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(NAAC Reaccredited 'B' Grade)



B.Aadhar

Single Blind Refereed & Peer-Reviewed Indexed

Multidisciplinary International Research Journal

Special Issue

on

Changing Trends in Higher Education



Chief Editor

Dr. Virag S. Gawande

Director

A. S. R. & D. Training
Institute Amravati

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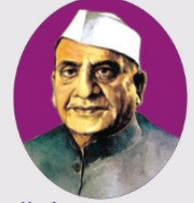
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• E-mail : ydvdcollege@gmail.com • Website : www.ydvdcollege.org ☎ 07225-299031



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११ वी व १२ वी कला, वाणिज्य

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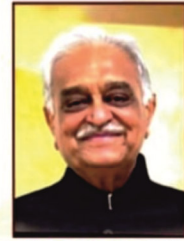
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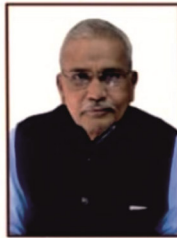
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व माजी कृषी मंत्री



शिक्षणमहर्षी डॉ. पंजाबराव उपाख्य
भाऊसाहेब देशमुख

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डॉ. हेमंत देशमुख
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* Website : www.ssesa.org * E-mail : president@ssesa.org

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* Mb.No. 9422838805, 9112216061

* Ph.No. 0721-2661770 (Office)



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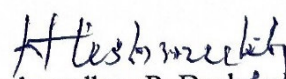
MESSAGE

I extend my heartfelt best wishes for the National Conference on “Changing Trends in Higher Education” being organized on 06th April 2026 at Y.D.V.D. Arts, Commerce & Science College, Teosa.

Higher education is rapidly evolving due to technological advancements, globalization, and changing societal needs. Institutions are adopting digital learning, interdisciplinary approaches, and skill-based education to prepare students for modern challenges. Adapting to these trends is essential to ensure that higher education remains relevant, innovative, and responsive to the demands of the contemporary world.

I am confident that this conference will provide an excellent platform for researchers, teachers, scholars, and students to share ideas, exchange experiences, and explore new directions in research.

I congratulate the Principal, organizing committee, faculty members, and all participants for this commendable initiative. I wish the conference great success.


(Harshvardhan P. Deshmukh)
President,
Shri Shivaji Education Society,
Amravati

Dr. Milind A. Barhate
Vice-Chancellor



Sant Gadge Baba Amravati University,
Amravati - 444 602, Maharashtra (India)

No. SGBAU/P-100/ 10/ 2026

Date : 20/ 3 / 2026

MESSAGE

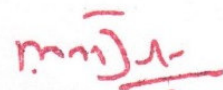
It gives me great pleasure to learn that Y.D.V.D. Arts & Commerce College, Teosa, Distt. Amravati is organizing a One Day National Conference on "*Changing Trends in Higher Education*" on 6th April, 2026.

Higher education is changing rapidly today due to new technologies, improved teaching methods, and the evolving needs of society. The theme of this conference is very relevant and timely, and it shows a thoughtful effort to understand and address the current challenges in higher education.

Such academic gatherings provide an excellent platform for academicians, researchers, and students to deliberate on emerging trends, share insights, and explore innovative strategies for improving the quality and accessibility of higher education.

I congratulate the Principal and the entire organizing team for taking this appropriate initiative. I wish the conference grand success and hope it fulfills its objectives.

With best wishes.


(Dr. Milind Barhate)

Dr. H.R. Deshmukh
Principal,
Y.D.V.D. Arts & Commerce College,
Teosa, Distt. Amravati

Phone : Office - 0721 - 2668273, Resi. 0721 - 2668108
E-mail : vc@sgbau.ac.in Website : www.sgbau.ac.in

PROF. MAHENDRA P. DHORE

M.Sc. M.Phil. Ph.D. (Computer Science)

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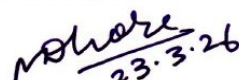
I am happy to know that, Y.D.V.D. Arts, Commerce & Science College, Teosa, Dist. Amravati, is organizing National Conference on “Changing Trends in Higher Education” on 6th April, 2026.

Now a days higher education is undergoing significant transformation, marked by a strong focus on multidisciplinary approaches, research-driven learning, digital integration, skill enhancement, and global collaboration. Institutions are increasingly striving to create learning environments that are innovative, inclusive and responsive to societal needs. In this dynamic context, it is essential to thoughtfully examine how our academic systems can adapt while maintaining academic excellence and ethical foundations.

The National Education Policy-2020 has provided a framework to reimagine higher education through flexibility, interdisciplinary learning, research orientation, and value-based education. This conference offers a valuable opportunity for academicians, researchers and policymakers to engage in meaningful discussions on emerging challenges and opportunities, and to explore strategies for strengthening the quality and relevance of higher education.

I congratulate the Principal, organizing committee and faculty members of Y.D.V.D, Arts, Commerce & Science College, Teosa for taking the initiative to host this significant academic event. I am confident that the deliberations and exchanges of ideas will contribute positively to shaping a forward-looking and robust higher education system.

I extend my best wishes for the grand success of the conference.


(Prof. Mahendra P. Dhore)
Pro-Vice-Chancellor

Mob. 9423103043, Ph. Off. : 0721-2668061

website : www.sgbau.ac.inEmail- provc@sgbau.ac.in / mpdhore@rediffmail.com / dhoremp@gmail.com



SHRI SHIVAJI EDUCATION SOCIETY

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Founder Member
**Dr. Panjabrao alias
Bhausaheb Deshmukh**

M. A., D.Phil.L.L.D. Bar-At-Law

Date : 16-03-2028

MESSAGE

I take great pleasure in knowing that Y.D.V.D. Arts, Commerce & Science College, Teosa, Dist. Amravati, is 'hosting the National Conference on "Changing Trends in Higher Education" on 6th April 2026.

Higher education today stands at a crucial turning point. Rapid technological advancements, digital learning platforms, industry partnerships, and global academic networks are reshaping the way, knowledge is created and shared. Universities and colleges are now expected to nurture creativity, research aptitude, entrepreneurship, and ethical leadership alongside academic excellence. Engaging in thoughtful discussions on these emerging trends is essential to ensure that our institutions remain relevant and forward-looking.

In alignment with the vision of the National Education Policy 2020, there is a renewed emphasis on flexibility, multidisciplinary learning, outcome-based education, and innovation-driven research. This conference provides- an excellent forum for academicians, scholars, and policymakers to deliberate on these developments and collectively explore strategies to enhance the quality and impact of higher education.

I warmly commend the organizers for their initiative in convening this important academic event. I am confident that the exchange of ideas and scholarly interactions will lead to constructive outcomes and meaningful progress.

I convey my best wishes for the successful conduct of the conference and hope it proves to be an inspiring and fruitful experience for everyone involved.



(Dilip B. Ingole)
Treasurer
Shri Shivaji Education Society,
Amravati

Address : Ambapeth, Amravati, Pin Code No. : 444 601
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FROM THE PRINCIPAL DESK

It gives me immense pleasure to welcome you to the National Conference on “Changing Trends in Higher Education” being organized by Y.D.V.D. Arts, Commerce & Science College, Teosa, Dist. Amravati, on 6th April 2026.

Higher education is experiencing a period of dynamic change driven by technological innovation, interdisciplinary learning, research advancement, and global collaboration. As academic institutions, we have the responsibility to continuously adapt, reflect, and respond to these evolving expectations. This conference has been conceived as a platform to deliberate on these emerging trends and to collectively explore pathways for strengthening the quality, relevance, and inclusiveness of higher education.

In the light of the National Education Policy 2020, there is renewed emphasis on flexibility, skill development, multidisciplinary approaches, and value-based education. Through expert talks, research presentations, and scholarly discussions, we aim to encourage meaningful dialogue that bridges theory and practice and contributes to institutional growth and academic excellence.

I sincerely thank the distinguished speakers, participants, organizing committee members, and all stakeholders for their support and active involvement. Your valuable contributions will undoubtedly enrich the deliberations and outcomes of this conference.

I extend a warm welcome to all and wish the conference great success. May it be a stimulating and rewarding experience for everyone.



Principal
Y.D.V.D. Arts Commerce
Science College, Teosa

Principal, Y.D.V.D. Arts, Commerce &
Science College, Teosa
Dean, Science & Technology, SGBAU,
Amravati

Editorial Note

Higher education across the globe is undergoing a profound transformation driven by technological advancements, globalization, and evolving societal needs. The traditional boundaries of teaching, learning, and research are rapidly expanding, giving rise to innovative approaches and interdisciplinary frameworks. In recent years, the integration of digital technologies such as online learning platforms, artificial intelligence, and virtual classrooms has significantly reshaped the educational landscape. The emergence of blended and hybrid learning models has made education more accessible, flexible, and inclusive, breaking geographical and economic barriers.

Moreover, there is a noticeable shift from teacher-centric to learner-centric education. Students are now encouraged to engage in critical thinking, problem-solving, and experiential learning. Skill-based education, employability, and industry collaboration have become key priorities, aligning academic curricula with real-world demands. Another important trend is the emphasis on multidisciplinary and holistic education, as advocated by modern education policies. Institutions are increasingly fostering research, innovation, and entrepreneurship, preparing students to face complex global challenges.

This conference aims to bring together academicians, researchers, and practitioners to deliberate upon these changing trends and their implications. The contributions in this volume reflect diverse perspectives and provide valuable insights into the evolving dynamics of higher education.

We hope this edited volume will serve as a meaningful resource for scholars, educators, and policymakers, and contribute to the ongoing discourse on transforming higher education for a better future.



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Our Editors have reviewed paper with experts' committee, and they have checked the papers on their level best to stop furtive literature. Except it, the respective authors of the papers are responicible for originality of the papers and intensive thoughts in the papers.

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Integrating Artificial Intelligence and Data Science into Higher Education Physics: Enhancing Student Learning and Research Skills

Ku. Suvidha Krushna Kadam

M.Sc. Mathematics (SEM IV) ,Mobile No. – 9960038702 ,Email – suvidhakadam53@gmail.com

Abstract:

The future of Artificial Intelligence(AI) in Physics education is predicted on design-based pedagogical innovation, wherein intelligent technologies are deliberately integrated into teaching methods to enhance scientific engagement and critical awareness among students. The landscape of higher education physics is undergoing a significant transformation driven by the rapid advancement of Artificial Intelligence (AI), Machine Learning (ML), and Data Science. Traditionally centered on theoretical derivations and manual experimentation, physics pedagogy is now increasingly reliant on computational power and algorithmic analysis. This paper investigates the integration of AI-driven tools and Data Science methodologies within university-level physics curricula. By analyzing current trends and educational outcomes, this paper argues that the synergy between AI and physics not only enhances conceptual understanding but also equips students with the essential computational research skills required in the modern scientific workforce. However, the study also addresses critical challenges, including the risk of over-reliance on “black-box” algorithms and the necessity of maintaining a foundation in first-principles physics. The findings suggest that a balanced, integrated approach is vital for preparing the next generation of physicists in an increasingly digital research environment.

Keywords: Physics Education, Artificial Intelligence, Data Science, Machine Learning, Computational Physics, Higher Education.

Chapter 1: Introduction

1.1 Background of the study

Artificial Intelligence (AI) is a vast branch of computer science concerned with developing intelligent computers capable of doing tasks that typically need human intelligence, Siri, Alexa, Self-driving cars, Robo-advisors, talking bots and email spam filters are examples of AI (Stanford Encyclopedia of Philosophy, 2020). AI is the world's new trend as it has proved more efficient in many fields, mainly during the COVID-19 pandemic. AI helped fight the virus and globally rescued jobs and educational systems.

Physics education has been built upon the twin pillars of theoretical derivation and physical experimentation for centuries. The mastery of physics required a deep understanding of manual calculus and hands-on laboratory work from Newton's law to Maxwell's equations. The field of physics is now experiencing a “computational revolution”, since moving further into the 21st century. The modern physicist no longer just uses a telescope; they use neural networks to filter cosmic noise and high performance computing to simulate quantum states.

The paper will outline the integrating AI and Data Science into higher education physics. However, it is also critical to understand the impact of this on teaching and learning.

1.2 The Problem Statement

The fast Advancement of AI and Data science in Professional research (such as at ISRO or LIGO) despite, many university physics programs still depend on traditional pedagogical methods that do not reflect modern requirements. There is a growing ‘skills gap’ between the theoretical physics taught in class and the computational data analysis required in modern research. Moreover, while Computer Science and Engineering (CSE) provides the infrastructure for advanced simulations, students often treat these tools as ‘Black boxes’- getting the correct numerical answer without fully grasping the underlying physical principles. The challenge lies in integrating these advanced technologies in a way that enhances, rather than replaces, conceptual understanding.

1.3 Objectives of the Research

➤To evaluate how AI and Machine Learning can be used as interactive tutors to improve student problem- solving in complex subjects like Electromagnetism and Quantum Mechanics.

- To analyze the impact of Data Science literacy on a student's ability to conduct rigorous experimental research and error analysis.
- To explore the role of Computer Science and Engineering in creating virtual laboratories that allow for same, scalable and cost- effective physics experimentation.
- To identify the ethical risks, such as algorithmic bias and the loss of foundational manual skills, in an AI- augmented learning environment.

1.4 Significance of the study

This research is significant for educators, curriculum designers, and students alike. After providing a roadmap for integrating computational tools into physics curriculum, this aims to ensure that the next generation of physicists is not only mathematically accomplished, but also technologically capable, ready to take the data- heavy challenges of 2026 and beyond.

Chapter 2: Literature Review

2.1 Evolution of Computational Physics Education

In the 1950's, Alan Turing proposed an answer to when a system designed by a human can be deemed 'intelligent'. If such a distinction is not detected, we say that it is an intelligent system or artificial intelligence (AI)" (Russell and Norvig, 2010). In 1956, John McCarthy provided one of the first definitions of AI, which still informs researcher today. "The study of AI is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that machine can be made to stimulate it." (Russell and Norvig, 2010).

Historically, physics education transitioned from purely analytical 'pen and paper' methods to use of basis computer simulations in the early 2000's. However, recent literature indicates a 'third wave' of transformation. According to Kotsis (2025), the shift from 'chalkboards to chatbots' represents a fundamental change in how abstract concepts are delivered. Unlike static simulations, modern AI-driven tools provide dynamic environment where the software adapts to the student's specific mathematical weakness.

2.2 AI and Machine Learning as Pedagogical Catalysts

A significant body of research from 2024 and 2025 highlights the success of Intelligent Tutoring System (ITS) in STEM.

Personalized Learning:

Mustofa (2024) argues that AI's primary strength in physics is its ability to provide immediate, targeted feedback. This is crucial for subjects like Thermodynamics or electromagnetism, where a single mathematical error can distract an entire derivation.

Performance Outcomes:

Surveys conducted by the Digital Education Council (2024) found that over 86% of students are already using AI for problem solving. Furthermore, Olanrewaju et al. (2025) demonstrated that students in AI- augmented physics courses showed a 15-20% improvement in conceptual retention compared to traditional lecture based groups.

2.3 The 'Black Box' Problem and Ethical Barriers

The Black Box AI is an AI-Powered coding assistant designed to help developers write, debug and search for code faster using natural language prompts.

A critical area of concern in recent literature is the epistemological crisis – the risk that students may arrive at the correct answer without understanding the physical laws involved. UNESCO (2025) warned against the 'Black Box' nature of many commercial AI tools, which prioritize the output over the process.

Research by Krupp et. al (2025) highlights that while AI can optimize grading and data sorting, it cannot replace the 'Scientific intuition' and 'Critical thinking' developed through human mentorship and first Principle reasoning.

2.4 Summary of the Gap

While the current literature confirms that AI and Data Science are widely used, there is still a significant gap in research regarding long term conceptual depth. Most studies focus on short term test scores rather than whether a student trained by an AI can formulate a new hypothesis.

This paper seeks to bridge that gap by explaining how integration of these tools impacts the deep research skills of physics students.

Chapter 3: AI and Machine Learning in Physics Pedagogy

3.1 The Shift from Passive to Active Learning

Traditional physics pedagogy often relies on the “Sage on the Stage” model, where a professor derives equations on a board while students take notes. Artificial Intelligence (AI) transforms this into an active process. Through Large Language Models (LLMs) and specialized physics solvers, students can now engage in a “Socratic dialogue” with their computers. Instead of searching for a static solution in a textbook, a student can ask an AI to explain the transition between two steps in a complex derivation, such as moving from Maxwell’s equations to the wave equation.

3.2 Machine Learning and Adaptive Problem-Solving

Machine Learning (ML) algorithms are the “engine” behind modern educational software. Intelligent Tutoring Systems (ITS): These systems analyze a student’s past performance to identify specific mathematical gaps. For example, if a student consistently fails problems involving Vector Calculus, the ML model will adjust the curriculum to provide more foundational exercises in line integrals before moving back to Electromagnetism.

3.3 Visualizing the Invisible: AI-Driven Modeling

One of the greatest hurdles in physics is the abstraction of concepts like Quantum Superposition or General Relativity.

Generative AI in Visualization: New AI tools can generate 3D, interactive models based on mathematical input. A student can change a variable in a Schrödinger equation and immediately see how the probability density function shifts in a visual space.

Neural Network Simulations: Students are now using pre-trained neural networks to predict the outcomes of chaotic systems (like double pendulums or weather patterns), allowing them to compare “classical predictions” with “AI-driven predictions.”

3.4 Case Study: AI in Quantum Mechanics Education

In advanced undergraduate courses, Quantum Mechanics is often a “gatekeeper” subject due to its mathematical difficulty.

The Application: Using AI to handle the heavy matrix mechanics and differential equations allows students to focus on the interpretational physics.

The Result: Evidence suggests that when AI handles the “computational grunt work,” students develop a stronger “physical intuition”—the ability to predict how a system will behave before they even start the math.

Chapter 4: Data Science and Experimental Research

4.1 The Data-Driven Laboratory

Modern physics experiments, from simple pendulum motion to advanced particle detection, generate vast amounts of data. Traditionally, students used manual plotting and basic linear regression to analyze these results. In the integrated curriculum, this is replaced by Data Science workflows. Students now utilize programming languages like Python and libraries such as Pandas and SciPy to handle large-scale datasets, allowing them to process thousands of data points in seconds—a shift from “calculating results” to “interpreting trends.”

4.2 Machine Learning for Pattern Recognition and Noise Reduction

Experimental physics is often a battle against “noise”—unwanted thermal fluctuations or electronic interference. Machine Learning (ML) provides students with advanced tools to filter this noise:

Anomaly Detection: Students can train simple ML models to identify outliers in their experimental data that might indicate equipment malfunction or human error.

Signal Extraction: In complex experiments like spectroscopy or fluid dynamics, ML algorithms help students extract weak signals from a noisy background, a skill directly transferable to professional research at institutions like CERN or LIGO.

4.3 Automated Error Analysis and Real-Time Feedback

One of the most innovative applications of AI in the lab is Automated Error Detection.

AI Lab Assistants: Recent research (Babayeva, 2025) highlights the use of LLM-based assistants that monitor a student’s data entry in real-time. If a student records a value that violates the laws of thermodynamics or conservation of energy, the AI provides an immediate prompt: “Your recorded pressure exceeds the theoretical limit for this volume; please check your sensor calibration.”

Predictive Uncertainty: Instead of just calculating “standard deviation,” students use Data Science techniques to model Uncertainty Quantification, providing a more rigorous statistical foundation for their lab reports.

4.4 Bridging the Gap: From Lab Bench to Professional Research

The integration of Data Science into higher education physics prepares students for the Industry 4.0 workforce.

Interdisciplinary Skills: By learning to apply ML to physical systems, students gain “dual-literacy” in both physics and data engineering.

Case Study – Astrophysics: Students now use pre-existing datasets from deep-space telescopes to practice Classification Algorithms, identifying star types or galaxy shapes. This “Discovery Learning” (Shapiro et al., 2024) turns a standard lab into a miniature research project, increasing student engagement and professional readiness.

4.5 The Challenge of “Physical Validity”

A critical point in this chapter is ensuring that Data Science does not replace Physical Reasoning. Students must be taught that a high “Correlation Coefficient” (R^2) in a machine learning model does not always imply a “Physical Law.” The lab curriculum must emphasize Physics-Informed Neural Networks (PINNs)—models that are constrained by physical constants—to ensure that the data science outputs remain scientifically valid.

Chapter 5: Computer Science Engineering and Virtual Infrastructure

5.1 The Shift from Physical to Digital Infrastructure

Traditionally, the “infrastructure” of physics education consisted of bricks-and-mortar laboratories and expensive specialized hardware. In 2026, the focus has shifted toward Cyber-Infrastructure. Computer Science Engineering now provides the backbone for “Virtual Laboratories” that are no longer just simple animations, but complex software environments powered by Real-Time Physics Engines.

5.2 High-Performance Computing (HPC) in the Classroom

Modern physics education requires massive computational power. CSE facilitates this through High-Performance Computing (HPC) and Cloud Architecture:

Scalable Simulations: Technologies like GPU acceleration allow students to run “Milky Way Simulations” or “Lattice QCD” models on a standard laptop by offloading the heavy math to university servers.

Mixed Workloads: As identified in recent 2026 research, HPC systems are now designed to handle “Mixed Workloads,” combining traditional physics-based models with modern Machine Learning training, allowing students to see the interaction between theoretical laws and data-driven predictions.

5.3 AI-Integrated Virtual Reality (VR) and Digital Twins

One of the most significant engineering breakthroughs in 2026 is the integration of Generative AI with Virtual Reality.

Digital Twins: Engineering departments are now creating “Digital Twins” of physical lab equipment. A student can interact with a virtual version of a Michelson Interferometer that behaves exactly like the real device, including simulated hardware wear and environmental noise.

AI Teaching Assistants (AI-TAs) in VR: Recent IEEE studies (2026) have evaluated “Voice-Activated AI-TAs” within VR headsets. These engineering marvels use Natural Language Processing (NLP) to answer a student's question while they are literally “standing inside” a 3D model of a magnetic field, providing an immersive, multimodal learning experience.

5.4 Edge Computing and Real-Time Lab Monitoring

For students working in physical labs, CSE provides Edge Computing solutions. Sensors attached to lab equipment process data “at the source” rather than sending it to a central server.

Reduced Latency: This allows for real-time safety monitoring and instant data visualization.

Internet of Things: The “Internet of Physics Things” enables students to remotely access and control laboratory equipment from across the globe, a crucial development for distance learning and international research collaboration.

5.5 Sustainability and Computational Efficiency

A final critical engineering focus in 2026 is Green Computing. As AI and simulations consume more electricity, CSE plays a vital role in optimizing algorithms to be energy-efficient. Physics students are now taught not just how to "code a simulation," but how to write "Sustainable Code" that minimizes the carbon footprint of their research, aligning scientific discovery with global environmental goals.

Chapter 6: Conclusion and Future Recommendations

6.1 Summary of Research Findings

This research has demonstrated that the integration of Artificial Intelligence (AI), Machine Learning (ML), and Data Science is no longer an optional "add-on" to physics education but a fundamental requirement for 2026 and beyond. Our analysis shows that:

Pedagogy: AI-driven adaptive tutors have successfully bridged the "math-gap" for students, allowing them to focus on physical intuition rather than getting lost in manual calculations.

Research: Data science literacy has transformed the physics lab from a place of simple verification to a site of modern discovery, where students use ML to find signals in noisy experimental data.

6.2 Addressing the Challenges

While the benefits are significant, this study identified critical risk that must be managed:

The "Black Box" Dilemma: There is a persistent danger that students may rely on AI for answers without understanding the underlying physical laws (e.g., using an AI to solve a Schrödinger equation without knowing what a wave function represents).

6.3 Future Recommendations for Higher Education

Based on the current trends of 2026, this paper proposes the following recommendations for universities:

Curriculum Re-Design: Physics departments should move away from teaching "coding" as an elective and instead embed Python-based Data Science and Prompt Engineering directly into core mechanics and electromagnetism courses.

Sustainable Computing: As simulations become more complex, departments must adopt "Green Computing" practices, teaching students to optimize their algorithms for energy efficiency.

6.4 Final Conclusion

In conclusion, the synergy between Physics and Computer Science Engineering is creating a new breed of "Computational Physicists." By embracing AI and Data Science while maintaining a rigorous foundation in first-principles physics, higher education can produce graduates who are not only prepared for the workforce of 2026 but are equipped to solve the next generation of global scientific challenges.

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Impact of Artificial Intelligence on Employment Patterns in Library and Information Science Profession : A Study

Mr.S.P.Kalane

Research scholar, SGBAU.Amravati.

Dr. Smita D. Suryawanshi

Librarian, Smt Narsamma Arts, Commerce And Science College Amravati.

Email – kalanesagar21@gmail.com

Abstract

Artificial Intelligence (AI) is increasingly transforming the structure and functioning of academic libraries. While technological automation is often perceived as a threat to employment, its actual impact within the Library and Information Science (LIS) profession appears more complex and evolutionary. This paper critically examines how AI integration influences employment patterns in LIS, particularly within the Indian higher education context. Based on analytical review of scholarly literature and contextual interpretation, the study argues that AI does not eliminate librarianship roles but reshapes their scope, demanding hybrid technological and intellectual competencies. The findings suggest that employability in LIS is shifting from routine operational expertise toward analytical, digital, and research-support capacities. The study concludes that sustainable professional growth in the AI era depends on adaptability, continuous skill development, and institutional readiness.

Keywords: Artificial Intelligence, LIS Employment, Digital Transformation, Academic Libraries, Skill Development.

1. **Introduction** -Artificial Intelligence has gradually moved from theoretical discourse to practical institutional implementation. Academic libraries, once primarily responsible for collection organization and circulation services, are now integrating AI-driven tools into cataloguing systems, plagiarism detection software, digital repositories, and research analytics platforms.

In India, policy initiatives such as National Education Policy 2020 emphasize digital infrastructure, multidisciplinary research, and knowledge-based development. This shift has indirectly influenced the expectations from academic libraries and LIS professionals. Recruitment patterns increasingly reflect demand for candidates possessing ICT proficiency, repository management skills, and familiarity with digital research tools.

Therefore, the central question is not whether AI replaces librarians, but how it restructures employment patterns within the profession.

Objectives of the Study

1. To examine the integration of AI technologies in academic libraries.
2. To analyze structural changes in employment patterns in LIS.
3. To interpret emerging skill requirements in Indian institutions.
4. To evaluate whether AI leads to displacement or transformation of professional roles.

3. Methodology

This study adopts a qualitative and analytical research design based on systematic literature review.

Sources include:

- Peer-reviewed journal articles
- Policy documents
- Reports from professional organizations
- Indian academic case observations

The approach is interpretative rather than merely descriptive. Instead of summarizing earlier works, the study synthesizes arguments and relates them to contemporary Indian higher education conditions.

4. Analytical Review of Literature

Scholarly discussions consistently indicate that AI affects routine-based functions more than cognitively complex roles. Automated cataloguing, metadata extraction, and circulation tracking reduce repetitive workload. However, research consultation, information literacy training, and data governance remain dependent on human expertise.

Global professional organizations such as the International Federation of Library Associations and Institutions highlight digital literacy and data stewardship as emerging core competencies. Similarly, the American Library Association emphasizes AI awareness and digital preservation skills as essential for future librarians.

Economic assessments by the Organization for Economic Co-operation and Development suggest that automation tends to restructure skilled professions by enhancing productivity rather than eliminating employment. These observations align with trends in LIS.

Indian research further reveals growing adoption of AI-enabled plagiarism detection tools, institutional repositories, and digital thesis submission systems across universities.

Overall, the literature supports the argument that AI transforms professional roles by increasing specialization and technological integration.

5. Indian University Context: Observational Perspective

In universities such as Savitribai Phule Pune University and University of Delhi, digital repositories and research analytics systems are actively maintained. These systems require professionals capable of metadata structuring, data interpretation, and digital preservation management.

Similarly, institutions affiliated with Sant Gadge Baba Amravati University have gradually implemented digital dissertation submission processes. While smaller colleges may not fully deploy AI-based analytics, digitization efforts are clearly expanding.

From an academic standpoint, it appears that employment advertisements increasingly emphasize digital competencies. This indicates gradual yet steady transformation in recruitment expectations.

6. Structural Changes in Employment Patterns

1. Shift from Operational to Strategic Roles

Traditional responsibilities such as manual indexing, shelving, and record maintenance are decreasing in importance. In contrast, strategic roles such as:

- Research data management
- Citation and impact analysis
- Institutional repository coordination
- Digital literacy training are gaining prominence.

Changing Roles of LIS Professionals in the AI Era

Traditional Roles	Emerging AI-Era Roles
Manual cataloguing	Automated metadata management
Circulation desk operations	Digital repository management
Physical indexing	Research data management
Reference desk assistance	Research analytics support
Library orientation	Digital literacy training

2. Hybrid Skill Requirement

Modern LIS professionals must integrate:

- Core knowledge organization principles

- ICT proficiency
- Basic understanding of AI-enabled tools
- Analytical and communication abilities

This reflects characteristics of skill-biased technological change, where technologically skilled professionals experience increased demand.

7.Critical Discussion

It would be inaccurate to conclude that AI threatens the LIS profession. Instead, technological integration redefines professional identity. The real challenge lies in adaptation capacity.

Institutions investing in professional development workshops and interdisciplinary collaboration demonstrate smoother employment transitions. Conversely, limited infrastructure and inadequate curriculum revision may slow transformation.

From a reflective academic perspective, employability in LIS is becoming competence-driven rather than designation-driven.

8.Findings

- AI reduces dependence on routine clerical tasks.
- Analytical and technology-oriented roles are expanding.
- Indian adoption patterns are progressive but uneven.
- Continuous up skilling determines professional sustainability.

9.Conclusion-Artificial Intelligence is restructuring, not replacing, the Library and Information Science profession. Employment patterns are evolving toward technologically enriched and research-support roles. In the Indian higher education landscape, the key determinant of employability is adaptability to digital transformation. The future of LIS depends on intellectual flexibility, interdisciplinary collaboration, and commitment to lifelong learning.

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Impact of Brand Image and Product Quality on Consumer Perception of Selected Shirt Brands in Amravati City.

Prof. Gauri S Kalmegh

Research Supervisor

Prof. Ram Meghe Institute of Technology and Research Badnera , Amravati

Email:rupali1wankhade12@gmail.com ,Mobile : +91-7773998492

Miss Rupali V Wankhade

Research Scholar

Abstract:

This study investigates the impact of brand image and product quality on consumer perception of selected shirt brands in Amravati city. The findings reveal significant relationships between brand image dimensions such as reputation, trustworthiness, prestige, and promotional effectiveness, and product quality attributes including fabric quality, durability, comfort, and stitching standards, and the overall perception formed by consumers. Consumers tend to develop favourable perceptions toward brands that consistently deliver superior quality and maintain a strong and positive brand image in the market.

The study further highlights that well-established brands with strong market positioning and consistent quality standards are more likely to influence customer satisfaction, preference, and repurchase intention. Brand image enhances emotional attachment and trust, while product quality directly affects functional satisfaction and value perception. Together, these factors significantly shape consumer buying behaviour and long-term loyalty.

This research contributes to a deeper understanding of how brand-related and product-related factors influence consumer perception in the apparel sector. By recognizing the importance of maintaining a strong brand image and delivering consistent product quality, marketers and brand managers can design effective strategies to enhance customer satisfaction and competitive positioning in the market. The study emphasizes consumer perception patterns in the context of shirt brands in Amravati city.

Keywords: Brand Image, Product Quality, Consumer Perception, Customer Satisfaction, Shirt Brands.

❖ Introduction:

In the contemporary retail and apparel industry, brand image and product quality play a crucial role in influencing consumer behavior and shaping market competitiveness. In an increasingly dynamic marketplace, consumers are no longer influenced solely by price; instead, they evaluate brands based on factors such as reputation, perceived quality, trustworthiness, and overall value proposition. As consumer awareness continues to grow, brand perception has emerged as a significant determinant of purchase decisions, particularly in the apparel sector where aspects like style, comfort, durability, and brand prestige strongly influence buying behavior (David A. Aaker, 1991; Kevin Lane Keller, 1993).

When consumers choose shirt brands, they often associate brands with their personal identity, social status, and lifestyle preferences. A strong and positive brand image can enhance consumer confidence and create emotional attachment with the brand, while superior product quality ensures functional satisfaction and encourages repeat purchases and long-term loyalty (Valarie A. Zeithaml, 1988; Richard L. Oliver, 1999). This shift reflects the evolution of consumer culture, where buyers are more informed, value-conscious, and selective in their purchasing decisions.

Furthermore, in today's highly competitive retail environment, apparel brands must continuously innovate and maintain consistent quality standards to meet changing customer expectations. Consumer perceptions are influenced not only by tangible attributes such as fabric quality, stitching, durability, and comfort but also by intangible factors including brand reputation, advertising effectiveness, brand communication, and word-of-mouth recommendations (Philip Kotler & Kevin Lane Keller, 2016). These elements collectively shape consumers' attitudes toward brands and ultimately influence their buying behavior.

Understanding the relationship between perceived quality, brand image, and consumer buying behavior is therefore essential for apparel companies to strengthen their market position and build sustainable customer relationships. In this context, the present study focuses on examining the impact

of perceived quality and brand image of branded shirts on the buying behavior of customers in Amravati City, aiming to provide insights into the factors that influence consumer preferences in the local retail market.

1. Brand Image and Consumer Perception

Brand image represents the overall impression of a brand in the minds of consumers. It includes factors such as brand awareness, credibility, prestige, reliability, and promotional appeal. A positive brand image helps build trust and strengthens long-term relationships between consumers and brands. According to Kevin Lane Keller (1993), brand image is formed through consumers' perceptions and associations stored in memory, which influence their evaluation of a brand. Similarly, David A. Aaker (1991) emphasized that strong brand image contributes significantly to brand equity and consumer loyalty.

Consumers often prefer brands that reflect their personality, social status, and lifestyle aspirations. In the apparel industry, clothing brands act as symbolic products through which individuals express identity and social belonging. As noted by Philip Kotler and Kevin Lane Keller (2016), brand image not only influences first-time purchase decisions but also affects repeat buying behaviour and customer advocacy. In the shirt segment, well-recognized brands generally enjoy higher customer loyalty due to their strong market reputation and perceived consistency in quality. Therefore, maintaining a favourable brand image is essential for sustaining competitive advantage in the apparel industry.

2. Product Quality in Shirt Brands

Product quality is one of the most important determinants of customer satisfaction in the apparel sector. In the case of shirt brands, quality can be evaluated through attributes such as fabric strength, colour retention, stitching quality, comfort, fit, durability, and overall design appeal. Consumers assess these characteristics before forming perceptions about a brand's reliability and value for money.

According to Valarie A. Zeithaml (1988), perceived quality refers to the consumer's judgment about a product's overall excellence or superiority. High product quality enhances customer satisfaction and builds trust, which eventually leads to brand loyalty and repeat purchase behaviour. Similarly, Richard L. Oliver (1999) explained that satisfaction derived from product performance strengthens long-term consumer loyalty. When apparel brands maintain consistent quality standards, they encourage positive word-of-mouth communication among consumers. However, poor or inconsistent quality can damage brand reputation and reduce repurchase intentions. Hence, maintaining superior product standards is essential for strengthening consumer perception and brand loyalty in the apparel market.

3. Socio-Economic and Market Factors Influencing Consumer Perception

Consumer perception toward branded shirts is also influenced by several socio-economic and market-related factors.

a. Income Level

Consumers' purchasing power significantly affects their brand preference and perception. Higher income groups tend to prefer premium brands that offer superior quality, status value, and brand prestige (Kotler & Keller, 2016).

b. Lifestyle and Personality

Consumer lifestyle patterns and personality traits influence their clothing choices and brand preferences. Apparel products are often used as a medium of self-expression and identity formation (Solomon, 2018).

c. Market Competition

The availability of multiple competing brands and competitive pricing strategies can influence consumers' perceptions and buying decisions. Intense competition in the apparel market encourages brands to differentiate themselves through quality, design, and brand positioning (Porter, 2008).

d. Advertising and Promotion

Marketing communication tools such as advertising, sales promotions, and digital marketing significantly affect brand awareness and consumer attitudes. Effective promotion can strengthen brand image and shape positive consumer perception (Belch & Belch, 2018).

e. Social Influence

Recommendations from family members, friends, and peer groups play a crucial role in shaping consumer perception and purchase decisions. Word-of-mouth communication is considered one of the most influential factors in consumer behaviour (Kotler & Keller, 2016).

❖ Review of Literatures

In most of the previous studies, **Keller (1993)** emphasized that brand image plays a vital role in shaping consumer perception and purchase behavior. A strong brand image enhances customer trust and creates a favorable impression in the minds of consumers. The study suggested that consumers are more likely to prefer brands with strong brand associations, awareness, and perceived quality. Brand image not only influences buying decisions but also contributes to customer loyalty and long-term brand equity.

Aaker (1996) in his study on brand equity found that perceived quality and brand associations significantly influence consumer preference and satisfaction. The study highlighted that consumers evaluate brands based on both tangible attributes such as product performance and intangible attributes such as reputation and emotional connection. Strong brand equity leads to higher customer retention and competitive advantage in the market.

Kotler & Keller (2016) stated that product quality is one of the most important determinants of customer satisfaction and consumer perception. Quality dimensions such as durability, reliability, features, and performance directly influence repurchase intention. The study emphasized that consistent product quality enhances brand credibility and builds customer trust, which ultimately affects overall perception.

Garvin (1987) identified multiple dimensions of product quality including performance, durability, conformance, aesthetics, and perceived quality. The research suggested that consumers form perceptions based on these quality dimensions, particularly in consumer goods and apparel sectors where comfort, fabric strength, and design play a crucial role in buying behavior.

Schiffman & Kanuk (2010) explained that consumer perception is influenced by psychological, social, and marketing factors. Brand reputation, word-of-mouth communication, advertising effectiveness, and past experiences significantly shape consumer attitudes toward a product. The study concluded that positive perception leads to higher satisfaction and brand loyalty.

Dodds, Monroe & Grewal (1991) found that perceived quality and perceived value strongly influence purchase intention. Consumers tend to compare price with quality before forming an opinion about a brand. If the perceived quality exceeds expectations, consumers develop a favorable perception and are more likely to repurchase the product.

Rao & Monroe (1989) indicated that brand name acts as a signal of quality. Well-known brands are often perceived as more reliable and superior compared to lesser-known brands. This perception influences consumer confidence and decision-making, particularly in competitive product categories like apparel.

Recent studies in the apparel sector suggest that fabric quality, stitching, comfort, durability, and brand reputation significantly affect consumer perception and satisfaction. Consumers prefer shirt brands that maintain consistency in quality and possess strong market positioning. Brand image and product quality together form the foundation of positive consumer perception and long-term loyalty.

❖ Statement of the Problem

In the competitive apparel market of Amravati city, consumers are exposed to several shirt brands offering similar styles, prices, and features. Although brand image and product quality are considered important factors influencing purchase decisions, it is not clearly known which factor has a stronger impact on consumer perception at the local level.

Do consumers give more importance to brand reputation or to actual product quality while purchasing shirts? Is there any significant difference in perception among selected shirt brands?

Hence, this study attempts to examine the impact of brand image and product quality on consumer perception of selected shirt brands in Amravati city.

❖ Objectives of the study

- 1.To examine the impact of brand image on consumer perception of selected shirt brands in Amravati city.
- 2.To analyze the influence of product quality on consumer perception of selected shirt brands.

❖ Research Methodology

(a)Source of Data:

The study is based on both primary and secondary data. Primary data is collected through a structured questionnaire designed to measure consumer perception regarding brand image and product quality.

Secondary data is collected from books, research journals, magazines, websites, and published articles related to consumer behavior and branding.

(b) Sample and Sampling:

Convenience sampling technique has been adopted for the study. The sample size consists of 100 consumers who purchase and use branded shirts in Amravati city, Maharashtra.

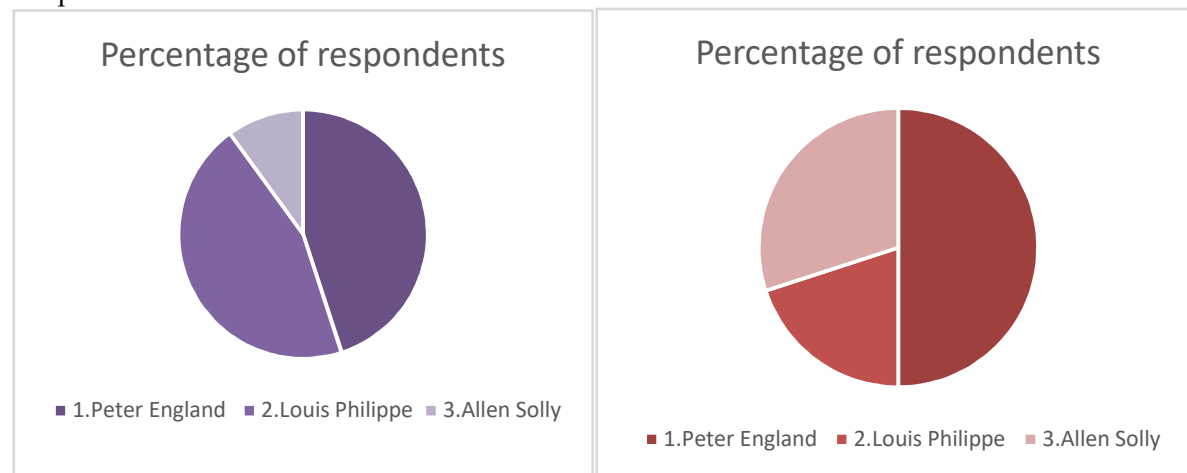
(c) Tools for Analysis:

Percentage analysis is used for analyzing the data collected from the respondents.

(d) Limitations of the Study:

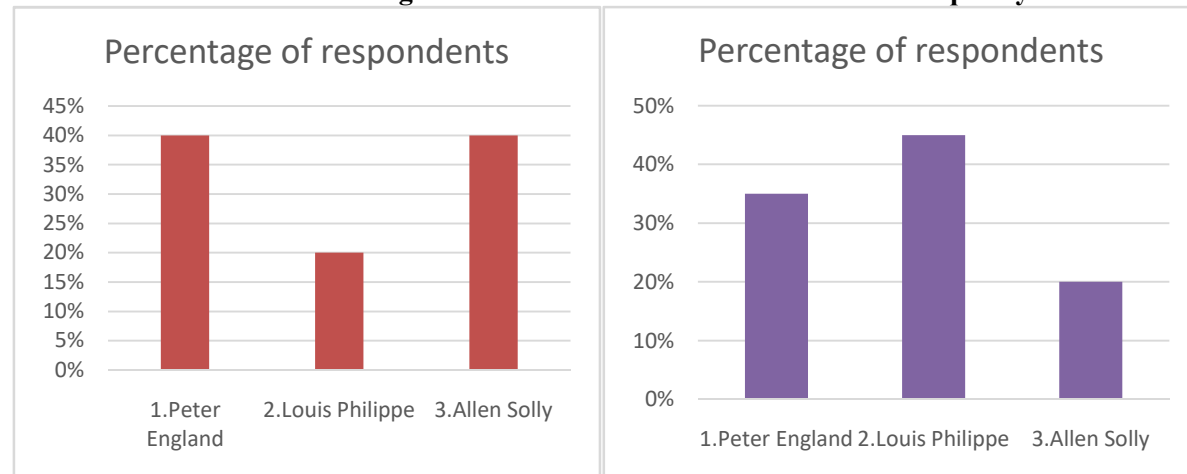
a) The study is limited to consumers of selected shirt brands in Amravati city only.

b) The findings of the study cannot be generalized to other cities or regions as it is based on a limited sample size.



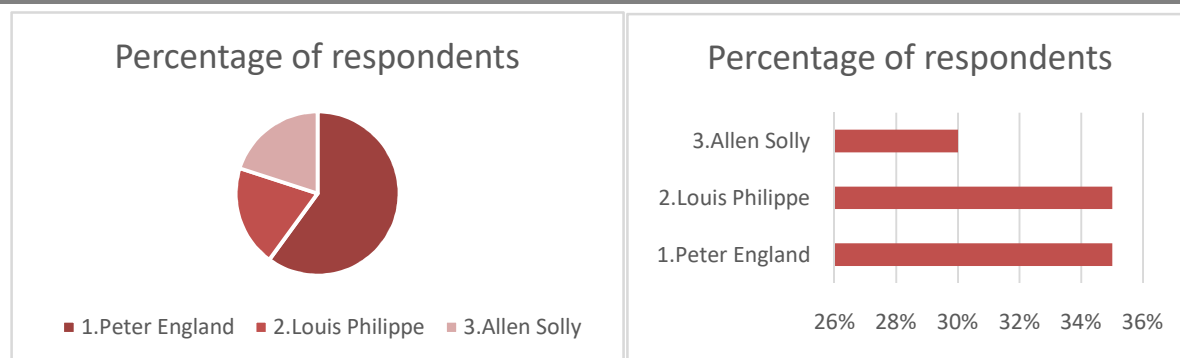
The brand is well known among customers.

The brand offers consistent quality.



I prefer this brand over other shirt brands.

The shirts are comfortable to wear.



The brand has a strong reputation in Amravati city. The shirts are worth their price.

❖ Data Analysis & Interpretation:

The analysis of consumer responses indicates clear differences in brand perception among the selected shirt brands in Amravati city. Both Peter England and Louis Philippe show strong brand awareness, with 45% of respondents recognizing each brand as well known, while only 10% identified Allen Solly as well known. In terms of consistent product quality, Peter England is perceived as the most reliable brand, with 50% of respondents acknowledging its quality consistency, followed by Allen Solly (30%) and Louis Philippe (20%). Brand preference among consumers is almost equally divided between Peter England (40%) and Allen Solly (40%), whereas only 20% prefer Louis Philippe. Regarding comfort, Louis Philippe ranks highest, with 45% of respondents considering its shirts the most comfortable, followed by Peter England (35%) and Allen Solly (20%). Additionally, Peter England enjoys the strongest reputation in Amravati city, as 60% of respondents believe it has a strong market image, while Louis Philippe and Allen Solly each received 20%. In terms of value for money, both Peter England and Louis Philippe are equally perceived as worth their price by 35% of respondents each, while Allen Solly closely follows with 30%. Overall, the findings suggest that Peter England dominates in terms of reputation and perceived quality, Louis Philippe is recognized for comfort and value, and Allen Solly maintains moderate preference but comparatively lower brand recognition in the market.

❖ Conclusion:

It is understood that brand image and product quality play a significant role in shaping consumer perception in the apparel market of Amravati city. The study reveals that consumers give considerable importance to well-known brands while making purchase decisions. Strong brand recognition positively influences customer trust and preference.

It has been observed that consistency in product quality significantly impacts consumer satisfaction and loyalty. Brands that maintain superior fabric quality, durability, and comfort are more likely to be preferred by customers. The findings indicate that Peter England is perceived as highly consistent in quality, while brand preference is mainly divided between Peter England and Allen Solly.

Consumer perception is influenced by a combination of brand reputation and product performance. Understanding these factors is essential for marketers to develop effective branding strategies and maintain competitive positioning. By focusing on strengthening brand image and ensuring consistent product quality, apparel companies can enhance customer satisfaction, increase repurchase intention, and build long-term brand loyalty in the market.

❖ Recommendations:

Based on the findings of the study, it is recommended that Allen Solly should focus on increasing brand awareness through effective advertising and promotional activities in Amravati city. Peter England should continue maintaining its strong reputation and consistent product quality to retain customer trust and loyalty. Meanwhile, Louis Philippe, which is perceived as the most comfortable brand, should further emphasize comfort, design, and product innovation to strengthen its market position. Overall, all brands should maintain high product quality, adopt competitive pricing strategies, improve customer engagement, and utilize effective marketing communication to enhance brand image and influence consumer buying behaviour in the competitive apparel market.

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A Study on the Academic, Financial, and Psychological Challenges of MPSC Aspirants

Dr. G. S. Kalmegh

Research Guide -

Shravani V. Shelke, Lekha K. Rathi, Kalyani D. Thakare, Prasanna P.
Malviya.

Students Email: prasannamalviya1@gmail.com|Phone: +918766595784

Department of Master of Business Administration, Prof. Ram Meghe Institute of Technology &
Research, Badnera, Maharashtra, India

Abstract

One of the most competitive hiring procedures for government jobs in Maharashtra is the Maharashtra Public Service Commission (MPSC) exam. Thousands of candidates spend years preparing each year in the hopes of landing coveted administrative jobs. However, there are other intellectual, financial, and psychological obstacles that frequently accompany this preparatory process. The purpose of this study is to determine and examine the main issues that MPSC candidates encounter while preparing.

For the study, a descriptive quantitative research design was used. A standardized online questionnaire with closed-ended questions and a 5-point Likert scale was used to gather data from 60 MPSC candidates. Academic challenges, financial strain, psychological stress, and job uncertainty were the main topics of the poll. The replies were interpreted using descriptive statistical techniques including percentage analysis and frequency distribution.

The findings indicate that lack of proper guidance is one of the most significant academic challenges, with 63.2% of respondents agreeing that it affects their preparation. Additionally, 60% of aspirants reported financial strain due to the long duration of preparation, while 49.1% experienced pressure from family or society to succeed in the examination. These results highlight that MPSC preparation involves not only academic dedication but also significant financial and psychological pressures.

The study emphasizes the need for improved guidance systems, affordable preparation resources, and psychological support for aspirants. Addressing these challenges can help create a more supportive environment for students preparing for competitive examinations.

Keywords:MPSC Aspirants, Competitive Examinations, Financial Strain, Psychological Stress, Career Uncertainties.

Introduction

Overview of the MPSC

With India's rapidly growing population, the education system has become increasingly competitive. The Maharashtra Public Service Commission (MPSC), established on May 1, 1960, operates as an autonomous body under Article 315 of the Indian Constitution, entrusted with recommending candidates for government posts and advising on service matters. Annually, MPSC conducts the Rajya Seva Examination to recruit for Class A, B, and C posts within the Maharashtra Government, known for its competitiveness and allure due to higher salaries and prestigious status.

Structure and Selection Process

The MPSC State Services Examination follows a three-stage selection process comprising a Preliminary exam, a Main exam and a Personality Test (Interview). The Preliminary stage consists of two objective papers totaling 400 marks: Paper I (General Studies), covering history, geography, polity, and economy with a focus on Maharashtra, and Paper II (CSAT), which tests aptitude and reasoning. The Mains stage has transitioned to a descriptive pattern totaling 1,750 marks across nine papers. These include two qualifying language papers (Marathi and English), one essay paper, four General Studies papers (covering heritage, governance, technology, and ethics), and two papers for an optional subject. The final Interview assesses administrative aptitude for 275 marks (Source: Official website of MPSC).

MPSC Recruitment Statistics and Candidate Participation (2019–2020)

During 2019–20, MPSC conducted 22 competitive exams, admitting 533,154 candidates and finalizing 10 exams for 1,848 posts. They made 2,414 recommendations, processed 8 requisitions for direct recruitment involving 288 posts and 125,911 applications, interviewed 1,039 candidates, and recommended 279. A screening test for one post had 1,549 applicants and 1,399 participants. Notably, 905 candidates from backward classes were recommended for 2,673 reserved posts, in addition to 504 recommended for unreserved posts, underscoring MPSC's commitment to social equity (GoM, MPSC, 2022).

Challenges face by aspirant of every competitive exam

The National Mental Health Survey (NMHS) 2015-16 reveals that 6.4% of adults aged 18-29 in India suffer from mental disorders, with anxiety (3.1%) and mood disorders (2.9%) being most common (Gautam, et al., 2020). Each year, countless students from villages and towns migrate to cities to prepare for civil service exams, facing significant financial burdens from coaching fees, study halls, and living expenses, yet they persist in bearing these costs for years to succeed (Joshi, P., 2019). Aspirants of competitive exams, including those for the Maharashtra Public Service Commission (MPSC), often face significant physical and mental health challenges due to rigorous study schedules. This can lead to long-term effects such as stress, anxiety, and depression, which are more prevalent among these students than the general population (Rao & Nagendra, 2017). Excessive stress can result in severe psychological and physical health issues, and in extreme cases, may lead to suicidal tendencies (Larson, 2006).

Research objectives

1. To identify the major problems faced by MPSC aspirants in Amravati.
2. To examine academic challenges such as syllabus difficulty, study material, and preparation strategies.
3. To analyze the financial difficulties faced by students during MPSC preparation.

Literature Review

Several researchers have examined the challenges faced by aspirants preparing for competitive examinations in India. These studies highlight academic pressure, financial constraints, and psychological stress as major issues affecting students.

Lokhande and Joshi (2023) explain that the increasing population and limited government job opportunities have intensified competition in public service examinations. According to their study, aspirants often spend several years preparing, which increases uncertainty regarding career stability and future opportunities.

Joshi (2019) studied students preparing for civil service examinations and found that many aspirants migrate from rural areas to cities for coaching and better study environments. This migration often creates financial pressure due to coaching fees, accommodation costs, and daily living expenses. Rao and Nagendra (2017) examined the psychological impact of competitive exam preparation and reported that aspirants frequently experience stress, anxiety, and mental exhaustion due to long study hours and repeated exam attempts. The study also emphasized that lack of emotional support and uncertainty about success can negatively affect mental health.

The National Mental Health Survey of India (2015–16) also highlights the prevalence of mental health concerns among young adults aged 18–29. Gautam et al. (2020) reported that anxiety and mood disorders are common among students facing academic and career-related pressure. Larson (2006) emphasized that prolonged academic stress without proper coping mechanisms can lead to severe psychological consequences, including depression and burnout. The study suggests the need for psychological support systems for students preparing for highly competitive examinations.

Research Methodology

1. Research Design

This study utilizes a descriptive research design to identify and quantify the specific financial, mental, academic, and career-related challenges faced by MPSC aspirants. By employing a survey-based approach, the research aims to collect standardized data from a broad range of respondents, allowing for the identification of significant patterns and trends within the aspirant community.

2. Participants and Sampling

The research involves a sample size of 60 MPSC aspirants, selected using convenience sampling to target individuals actively engaged in preparation. The participants represent a diverse

demographic, encompassing both male and female candidates across a wide age range from their early 20s to late 30s. Furthermore, the sample includes a spectrum of experience, covering everyone from first-time aspirants with 1–2 attempts to veteran candidates who have attempted the exam more than 4 times.

3. Research Instrument

A structured online questionnaire, developed through Google Forms, served as the primary tool for data collection. This instrument was organized into three distinct sections: Section A focused on demographic profiles, including name, age, gender, and attempt history; Section B assessed the intensity of challenges through 15 core statements regarding syllabus vastness, financial pressure, and mental exhaustion, utilizing a 5-point Likert Scale and “Yes/No/Maybe” options; and Section C provided an open-ended format for qualitative feedback, allowing respondents to share subjective insights and personal recommendations.

4. Data Collection Procedure

The survey was distributed digitally across various social media platforms and specialized MPSC aspirant communities. Every participant was fully informed of the study’s purpose and participated on a voluntary basis. Responses were automatically recorded into a spreadsheet format, a process that ensured data integrity and facilitated a streamlined transition into the analysis phase.

5. Data Analysis

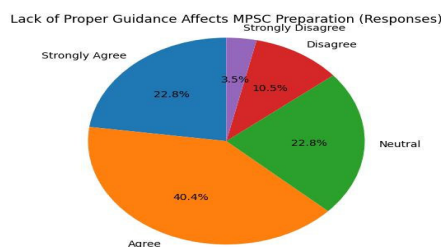
The analysis of the gathered data was conducted using descriptive statistics to provide a clear overview of the results. Frequency distribution was used to count response categories, while percentage analysis helped determine the relative severity of specific challenges. To ensure a structured interpretation, the findings were categorized into four thematic areas: Psychological, Financial, Academic, and Career-related.

6. Ethical Considerations

To uphold rigorous ethical standards, the anonymity of all respondents was strictly maintained throughout the reporting process. Personal contact details were not utilized beyond the necessity of identifying unique responses, and all data was handled with confidentiality, serving exclusively academic and research objectives.

Data Analysis & Interpretation

1.Lack of proper guidance affects exam preparation



Interpretation:

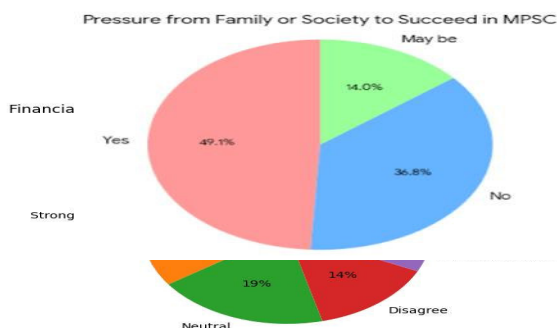
A majority of respondents (63.2%) either agreed or strongly agreed that lack of proper guidance significantly affects their MPSC preparation, making it the most prominent academic challenge faced by MPSC aspirants in this study.

2. The long duration of preparation increases financial burden on me or my family.

Interpretation:

The data reveals that a significant majority of MPSC aspirants experience a financial strain as a result of the extended time required for exam preparation. By combining the “Agree” and “Strongly Agree” categories, it is evident that 60% of respondents feel a tangible financial burden.

3. Pressure from family or society to succeed in MPSC.



Interpretation:

A significant portion of respondents (49.1%) confirmed feeling pressure from family or society to succeed in MPSC, identifying external social expectations as a prominent psychological challenge faced by nearly half of the aspirants in this study.

Findings of the Study**Academic Challenge**

The study reveals that the vast syllabus of the MPSC examination is a major academic challenge, as a majority of respondents found it difficult to complete within the available preparation time. In addition, many aspirants reported facing time management issues, struggling to allocate sufficient time across multiple subjects due to ineffective study planning and academic overload. Another significant challenge identified is the lack of proper guidance, with several participants indicating that insufficient mentoring and direction negatively impact their preparation. Furthermore, aspirants also experience difficulty in accessing quality study material, as they often find it challenging to identify reliable and high-quality resources for effective learning.

Financial Challenges

The study highlights that the high cost of preparation is a major financial challenge for MPSC aspirants, as expenses related to coaching fees, books, and study materials create significant pressure. Additionally, financial constraints limit access to quality coaching and resources for many candidates, affecting their overall preparation. The long duration of preparation further increases the financial burden, as aspirants often spend several years studying, which adds continuous strain on both themselves and their families.

Psychological Challenges

The study indicates that MPSC aspirants experience high levels of stress and anxiety during their preparation, which significantly affects their overall well-being. Uncertainty regarding selection further impacts their motivation, as the fear of failure often reduces their confidence and focus. Continuous and prolonged preparation also leads to mental exhaustion, resulting in burnout and fatigue among candidates. In addition, many aspirants face considerable pressure from family and society to succeed, which adds to their psychological burden and intensifies the challenges they encounter during the preparation process.

Career-Related Challenges**1. Reduced Career Opportunities**

Continuous preparation limits opportunities in other career fields.

2. Missed Job Opportunities

Many respondents admitted missing job opportunities due to MPSC preparation.

3. Uncertainty About Future Career

Spending several years preparing creates confusion and insecurity about long-term career prospects.

Conclusion

The study highlights that the journey of preparing for the MPSC examination is complex and demanding, involving multiple challenges beyond academic study. Through the responses of 60 aspirants, the research identifies key difficulties in academic guidance, financial sustainability, and psychological pressure. The findings reveal that many aspirants struggle due to lack of proper mentorship and structured preparation strategies, which can significantly affect their performance and confidence.

Financial burden is another critical issue, as the extended duration of preparation requires substantial investment in coaching classes, study materials, and living expenses. This often creates pressure not only on the aspirants but also on their families. Additionally, social expectations and family pressure contribute to psychological stress, which can impact mental well-being and motivation during the preparation period.

Overall, the study suggests that improving access to reliable guidance, providing affordable learning resources, and promoting mental health support can greatly benefit MPSC aspirants. Educational institutions, coaching centers, and policymakers should work toward creating a supportive ecosystem that helps students manage these challenges effectively. Such measures can enhance the overall preparation experience and increase the chances of success for aspirants pursuing careers in public service.

Suggestions**Improve Guidance and Mentorship**

Proper guidance should be provided to MPSC aspirants through mentoring programs, career counseling, and expert sessions. Coaching institutes and colleges can organize workshops to help students understand preparation strategies and exam patterns.

Affordable Study Resources

Government and educational institutions should provide free or low-cost study materials, online lectures, and digital libraries to reduce financial burden on aspirants.

Mental Health Support

Counseling services, stress management workshops, and peer support groups should be made available to help aspirants deal with anxiety, stress, and depression.

Career Backup Planning

Aspirants should be encouraged to develop alternative career options or skill-based education alongside preparation to reduce uncertainty and risk.

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Changing Trends in Higher Education in India: A Critical Research Analysis

MR. Chandrashekhar Laxmanrao Korey

Research Student:

Shri. Narayanrao Rana Mahavidyala Badnera (Railway), Amravati. Maharashtra, India.

Email: chandrashekharkorey05@gmail.com

Abstract

Higher education plays a critical role in shaping national development, economic growth, and knowledge production.

In recent decades, the higher education system in India has undergone significant transformation due to globalization, technological advancement, demographic expansion, and policy reforms. One of the most influential policy interventions in recent years has been the implementation of the National Education Policy 2020, which aims to transform higher education through multidisciplinary learning, digital integration, research promotion, and collaboration.

This research paper critically examines the changing trends in higher education in India. The study focuses on key developments such as policy reforms, digital learning, multidisciplinary education, research and innovation, internationalization, and skill-based education. The research adopts a qualitative methodology based on secondary data collected from government reports, academic Journals, and policy documents.

The findings indicate that Indian higher education is gradually shifting from a traditional discipline-oriented system toward a flexible, technology-driven, and globally integrated educational ecosystem.

However, several challenges remain, including inequality in access, infrastructural limitations, digital divide, and funding constraints. The paper concludes that the future development of higher education in India will depend on effective policy implementation, strengthening of research culture, expansion of digital infrastructure, and inclusive access to education.

Keywords: Higher Education, India, Digital Learning, NEP 2020, Multidisciplinary Education Research and Innovation.

1. Introduction

Higher education serves as a vital foundation for national development and social transformation. Universities and colleges play a crucial role in producing skilled human resources, generating new knowledge, and promoting innovation.

In the era of globalization and knowledge economy, the importance of higher education has increased significantly.

India currently possesses one of the largest higher education systems in the world. According to the All India Survey on Higher Education (2022-23), India has:

- 1,213 Universities
- 46,624 Colleges
- 12,543 Standalone Institutions
- 4.46 Crore students enrolled in higher education.

The Gross Enrolment Ratio (GER) for the age group of 18-23 years has increased to 29.5%, indicating gradual expansion in access to higher education.

Despite these achievements, the higher education sector in India continues to face several challenges, including unequal access, faculty shortages, infrastructure deficits, and governance issues. In response to these challenges, several policy reforms have been introduced in recent years. The most significant among them is the National Education

Policy 2020, which aims to bring structural transformation to the higher education system.

2. Literature Review

Several scholars and international organizations have analyzed the transformation of higher education systems worldwide. According to reports published by UNESCO, higher education institutions play a critical role in promoting sustainable development and knowledge-based economies.

Similarly, research conducted by the World Bank highlights the relationship between higher education expansion and economic growth in developing countries. These studies emphasize the

importance of policy reforms, technological integration, and research innovation in strengthening higher education systems.

In the Indian context, scholars have argued that the National Education Policy 2020 represents a comprehensive attempt to reform the higher education sector.

3. Research Objectives

- To analyze the changing trends in higher education in India:
- To examine the impact of policy reforms on the higher education system.
- To explore the role of digital technology in transforming higher education.
- To identify the challenges and future prospects of higher education in India.

4. Research Methodology

This research paper adopts a qualitative research methodology based on the analysis of secondary data. Data for the study has been collected from government reports, academic research articles, policy documents, and international publications.

Important data sources include reports published by the Ministry of Education, the All India Survey on Higher Education, and international organizations such as the Organisation for Economic Co-operation and Development.

5. Changing Trends in Higher Education in India

5.1 Policy Reforms-The National Education Policy 2020 introduces several structural reforms aimed at improving accessibility, quality, and global competitiveness.

5.2 Multidisciplinary Education-Recent reforms encourage multidisciplinary education, allowing students to combine subjects across different academic fields

5.3 Digitalization of Higher Education- Major initiatives include SWAYAM, National Programme on Technology Enhanced Learning (NPTEL), and National Digital Library of India.

5.4 Research and Innovation - Universities are increasingly establishing research centers, innovation hubs, and startup incubation facilities. The proposed National Research Foundation aims to strengthen research funding.

5.5 Internationalization of Higher Education - Includes student mobility, collaborative research projects, and academic partnerships with foreign institutions.

5.6 Skill-Based Education - Universities are integrating vocational education, internships, and industry partnerships into academic programs.

6. Challenges in Indian Higher Education

- **Inequality in Access**-Educational opportunities remain uneven between rural and urban areas.
- **Infrastructure Limitations** - Many institutions suffer from inadequate infrastructure and funding shortages.
- **Faculty Shortage** - Shortage of qualified faculty members affects teaching quality.
- **Implementation Challenges** - Effective implementation of reforms requires administrative capacity and financial investment.

7. Conclusion

The higher education system in India is undergoing a major structural transformation driven by policy reforms, technological advancement, and globalization. The National Education Policy 2020 provides a comprehensive framework for modernizing higher education. However, addressing challenges related to funding, infrastructure, and social inequality remains essential. Strengthening research culture, expanding digital infrastructure, and ensuring inclusive access to education will play a crucial role in shaping the future of higher education in India.

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Perceived impact of IIT- Backed NPTEL certifications on career readiness: A survey of MBA students in Amravati city.

**Prof. Dr. Gauri S. Kalmegh, Vishal Avatade, Dhanashri Ingale,
Rutuja Kshirsagar, Sapana Wakode**

Assistance Professor, Students

Department of Management Studies, Prof. Ram Meghe Institute of Technology and Research
Badnera-Amravati Maharashtra. ,Email ID -wakodesapana92@gmail.com, Mob no- 9730109316

Abstract:

The main objective of the present study is to evaluate the impact of NPTEL courses on the learning engagement of the students. In the present study, the researcher attempted to know the ways the students are interacting with the NPTEL lectures and assignments. In addition to this, the researcher attempted to know the challenges the students face during the learning process. The researcher administered questionnaires to 50 MBA students from various colleges of Amravati. The results of the study showed that the students are regularly submitting assignments. However, the results showed that the students are not attending the video lectures regularly. The conclusion of the present study is that the motivation of the students is key to the success of the NPTEL courses. In addition to this, the present study concludes that the NPTEL courses are useful for the development of knowledge and skills.

Keywords:

NPTEL Certification, Career Readiness, Online Learning, MBA Students, Skill Development, Student Engagement, Higher Education.

Introduction:

National Programme on Technology Enhanced Learning (NPTEL) is one of the most significant programs undertaken for the specific purpose of imparting quality online education. NPTEL is an online education initiative by IITs and IISc for imparting online education in engineering, management, humanities, and science disciplines. NPTEL, under its SWAYAM initiative, offers video courses, assignments, and certifications for learners to acquire quality knowledge and skills. The certifications offered by NPTEL have gained significant importance for their academic and professional value. Students prefer to take courses offered by NPTEL for acquiring quality knowledge and skills.

It is a must that MBA students have high levels of theory and management skills in order to become successful management professionals in the corporate world. NPTEL, in association with IIT, can help MBA students build up their profile and learn skills through certification from renowned organizations. It can help MBA students build up their analytical skills, IT skills, and subject skills, making it a necessity for management professionals. It has been observed that NPTEL courses have become a trend for MBA students. It is essential for MBA students to build up their profile. It is significant to understand the perceptions of MBA students in order to evaluate the importance of these certifications in management education (Bas et al., 2024).

1.1 NPTEL Certifications and Skill Development

NPTEL certification is an opportunity for the students to learn new things and develop new skills in addition to their regular curriculum. NPTEL is conducted by professors from various premier institutions such as IITs and IISCs. NPTEL certification is an opportunity for the students to develop thinking skills and problem-solving skills, which is in high demand in the market. Moreover, NPTEL certification is an opportunity for the students to develop self-learning and lifelong learning skills, which is important for the future of the students (Bas et al., 2024).

1.2 Career Readiness among MBA Students

It is defined as “the preparedness of the students from the academic environment to the real-world environment.” Career readiness includes several skills such as communication skills, team work, leadership skills, and more. Career readiness is considered one of the major qualities of MBA students. This is due to the reason that it is only through the concept of management that a manager

will have both theoretical and practical knowledge of how things should be managed. It is always beneficial for MBA students to take up certification programs so that they become ready during the recruitment drive (Assylzhan et al., 2023).

1.3 Factors Influencing Career Readiness through NPTEL Certifications

There are various factors affecting the NPTEL certifications while preparing the students for the future. These are:

1. Development of Skills: NPTEL courses provide the students with the skills that are required for the professional environment. (Kovalev et al., 2025)

2. Industry-Specific Knowledge: NPTEL courses are designed in a way that they meet the requirements of the industry. The students are provided the opportunity to update their knowledge of the latest developments. (Bas et al., 2024)

3. Self-Learning and Motivation: Completing the online courses helps the students to become self-learners.

4. Academic Recognition: As the online courses are conducted by IITs and IISc, it provides academic recognition and is highly appreciated in the job scenario.

5. Confidence during Job Interviews: More certifications give confidence during job interviews.

Review of Literature

The development of online learning platforms has significantly affected the ways in which students seek to acquire knowledge and skills. Using Massive Open Online Courses (MOOCs), students can make use of the online platform to acquire further qualifications. These programs help the students gain experience and confidence regarding their respective jobs through interviews (Assylzhan et al., 2023). Different researchers have found that the students can enhance their skills through acquiring knowledge regarding the specific field with the help of online certifications. These programs help the students acquire updated knowledge regarding different technological and management advancements (Kovalev et al., 2025).

It has been noted that it is very important to have the right kind of skills for the management field, especially for the management students who are studying various management courses like MBA in business administration. It has been noted that it is very important to have the right kind of skills for the management field because it is very useful for the added qualifications of the academic qualifications. It has been noted from the research that it is very useful for adding value to the resume. It is very useful for getting a job easily. It is also very useful for self-learning, which is very important for the management positions of various organizations (Bas et al., 2024).

Although online certifications have become popular among students, very few studies have been conducted to analyze the impact of online certifications on management students in terms of perceptions. This study may be considered an important study to analyze the relationship between NPTEL certifications and career readiness of management students. This study may provide an insight into the importance of NPTEL certifications for career readiness of management students. This may be considered an important study to be conducted in a region like Amravati, where online certifications have become popular among management students. In the literature review section, the relationship between online certifications and preparedness of management students is discussed.

1. Skill Gap Bridging

NPTEL serves as a bridge between traditional academic curricula and industry requirements. By providing IIT-quality technical and management courses, it enhances the technical competency of MBA students, making them more competitive in the job market.

2. Credentialing and Career Advancement

Certifications from prestigious institutions like IITs act as a strong signal to employers. For MBA students, these credentials validate their expertise in niche areas (such as Data Analytics or Supply Chain), often leading to better internship placements and higher starting salaries.

3. Self-Paced Learning and Motivation

Students who complete these certifications are viewed by recruiters as proactive and self-motivated learners, which are critical traits for career readiness.

4. Regional Adoption in Tier-II Cities

In cities like Amravati, NPTEL provides students with access to elite institutional resources that were previously geographically inaccessible. This "democratization of education" plays a vital role in levelling the playing field for regional MBA graduates.

3. Research Methodology

Research Problem

Of course, some of the students are actually taking the NPTEL course, but most of the students are not really participating in the learning process. It appears that most of the students are only concerned with completing the assignments in order to pass and obtain the marks or the certificate, and not really attending the lectures and learning the material.

Objectives of the Study

1. To understand the importance of NPTEL certification in the context of the MBA syllabus.
2. To explore the perception of the students regarding the NPTEL certification as a value addition to their career and employability skills.
3. To identify the challenges faced by the MBA students in pursuing the NPTEL certifications.
4. To explore the possibilities of making the NPTEL courses more effective for the management students.

3.1 Research Design

For this research, a descriptive research design has been used to analyze the perceptions of MBA students about NPTEL certification courses. Descriptive research design is appropriate to study the opinions of students, their participation, and the impact of NPTEL courses on the skills of MBA students.

3.2 Sources of Data

For this research, primary as well as secondary data has been used.

Primary data collection was conducted through a structured questionnaire, which was used to gather data from MBA students. The questions in the questionnaire were mainly focused on the students' awareness of NPTEL courses, their participation in the lectures, assignments, and the impact of NPTEL courses on their career. Secondary data collection was conducted through various sources, i.e., academic journals, books, research papers, official website of NPTEL, online sources of various educational institutions, online learning, employability, etc.

3.3 Sampling Technique

Convenience sampling was used in this research. The students of Selected MBA colleges of Amravati city were selected based on availability.

3.4 Sample Size

The research sample consists of 50 MBA students from various colleges in Amravati City. The students were selected to find out their experience with the NPTEL course and to find out the level of their interest in online courses.

3.5 Data Collection Method

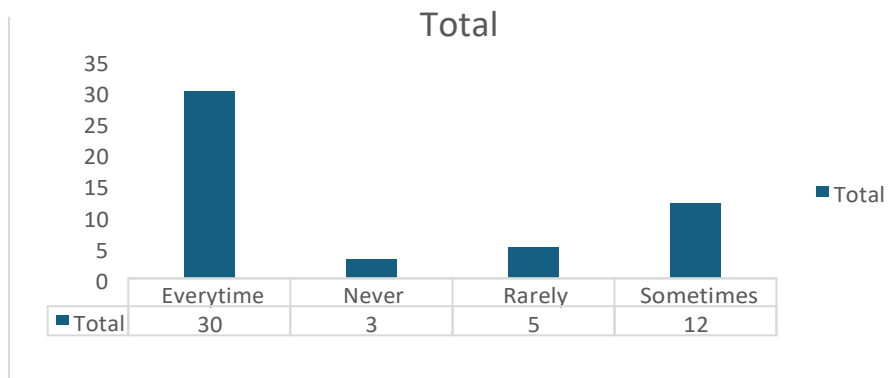
A structured questionnaire was used with objective questions and statements based on a Likert scale. The questions are based on the influence of NPTEL courses on skill development, career, whether students attend the lectures regularly, or whether they attend only to get the certificate.

3.6 Tools of Data Analysis

Simple statistical tools are used to analyze the data, with percentages and tables to find out the trends of the students based on the course and the NPTEL certificate.

4. Data Analysis and Interpretation.

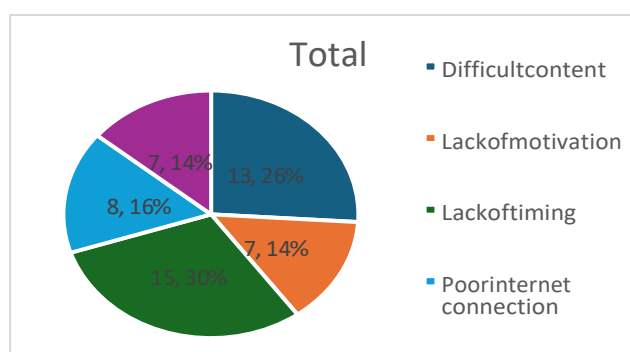
This section is concerned with the analysis and interpretation of data collected from 50 MBA students of various educational institutions in Amravati City. For this purpose, a questionnaire was used as a data collection tool. It was designed in such a way that it sought information on students' awareness of NPTEL courses, their participation in lectures, and their completion of assignments in terms of how they perceive it for future needs. After collecting data from students, it was analyzed using simple statistical methods like percentages and tables.



No. of students who complete assignment sincerely

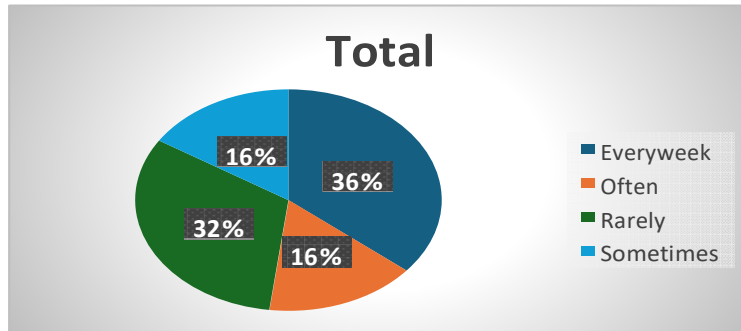
The findings suggest a high level of academic engagement among the participants, where 60% or 30 out of the total participants answered "Every time" in completing NPTEL assignments. Another 24%, or 12 out of the total participants, answered "Sometimes." This translates to a high level of positive academic engagement among the participants, where 84% of them showed sincerity in completing their assignments. Only a small percentage of 10% showed low sincerity in completing their assignments, while the rest belonged to miscellaneous categories.

The findings suggest that the NPTEL framework is successful in developing professional discipline and time management skills in the participants, both of which are essential for career readiness. A high percentage of sincerity in completing assignments "Every Time" (60%) is plausible in relation to the participants' higher mastery of concepts, considering that NPTEL's continuous assessment scheme directly impacts the final eligibility for certification.



Difficulties face by students

The findings suggest that "Lack of timing" is the most significant factor for the students, as it accounts for 30% of the issues faced by the students during NPTEL lectures. This is closely followed by "Difficult concepts," accounting for 26%. This implies that more than half of the total number of students is facing issues, either due to time management or due to the difficulty level of the concepts. Other issues include logistical and psychological issues, such as "Poor internet connection" accounting for 16%, "Lack of motivation" accounting for 14%, and other issues accounting for 14%. This implies that, despite the technical issues, the most significant issues for the students can be addressed by providing more flexibility to the students. This is because, despite the technical issues, the most significant issues for the students can be addressed by providing more flexibility to the students.



Regularity in NPTEL Lectures

The chart provided in Regularity in NPTEL Lectures depicts an inconsistent pattern of engagement among the students, with the most common response falling under the “Sometimes” category at 36%. A significant number of the total attend the lectures very infrequently at 32%, while a small percentage display a higher level of regularity in attending classes, with 16% attending “Every week” and another 16% attending “Often.” This suggests a general lack of engagement among the students, as about 68% attend very infrequently. This inconsistent pattern of attending classes could be related to the barriers of time management and conceptual difficulties faced by the students, thus necessitating the implementation of strategies to enhance persistence among the students to increase the attendance rates.

Findings:

- 1.The study reveals that the majority of MBA students successfully complete their NPTEL assignments because they have to submit them.
- 2.Time constraints and difficulty in understanding complex concepts are the primary challenges faced by MBA students in completing NPTEL courses.
- 3.Besides this, technical difficulties such as an insufficient internet connection and a lack of motivation also create challenges for the students.
- 4.As indicated by the attendance analysis above, the students do not attend the NPTEL lectures consistently, with some attending the lectures rarely or sporadically.
- 5.Overall, while the students do complete the assignments, the lecture attendance and deep learning engagement remain wanting.Overall,while students participate in assignments, regular lecture attendance and deep learning engagement remain limited.

Suggestions:

- 1.Encourage continuous engagement with NPTEL courses by integrating the lectures into the college time table, so attending the lectures becomes part of the regular routine.
- 2.Students need to be helped to be good time managers, and for this, practical advice on how to do so, especially in terms of NPTEL courses and regular classes, would be beneficial.
- 3.Space for concept clarification would be helpful, and the faculty could organize discussion sessions or classes to clear concepts that the lectures may not have clarified.
- 4.Technical support would be enhanced by improving internet facilities, so there is no hindrance to learning.
- 5.The focus would then be on learning, and the value of learning and developing skills would be instilled in the students, rather than the certificate being the sole motivator for completing the assignments.

Conclusion:

The study reveals that a considerable number of students do undertake the NPTEL assignments. However, the regular attendance of students for video lectures is a matter of concern. Time constraints, difficulty level of concepts, and technical problems act as barriers for the regular engagement of students with the video lectures. In the end, the students may only be interested in completing the assignments for the purpose of certification, rather than understanding the concepts. To improve the efficiency of learning in NPTEL courses, time management skills, academic support, and regular engagement of students with video lectures need to be emphasized.

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A Comprehensive Analysis of Mahatma Jyotirao Phule Jan Arogya Yojana in Akola District

Mr.Mahesh S. Baheti

Research Scholar Smt. Laxmibai Radhakrishnan Toshniwal College of Commerce,
Akola,SantGadge Baba Amravati University, Amravati

Dr. Anil M.Tirkar

Professor Smt. Laxmibai Radhakrishnan Toshniwal College of Commerce,
Akola,SantGadge Baba Amravati University, Amravati

Abstract-

This paper will provide an assessment of the performance of Mahatma JyotiraoPhule Jan ArogyaYojana (MJPJAY) in Akola District, in terms of benefits in access to health care and awareness, equity and socio-economic effect on the beneficiaries. The design of the research is descriptive and analytical design where the researcher uses quantitative data on 1050 respondents using a structured questionnaire gauged on a five point Likert scale. Mean, standard deviation, one-sample t-test, independent sample t-test and chi-square test were used as statistical measures to test perceptions and hypotheses. The results indicate that there are moderate levels of awareness of the eligibility criteria (Mean = 3.09), transparency (Mean = 3.07), and ease of enrollments (Mean = 3.08), which has statistically significant positive distinctions ($p < 0.05$). Nevertheless, the needy population was covered with a lower mean (2.94) that had a negative significance ($t = -2.016$, $p = 0.044$), which shows that there are gaps in inclusiveness. The study also reveals that there are great differences between the economic groups with a significant difference between Category 2 respondents (Mean $\approx 4.314.32$) indicating a significantly better access than Category 1 (Mean ≈ 2.08 2.40) with strong significance ($p = 0.000$). The outcome of chi-square ($\chi^2 = 80.339$, $p = 0.000$) confirms that there is a significant correlation between economic status and healthcare access improvement. In general, the study states that although the MJPJAY has helped positively in the reduction of financial load and enhancement of health care access, disparities in access and service delivery still exist. The study indicates that there is a need to have specific policy additions, increase awareness and moderate implementation policies to bring about the aim of the scheme inclusive healthcare cover.

Keyword-MJPJAY, Healthcare Accessibility, Health Insurance, Beneficiary Awareness, Financial Protection, Public Health Policy, BPL and APL Disparities, Healthcare Utilization.

1. Introduction

The Indian healthcare system has been experiencing a swift change where equity, accessibility, and financial protection have gained importance, especially to the economically disadvantaged sections. On this note, the Mahatma JyotiraoPhule Jan ArogyaYojana (MJPJAY) is one of the major public health insurance programs launched by the Government of Maharashtra to offer quality and cashless medical treatment to the targeted beneficiaries (Raghuwanshi, 2025). The scheme was formulated to solve the chronic issues of high out-of-pocket healthcare spending and accessibility of high-quality medical care amongst low-income populations, which minimizes the financial burden of medical crises (Iyer et al., 2025). The scheme has also been expanded over the years to have a broader area of cover that includes the benefits to a large spectrum of secondary and tertiary healthcare services and surgeries, therapies and treatment of serious illnesses (Joshi, 2018). It guarantees the beneficiaries the ability to obtain healthcare services across a network of empanelled public and privately owned hospitals without the hassle of making an advance payment hence inclusivity and health security. This extension of coverage limits and enrollment of more beneficiaries into the scheme is an indication of the efforts of the state to ensure universal health coverage, as well as enhancement of the healthcare delivery system (Garg et al., 2025; Iyer et al., 2025; Sankar & Mahendran, 2025).

However, at the district level, the effectiveness of such schemes and its success are pegged on several factors such as awareness to the beneficiaries, the availability of healthcare facilities,

administrative efficiency and the socio-economic status. The district of Akola, Maharashtra, at the Vidarbha region is the best context to investigate the real-time implementation and effects of MJPJAY. The district is that of a mixed urban-rural population with a substantial percentage of it being involved in agriculture and other related endeavors with a tendency to become economically unstable and also lacking quality healthcare facilities. In that kind of situation, programs such as MJPJAY will be vital in alleviating the difference between demand and supply in the healthcare sector such that even the disadvantaged groups will be able to acquire the medical services they need. The availability and distribution of empanelled hospitals, whether government or private, have a great impact on the availability and access to the scheme in the district (Gohel, 2025; Kaul & Pandey, 2025; Raghuwanshi, 2025). In addition, the efforts of local health authorities, awareness campaigns, and facilitation centers are crucial with respect to making sure that the potential beneficiaries are aware and qualified to make proper use of the scheme (Bag, 2025; Kondekar & Patil, 2024; Pustake et al., 2024).

A thorough study of MJPJAY in Akola District will entail analyzing some of the key dimensions like awareness of beneficiaries, enrollment trends, utilization rates, quality of healthcare as well as patient satisfaction. It also involves an evaluation of the operational issues such as delays in the processing of claims, restricted involvement of hospitals, cases of denial of treatment and administrative bottleneck which could interfere with the smooth running of the scheme. It is important to understand these aspects with an aim of ascertaining the gaps between formulation and implementation of policies to give insight in areas that need to be improved. Moreover, the analysis in question can help enhance a deeper comprehension of the role of public health insurance schemes in addressing the healthcare seeking behavior, decreasing financial vulnerability, and enhancing the overall health outcomes within the disadvantaged populations. Through the analysis of the successes and shortcomings of MJPJAY in the local environment of the Akola District, the paper will also be able to provide useful suggestions to improve the effectiveness, transparency, and coverage of the scheme (-, 2023; Kumar et al., 2023; Mukherjee, 2023; Phalswal et al., 2023). This study supports the significance of localized assessment in reinforcing massive health programs and making sure that the intended outcomes of these programs are delivered to the most deserving parts of the society (Mathur, 2022).

2. Literature Review

(Shende & Wagh, 2024) Precarious employment (PE) has emerged as an important factor of population health and a contributor to health and social inequities. The article is a synthesis and critical evaluation of the evidence on labor market programs to deal with PE discovered with a systematic review. An overview of 21 initiatives, which have been divided into categories of labor market policies, legislation and reforms, union strategies, apprenticeships and youth programs, and social protection programmes was reviewed. Among them, 10 efforts have proven positive and stable results, and 11 of them presented mixed, negative, or unclear results. The article identifies the public health consequences of PE and presents the recommendations in relation to the implementation and evaluation of interventions. The study fails to find the most effective approach, given that initiatives, methods of evaluation and socioeconomic and historical backgrounds in countries are different. Rather, it states that to make initiatives the most relevant and effective to the local context, one should focus on particular PE obstacles, the labour market frameworks, and socioeconomic factors to employ the measures to their maximum potential to combat the job-related health disparities.

(Somani, 2023) The research paper assesses the success of Mahatma Jyotiba Phule Jan Arogya Yojana (MJPJAY) in enhancing the accessibility to healthcare by Below Poverty Line (BPL) families in India. The scheme was implemented in 2013 and is expected to cover free and cashless medical care to those economically weaker. The paper focuses on how BPL families are accessing these medical services and the influence that it has on their general health status. It also evaluates the success of the scheme in reaching its goal of cutting financial load and enhancing access to healthcare. The study brings to the fore critical issues of implementation like creation of awareness gaps and provision of services and areas of improvement have been brought out. The methodology involves both primary data gathered in the form of surveys and interviews with a beneficiary as well as the secondary data gathered in the form of reports and publications. The results will be of great use to the

policymakers and health practitioners to improve the effectiveness, efficiency, and coverage of the MJPJAY scheme.

(Kailashchandra Somani & Bhangdia Principal Smt Kesharbai Lahoti Mahavidyalaya, 2023). Explores the issues and the prospects of the Mahatma JyotibaPhule Jan ArogyaYojana (MJPJAY), introduced in 2013-2020 to make healthcare benefits available to the families below the poverty line (BPL) in India. The paper takes the methodology of a thorough literature review, including policy documents, scholarly articles, and news related to MJPJAY. The results demonstrate that there are major issues in the implementation of the program, which are poor healthcare infrastructure, lack of financial management, and poor awareness of BPL families about the scheme. Irrespective of the above, the MJPJAY has significant opportunities, including increasing the access to necessary healthcare services, enhancing the quality of care, and saving costs to the beneficiaries. As the paper highlights, through the enhanced management, proper funding, and the increased public sensitization programs, the MJPJAY can be used effectively in providing support to the BPL families, enhancing their health outcomes, and acting as a role model in terms of other similar social health insurance programs in India.

Mathur, 2022) Mahatma JyotiraoPhule was a leading social reformer and an educator in India whose efforts have continued to make an impact in the current society. His trailblazing activities and advocacy of education among the marginalized communities, especially women, and low-caste groups formed the basis of increased social inclusion and equality between genders. The notions of Phule were also applied in the geography of community-based welfare and corporate social responsibility, which focused on the morality of people and corporate organization towards the community. This stands as an advocacy of secularism and social justice by Tis which contributed to the formation of the modern Indian democratic values and creating a more aware society about equality and human rights. His nationalism was connected to social reform whereby he urged the citizens to strive towards a progressive and inclusive nation. This essay will discuss how the vision and ideologies of Phule have received a resounding echo in the modern world and how his values not only questioned the social hierarchies of the day, but also proved inspirational in the modern world, change policies, education and social awareness.

(Gujar et al., 2019) The Mahatma JyotibaPhule Jan ArogyaYojana (MJPJAY) is a health insurance provided by the state government, which offers free quality critical care to poor families. The purpose of this research was to measure the awareness of the patients of MJPJAY scheme and measure their perceptions of the services they obtained through the application of the Service Quality (SERVQUAL) framework in a tertiary care hospital. One hundred exit interviews were done in the course of six months using structured questionnaire among beneficiaries of MJPJAY. The responses were analysed using descriptive statistics, in the form of percentages. The researchers revealed that three out of four beneficiaries were males and 1 out of four were females, and averagely, 20 years. The SERVQUAL analysis showed a satisfactory rating of the quality of the service of 4 on the Likert scale in all five measures. It has shown that the intangible and heterogeneous nature of service quality in healthcare may be successfully measured in terms of the perception of patients based on SERVQUAL to emphasize the significance of the soft skills in patient care.

3. Research Methodology

The research design that is used in the study aims to offer an objectivity and empirically-based research in terms of the effectiveness of Mahatma JyotiraoPhule Jan ArogyaYojana (MJPJAY) in Akola District. The research design adopted is descriptive and analytical with the support of quantitative data to guarantee objectivity, accuracy as well as reliability in results. The structured questionnaire with a five-point Likert scale was used to gather primary data regarding the perceptions of the beneficiaries about their awareness, accessibility, financial protection, and service quality. A random sampling method was used to obtain 1050 respondents in the rural and urban settings, which was representative and reduced bias. To make the data collected consistent and valid, the data was well processed, coded and analyzed by use of statistical software. Descriptive and inferential statistical tests, such as mean, standard deviation, t-tests, ANOVA, correlation tests, regression tests, and chi-square tests, were used to test relationships and hypothesis and have a comprehensive picture of the impact of the scheme.

3.1 Research Design

The research design is descriptive and analytical study to effectively assess the effectiveness of the MJPJAY scheme. The descriptive technique will assist in the interpretation of the present situation of healthcare access, awareness and financial protection among the beneficiaries whereas the analytical component will permit analysing the correlation between such variables as income level, location, and healthcare utilisation. The design is appropriate because it will enable either an observation or interpretation of the real world conditions without manipulation. It can also be used to test hypotheses, and compare between different groups, such that a thorough review of socio-economic and healthcare results related to the scheme are undertaken.

3.2 Data Collection Method

The study focuses mainly on quantitative information gathered by the researcher on respondents to provide objectivity, precision and systematism in the analysis of MJPJAY scheme. Quantitative data gives the numerical description of the perceptions, behaviors, and outcomes of beneficiaries, which simplifies the application of statistical methods, including mean, standard deviation, and hypothesis testing. It allows the identification of patterns, trends, and relationship between variables, and it is well-organized, which results in consistency, reliability as well as an ability to generalize the results to the whole population of the study. The structured questionnaire was used to collect data and acquire answers on the issues of awareness, accessibility, financial advantages, and the quality of healthcare services provided in MJPJAY. The questionnaire has used a five point Likert scale which is strongly disagree, strongly disagree, strongly agree or disagree with the question and the responses have availed respondents with a definite means of expressing perceptions. Such an approach provided consistency, data simplicity, as well as collection of credible primary information directly provided by beneficiaries representing their real-life experiences and views on the scheme.

3.3 Sampling Techniques

The research uses random sampling method in order to make sure that all members of the population have equal probability of being selected and hence reducing bias and enhancing the representativeness of the sample. This will assist in capturing various views in various socio-economic, educational and occupational groups of people. The survey population will include 1050 individuals, which will be sufficient to improve the statistical accuracy level, decrease sampling error, and conduct subgroup analysis, e.g., rural/urban and BPL/APL analyses. The accuracy and generalizability of the results also increase with a bigger sample size. The research is undertaken in Akola district which consists of both rural and urban regions in order to capture the diversity of geographical locations. The presence of different regions provides an equal representation and provides compared meaningfulness when comparing access to healthcare, the quality of services, and the effectiveness of schemes in different socio-economic and infrastructural contexts.

3.4 Data Processing

Responses were organized logically into sensible categories to be analyzed after data collection had been completed through codification. They were then processed into the statistical software so that accuracy and efficiency are assured. Data cleaning was also done to eliminate errors and inconsistencies, which guaranteed reliability of results. The data tabulation and classification aided in simplifying difficult data into a form that is easy to understand like tables and charts. The reason why this step is important is that it is essential to prepare the dataset to undergo further statistical analysis, as well as providing the validity of the results, consistency, and the appropriateness of interpretation.

3.5 Statistical Tools Used

Both descriptive and inferential statistical tools are used to analyze the data in the study. Respondent perceptions are summarized using descriptive statistics like standard deviation and mean. The use of inferential methods such as t-tests, ANOVA, correlation and regression analysis and chi-square analysis are used to test relationship, differences, and significance between the variables. These are tools that can be used to test the hypotheses and calculate patterns in the data. The various statistical approaches used are also a guarantee of a thorough analysis with in-depth information of the effectiveness, accessibility and the effect of the MJPJAY scheme.

4. Data Analysis & Interpretation

The study measures the role of MJPJAY in healthcare access, equity, awareness and socio-economic outcome. It analyses the beneficiary knowledge, rural-urban and BPL-APL differences, service quality, financial protection and policy effectiveness with the help of statistical tools. Results underscore lack of accessibility, awareness, and quality, which provides evidence-based practice to enhance efficiency, sustainability, and overall well-being of beneficiaries of the schemes.

4.1 Objective 1.To Evaluate OfMahatmaJyotirao Phule Jan ArogyaYojanaAndIdentifyTheBeneficiariesForTheMjppjay Scheme.

T-Test

Table. 1 One-Sample Statistics of MJPJAY Awareness and Perception Variables

One-SampleStatistics				
	N	Mean	Std. Deviation	Std. Error Mean
1. I am aware of the eligibility criteria of the MJPJAY scheme.	1050	3.09	.973	.030
2. The beneficiary identification process under MJPJAY is transparent.	1050	3.07	.891	.027
3. The scheme successfully reaches deserving beneficiaries.	1050	3.08	.967	.030
4. Enrollment under MJPJAY is easy and hassle-free.	1050	3.08	.984	.030
5.MJPJAYcoversalarge section of the needy population.	1050	2.94	.888	.027

It has the descriptive statistics (N = 1050) of five statements based on Mahatma JyotiraoPhule Jan ArogyaYojana. The standard deviation is in the range of 0.888 and 0.984 and the mean scores are 2.94 to 3.09. The mean (3.09) and the lowest are the eligibility awareness and the coverage perception (2.94).

Table. 2 One-Sample T-Test Results Against Test Value Three

One-SampleTest					
	TestValue=3				
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference
					Lower Upper

1. I am aware of the eligibility criteria of the MJPJAY scheme.	2.886	1049	.004	.087	.03	.15
2. The beneficiary identification process under MJPJAY is transparent.	2.633	1049	.009	.072	.02	.13
3. The scheme successfully reaches deserving beneficiaries.	2.649	1049	.008	.079	.02	.14
4. Enrollment under MJPJAY is easy and hassle-free.	2.572	1049	.010	.078	.02	.14
5. MJPJAY covers a large section of the needy population.	-2.016	1049	.044	-.055	-.11	.00

The testing value of 3 revealed that there are significant positive differences in the areas of awareness ($t=2.886$, $p=0.004$), transparency ($t=2.633$, $p=0.009$) and reach ($t=2.649$, $p=0.008$) and the ease of enrollment ($t=2.572$, $p=0.010$). It has a negative difference in the coverage perception ($t=-2.016$, $p=0.044$) and it has slightly only less agreement between the respondents.

Hypothesis Testing Results for Objective 1

In Objective 1, that is to calculate the efficiency of Mahatma Jyotirao Phule Jan Arogya Yojana (MJPJAY) and the beneficiaries of the scheme, one-sample t-test was conducted with a test value of 3. The results suggest that the respondents are also rather positive in response to the knowledge of the eligibility criteria ($t = 2.886$, $p = 0.004$), the ability to learn who benefits the scheme ($t = 2.633$, $p = 0.009$), that the scheme reaches deserving beneficiaries ($t = 2.649$, $p = 0.008$) as well as the simplicity of the enrolment ($t = 2.572$, $p = 0.010$). The mean scores are significant, as they are enormous against the neutral value which indicates the moderate level of agreement and satisfactory performance in terms of implementing it. However, the relative low yet significant negative differentiation ($t = -2.016$, $p = 0.044$) shows that the perception that the scheme will encompass a high percentage of the needy population does not concur with the agreement. Overall, it can be concluded that the results show a positive rate on awareness and procedural aspects, but the area that requires policy adjustments and advancement is the coverage expansion.

4.2 Objective 2. To Study Access Of Below Poverty Line (Bpl) And Above Poverty Line (Apl) Families (Excluding White Cardholders As Defined By Civil Supplies Department).

T-Test

Table. 3 Group Statistics by Economic Category under MJPJAY

Group Statistics					
	8. Economic Category	N	Mean	Std. Deviation	Std. Error Mean
6. BPL families have adequate access to MJPJAY benefits.	1	509	2.08	1.205	.053
	2	541	4.32	1.085	.047
7. APL families can easily access MJPJAY services.	1	509	2.09	1.194	.053
	2	541	4.31	1.093	.047
8. Income level does not restrict treatment access under MJPJAY.	1	509	2.11	1.212	.054
	2	541	4.31	1.096	.047
9. Hospital treat BPL and APL beneficiaries equally.	1	509	2.40	1.098	.049
	2	541	3.29	1.217	.052

The given table indicates certain means variations between Economic Category 1 (n=509) and Category 2 (n=541) using the Mahatma Jyotirarajan Phule Jan Arogya Yojana. The category 2 (4.314.32) means is greater than the category 1 (2.082.40) means and this indicates that there are great differences in perceptions in terms of access, income neutrality, and equal treatment in hospitals.

Table 4.15 Independent Samples T-Test Comparing Economic Categories' Perceptions

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval Difference	
									Lower	Upper
6. BPL families have adequate access to	Equal variances assumed	10.501	.001	-31.699	1048	.000	-2.241	.071	-2.380	-2.102
	Equal variances not assumed			-31.599	1020.237	.000	-2.241	.071	-2.380	-2.102

MJPJAY benefits.	not assumed									
7. AP L families can easily access MJPJAY services.	Equal variances assumed	10.495	.001	-31.479	1048	.000	-2.222	.071	-2.360	-2.083
	Equal variances not assumed			-31.394	1025.053	.000	-2.222	.071	-2.361	-2.083
8. Income level does not restrict treatment access under MJPJAY.	Equal variances assumed	14.632	.000	-30.837	1048	.000	-2.197	.071	-2.337	-2.057
	Equal variances not assumed			-30.743	1021.716	.000	-2.197	.071	-2.337	-2.057
9. Hospitals treat BP L and AP L beneficiaries equally.	Equal variances assumed	20.720	.000	-12.463	1048	.000	-.893	.072	-1.034	-.753
	Equal variances not assumed			-12.502	1046.142	.000	-.893	.071	-1.033	-.753

The t-test will be used to indicate statistically significant differences ($p=0.000$) between all the statements. In order to get to BPL, $t = -31.699$ (mean difference = -2.241). For APL access, $t = -31.479$ (-2.222). Income restriction shows $t = -30.837$ (-2.197). Equal treatment $t = -12.463$ ($-.893$) which is a test that shows existence of compatible differences in perception based on economic categories.

Crosstabs

Table. 4 Group Statistics by Economic Category under MJPJAY

Case Processing Summary			
	Cases		
	Valid	Missing	Total

	N	Percent	N	Percent	N	Percent
8. Economic Category*14. Access to healthcare has improved due to MJPJAY.	1050	100.0%	0	0.0%	1050	100.0%

The crosstab (N=1050) reflects the distribution of the responses over five levels of the improvement. Category 1 has more points in the scale points of 2 (221) and 4 (181) in the scale points and more concurrence in the scale point 5 (82) in the category 2. This highlights the disparity in the perceived health care change in Mahatma Jyotirao Phule Jan Arogya Yojana.

8. Economic Category * 14. Access to healthcare has improved due to MJPJAY Cross tabulation							
Count							
		14. Access to healthcare has improved due to MJPJAY.					Total
		1	2	3	4	5	
8. Economic Category	1	1	221	103	181	3	509
	2	3	174	115	167	82	541
Total		4	395	218	348	85	1050

The comparison will be the cross tabulation (N=1050) of Economic Category 1 (509) and 2 (541) in regards to the healthcare enhancement in Mahatma Jyotirao Phule Jan Arogya Yojana. The greatest response of the Category 1 is at scale point 2 (221) and the greatest agreement at the scale point 5 (82) on the Category 2 makes known the difference in perceptions.

Table. 5 Chi-Square Test Results for Economic Category Association

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	80.339 ^a	4	.000
Likelihood Ratio	98.779	4	.000
Linear-by-Linear Association	30.992	1	.000
N of Valid Cases	1050		
a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 1.94.			

The Chi-Square ($\chi^2 = 80.339$, $df = 4$, $p = 0.000$) value is statistically significant which implies that economic category has statistically significant relationship with healthcare access improvement. The outcome of the likelihood ratio (98.779 , $p = 0.000$) and linear-by-linear association (30.992 , $p = 0.000$) are significant. The 1050 cases were all legitimate and the number was lower than five cases in two cells which was the anticipated number of cases.

Hypothesis Testing Results for Objective 2

In Objective 2, which examines access to Mahatma Jyotirao Phule Jan Arogya Yojana by the independent samples of t-tests, the economic-category has significant differences. Mean scores of the respondents under Category 2 (4.314.32) were determined to be significantly higher than the scores of the respondents under Category 1 (2.082.40), illustrating that there is a high level of differences between perception of benefits accessibility, income neutrality, and equal treatment in a hospital. The differences were all significant ($p = 0.000$), and the means gaps were large in the case of the BPL access ($t = -31.699$, difference in means = -2.241), the APL access ($t = -31.479$, difference in means = -2.222), and income-based restriction ($t = -30.837$, -2.197). The considerable discrepancy was also reported in the instance of equal treatment ($t = -12.463$, -0.893). The Crosstab analysis also shows that there is greater difference in perceived improvement in healthcare because the more and more the category 2 agrees in higher levels in the scale. The chi-square test ($\chi^2 = 80.339$, $p = 0.000$) confirms the presence of significant relationship between economic category and healthcare access improvement and demonstrates that there are significant differences in the perceptions of access among the economic categories.

5. Conclusion

To sum up, this paper has provided a comprehensive and factual analysis of the Mahatma Jyotirao Phule Jan Arogya Yojana (MJPJAY) efficacy in Akola District, its advantages, and its current flaws based on statistical data. The outcome of the one-sample t-test shows that, attitude towards awareness of eligibility criteria (Mean = 3.09, $t = 2.886$, $p = 0.004$), transparency in identifying beneficiaries (Mean = 3.07, $t = 2.633$, $p = 0.009$), the ability of the scheme to reach deserving beneficiaries (Mean = 3.08, $t = 2.649$, $p = 0.008$) and ease of The view that MJPJAY is viewed to cover a substantial proportion of needy population however has a relatively lower mean (2.94) and negative t-test ($t = -2.016$, $p = 0.044$), thus showing dissatisfaction when it comes to coverage. Moreover, the results of independent sample t-test show that there is a significant difference between economic groups with very noticeable better access reported by Category 2 (Mean range = 4.31 4.32) and much lower access reported by Category 1 (Mean range = 2.08 2.40) with significant statistical significance ($p = 0.000$). The average changes of main variables including BPL access (-2.241 , $t = -31.699$), APL access (-2.222 , $t = -31.479$), income neutrality (-2.197 , $t = -30.837$), and equal treatment (-0.893 , $t = -12.463$) are clear evidence of inequalities when it comes to the service accessibility. Besides, the result of the chi-square test ($\chi^2 = 80.339$, $df = 4$, $p = 0.000$) proves the significant relationship between the economic category and the perceived improvement of access to healthcare. All these findings indicate that, though MJPJAY has made some progress in increasing access to health care and lightening the financial load, it has not been able to deliver equitable distribution of benefits, specifically to weak economic groups. Thus, the paper highlights the importance of increased policy provisions, heightened awareness, fair service provision, and better implementation platforms to provide inclusive and successful healthcare coverage to all beneficiaries.

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Role of selective ignorance enhancing employee work-life balance among private sector employees in Amravati city

Prof.Kamini Bijawe

Research Supervisor

Tejaswin i Pathak

Research Scholar

Prof. Ram Meghe Institute of Technology and Research, Badnera, Amravati

Email:- pathaktejaswini252@gmail.com Phone No:- 8767659347

Abstract

The nature of employment in the private sector has been profoundly transformed by rapid digitalization of workplaces, resulting in a continuous flow of information through digital platforms, emails, messages, and notifications. While technology enhances productivity, it also causes information overload, increased cognitive strain, extended working hours, and difficulties in maintaining a healthy work life balance. In Tier II cities such as Amravati, where expanding service sector employment and competitive work cultures demand constant availability and responsiveness, these challenges are particularly evident among private sector employees.

In this context, selective ignorance emerges as a deliberate self regulation strategy that enables employees to consciously filter and ignore interruptions, distractions, and unnecessary information. Selective ignorance does not imply carelessness; rather, it represents a conscious effort to prioritize relevant tasks, establish communication boundaries, and conserve mental and emotional resources. The present study examines how selective ignorance enhances work life balance and reduces information overload among private sector employees in Amravati city.

The study focuses on employees working in key service sector organizations such as banks, non banking financial companies, educational institutions, and other non IT service organizations. To support theoretical understanding, secondary data are collected from books, academic journals, and online research databases. The collected data are analyzed using basic statistical tools such as percentages, tables, and charts.

The findings reveal a strong relationship between selective ignorance and improved work life balance. Employees who consciously ignore unnecessary communications, unproductive meetings, and non urgent digital interactions report lower stress levels, improved focus, better time management.

Keywords

Selective Ignorance, Information Overload, Work-Life Balance, Private Sector

Introduction

The rapid digitization of work processes has significantly transformed the nature of employment in the private sector. Advances in information and communication technologies have enabled faster decision-making, flexible work arrangements, and enhanced organizational efficiency. However, this digital transformation has also blurred the boundaries between professional and personal life. Employees increasingly receive work-related communications through emails, instant messaging applications, and social media platforms beyond official working hours, making it difficult for them to psychologically disconnect from work.

1.2 Background of the Study

In the contemporary workplace, employees are exposed to an excessive volume of information on a daily basis, a phenomenon commonly referred to as **information overload**. Research in organizational behavior and psychology suggests that information overload negatively affects employee productivity, decision-making ability, and mental well-being. Continuous exposure to notifications, emails, and digital communication leads to cognitive fatigue, increased stress levels, and reduced efficiency at work.

With the rise of competitive work cultures, employees often feel pressured to remain constantly available and responsive to supervisors, clients, and colleagues. This expectation of constant connectivity results in psychological strain, reduced family interaction, and limited time for rest and leisure activities. Consequently, employees experience an imbalance between work and personal life, which adversely affects their overall quality of life.

The issue is particularly relevant in developing Tier-II cities such as **Amravati**, where rapid industrial growth, urbanization, and digital transformation are reshaping workplace expectations. Private sector organizations in such cities increasingly adopt technology-driven work practices similar to metropolitan areas, yet employees may lack adequate coping mechanisms to manage digital work demands effectively.

1.3 Concept of Selective Ignorance

Selective ignorance refers to a conscious and purposeful strategy adopted by employees to ignore non-essential information, messages, and distractions in the workplace. In modern private sector organizations, employees are continuously exposed to digital communication such as emails, instant messages, calls, and notifications, which often leads to information overload and reduced concentration. This challenge is particularly evident in fast-growing cities like Amravati, where work environments demand constant availability and quick responses.

By filtering irrelevant communication, workplace gossip, and minor conflicts, employees protect their mental well-being and reduce unnecessary stress. Selective ignorance enables better prioritization of tasks, improved time management, and enhanced work performance. It is not an avoidance of responsibility but a deliberate method of managing attention and conserving cognitive resources.

Furthermore, selective ignorance contributes to a healthier work-life balance by minimizing emotional exhaustion and mental fatigue. Employees who practice this strategy experience greater emotional stability, improved decision-making, and increased confidence. Overall, selective ignorance serves as an effective self-regulation mechanism that enhances productivity, psychological well-being, and work-life harmony among private sector employees.

1.4 Concept of Work-Life Balance

Work-life balance refers to the ability of employees to manage professional responsibilities and personal life without experiencing stress, fatigue, or emotional exhaustion. In today's digitally connected and fast-paced work environment, achieving work-life balance has become increasingly challenging due to long working hours, high workloads, and continuous work-related communication. This issue is particularly prominent among private sector employees in developing cities such as Amravati.

Excessive work demands often lead to work-family conflict, reduced personal time, and increased stress, negatively affecting employees' well-being and motivation. However, supportive organizational practices, flexible work arrangements, and effective self-management strategies help employees maintain balance. Employees who successfully manage their time, attention, and emotional energy experience improved well-being, higher job satisfaction, and better work performance. Overall, work-life balance plays a crucial role in enhancing employee productivity, mental health, and long-term organizational effectiveness.

1.5 Selective Ignorance and Work-Life Balance

Several studies in organizational psychology indicate that employees who effectively filter information and maintain firm boundaries between work and personal life are less vulnerable to stress, anxiety, and burnout. Such employees demonstrate better coping mechanisms, experience greater autonomy, and are more capable of maintaining a healthy work-life balance.

Despite its increasing relevance in modern organizations, the concept of selective ignorance remains relatively underexplored in the Indian private sector context. Particularly in Tier-II cities like Amravati, limited empirical research has been conducted to understand how employees perceive selective ignorance, the extent to which they practice it, and its impact on their work-life balance.

3. Research Methodology

3.1 Research Problem

Private sector employees in Amravati city are increasingly struggling with information overload due to constant emails, messages, and digital interruptions, which reduces their focus and affects their work-life balance. Many employees find it difficult to filter unnecessary information, leading to stress, long working hours, and reduced productivity. Although the concept of selective ignorance intentionally ignoring non-essential information can help employees manage distractions and improve balance, there is very limited research on how this concept works in the private sector of Amravati. Therefore, the research problem focuses on understanding how selective ignorance can

support private sector employees in reducing information overload and enhancing their overall work-life balance.

3.2 Research Objectives

- 1.To examine the level of information overload faced by private sector employees.
- 2.To study how selective ignorance helps employees manage distractions and stay focused at work.
- 3.To analyze the role of selective ignorance in improving employees' work-life balance.
- 4.To identify the factors that influence employees' ability to practice selective ignorance effectively.

3.3 Hypotheses

H1:

There is a significant relationship between selective ignorance and employees' work-life balance.

H2:

Selective ignorance reduces information overload among private sector employees.

3.4 Research Design

The present study follows a descriptive research design as it aims to describe and understand the role of selective ignorance in enhancing the work-life balance of private sector employees in Amravati city. To collect accurate and relevant information, the study uses a survey method supported by structured questionnaires as the primary tool for gathering data from employees regarding information overload and selective ignorance. The research adopts a cross-sectional time horizon, meaning data will be collected at one specific point in time from private sector employees across different industries in Amravati. Overall, this research design helps in systematically collecting, analysing, and interpreting data to understand how selective ignorance influences work-life balance in the private sector.

3.4 Data Sources & Methods

Primary Data

Primary data is information gathered directly from original sources like surveys, interviews, observations, or experiments specifically for the research at hand. It is gathered specifically for the current research purpose. This data is original and more accurate as it comes directly from respondents. In this study, primary data is collected through a Structured questionnaire from employees.

Secondary Data

Secondary data refers to information that has already been collected, processed, and published by others such as government reports, academic journals, industry studies, or company records and is reused for a new research purpose. Sources include books, journals, websites, reports, and research papers. This data helps in understanding concepts, theory, and past research findings.

3.6 Sampling Procedure

The sampling procedure explains whom the study focuses on and how the respondents were selected. For this study, data was collected from private sector employees working in different industries across Amravati city. These employees were chosen because they regularly experience information overload and work-life balance challenges, making them suitable for examining the role of selective ignorance. A structured questionnaire was used to gather responses from them in a planned and systematic way.

3.6.1 Universe

The sampling universe for this study is Amravati City.

3.6.2 Sampling Elements

The sampling elements of this study are individual private sector employees. These include employees working at different levels like entry-level, mid-level, and managerial positions across various private industries in Amravati.

3.6.3 Sampling Method-The study uses a quota sampling method, in which private sector employees are selected by dividing them into different service sector groups such as education, banking, and NBFCs, and a fixed number of respondents is chosen from each group. This method is suitable because the researcher ensured balanced representation from each sector while collecting data through a Google Form shared with employees working in various non-IT service organizations in Amravati

city. Respondents within each quota were selected based on their availability and willingness to participate.

3.6.4 Sample Size

A sample of 100 respondents will be selected from various organizations in Amravati City

Sr.No	Service Sector	Total Sampling
1	Banking Sector	25
2	NBFC Sector	25
3	Educational Sector	25
4	Non- IT Service sector	25

3.7 Data Analysis

The collected questionnaire responses will be arranged and analysed using Microsoft Excel. Basic tools like tables, percentages, and simple charts will be used to understand the data. The results will then be interpreted to see how selective ignorance affects the work-life balance of private sector employees.

4. Data Analysis and Interpretation

Category	Subgroup	Count	Percentage
Gender	Male	57	57
	Female	43	43
Work Experience	Less than 1 year	24	24
	1–3 years	19	19
	4–10 years	29	29
	More than 10 years	28	28
Total Respondents		100	100%

Fig no 4.1: Demographic analysis of graph

The table shows a fairly balanced gender distribution, with 57% male and 43% female respondents. The work experience data indicates representation from all career stages, with 24% having less than one year of experience, 19% having 1–3 years, and a majority (57%) having more than four years of experience. This balanced distribution ensures that the study reflects diverse employee perspectives and provides reliable insights into selective ignorance and work-life balance across different experience levels.

Which type of work information do you often skip or mute?

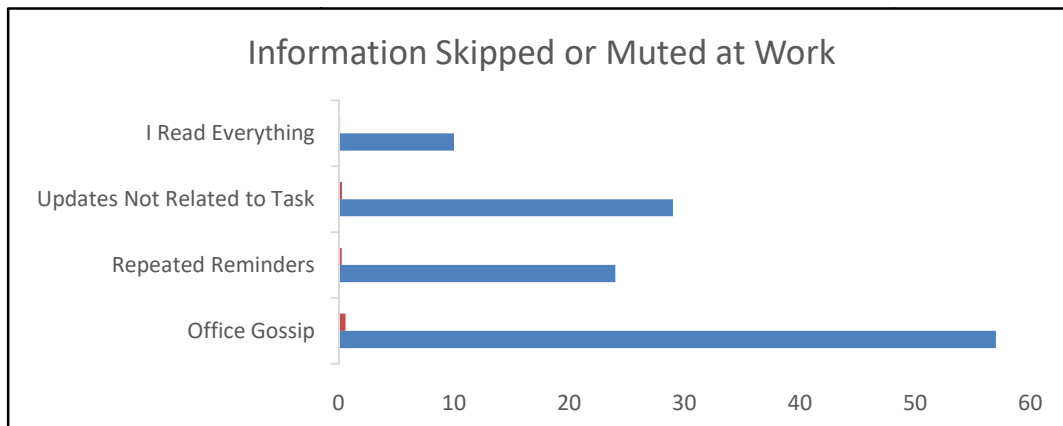


Fig 4.2 : Information Employees Usually Ignore at Work

The chart shows that most employees ignore office gossip at work. Many employees also skip updates that are not related to their tasks and repeated reminders, as these are not very useful for their work. Only a few employees say that they read everything. This means employees choose important information and ignore unnecessary messages to save time and stay focused.

Do you think avoiding non-essential tasks helps you stay more productive during the day?

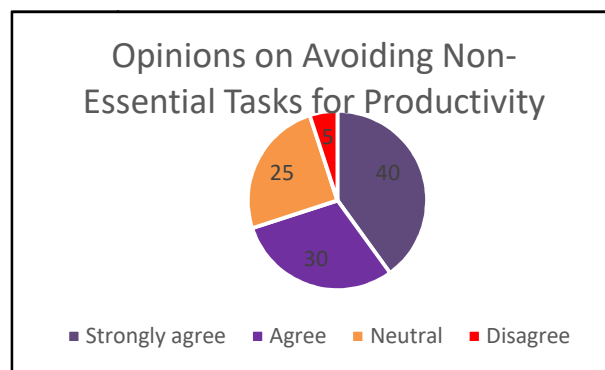


Fig 4.3 : Opinions on Avoiding Non-Essential Tasks to Improve Productivity

The pie chart shows that most employees believe avoiding non-essential tasks helps improve productivity. A large portion strongly agree (40%), while 30% agree, showing overall positive support. 25% are neutral, meaning they are unsure about its impact. Only 5% disagree, indicating very few employees feel that avoiding non-essential tasks does not help productivity. Overall, the chart suggests that focusing on important tasks is widely seen as a way to work more efficiently.

Overall, do you think choosing what work to engage with helps you maintain a better work-life balance?

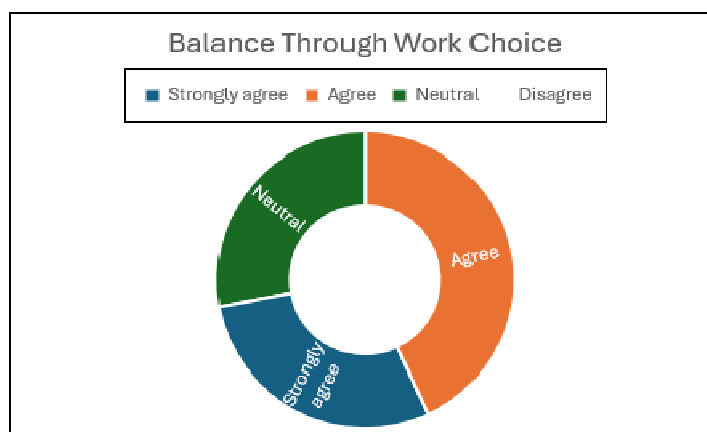


Fig 4.3: Work Choice and Work-Life Balance

The table shows that most respondents believe that choosing what work to engage with helps in maintaining a better work-life balance. 43% agree and 29% strongly agree, which together indicate a strong positive opinion. 28% of respondents are neutral, meaning they are unsure or see both positive and negative effects. No respondents disagree, showing that no one feels this approach harms work-life balance. Overall, the results suggest that selective engagement with work is widely seen as helpful for achieving a better work-life balance.

5.Findings

- 1.A majority of employees consciously practice selective ignorance by ignoring office gossip, repeated reminders, and task-irrelevant updates, indicating intentional information filtering.
2. Most respondents prioritize notifications based on urgency and relevance, reflecting purposeful task management rather than careless avoidance.
- 3.A significant proportion of employees agree or strongly agree that avoiding non-essential tasks improves daily productivity and reduces mental strain.
4. Employees believe that focusing only on important tasks helps in reducing stress, saving time, and improving overall efficiency.
- 5.Overall findings strongly suggest that selective ignorance positively contributes to better work-life balance, with minimal disagreement among respondents.

6. Conclusion

The study clearly reveals that selective ignorance is widely practiced among private sector employees as an effective self-management strategy in digitally intensive work environments. Employees consciously filter non-essential information such as office gossip, repeated reminders, and irrelevant updates to reduce information overload and maintain focus. The findings demonstrate that avoiding non-essential tasks enhances productivity, reduces stress, and supports better time management. Moreover, employees who prioritize important tasks experience improved work-life balance and greater emotional stability. Overall, the results confirm that selective ignorance positively influences both professional efficiency and personal well-being. Therefore, encouraging employees to develop healthy boundaries and purposeful information filtering can contribute to sustainable work practices and improved quality of work life, especially in fast-growing cities like Amravati.

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A Critical Review of Soil and Water Parameters of Agricultural Land in a Specific Geographic Region Using Machine Learning

Prof. Sushilkumar.R. Kalmegh

Professo

Anup S. Bele

Research Scholar

Computer Science Departmen ,Sant Gadge Baba Amravati University, Amravati, India, Amravati,

Abstract

Soil and water quality play a crucial role in agriculture, environmental sustainability, and ecosystem balance. Traditional laboratory analysis methods for soil and water parameters are often time-consuming and expensive. Recently, machine learning (ML) techniques have been widely used to analyze and predict soil and water parameters efficiently. This paper reviews various machine learning algorithms used for soil and water parameter analysis, including classification, regression, and clustering techniques. The study discusses commonly used parameters such as pH, electrical conductivity (EC), nitrogen, phosphorus, potassium, turbidity, dissolved oxygen (DO), and total dissolved solids (TDS). The paper also highlights the advantages of machine learning models such as Random Forest, Support Vector Machine (SVM), Artificial Neural Networks (ANN), and Decision Trees in environmental data analysis.

Keywords: Soil Quality, Water Quality, Machine Learning, Environmental Monitoring

1. Introduction

Soil and water resources are essential components of agricultural productivity and environmental sustainability. Monitoring and analyzing soil and water parameters help in determining fertility, pollution levels, and environmental health. Traditional analysis methods require laboratory testing and manual data processing, which can be costly and time-consuming [1].

Machine learning techniques provide efficient methods for analyzing environmental data and predicting soil and water quality parameters. With the growing availability of environmental datasets, machine learning models are being used for classification, prediction, and decision support systems [2].

This review paper aims to analyze the role of machine learning techniques in evaluating soil and water quality parameters and to discuss the commonly used algorithms for environmental monitoring.

2. Soil Parameters Analysis

Soil parameters are essential indicators of soil fertility and crop productivity. Several parameters are analyzed using machine learning models to improve agricultural decision making.

2.1 Soil pH

Soil pH indicates the acidity or alkalinity of soil and plays a vital role in nutrient availability for plants. Machine learning algorithms such as Artificial Neural Networks and Support Vector Machines have been applied to predict soil pH levels using environmental datasets [3].

2.2 Nitrogen (N)

Nitrogen is a primary nutrient required for plant growth. Machine learning models help in predicting nitrogen levels using soil composition and environmental data, enabling better fertilizer management [4].

2.3 Phosphorus (P)

Phosphorus is essential for root development and plant energy transfer. Data mining techniques have been applied to estimate phosphorus levels in soil and recommend appropriate fertilizers [5].

2.4 Potassium (K)

Potassium improves plant resistance to diseases and drought conditions. Machine learning approaches such as Random Forest and Decision Trees are commonly used for predicting potassium content in soil samples [6].

2.5 Electrical Conductivity (EC)

Electrical conductivity represents the salinity level of soil and indicates the presence of soluble salts. ML models can effectively analyze EC values to determine soil quality and crop suitability [7].

3. Water Quality Parameters

Water quality analysis is critical for agriculture, drinking water safety, and environmental protection.

3.1 pH of Water

Water pH indicates the acidic or basic nature of water and affects aquatic life and irrigation suitability. Machine learning models can predict water pH using multiple environmental variables [8].

3.2 Turbidity

Turbidity measures the clarity of water and indicates the presence of suspended particles. Machine learning algorithms such as SVM and ANN have been applied to predict turbidity levels in water bodies [9].

3.3 Dissolved Oxygen (DO)

Dissolved oxygen is an important parameter for aquatic ecosystems. Low DO levels may indicate water pollution. Machine learning models can analyze and predict DO levels using historical datasets [10].

3.4 Total Dissolved Solids (TDS)

TDS represents the total amount of dissolved substances in water. Machine learning algorithms help in predicting TDS levels for assessing water quality [11].

Table:1 Soil and Water Parameters Analysis

Parameter	Type	Low Range	Normal Range	High Range	Description	Reference
Soil pH	Soil	< 5.5	6.0 – 7.5	> 8.0	Indicates soil acidity or alkalinity	[16], [17]
Nitrogen (N)	Soil	<20 kg/ha	20 – 50 kg/ha	>50 kg/ha	Essential nutrient responsible for plant growth, leaf development, and chlorophyll formation.	[18]
Phosphorus (P)	Soil	<10 kg/ha	10 – 25 kg/ha	>25 kg/ha	Important for root development, energy transfer, and flowering in plants.	[18]
Potassium (K)	Soil	<100 kg/ha	100 – 250 kg/ha	>250 kg/ha	Helps regulate plant water balance and improves resistance to diseases.	[18]
Electrical Conductivity (EC)	Soil	<0.4 dS/m	0.4 – 1.5 dS/m	>1.5 dS/m	Measures soil salinity and the concentration of dissolved salts in soil.	[19]
Soil Moisture	Soil	< 10 %	10 – 30 %	> 30 %	Represents the amount of water present in soil	[20]

Water pH	Water	< 6.5	6.5 – 8.5	> 8.5	Indicates the acidic or alkaline nature of water and its suitability irrigation	[21]
Turbidity	Water	< 1 NTU	1 – 5 NTU	> 5 NTU	Measures the cloudiness of water caused by suspended particles such as silt, clay, or organic matter.	[22]
Dissolved Oxygen (DO)	Water	< 4 mg/L	4 – 8 mg/L	> 8 mg/L	Indicates the amount of oxygen available in water.	[22]
Total Dissolved Solids (TDS)	Water	<300 mg/L	300 – 500 mg/L	>500 mg/L	Represents the total concentration of dissolved minerals and salts present in water.	[21]
Electrical Conductivity (EC)	Water	<250 μ S/cm	250 – 750 μ S/cm	>750 μ S/cm	Indicates the presence of dissolved salts and minerals in water affecting water quality.	[23]

3.5Agricultural Land in the Amravati Region

The Amravati region, in the Vidarbha area of Maharashtra, India, is known for its significant agricultural activities. The region has fertile agricultural land that supports the cultivation of major crops such as cotton, soybean, wheat, and pulses. Soil types in this region mainly include black cotton soil (regur soil) and Saline belts, which is rich in nutrients and suitable for crop production. However, agricultural productivity in the Amravati region is influenced by various soil and water parameters. Monitoring and analyzing these parameters is essential for improving crop yield and sustainable farming practices. Recently, Machine learning methods have been used to analyze soil and water datasets to predict soil fertility and optimize agricultural land management in the region [3].

4.Critical Review of Literature

Singh and Shukla [1] explored the use of **D"ata mining techniques for soil quality assessment"**. Their study demonstrated that classification algorithms can effectively analyze soil datasets and identify patterns related to soil fertility.

Han et al. [2] provided a comprehensive overview of **D"ata mining concepts and techniques"**, which form the foundation for many machine learning applications used in environmental data analysis.

.S Li et al. [4] proposed machine learning methods to **P"redict soil pH levelsand showed that regression models can accurately estimate soil chemical properties"**.

Shah and Dubey [5] applied machine **L"earning algorithms to predict nitrogen content in soil"**, demonstrating improved prediction accuracy compared with traditional statistical approaches.

Sharma and Gupta [6] also explored **D"ata mining methods for soil fertility prediction"** and highlighted the potential of classification techniques for agricultural decision support systems.

Patel and Shah [7] evaluated different machine learning algorithms for **S"oil nutrient analysis and concluded that ensemble methods"** such as Random Forest provides greater accuracy and better handling of complex soil datasets.

Nguyen et al. [8] investigated the **"prediction of soil salinity using machine learning models and demonstrated the importance of environmental factors"** such as temperature and water quality in determining soil conditions.

Kumar and Singh [9] developed a **P"redictive model for water quality assessment using machine learning algorithms"** and demonstrated the effectiveness of classification techniques for environmental monitoring.

Ahmed et al. [10] applied **A"rtificial neural networks to predict turbidity levels in water systems"** and found that neural networks are capable of modeling nonlinear relationships in environmental data.

Zhang et al. [11] used **M"achine learning approaches to predict dissolved oxygen levels in water bodies"**, which is an important parameter for assessing aquatic ecosystem health.

Jain and Kumar [12] studied **W"ater quality analysis using data mining techniques"** and highlighted the usefulness of clustering and classification methods for identifying pollution patterns in water resources.

Vapnik [14] developed the **T"heoretical foundation of Support Vector Machines (SVM)"**, a powerful classification method commonly applied in soil and water parameter prediction.

Haykin [15] provided a **D"etailed explanation of neural network models"**, which are commonly used for complex for complex environmental prediction problems.

Breiman [16] later **I"ntroduced the Random Forest algorithm"**, which combines multiple decision trees to improve prediction accuracy and reduce over fitting.

Brady and Weil [17] and Havlin et al. [19] provided **F"undamental knowledge on soil properties, nutrient cycles, and soil fertility management"**.

FAO guidelines [18] offer standardized methods for **S"oil description and classification"**, which are important for collecting reliable soil data.

Lal and Stewart [20] and Hillel [21] **H"ighlighted the role of soil quality in sustainable agriculture and environmental conservation"**.

The World Health Organization [22], APHA [23], and the **"U.S. Environmental Protection Agency"** [24] provide **I"nternationally recognized guidelines for water quality assessment and monitoring"**.

5. Gaps In Research

Many studies have focused on individual soil parameters such as soil pH, nitrogen, or salinity using machine learning algorithms.

Li et al. [4] investigated the prediction of soil pH using machine learning models, Shah and Dubey [5] applied machine learning techniques for nitrogen prediction in soil.

Nguyen et al. [8] studied soil salinity prediction using machine learning approaches., which limits the ability to provide a comprehensive understanding of soil health and agricultural productivity.

Singh and Shukla [1] and Sharma and Gupta [6] explored the use of classification algorithms for soil quality assessment and fertility prediction. However, their studies were mainly based on limited datasets and lacked region-specific analysis, which reduces the general applicability of their models to specific agricultural regions.

Ahmed et al. [10] applied artificial neural networks to predict turbidity levels in water systems, Zhang et al. [11] used machine learning models to estimate dissolved oxygen levels.

Additionally, although several studies emphasize soil quality and sustainable agriculture [17]–[21], there is still a lack of decision-support systems that combine soil science knowledge with machine learning models to assist farmers in managing agricultural land effectively.

6. Materials And Methods

a) Study Area: Agricultural area in the Amravati division (Vidarbha, Maharashtra)

b) Sample (Data) Collection:

soil and water composite samples of data sets will be gathered from various sources including soil health card[25], Central Ground Water Board, Ministry of Jal Shakti, Government of India[26], or any other reliable modes.

c)Tools:

Agricultural fields use data mining tools and technologies for fast access of data and valuable information from vast amount of data.

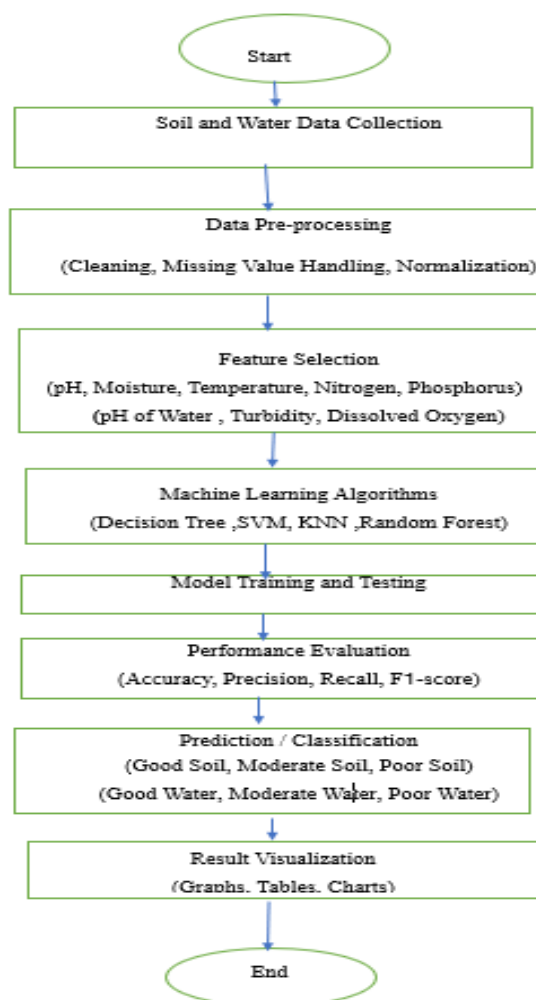
Weka

Weka is also open-source software. One can access it through a graphical user interface. The software is very user-friendly. The application of this tool is in research and teaching. Along with this, Weka lets you access other machine learning tools as well [29].

Python

Python was created in the late 1980s by Guido van Rossum at Centrum Wiskunde& Informatica (CWI) in the Netherlands and was first released in 1991. It is an interpreter, high-level, general-purpose language that supports multiple paradigms object-oriented, procedural, and functional programming [30].

The general process used in soil and water analysis using machine learning is shown below.



**.1Fig Flowchart of Soil and Water Parameter Analysis Using Machine Learning
(d Machine Learning Techniques Used)**

Several machine learning techniques are used for soil and water parameter analysis.

Decision Tree

Decision tree algorithms are widely used for classification and prediction tasks. They help in identifying relationships between environmental parameters and soil or water quality [12].

Support Vector Machine (SVM)

SVM is a supervised machine learning technique used for classification and regression problems. It has been successfully applied in soil nutrient prediction and water quality classification [13].

Artificial Neural Networks (ANN)

ANN models mimic human brain functions and are effective in analyzing complex environmental datasets. They have been widely used in predicting soil fertility and water quality parameters [14].

Random Forest

Random Forest is an ensemble learning technique that improves prediction accuracy by combining multiple decision trees. It is commonly used for environmental data analysis due to its robustness and accuracy [15].

.7Comparative Analysis

Algorithm	Key Features	Advantages	Limitations	References
SVM	Supervised learning classification method	High accuracy, effective for high-dimensional data	Computationally expensive for large datasets	[14]
Decision Tree	Tree-based classification model	Easy to understand and interpret	Risk of over fitting	[13]
Random Forest	Ensemble of several decision trees	Offers strong accuracy and can process large volumes of data	Requires more computational resources	[16], [[7
ANN	Neural network-based predictive model	Captures nonlinear relationships	Requires large training data and time	[15], [[10, [[11
KNN	Distance-based classification method	Simple implementation	High memory and computation cost	[4], [[5, [[8

8. Discussion

Recently, machine learning has seen rapid growth and data mining techniques have been increasingly applied to analyze complex environmental datasets and predict soil and water quality parameters.

Singh and Shukla [1] and Sharma and Gupta [6] highlighted the usefulness of classification algorithms in identifying soil fertility patterns and improving agricultural decision-making. These techniques help analyze large soil datasets and identify relationships between various soil parameters. However, several of these studies focus mainly on a limited number of parameters and do not incorporate multiple environmental factors simultaneously.

Machine learning algorithms, including Support Vector Machines (SVM), Decision Trees, Random Forest, and Artificial Neural Networks, are widely applied in the analysis of environmental data. The fundamental principles and theoretical background of these algorithms have been extensively studied and discussed by Vapnik [14], Breiman [16], and Haykin [15]. These algorithms provide powerful tools for handling complex nonlinear relationships among soil and water variables.. Amravati in Maharashtra have unique soil characteristics and cropping patterns that require region-specific analysis [3], [27]. Without localized data, machine learning models may not provide accurate predictions for agricultural decision-making.

Overall, the literature indicates that machine learning techniques provide significant opportunities for improving soil and water parameter analysis.

9. Conclusion

Soil and water quality analysis is essential for sustainable agriculture, environmental protection, and effective resource management. Traditional methods of analyzing soil and water

parameters require significant time, cost, and laboratory resources. With the advancement of technology, machine learning techniques have become powerful tools for analyzing large environmental datasets and predicting soil and parameters related to water quality more efficiently.

This review highlights the significance of key soil parameters such as pH, nitrogen, phosphorus, potassium, and electrical conductivity, as well as water parameters related to water quality, such as pH, turbidity, dissolved oxygen (DO), and total dissolved solids (TDS). Machine learning algorithms like Decision Trees, Support Vector Machines (SVM), Artificial Neural Networks (ANN), and Random Forest have shown promising performance in predicting and classifying these parameters with high accuracy.

The integration of machine learning with environmental monitoring systems can greatly enhance decision-making processes in agriculture, irrigation management, and water resource planning.

In conclusion, machine learning provides an effective and intelligent approach for soil and water parameter analysis. Future research should focus on creating more accurate prediction models, integrating remote sensing data, and implementing real-time monitoring systems to support sustainable agriculture and environmental conservation.

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Implementation of Robust Network Security Frameworks Using Firewalls, Encryption, and Emerging Security Technologies

Mr. Aniket A. Dhikar

Under Guidance Of

Ms. Rhutika V. Jawarkar

dhikaraniket@gmail.com , Rhutikajawarkar25@gmail.com Department Of Computer Science, Shri.
Dadasaheb Gawai Charitable Trust, Amravati's, Takshashila Mahavidyalaya , Amravati

ABSTRACT:

Network security has become more important to personal computer users, organizations, and the military. With the advent of the internet, security became a major concern and the history of security allows a better understanding of the emergence of security technology. The internet structure itself allows for many security threats to occur. If the architecture of the internet is modified, it can reduce the possible attacks that can be sent across the network. Knowing the attack methods allows us to emerge with appropriate security. Many businesses secure themselves from the internet by means of firewalls and encryption mechanisms. The businesses create an “intranet” to remain connected to the internet but secured from possible threats. The entire field of network security is vast and in an evolutionary stage. In order to understand the research being performed today, background knowledge of the internet, its vulnerabilities, attack methods through the internet, and security technology is important and therefore they are reviewed. Index Terms- Data Security, Internet Architecture, IPv4, Network Security.

I. INTRODUCTION

The world is becoming more interconnected due to Internet and new networking technology. There is a large amount of personal, commercial, military, and government information on networking infrastructures worldwide. Network security is becoming of utmost importance because of intellectual property that can be easily acquired through the internet. There can be breach in intellectual property. There are two types of fundamentally different networks: data networks and synchronous network comprised of switches. The internet is considered a data network. Since the current data network consists of computer-based routers, information can be obtained by special programs, such as “Trojan horses,” planted in the routers. The synchronous network that consists of switches does not buffer data and therefore are not threatened by attackers.[1]

That is why security is emphasized in data networks, such as the internet, and other networks that link to the internet. The vast topic of network security is analyzed by researching the following:

1. Internet architecture and vulnerable security aspects of the Internet
2. Types of internet attacks and security methods
3. Security for networks with internet access
4. Current development in network security hardware and software

II. NETWORK SECURITY

System and network technology is a key technology for a wide variety of applications. Networks and applications need security. Although, network security is a critical requirement, there is a significant lack of security methods that can be implemented easily. There exists a “communication gap” between the developers of security technology and developers of networks. Network design is a well-developed process that is based on the Open Systems Interface (OSI) model. The protocols of different layers can be easily combined to create stacks which allow modular development. The implementation of individual layers can be changed later without making other adjustments, allowing flexibility in development. In contrast to network design, secure network design is not a well-developed process. There isn't a methodology to manage the complexity of security requirements. Secure network design does not contain the same advantages as network design. Network security doesn't mean securing both end computers. When transmitting data the communication channel should not be vulnerable to attack. A possible hacker could target the communication channel, obtain the encrypted data, and decrypt it and re-insert a false message.

Securing the middle network is just as important as securing the computers and encrypting the message. developing a secure network, the following need to be considered.[2][3]

1. Access– Authorized users are provided the means to communicate to and from a particular network
 2. Confidentiality– Information in the network remains private
 3. Authentication – Ensure the users of the network are who they say they are
 4. Integrity – Ensure the message has not been modified in Transit
 5. Non-repudiation – Ensure the user does not refute that he used the network
- With the understanding of security issues, potential attackers, needed level of security, and factors that make a network vulnerable to attack an effective network security plan is developed To make the computer less vulnerable to the network there are many products available. These tools are encryption, firewalls, intrusion-detection, and security management and authentication mechanisms. Businesses throughout the world are using a combination of some of these

tools. “Intranets” are both connected to the internet and Information over the Internet. Regardless of their sizes and In the modern Information Technology era, information plays a vital role in almost every aspect of human life. Organizations continuously collect large volumes of data from multiple sources such as business transactions, social media platforms, sensors, and digital communication systems. This data must be efficiently stored, managed, and processed to generate meaningful information and valuable knowledge for strategic decision-making. The rapid advancement of computer technologies, electronic devices, and the significant growth in computing power and storage capacity have resulted in an exponential increase in data generation.[4][5]

To manage this enormous volume of data, organizations commonly use data warehouses and large-scale database systems that allow enterprises to store, integrate, and access reliable datasets. However, simply storing data is not sufficient. Extracting meaningful patterns, trends, and relationships from these large datasets requires advanced analytical methods. Data mining, which is an essential component of knowledge discovery in databases (KDD), provides powerful techniques for analyzing large volumes of data and identifying hidden patterns that can support intelligent decision-making.

Various data mining techniques such as classification, clustering, association rule mining, regression, and anomaly detection are widely used to analyze complex datasets. These techniques are applied in several domains including healthcare, finance, marketing, education, fraud detection, and e-commerce. By using these techniques, organizations can predict future trends, improve operational efficiency, and make data-driven decisions.

This paper presents a comprehensive analytical study of major data mining techniques and examines their significance and applications in modern data-driven environments

III. DIFFERENTIATING DATA SECURITY AND NETWORK SECURITY

Data security is the aspect of security that allows a client's Data to be transformed into unintelligible data for transmission. Even if this unintelligible data is intercepted, a key is needed to Decode the message. This method of security is effective to a Certain degree. Strong cryptography in the past can be easily Broken today. Due to advancement of hackers, cryptographic Methods have to develop constantly to be one step ahead. When transferring cipher text over a network, it is helpful to Have a secure network. This will allow for the cipher text to be Protected, so that it is less likely for many people to even attempt To break the code[6].

A secure network will also prevent someone From inserting unauthorized messages into the network. Therefore, hard ciphers are needed as well as attack-hard Networks. The relationship of network security and data security to the OSI model is shown in Figure 1. It can be seen that the Cryptography occurs at the application layer; therefore the Application writers are aware of its existence. The user can Possibly choose different methods of data security. Network Security is mostly contained within the physical layer. Layers Above the physical layer are also used to accomplish the network Security required. Authentication is performed on a layer above The physical layer. Network security in the physical layer requires Failure detection, attack detection mechanisms, and intelligent Counter measure strategies.

IV. INTERNET ARCHITECTURE AND VULNERABLE SECURITY ASPECTS

era of security breaches on the Internet is causing Organizations to use protected private networks or intranets. The Internet Engineering Task Force (IETF) has introduced security Mechanisms at various layers of the Internet Protocol Suite . These security mechanisms allow for the logical protection of Data units that are transferred across the network. The current Version and new version of the Internet Protocol are analyzed to Determine the security implications. Although security may exist Within the protocol, not all attacks are guarded against. These Attacks are analyzed to determine other security mechanisms that May be necessary. The security architecture of the internet protocol known as IP Security is a standardization of internet security. IP security, IP Sec, covers the new generation of IP (IPv6) as well as the current Version (IPv4). Although new techniques, such as IP sec, have Been developed to overcome internet's best-known deficiencies, They seem to be insufficient a visual representation of how IPsec is Implemented to provide secure communications. IP sec is a point-to-point protocol, sencrypts, the Other decrypts and both sides share key or keys. IPsec can be Used in two modes, namely transport mode and tunnel modes.[7][8]

V. ATTACKS THROUGH THE CURRENT INTERNET PROTOCOL IPV4

1.Common Internet Attack Methods Common internet attacks methods are broken down into Categories. Some attacks gain system knowledge or personal Information, such as eaves dropping and phishing. also interfere with the system's intended function, such as viruses, worms and trojans. The other form of attack is when the system's resources are consumes uselessly, these can be caused by denial of service (DoS) attack. Other forms of network intrusions also exist, such as land attacks, surf attacks, and teardrop attacks. These attacks are not as well-known as DoS attacks, but they are used in some form or another even if they aren't mentioned by name.

1.1 Eavesdropping Interception of communications by an unauthorized party is called eavesdropping. Passive eavesdropping is when the person only secretly listens to the networked messages. On the other hand, active eaves dropping are when the intruder listens and inserts something into the communication stream. This can lead to the messages being distorted. Sensitive information can be stolen this way .

1.2 Viruses Viruses are self-replication programs that use files to infect and propagate Once a file is opened, the virus will activate within the system.

1.3 Worms A worm is similar to a virus because they both are self-replicating, but the worm does not require a file to allow it to propagate There are two main types of worms, mass-mailing worms and network- aware worms. Mass mailing worms use email as a means to infect other computers. Network-aware worms are a major problem for the Internet. A network-aware worm selects a target and once the worm accesses the target host, it can infect it by means of a Trojan or otherwise.

1.4 Trojans urpose. Trojans usually carry some payload such as a virus.

1.5 Phishing Phishing is an attempt to obtain confidential information from an individual, group, or organization Phishers trick users into disclosing personal data, such as credit card numbers, online banking credentials, and other sensitive information.

1.6 IP Spoofing Attacks Spoofing means to have the address of the computer mirror the address of a trusted computer in order to gain access to other computers. The identity of the intruder is hidden by different means making detection and prevention difficult. With the current IP protocol technology, IP- spoofed packets cannot be eliminated .

1.7 Denial of Service Denial of Service is an attack when the system receiving too many requests cannot return communication with the requestors .The system then consumes resources waiting for the handshake to complete. Eventually, the system cannot respond to any more requests rendering it without service.

2. Technology for Internet Security

Internet threats will continue to be a major issue in the global world as long as information is accessible and transferred across the Internet. Different defense and detection mechanisms were developed to deal with these attacks.

- **Cryptographic systems**

Cryptography is a useful and widely used tool in security engineering today. It involved the use of codes and ciphers to transform information into unintelligible data. These unintelligible data is thus transferred in the network safely.

- Firewall

A firewall is a typical border control mechanism or perimeter defense. The purpose of a firewall is to block traffic from the outside, but it could also be used to block traffic from the inside. A firewall is the frontline defense mechanism against intruders. It is a system designed to prevent unauthorized access to or from a private network. Firewalls can be implemented in both hardware and software, or a combination of both.

- Intrusion Detection Systems

An Intrusion Detection System (IDS) is an additional protection measure that helps ward off computer intrusions. IDS systems can be software and hardware devices used to detect an attack. IDS products are used to monitor connection in determining whether attacks are been launched. Some IDS systems just monitor and alert of an attack, whereas others try to block the attack.

- Anti-Malware Software and Scanners

Viruses, worms and Trojan horses are all examples of malicious software, or Malware for short. Special so-called anti-Malware tools are used to detect them and cure an infected system.

- Secure Socket Layer (SSL)

The Secure Socket Layer (SSL) is a suite of protocols that is a standard way to achieve a good level of security between a web browser and a website. SSL is designed to create a secure channel, or tunnel, between a web browser and the web server, so that any information exchanged is protected within the secured tunnel. SSL provides authentication of clients to server through the use of certificates. Clients present a certificate to the server to prove their identity.[9][10]

VI. SECURITY ISSUES OF IP PROTOCOL IPV6

IPv6 is the next thing everyone's talking about. From a security point of view, IPv6 is a considerable advancement over the IPv4 internet protocol. Despite the IPv6's great security mechanisms; it still continues to be vulnerable to threats. Some areas of the IPv6 protocol still pose a potential security issue. The new internet protocol does not protect against is configure servers, poorly designed applications, or poorly protected sites. The possible security problems emerge due to the following:

1. Header manipulation issues also interfere with the system's intended function, such as viruses, worms and trojans. The other form of attack is when the system's resources are consumed uselessly, these can be caused by denial of service (DoS) attack. Other forms of network intrusions also exist, such as land attacks, surf attacks, and teardrop attacks. These attacks are not as well known as DoS attacks, but they are used in some form or another even if they aren't mentioned by name.

- Eavesdropping

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- Trojans Trojans appear to be benign programs to the user, but will actually have some malicious purpose. Trojans usually carry some payload such as a virus.

- Phishing Phishing is an attempt to obtain confidential information from an individual, group, or organization. Phishers trick users into disclosing personal data, such as credit card numbers, online banking credentials, and other sensitive information.

- IP Spoofing Attacks

Spoofing means to have the address of the computer mirror the address of a trusted computer in order to gain access to other computers. The identity of the intruder is hidden by different means making detection and prevention difficult. With the current IP protocol technology, IP-spoofed packets cannot be eliminated [11].

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Data mining is the extraction of hidden predictive information from large databases; it is a powerful technology with great potential to help organizations focus on the most important information in their data warehouses. Data mining tools predict future trends and behaviors, helps organizations to make proactive knowledge-driven decisions. The automated, prospective analyses offered by data mining move beyond the analyses of past events provided by

DOI : Retrospective tools typical of decision support systems. Data mining tools can answer the questions that traditionally were too time consuming to resolve. They prepare databases for finding hidden patterns, finding predictive information that experts may miss because it lies outside their expectations.

Data mining, popularly known as Knowledge Discovery in Databases (KDD), it is the nontrivial extraction of implicit, previously unknown and potentially useful information from data in databases. Though, data mining and knowledge discovery in databases (or KDD) are frequently treated as synonyms, data mining is actually part of the knowledge discovery process.

VII. SECURITY IN DIFFERENT NETWORKS

The businesses today use combinations of firewalls, encryption, and authentication mechanisms to create "intranets" that are connected to the internet but protected from it at the same time. Intranet is a private computer network that uses internet protocols. Intranets differ "Extranets" in that the former are generally restricted to employees of the organization while extranets can generally be accessed by customers, suppliers, or other approved parties. There does not necessarily have to be any access from the organization's internal network to the Internet itself. When such access is provided it is usually through a gateway with a firewall, along with user authentication, encryption of messages, and often makes use of virtual private networks (VPNs). Although intranets can be set up quickly to share data in a controlled environment, that data is still at risk unless there is tight security. The disadvantage of a closed intranet is that vital data might not get into the hands of those who need it. Intranets have a place within agencies. But for broader data sharing, it might be better to keep the networks open, with these safeguards:

1. Firewalls that detect and report intrusion attempts
 2. Sophisticated virus checking at the firewall
 3. Enforced rules for employee opening of e- Mail attachments
 4. Encryption for all connections and data transfers
 5. Authentication by synchronized, timed passwords or security certificates
- It was mentioned that if the intranet wanted access to the internet, virtual private networks are often used. Intranets that exist across multiple locations generally run over separate leased lines or a newer approach of VPN can be utilized. VPN is a private network that uses a public network (usually the Internet) to connect remote sites or users together. Instead of using a dedicated, real-world connection such as leased line, a VPN uses "virtual" connections routed through the Internet from the company's private network to the remote site or employee.[12]

VIII. CURRENT DEVELOPMENTS IN NETWORK SECURITY

The network security field is continuing down the same Route. The same methodologies are being used with the addition Of biometric identification. Biometrics provides a better method Of authentication than passwords. This might greatly reduce the Unauthorized access of secure systems. The software aspect of Network security is very dynamic. Constantly new firewalls and Encryption schemes are being implemented. The research being Performed assist in understanding current development and Projecting the future developments of the field. Hardware Developments Hardware developments are not developing rapidly. Biometric systems and smart cards are the only new hardware Technologies that are widely impacting security. The most Obvious use of biometrics for network security is for secure Workstation logons for a work station connected to a network. Each workstation requires some software support for biometric Identification of the user as well as, depending on the biometric Being used, some hardware device. The cost of hardware devices Is one thing that may lead to the widespread use of voice Biometric security identification, especially among companies And organizations on a low budget. Hardware device such as Computer mice with built in thumbprint readers would be the Next step up. These devices would be more expensive to Implement on several computers, as each machine would require Its own hardware device. Software Developments The software aspect of network security is very vast. It Includes firewalls, antivirus, VPN, intrusion detection, and much More. The research development of all security software is not Feasible to study at this point. The goal is to obtain a view of Where the security software is heading based on emphasis being Placed now.[13]

IX. FUTURE TRENDS IN SECURITY

What is going to drive the Internet security is the set of Applications more than anything else. The future will possibly be That the security is similar to an immune system. The immune System fights off attacks and builds itself to fight tougher Enemies. Similarly, the network security will be able to function As an immune system. The trend towards biometrics could have taken place a while

Ago, but it seems that it isn't being actively pursued. Many Security developments that are taking place are within the same Set of security technology that is being used today with some Minor adjustments.

X. CONCLUSION

Network security is an important field that is increasingly Gaining attention as the internet expands. The security threats and Internet protocol were analyzed to determine the necessary Changes in security technology. The security technology is Mostly software based, but many common hardware devices a used. The current development in network security is not very impressive. Originally it was assumed that with the importance of the network security field, new approaches to security, both hardware and software, would be actively researched. It was a surprise to see most of the development taking place in the same technologies being currently used. Combined use of IPv6 and security tools such as firewalls, intrusion detection, and authentication mechanisms will prove effective in guarding intellectual property for the near future. The network security field may have to evolve more rapidly to deal with the threats further in the future.

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Changing Trends and Research in the Curriculum of Various Courses in the Faculty of Commerce and Management

Dr. Bharati R. Chokhani

bharatichokhani@gmail.com CHB Lecturer Sudhakar Rao Naik Arts, Science and Umashankar Khetan Commerce College, Akola.

Abstract

India's commerce education system has undergone substantial change as a result of historical transitions and boosted by the globalisation, privatisation, and liberalisation eras. This paper examines the development of commerce education, beginning with the late 19th and early 20th century origins. It highlights the significance of digital platforms like e-commerce, e-learning, e-banking, and e-marketing. The study emphasises the necessity of updating curricula, working with businesses, and including useful, career-focused skills. The study finds major obstacles that impede the development of graduates who are prepared for the workforce, such as out-of-date curricula, a lack of digital literacy, and insufficient industry exposure, using secondary data and a descriptive research technique. The literature review backs up the demand for changes, promoting education that is entrepreneurship-focused, experiential learning, and the development of soft skills. This study emphasises the need for a dynamic, skill-oriented approach to commerce education that synchronises academic instruction with the changing needs of the corporate sector. This alignment guarantees that graduates are prepared to contribute significantly to the economic growth of India.

Keywords

E-commerce, e-learning, e-banking, and e-marketing, career-focused skills, digital literacy, commerce education.

Introduction

An important development in Indian commerce education occurred in 1886 when the Trustees of Pachiyappa's Charities established the country's first commerce school in Chennai. This effort paved the way for the establishment of the Commerce Department at Presidency College in Kolkata in 1903. The first school devoted to higher education in this field was Sydenham College of Commerce and Economics, which opened its doors in 1913. Commerce education has developed into a vital sector in the post-independence era that satisfies the demands of industrialisation and technical advancement. Commerce education has been greatly impacted by the growing LPG problem. E-banking, e-marketing, e-commerce, e-finance, e-investment, paperless trade, and e-governance are only a few of the new aspects brought about by the technology revolution that have gained international significance. Call centres, outsourcing, small enterprises, and IT services are all growing quickly at the same time. The way that commerce is taught and learned must fundamentally change as a result of these advances. Technology must be incorporated into commerce school, and new skills and training are necessary for adaptation. Careers in e-commerce demand both technological proficiency and practical understanding. A comprehensive understanding of the sector and its employment opportunities is provided via e-commerce education. These courses give students the skills they need to run a business by covering fundamental business concepts. Online banking, web hosting, website design, digital certificates, online payment systems, and shopping cart software are just a few of the subjects covered by specialised e-commerce training that is becoming more and more important. These specialized abilities offer a significant advantage. The primary objective of education is to create individuals who can confront life's difficulties. Specifically, commerce education is designed to equip individuals to address challenges in the fields of commerce and business. To attain this goal, commerce education must have a strong link with businesses and industries. It should be more application-oriented, including practical training and real-world experience.

Meaning and concepts

According to Chessman, Commerce education is a type of education that both directly and indirectly prepares the entrepreneur for his vocation. A variety of business disciplines, including

accounting, marketing, finance, and entrepreneurship, are covered in commerce education, corporate governance, corporate accountability, environmental accounting, development, and commercial and business laws. The information, abilities, and mind-set needed to successfully manage trade, commerce, and industry are developed through commerce education as a living discipline of education.

Literature Review

According to recent surveys, India urgently needs to update its commerce education to meet industrial and global standards. Academics place a strong emphasis on bridging the knowledge gap between academics and practical skills. Key insights on current issues and trends in the sector are outlined in this review.

- According to RohitVerma, "bridging the gap between academia and industry is the necessity of specialized business education, distinct from traditional commerce faculties." It emphasizes how crucial industry integration, digital literacy, and practical skills are to students' success. The report highlights the shortcomings of existing commerce education and promotes improved instruction via business partnerships and digital platforms. It also emphasizes the variety of employment options accessible to business graduates and the critical role that a strong educational foundation plays in developing entrepreneurial potential.
- The issues with Indian commerce education are emphasized in Suraksha, Ritu, and Deepak Bhatia's (2013) [1] study, and the authors believe that new methods for improving commerce education in the years to come. They offered some helpful recommendations, such as holding seminars and workshops for the benefit of instructors and students, conducting SWOT analyses of commerce education institutions, facilitating industry-institute placement interactions, making the curriculum for commerce education more skill-oriented and practical, and including case studies to enhance commerce education in India.
- In this research paper, DeepaliKailasraoMankar (2016) [9] emphasized the breadth encompassing a variety of business domains, including accounting, marketing, finance, entrepreneurship development, commercial and business laws, environmental accounting, corporate governance, and corporate accountability. In light of the evolving global business landscape, the author emphasized the significance of commerce education.
- According to RohitBansal (2017), commerce education holds the top spot in India and was impacted by the LPG. Following the LPG, the structure of Indian commerce education was altered. By acquiring the necessary abilities, information, and mindset, it demonstrated a substantial contribution to the nation's economy. This article has a strong emphasis on education, particularly commerce education, and makes an effort to address certain issues and opportunities related to this field. A answer to today's global industrial and economic challenges is emerging in the form of commerce education.
- According to S. Sunil Kumar (2020), management and commerce education in India prepares students to be dynamic managers with cutting-edge business abilities to meet the actual problems of the fast-paced business environment. Additionally, LPG has encountered hitherto unheard-of difficulties in Indian management and commerce. Ultimately, it came to the conclusion that management and commerce in India must be comprehensive, focused, and tailored in order to close the gap between academic curricula and industrial demands.
- According to Nandan N (2024), "the field of commerce is essential to modern education and business as well." In contemporary phenomena, it has a broad scope in both the public and private sectors and faces numerous obstacles. Additionally, use secondary sources to persuade business that there are a variety of business options. This essay focuses on identifying the difficulties posed by recent developments in Indian commerce and proposes a new education program for 2020 that will improve not just commerce but also a number of other fields.

Statement of the problem

In reality, the indiscriminate growth of liberal commerce education has also resulted in certain issues. There is no doubt that the quantitative expansion has led to quality deterioration. Because of this, a commerce graduate now has little advantage over his peers when it comes to getting hired for jobs that were formerly thought to be within his purview.

Additionally, the current curriculum does not adequately prepare pupils for competitive exams. Both jobs demanding basic topic knowledge and jobs requiring technical or specialized knowledge are not prepared for by the current system of commerce school. Nowadays, even a commerce graduate is not recognized as a certified bookkeeper.

Research Methodology

With an emphasis on identifying current trends, obstacles, and potential future orientations, the current study aims to analyse the changing landscape of commerce education in India. In order to critically examine the historical development, contemporary advancements, and anticipated trajectory of commerce education within the Indian context, the study mainly uses second-hand data from secondary sources, such as research papers, articles, survey reports, pertinent websites, newspapers, and published books, along with descriptive research methodology.

Objectives of the study

1. To analyse current developments and patterns in Indian commerce education.
2. To determine the potential and difficulties facing Indian commerce education.
3. Examining how Indian commerce education would develop in the future.

Present state of commerce education in India

Commerce education in India is experiencing a significant surge in enrolment and undergoing a slow digital revolution, yet faces a critical gap between traditional, theory-heavy curricula and industry demands for specialized skills. While demand for courses in finance, accounting, and analytics is rising, the sector is characterized by a mix of high-quality institutions and out-dated, lecture-driven, under-resourced colleges.

Key aspects of the present state of commerce education in India include:

- **Growing Enrolment and Demand:** Commerce is a popular choice for higher education, with, substantial enrolment growth in B.Com and M.Com programs over the last 15 years.
- **Curriculum & Pedagogical Challenges:** Many programs remain, out-dated, content-oriented and lacking in practical application. There is a noted lack of focus on modern, industry-required skills like data analytics, AI in finance, and, international taxation.
- **Industry-Academic Gap:** A significant, shortage of job-ready graduates exists, with employers often citing a lack of technical, IT, and soft skills among graduates.
- **Need for Reform:** The industry requires a shift toward skill-based learning, digital integration, and, entrepreneurship-focused curricula to align with global business standards.
- **Impact of NEP 2020:** The National Education Policy 2020 is expected to provide a framework for more flexible, multidisciplinary, and vocational, commerce education.
- **Digital Transformation & AI Integration:** To educate students for tech-driven corporate contexts, the curriculum is progressively integrating AI, machine learning, blockchain, and big data analytics.
- **Specialized & Professional Courses:** Traditional general commerce degrees are being replaced by specialized, career-focused programs like B.Com. (Accounting & Finance), B.Com. (Banking and Insurance), and B.Com. (Financial Markets).
- **Emphasis on Digital Tools and E-Commerce:** To address the demands of the digital economy, curricula increasingly include e-banking, e-marketing, e-commerce, and data analytics.
- **Sustainability and Ethics (ESG):** With an emphasis on corporate social responsibility and sustainable business practices, ESG frameworks are emerging as essential elements.
- **Soft Skills & Emotional Intelligence:** Beyond technical knowledge, modern curricula emphasize communication, leadership, and emotional intelligence (EQ) as critical skills for management roles.
- **Phygital Learning:** The adoption of hybrid models (combining physical and digital) is now standard, offering flexibility through online platforms, Massive Open Online Courses (MOOCs), and virtual classrooms.

Challenges of commerce education in India

Despite the need for change, several challenges inhibit the modernization of commerce and management education:

- **Out-dated Curriculum:** Many institutions still struggle with outdated curricula that lack real-world application.

- Infrastructure Disparities: A lack of digital infrastructure, particularly in developing regions, hinders the adoption of AI and advanced analytics.
- Faculty Readiness: There is a significant gap in training faculty members to effectively teach and use modern technology.
- Industry-Academia Gap: A shortage of practical, job-oriented skills, leading to a need for stronger partnerships with industry for internships and live projects.
- Theory-oriented curriculum: The UG and PG curricula are more theoretical in nature and lack a practical perspective. Once more, the curricula are out of date and have not been updated to reflect the most recent advancements in global commerce education and industry demands.
- Poor academic standards: In India, strong academic standards should be set for the appointment of professors in higher education institutions. However, the UGC/MHRD and state governments regularly relax the minimal academic requirements of NET, SET, and PhD for teaching UG and PG classes.
- Poor financial foundation: The bulk of commerce education institutions in India rely on government funding, which are insufficient to give students with the infrastructure and learning resources they need to acquire top-notch knowledge.
- Students' dislike of commerce education is one of its main problems. For competitive exams, both UPSC and state-level public service commissions in states only require one or two papers; the more extensive commerce syllabus in competitive exams is unappealing.

Suggestions

To educate students for the corporate environment, commerce and management education should be redesigned. To make commerce education more useful and focused on the workplace, we would like to recommend the following actions. The MHRD, AICTE, UGC, and State governments have taken a look at some of our recommendations, but they are still insufficient and need to be improved.

- Infrastructure and educational materials: To enable commerce education to meet global challenges, facilities such as well-equipped classrooms with contemporary communication devices like computer networks, overhead projectors, internet access, business labs, well-equipped libraries, digital libraries, etc., should be made available. appropriate lighting, ventilation, and seating configurations. Aim for a stable student-teacher ratio and steer clear of packed classrooms.
- In order to improve the effectiveness and practicality of commerce education, learner-cantered, case-based, and project-based teaching approaches should be used in favour of the antiquated and ineffective ones. Simulation and role-playing techniques should also be prioritized.
- In order to make the curriculum more realistic and useful, it must be parallel to professional courses such as Chartered Accountant (CA), Company Secretary (CS), Certified Public Accounting (CPA), Certified Management Accountant (CMA), and Business Accounting and Taxation (BAT). Include the practical parts of creating reports, taking minutes, conducting case studies, group discussions, project work, and field surveys in commerce curricula.
- Industry -Institutional-university linkage: It is imperative to connect educational institutions with business in order to meet the demands of the corporate sector and address the problems posed by globalization. In order for the students to comprehend industry requirements and receive the necessary training.
- Redesign the business education program to satisfy business and other organizations' needs.
- Establish business labs at every college to provide students real-world experience.
- Appoint qualified faculty: Full-time permanent faculty should be appointed, and they should be active in administration. Teaching faculty in commerce education should be appointed only on the basis of merit.
- Programs for faculty development should provide them with training. Commerce education should be included in the field of professional education.

Conclusion

This paper contends that in order to meet the needs of a technologically advanced, international economy, Indian commerce education must change. A transition from theoretical learning to practical, skill-based learning is required, as demonstrated by the historical overview and study of post-LPG changes. Education and research reveal a discrepancy between industrial

expectations and academic preparation, especially in the areas of analytical, technical, and presentation abilities. It promotes industry alliances, job-oriented courses, and the incorporation of digital tools like e-commerce and e-governance in order to address this. The development of soft skills and entrepreneurial mind-sets are emphasized. Commerce education may generate graduates who are capable of navigating the intricacies of the contemporary business environment and contributing to India's economic progress by emphasizing practical experience, digital literacy, and business collaboration. The evolution of commerce education in India is a crucial reaction to the forces of globalization and technological disruption, according to the paper's conclusion. The need for a paradigm change from conventional, theoretical frameworks to a dynamic, skill-centric model is highlighted by the historical background, especially the effects of LPG. Indian commerce education may successfully generate graduates who are not only academically sound but also industry-ready and entrepreneurial by adopting a holistic educational approach that skilfully combines theoretical knowledge with practical application. This change will guarantee that commerce education continues to be a key driver of economic growth, enabling students to prosper in the intricate and dynamic global business environment and meeting the needs of a market that is changing quickly.

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An Analytical Study on Impact of Summer Internship Program Experience on Career Readiness of MBA Students with special Reference to PRMIT&R, Badnera

Dr. G. S. Kalmegh,

Shreya P. Dharme, Nikita S. More, Mayuri S. Katole, Divya R. Dabhade

Email-mayurikatole822@gmail.com, Phone-+91-7387289569

Department of Management Studies,

Prof. Ram Meghe Institute of Technology & Research, Badnera, Maharashtra, India

Abstract

Internships have become an essential component of management education as they provide MBA students with valuable practical exposure to real-world business environments. In today's highly competitive job market, organizations expect graduates to possess not only theoretical knowledge but also practical skills, confidence, and professional competence. Internship programs help Students Bridge the gap between classroom learning and industry requirements by allowing them to experience real organizational practices and workplace culture. The main objective of this study is to examine the impact of internship experience on the career readiness of MBA students at Prof. Ram Meghe Institute of Technology and Research (PRMITR), Amravati City. The study is based on a survey conducted among 50 MBA students who have completed their internships. The collected data was analyzed using simple percentage analysis.

The findings reveal that internship experience significantly enhances students' professional skills, teamwork abilities, and job confidence. It also helps students gain industry knowledge and develop a better understanding of workplace expectations. The study concludes that internships play a vital role in improving the employability and career readiness of MBA students and act as an important bridge between academic learning and practical industry experience.

Keywords: Internship Experience, Career Readiness, MBA Students, Employability Skills, Professional Skills, Industry Exposure.

1. Introduction

The Summer Internship Programme (SIP) is an essential component of the Master of Business Administration (MBA) curriculum at Prof. Ram Meghe Institute of Technology and Research, Badnera–Amravati. The programme is designed to provide students with practical exposure to real business environments and to bridge the gap between theoretical knowledge and practical application. As per the academic guidelines, every MBA student is required to complete a minimum of 60 working days of internship after the completion of the second semester and before the commencement of the third semester.

The primary objective of the SIP is to enable students to gain hands-on experience in industry, corporate organizations, government undertakings, NGOs, SMEs, financial institutions, or other business establishments. Through this internship, students are exposed to real organizational practices, work culture, managerial decision-making processes, and professional responsibilities.

The SIP may involve research-based projects using primary or secondary data or operational assignments related to management functions. During the internship period, students are expected to work on specific projects assigned by the organization or faculty guide, maintain a SIP progress diary, and document their daily learning and work progress. At the end of the internship, students must prepare and submit a structured SIP report along with the progress diary, duly approved by the organizational authority and evaluated by the institute.

Furthermore, the Summer Internship Programme carries four academic credits, reflecting its importance in developing managerial competencies. The internship experience helps students enhance professional skills such as communication, teamwork, problem-solving, and analytical abilities while also improving their understanding of industry expectations. Overall, the SIP plays a significant role in preparing MBA students for future career opportunities and enhancing their employability in the competitive business environment.

2. Review of Literature

A review of literature helps to understand previous studies conducted on the impact of internships on students' learning, skill development, and career readiness. Many researchers have highlighted the importance of internships in improving practical knowledge, professional skills, and employability of management students.

C. R. Kothari (2004) explained that research is a systematic process of collecting, analyzing, and interpreting data to understand a specific problem. According to him, empirical studies such as surveys are useful for examining educational outcomes like skill development and career preparedness among students.

Jack K. Phillips (1997) stated that internship programs help students gain practical exposure and develop workplace competencies. His research emphasized that experiential learning plays a crucial role in preparing students for professional careers by improving their confidence and problem-solving abilities.

David A. Kolb (1984) introduced the concept of **experiential learning**, which explains that knowledge is created through the transformation of experience. According to Kolb, internships and practical training provide opportunities for students to apply theoretical knowledge in real-life situations, which enhances learning and professional development.

Paul D. D'Abate (2009) conducted a study on the value of internships and found that internships significantly improve students' professional skills, workplace understanding, and networking opportunities. The study concluded that internship experiences positively influence students' career readiness and employment opportunities.

Margaret A. Knouse and Kevin M. Fontenot (2008) examined the role of internships in management education and concluded that students who complete internships gain better job prospects and develop stronger interpersonal and communication skills compared to those who do not participate in internships.

Maertz Carl P. (2014) found that internships contribute to the development of job-related skills, industry knowledge, and professional attitudes among students. The study highlighted that internship programs enhance students' readiness for future careers and improve their employability.

Overall, previous studies indicate that internship programs play a significant role in enhancing **practical knowledge, professional skills, confidence, and career clarity among students**. These studies support the idea that internship experience is an important factor in preparing MBA students for successful careers in the corporate world.

3. Research Methodology

Research methodology plays an important role in conducting a systematic and scientific investigation. It provides a structured approach for collecting, analyzing, and interpreting data related to the research problem. The present study focuses on examining the impact of internship experience on the career readiness of MBA students at Prof. Ram Meghe Institute of Technology and Research (PRMITR), Amravati City.

1. Research Design

The study is based on a descriptive research design, which aims to describe and analyze the influence of internship experience on the professional development and career readiness of MBA students.

2. Data Collection Method

The data for this study was collected through a structured questionnaire designed to gather responses from MBA students regarding their internship experiences and the skills they developed during the internship period.

3. Sample Size

A total of 77 MBA students who have completed their internship were selected as the sample for this study.

4. Sampling Technique

The study adopted a convenience sampling method, where respondents were selected based on their availability and willingness to participate in the survey.

5. Sources of Data

Primary data was collected directly from MBA students through questionnaire responses related to their internship experience. Secondary data was collected from books, academic journals, research articles, and online sources related to internships and career readiness.

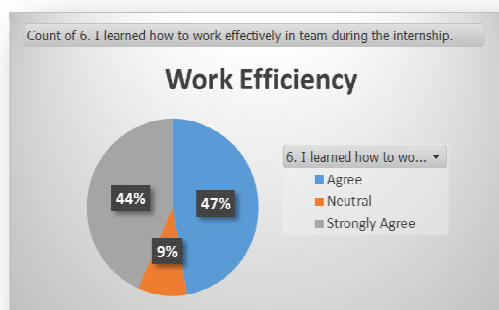
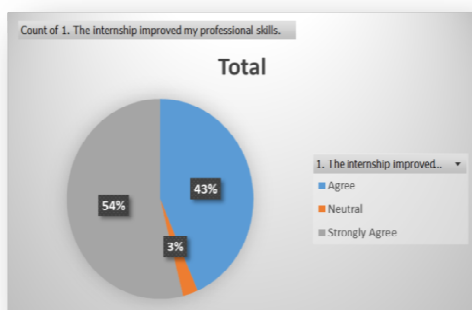
6. Data Analysis Technique

The collected data was analyzed using simple frequency and percentage analysis to understand the pattern of responses and measure the impact of internship experience on career readiness of MBA students.

4. Objective of the Study

1. To study the importance of internships in MBA education.
2. To examine the impact of internship experience on career readiness.
3. To analyze the relationship between internship experience and employability of MBA students.

5. Data Analysis



6. Data Interpretation

The data collected from MBA students of PRMITR, Amravati City was analyzed using the frequency and percentage method to understand the impact of internship experience on career readiness. The analysis shows that a majority of students (76%) agreed that the internship helped them improve their professional skills, which indicates that internships provide practical learning beyond classroom knowledge. Similarly, 76% of respondents stated that internships helped them gain new knowledge related to their MBA specialization, showing that practical exposure strengthens academic understanding. The results also reveal that 76% of students agreed that internship experience increased their confidence for future jobs, which highlights the importance of real workplace exposure in building self-confidence among management students. Furthermore, 72% of students agreed that internships helped them gain clarity about their career goals, as they were able to understand different job roles and industry expectations during the internship period. In addition, 74% of respondents agreed that internships helped improve their communication skills, which is an important competency required in the corporate world. The study also found that 76% of students agreed that internship experience helped them learn teamwork and collaboration, which are essential skills for working effectively in organizations. Overall, the interpretation clearly indicates that internship experience has a strong positive impact on the career readiness of MBA students. It helps students develop professional skills, gain industry knowledge

7. Conclusion

The study concludes that internship experience plays a crucial role in enhancing the career readiness of MBA students. The findings reveal that internships significantly contribute to the development of professional skills, improvement in job confidence, and enhancement of teamwork abilities among students. Through internships, students gain valuable practical exposure that helps them apply theoretical knowledge in real organizational settings and understand workplace culture and responsibilities. Moreover, internship experience prepares students to face real-world challenges and improves their employability prospects. Therefore, internships serve as an essential link between

academic learning and industry expectations, making them an important component of management education for building a successful professional career.

8. Suggestions

MBA institutes should make internships a well-structured and compulsory part of the curriculum so that students can gain practical exposure to real business environments.

Educational institutions should build strong partnerships with companies and organizations to provide quality internship opportunities for students.

Colleges should organize workshops, seminars, and skill development programs before internships to prepare students for workplace challenges.

Students should take internships seriously and actively engage in learning tasks to enhance their professional skills, confidence, and work experience.

Organizations should provide proper guidance, supervision, and mentorship during internships so that students can learn effectively from industry professionals.

Regular feedback and evaluation during the internship period can help students identify their strengths and areas for improvement, which will support their professional growth.

These suggestions can help improve the effectiveness of internship programs and enhance the career readiness and employability of MBA students.

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Assessing the Evolution of Cyber Threats and Strategic Security Solutions

Mr. Saurabh S. Mawaskar

Under Guidance Of

Prof. Rhutika V. Jawarkar

Department Of Computer Science ,Shri. Dadasaheb Gawai Charitable Trust, Amravati's,
Takshashila Mahavidyalaya , Amravati , ssaurabhmawaskar5@gmail.com ,
Rhutikajawarkar25@gmail.com

Abstract:

Cybersecurity is important to the computerised news industry. One of the defects in competition issues in the new planet is news security. Cybercrimes, what act the rise everyday, are mainly that springs to mind at any time we deem computerised guardianship. If skill is no safety to secure it, plans, awake files, file, and different main essential items are imperilled. Every business, either an IT firm or a hint of adjustment, needs to be protected equally. The attackers do not trail as a result of the advancement of new complicated security orders. They are utilising more brand-new and upgraded taxicab strategies to aim the feeble points of miscellaneous firms generally. Because of the tremendous amounts of files that the military, management, commercial, restorative, and friendly areas accumulate, use, and store on PCs and additional tools, computerised safety is important. Sensitive information, holding commercial dossiers, shielded features forged by original understanding, individual information, and various types of file that unauthorised approach or familiarity protect have undesirable belongings, can hold a considerable portion of earlier dossiers.

Keywords: computerised security, high-tech dangers, high-tech attacks, cybercrime, cyber defence

INTRODUCTION

Cybersecurity is essential in contemporary's networked planet to protect our mathematical methods, networks, and dossiers from unauthorised approach, criminal activity, and potential instabilities. The demand for efficient cybersecurity measures has never been greater due to the technology's exponential growth and growing reliance on digital infrastructure. Even contemporary technologies such as cloud estimating, mobile estimating, net investment, and ecommerce, demand an extreme level of security. Since these electronics involve some important facts about a person, their freedom has curved into a top priority. Each country's safety and financial well-being believe in embellishing cyber safety and looking after vital facts foundation. For a society to efficiently put an end to or recover from cyberattacks, all of the arrangements, society, and tools must agree. The tasks of finding, inspection, and remediation are three important freedom processes that can be increased by a united threat administration whole. The review of the main ideas and significance of cybersecurity in this introduction.

Definition :- Cybersecurity is outlined as the practice of forestalling unauthorised approach, misuse, and harm to manipulative structures, networks, dossiers, and certainties. It includes a broad range of plans, forms, and processes booked to protect the solitude, chance, and fullness of mathematical characteristics. Cybersecurity demands preventing, recognizing, and fighting many connected to the internet dangers particular taxicab attempts, malware contaminations, dossier breaches, and additional cybercrimes.

• Importance of Cybersecurity

Cybersecurity is the process of hampering unauthorised approach, misuse, and damage to computer arrangements, networks, dossier, and information. It involves a broad range of plans, forms, and procedures engaged to defend the confidentiality, approachability, and dependability of mathematical assets. Cybersecurity requires preventing, spotting, and fighting many connected to the internet dangers aforementioned hack attempts, malware contaminations, data breaches, and different cybercrimes.

- **Evolving Cyber Threat**

The cybersecurity threat landscape is always changing and getting more complex. To conduct cyberattacks, cybercriminals and other bad actors constantly create new methods and take advantage of weaknesses in software, networks, and user behaviour. Financial loss, reputational harm, operational interruptions, privacy violations, and even hazards to national security could be caused by these attacks. The attack surface has been further increased by the introduction of technologies like artificial intelligence, the Internet of Things, and cloud computing, posing new cybersecurity issues.

- **Purpose**

Protecting calculating arrangements, networks, and data from unauthorised approach, use, announcement, break, or destruction is the aim of cybersecurity. It requires dawdling in place a type of safeguards and processes to keep digital property, structures, and data processing infrastructure against potential dangers like hackers, malware, viruses, dossier breaches, and added cyber attacks. Cyber Security everything to assure delicate dossier from unauthorised access and damage to calculating arrangements and networks by guaranteeing the confidentiality, purity, and chance of dossier and information. To recognise, stop, detect, respond to, and recover from cyber threats, a variety of techniques, technologies, and procedures are used. Security, privacy, and trustworthiness of digital systems, networks, and data are the main goals of cybersecurity. Effective cybersecurity solutions can help people, businesses, and governments lower the risks posed by cyber threats, safeguard confidential data, and ensure the availability and integrity of their digital assets.

Principles of Cyber-security.[1]

The following guiding concepts form the foundation of cybersecurity and serve to apply it.

- **Confidentiality** : Keeping sensitive data and information private by limiting access to just those who are authorised.
- **Integrity** : Upholding the reliability, correctness, and consistency of data and systems.
- **Availability** : System and data availability refers to making sure they are available and useful when required.
- **Authentication** : Verifying users' and devices' identities during authentication helps prevent unauthorised access.
- **Authorization** : Giving the right users and entities the right access privileges is known as authorization.
- **Non-repudiation** : The provision of proof demonstrating the provenance and reliability of digital transactions.
- **Resilience** : Is the process of creating networks and systems that can tolerate outages or cyberattacks and bounce back.
- **Mitigating Cyber Threats** : Cybersecurity aids in the identification, detection, and effective response to cyber threats. It entails using technology to identify and stop unwanted behaviour, malware infections, and other types of cyberattacks, such as firewalls, intrusion detection systems, and security software.
- **Maintaining Trust and Confidence** : Building and maintaining confidence in online interactions, digital transactions, and other kinds of online services is made possible by cybersecurity. Cybersecurity helps people, businesses, and society at large feel more secure by safeguarding user data, privacy, and the security of online platforms.[2][3]

Technology

Network freedom finishes named firewalls keep track of and manage two together arriving and demonstrative networks sell goods conform with pre-settled protection organising. Between networks and outside networks (like the Internet), they present an image of a firewall, preventing unauthorised approach and obstructing hateful traffic. IDS/IPS electronics attend network traffic for some unusual patterns or behaviours that may be signs of an assault or interruption. They can spot potential protection breaches, inform administrators, and in sure positions, automatically take deterrent measures to hinder assaults in actual time for action or event. Software for detecting and averting malware, containing as viruses, worms, Trojan mares,

ransomware, and spyware, is known as antivirus and anti-malware program. These finishes act arrangement, programme, and file flipping through in consideration of find and quarantine malware infections. Cryptographic systems like SSL and TLS are used to save connected to the internet ideas. They offer encryption and confirmation, making certain that information shipped between consumers and websites or middle from two point structures is protected from eavesdropping and guidance. Over open networks, like the Internet, VPNs build secure, encrypted relations. They authenticate a private network link, enabling consumers to link by chance or over public Wi-Fi networks and approach possessions carefully and privately.[4]

I. LITERATURE REVIEW

Preserving the company's technology policies and procedures is essential. However, unless the policies and procedures are put to the test, an organisation cannot assess how effective a security program is. Top management is compelled by threats and cyberattacks to make sure that the network and systems are safe from hackers. The sensitive information of clients is at risk due to the media's reports of a security breach that catches on fire.

Although a specific model isn't specified at this stage of the threat modelling process, the most widely used models should be trustworthy representations of threats and should be used often to get consistent results. The main objective of the methodology is to model threats based on the attacker's capabilities. An impact model is required in addition to asset value and acquisition cost so that the business may assess possible threats in several ways. Because of this, you should take into account both the direct and indirect costs related to your loss as well as the net intrinsic worth of each asset. Both the company and the pentesters should give serious consideration to this crucial step in the process. Because it makes it possible to rank the business's assets, giving the pentester a base around which to build process, procedure, and control testing.

How does Cyber Security make working so easy?

Cybersecurity does not necessarily make working "easy" in the sense of reducing effort or eliminating challenges. Instead, cybersecurity plays a critical role in enabling secure and efficient work environments by mitigating risks and protecting against potential threats. Here are a few ways in which cybersecurity contributes to making work more manageable:

Protection of Data and Assets

Cybersecurity methods protect priceless information, intellectual property, and digital assets from unauthorised access, theft, and damage. Cybersecurity lowers the danger of monetary losses, reputational harm, or legal repercussions by preserving the integrity and confidentiality of critical information.

User Awareness and Training: User education and training programmes are frequently included in cybersecurity initiatives to inform staff members on best practises, appropriate online conduct, and potential threats. Organisations may develop a more security-conscious workforce and lessen the chance of events linked to human error by equipping staff with the knowledge and abilities to recognise and respond to cybersecurity threats.

In the related realm of today, all benefits from forward-thinking computerised protective initiatives. At a various level, a cybersecurity epidemic grants permission to cause entirety from identity stealing to cheating attempts to the deficit of important dossiers like classification photos. Everyone is weak on unsafe forms like capacity plants, clinics, and commercial service providers.[5][6]

II. TYPES OF CYBER SECURITY

Cybersecurity can be divided into a number of subcategories or types that concentrate on specific facets of safeguarding computer networks, systems, and data. The following are some of the main categories of cybersecurity:

Network Security & Application Security: Network protection requires watching computer networks against interruption, abuse, and attacks. It works to secure network foundation and stop unauthorised approach to sensitive dossiers, to a degree firewalls, interruption discovery and stop systems, in essence private networks (VPNs), and network separation. Application safety is engaging attention insulating software wholes and uses at each stage of happening. In order to find and close protection breach that an attacker takes care of exploit, it requires secure systematised practices, frequent exposure assessments, and seepage experiments. To prevent unauthorised approach to or guidance of programmes, approach controls and authentication processes must more be fixed.

Data Security & Cloud Security: Protecting data against unauthorised access, disclosure, or change is part of data security. In order to guarantee the security, integrity, and accessibility of sensitive data, this includes putting encryption, access controls, and data loss prevention (DLP) mechanisms into place. Data backup, recovery, and storage protocols are all included in data security. Securing data and applications hosted in cloud settings is the main goal of cloud security. To safeguard cloud-based resources against unauthorised access or data breaches, it entails adopting strong access restrictions, encryption, and monitoring methods. Shared responsibility frameworks and regulations relevant to cloud service providers are also addressed by cloud security.[7]

Phishing & Social engineering : Phishing is the practice of shipping phoney emails that perform to have reliable beginnings. The objective search out exchange contemplative news like login news and fee card facts. It is the ultimate weighty type of cyberattack. Over education or a mechanics solution that filters injurious electronic mail, you can help protect manually. It is an action secondhand by opponents to deceive you into revealing impressionable news. They can demand a commercial fee or enhance their approach to your private facts. In order to make you more inclined to click on links, spread malware, or support distressing causes, social engineering may be linked accompanying few of the pressures filed above.

III. Cyber Threat

Cyber threats refer to the potential for a malicious attempt to interfere with or harm a system or computer network. Attacks' objectives vary based on what cybercriminals need. The attacks have an impact on many significant sectors, including the military, financial institutions, governments, enterprises, business, and hospitals that gather, store, and process sensitive computer data and share it with other computers via networks.

Types of CyberThreat

- **Malware :** Is a hateful operating system, such as viruses, worms, Trojan stallions, ransomware, spyware, or adware, that aims to permeate calculating systems, embezzle dossiers, restrict workflow, or alternatively cause harm.
- **Phishing:** Phishing is the practice of fooling dignitary into exposing delicate news, in the way that login passwords, credit card news, or individual facts, by employing dishonest methods, in the way that bogus emails, websites, or ideas.
- **DDoS & DoS Attack :** Attacks famous as dismissal-of-service (DoS) and delivered dismissal-of-duty (DDoS) are designed to astonish or consume structure resources, in the way that servers or networks, translation ruling class, are unreachable to authorised consumers. Attackers overcome guide systems with plenty of frequency range or requests, which disrupts help.
- **Zero-epoch Exploits:** programme imperfections that are unknown to the programme householder or for that skilled is no patch are the focus of zero-era exploits. Before safety patches or upgrades may be created and announced, attackers use these exposures to gain unauthorised approach.
- **Man-in-the-Middle (MitM) Attacks:** Without the target bodies' information, MitM attacks interrupt and tamper with ideas 'tween two bodies. Attackers put themselves even on the broadcast, bestowing them the chance to overhear, change, or increase hateful content.[8]

Techniques to Avoid Cyber Threats

Here are some crucial strategies and actions you can do to improve your cybersecurity and prevent cyber threats:

- **Use Secure and complicated Passwords:** Don't use the same password on several websites. Instead, create secure, complicated passwords for your online accounts. To generate and save passwords for each account securely, think about using a password manager.
- **Maintain Software Updates:** To make sure you have the most recent security updates and protection from known vulnerabilities, regularly update your operating system, programmes, and antivirus software.
- **Backup Your Data Regularly :** Implement a regular backup schedule for your key files and data. Back up your data frequently. Backups should be kept on offline or cloud storage platforms, and they should be accessible and secured in case of data loss or ransomware attacks.
- **Use Secure Wi-Fi Connections:** When connecting to Wi-Fi networks, pick secure ones that use encryption (e.g., WPA2 or WPA3) and require a password. Do not access sensitive information or carry out financial activities on unsecured or public Wi-Fi networks.

• **Monitor and Activity:** Monitor and examine account activity on a regular basis. Look over your credit card statements, bank statements, and online account activity for any unauthorised or questionable transactions. Report any irregularities right once to the appropriate organisations if you find any.

By putting these strategies and practises into practice, you may greatly improve your cybersecurity and lower your risk of becoming a victim of online dangers. It's important to keep in mind that cybersecurity requires continual work, so protecting your online safety requires being aware and proactive.

IV. Cybersecurity challenges that the industry is facing today:

➤ **Ransomware Offences**

One of the main high-tech protection issues that worries us in the mathematical age is ransomware. An original number of ransomware attacks will happen in 2021–2022, and this flow will be in the second place in 2023. According to research by ASTRA IT, there are 1.7 heap ransomware attacks per epoch, accompanying individuals happening all 2 seconds. The average ransomware attack happened in deficits of until \$1.85 heap. The National Health Service (NHS) compensated a stated \$100 heap in damages on account of the WannaCry ransomware epidemic. The amount of doubtful venture had connection with ransomware SARs written in the first half of 2021 was expected expected \$590 heap, surpassing the total stated for the complete period of 2020 (\$416 heap), in accordance with Fincen's (Financial Crime Enforcement Network) Financial Trend Analysis study.

➤ **IoT (Internet of Things) Attacks**

The Internet of Things or IoT, is specifically exposed to attacks to dossier security. The Internet of Things (IoT) refers to all mathematical, machinelike, calculating, and smart designs that can transmit data across a network of WWW links, in the way that laptops and movable phones. In order to approach users' delicate dossier, hackers mainly mark the IoT subdivision. More than 14.4 billion linked plays are expected to be common by 2023. According to IoT Analytics, skilled will be over 27 billion plays connected to the internet immediately by 2025. According to the dossier, there will be almost 12 billion manoeuvres connected to the internet by 2022, and skilled will be 25 billion by one end of 2030.

➤ **Malware for Mobile Banking**

At first glance, this seems to be a significant barrier for anyone worried about ATM skimming. Additionally, new techniques are being developed that will let thieves use tablets and cellphones to access bank accounts. Mobile banking malware, like its predecessor, preys on device flaws to steal login credentials, credit card numbers, and other confidential user data. If their strategy is effective, cybercriminals can deplete your bank account in less than 30 minutes. Thus, this has evolved into one of the riskiest issues that banks will face in 2023.

AI assaults

Consumers and businesses will likely employ AI considerably more in 2023. Cybersecurity could benefit or suffer from this. AI can assist security operations centre analysts, discover and stop attacks, and monitor and find fraud in the day-to-day job of security teams.

Nearly 68% of research participants felt artificial intelligence (AI) could be easily exploited against their businesses in spear-phishing and impersonation attacks in 2021.

Additionally, it warned that AI might encourage ransomware, endangering IT security.[8][9]

Advantages of Cybersecurity:

- Protection of Confidential Information
- Prevention of Financial Loss
- Secure us from dangerous attacks
- Browse the same website

Disadvantages of Cybersecurity:

- Cost and Resource Intensive
- False Sense of Security
- Potential for User Inconvenience
- Limited Effectiveness against insider Threats

CONCLUSION

In conclusion, cybersecurity issues and dangers are uniformly changeable and present serious risks to family, trades, and association. A complex and vital cyber countryside has existed presented on account of intensely evolution of science and the increasing relation of instruments and orders. As more schemes are enhanced, the attack surface expands, providing cybercriminals with more entrance points to exploit. This increases the risk of attacks on critical foundations, to a degree capacity grids, conveyance orders, and healthcare networks. Additionally, the shortage of skillful cybersecurity pros infuriates the challenges. There is an extreme demand for specialists who can efficiently discover, block, and put oneself in the place of other computer based threats. The shortage of these artists hampers organisations' strength to build healthy defences and react effectively to high-tech occurrence. To address these challenges and diminish warnings, organisations and individuals need to prioritise cybersecurity as a fundamental facet of their movements. The goal of computerised convicts is the computer world and the cyber protection breaches to a doubtful level. The science is hurtful and new belongings can seem more fearsome than they actually are. There is an increasing middle between cyber freedom and high-tech warnings. That will change the complete landscape of the computer network. A low fantasy is necessary to guarantee cyber safety, preventions and restore from cybercrimes and allure results. It grants permission to change the landscape of information technology.[10]

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A Study on Job Satisfaction and Challenges of Group D Employees in Private Sector

Prof.Dr. Gauri S. Kalmegh, Ms. Mitali Dahekar, Ms. Shrunkhala Dewle, Mr. Anivesh Sahu, Ms. Divyani Neware

Department of Management Studies, Prof. Ram Meghe Institute of Technology & Research, Badnera, Amravati

Abstract

Job satisfaction is an important factor that influences employee performance, motivation, and productivity in an organization. Group D employees in the private sector perform essential supportive tasks that help in the smooth functioning of organizations. However, they often face challenges such as heavy workload, low salary, job insecurity, and limited opportunities for growth. The present study aims to examine the level of job satisfaction and the challenges faced by Group D employees in the private sector. The study also analyzes the relationship between occupational stress and job satisfaction. A descriptive research design was used, and primary data were collected from **41 respondents** through a structured questionnaire using a **5-point Likert scale**. The data were analyzed using **frequency and percentage methods**. The findings show that factors such as salary, working conditions, workload, supervisor behavior, and job security significantly influence the job satisfaction of Group D employees. The study suggests that improving working conditions and providing better support can help increase employee satisfaction and productivity.

Key words: Job Satisfaction, Work Environment, Job Security, Working Conditions, Job Stress, Group D Employees, Career Growth.

❖ Introduction

Job satisfaction is an important concept in organizational behavior and human resource management. It refers to the feelings and attitudes that employees have toward their jobs. When employees feel satisfied with their work, they tend to show higher productivity, commitment, and loyalty toward the organization. Job satisfaction is influenced by factors such as salary, working conditions, job security, relationship with supervisors, and opportunities for growth and promotion. Organizations that focus on improving employee satisfaction often achieve better performance and organizational stability. On the other hand, dissatisfaction among employees can lead to absenteeism, low morale, and high turnover rates (Locke, 1976; Spector, 1997).

It is an important factor in organizational success because satisfied employees contribute positively to the growth and efficiency of the organization. Organizations with higher levels of employee satisfaction often experience better teamwork, improved communication, and higher employee retention. Organizations need to focus on creating a positive work environment that supports employee satisfaction and well-being (Judge, Thoresen, Bono, & Patton, 2001).

1.1 Challenges Faced by Group D Employees in the Private Sector

Group D employees in the private sector often face a number of challenges in their workplace. These challenges may include heavy physical workload, long working hours, limited access to training programs, and lack of participation in decision-making processes. In addition, many employees in these roles may experience job insecurity due to contractual employment arrangements. Such challenges can negatively impact their mental well-being, job satisfaction, and overall work performance (Cooper & Dewe, 2008).

1.2 Factors Influencing Job Satisfaction of Group D Employees

Several factors influence the level of job satisfaction among Group D employees. These include salary, job security, working conditions, workload, organizational support, and interpersonal relationships at the workplace. Employees working in lower occupational categories often face issues such as low wages, limited benefits, lack of recognition, and restricted opportunities for promotion. These factors can significantly affect their motivation and job satisfaction. When organizations fail to address these concerns, employees may experience dissatisfaction and decreased work performance (Herzberg, Mausner, & Snyderman, 1959).

1.3 Group D Employees in the Private Sector

Group D employees play an essential role in the daily functioning of organizations. They are generally responsible for performing basic and supportive tasks such as cleaning, maintenance, office assistance, and other operational duties. Although their roles may appear simple, they contribute significantly to maintaining the efficiency and smooth operation of workplace activities. In the private sector, many Group D employees work on contractual or temporary employment terms, which may lead to uncertainty regarding job stability and benefits. Despite their importance, these employees often receive less attention in research studies compared to higher-level employees (Brough & Frame, 2004).

❖ Review of Literature

Herzberg, F., Mausner, B., and Snyderman, B. (1959) in their book *The Motivation to Work* explained the Two-Factor Theory, stating that factors like salary, working conditions, and organizational policies influence employee job satisfaction and dissatisfaction.

Locke, E. A. (1976) in *Handbook of Industrial and Organizational Psychology* defined job satisfaction as a positive emotional state resulting from the evaluation of one's job experiences.

Spector, P. E. (1997) in the book *Job Satisfaction: Application, Assessment, Causes, and Consequences* discussed different factors affecting job satisfaction such as pay, supervision, promotion opportunities, and work environment.

Judge, T. A., Thoresen, C. J., Bono, J. E., and Patton, G. K. (2001) in their work *The Job Satisfaction–Job Performance Relationship* explained that higher job satisfaction leads to better employee performance and productivity.

Cooper, C. L., and Dewe, P. (2008) in *Well-being—Absenteeism, Presenteeism, Costs and Challenges* highlighted that workload, job stress, and poor working conditions can reduce employee satisfaction and well-being.

❖ Research Methodology

Research Problem

In many private sector organizations, Group D employees perform essential supportive tasks such as cleaning, maintenance, and office assistance. Despite their important role in maintaining workplace efficiency, these employees often face several challenges such as low salary, heavy workload, poor working conditions, limited promotion opportunities, and job insecurity. These factors can influence their level of job satisfaction and overall work performance. Therefore, it is important to study the level of job satisfaction and the challenges faced by Group D employees in the private sector.

Objectives of the Study

The major objectives are:

1. To understand the concept of occupational stress and its impact on Group D employees.
2. To identify the major causes of occupational stress among Group D employees in the workplace.
3. To measure the level of job satisfaction among Group D employees.
4. To examine the relationship between occupational stress and job satisfaction.
5. To analyze the factors influencing job satisfaction, such as salary, work environment, workload, supervisor behavior, and job security.
6. To study the impact of stress on employee performance and productivity.
7. To suggest practical measures for reducing occupational stress and improving job satisfaction among Group D employees.

Research Method

The present study adopts a **descriptive research method**. Descriptive research helps in describing the existing conditions, opinions, and experiences of employees regarding their job satisfaction and workplace challenges. This method allows the researcher to collect and analyze data systematically in order to understand the factors influencing job satisfaction among Group D employees in the private sector.

Sampling Design

The study uses a **convenience sampling**. Respondents were selected based on their availability and willingness to participate in the study. This method helped the researcher to collect data easily from employees working in different private organizations.

Universe of the Study

The universe of the study consists of **Group D employees working in private sector organizations** who perform supportive and operational tasks such as cleaning, maintenance, and office assistance.

Sample Size

For the purpose of the study, a **sample of 41 respondents** was selected. The responses were collected from Group D employees working in different private sector organizations.

Sources and Type of Data

The study is based on both **primary data and secondary data**.

Primary data was collected directly from respondents using a **structured questionnaire** based on job satisfaction and workplace challenges. Secondary data was collected from **books, research journals, articles, and online sources** related to job satisfaction, occupational stress, and employee well-being.

Data Collection Tool

A **structured questionnaire** was used as the main tool for collecting data from respondents. The questionnaire consisted of statements related to job satisfaction, workload, salary, supervisor behavior, working conditions, and job security. The responses were measured using a **5-point Likert scale** consisting of:

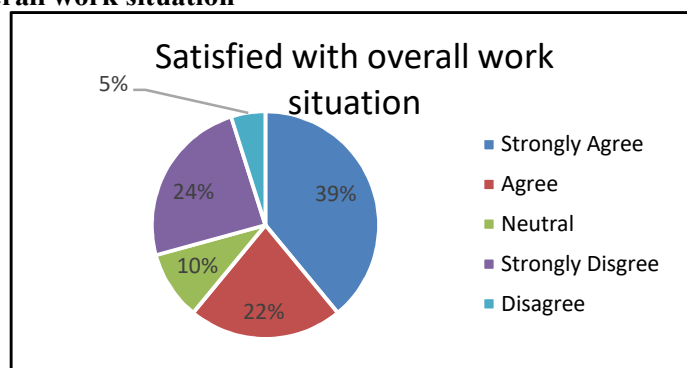
- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Data Analysis Method

The collected data were analyzed using **simple statistical tools such as frequency and percentage analysis**. The results were presented in the form of **tables and interpretations** to understand the level of job satisfaction and the challenges faced by Group D employees in the private sector.

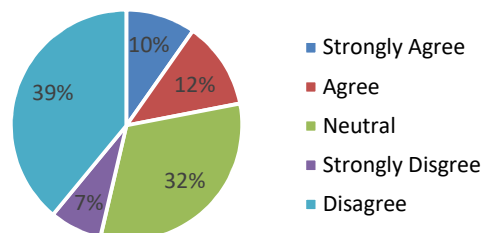
❖ Data Analysis & Interpretation

1. Satisfied with overall work situation



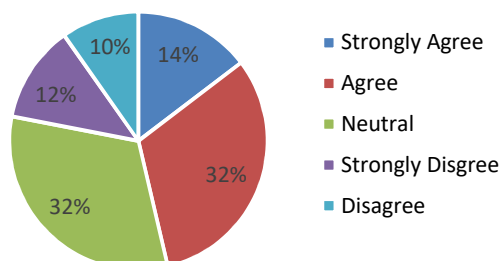
Interpretation: Out of 41 respondents, 39.02% strongly agree and 21.95% agree that they are satisfied with the overall work situation. This means 60.97% of employees are satisfied. However, 24.39% strongly disagree and 4.88% disagree, indicating 29.27% dissatisfaction, while 9.76% remain neutral. Overall, most employees are satisfied, but some are still dissatisfied with the work situation.

2. Feel stressed due to workload

Feel stressed due to workload

Interpretation: Out of 41 respondents, 21.96% agree that they feel stressed due to workload, while 46.34% disagree, indicating that most employees do not feel stressed by their workload. 31.71% remain neutral, showing mixed opinions among employees.

3. Appreciation from supervisor

Appreciation from supervisor

Interpretation: Out of 41 respondents, 46.34% of employees (14.63% strongly agree and 31.71% agree) feel they receive appreciation from their supervisor. 31.71% of respondents are neutral, while 21.96% (12.20% strongly disagree and 9.76% disagree) feel they do not receive appreciation. Overall, this indicates that many employees feel appreciated, but a considerable number remain neutral or dissatisfied.

❖ Findings

The study reveals that most employees are satisfied with their overall work situation and feel comfortable in the workplace environment. The majority of respondents reported that workload does not cause high stress and that job stress does not greatly affect their personal or family life. Many employees feel appreciated by their supervisors and maintain good communication and relationships with their co-workers, which contributes to a positive work atmosphere. The findings also show that most employees do not consider their job tasks repetitive or boring. In addition, a large number of respondents are satisfied with their salary and benefits, feel that their job provides opportunities for personal growth, and remain motivated to perform well in their work. Overall, the results indicate a generally positive level of job satisfaction among employees, although a small proportion expressed neutral opinions or some dissatisfaction in certain areas.

❖ Suggestions

The organization should continue to maintain a supportive and comfortable workplace environment to ensure higher employee satisfaction. Management should provide regular appreciation and recognition to employees for their work to improve motivation and morale. Efforts should be made to reduce work stress through better workload management and employee support programs. The organization should also focus on providing more opportunities for training, skill development, and career growth. Additionally, management should review salary structures and benefits periodically to ensure fairness and improve employee satisfaction. Strengthening communication between employees and supervisors can also help create a more positive work environment.

❖ Conclusion

The study concludes that most employees are generally satisfied with their jobs and the workplace environment. Employees reported positive relationships with co-workers, good

motivation to perform their work, and satisfaction with salary and benefits. The findings also indicate that job stress and workload do not significantly affect most employees. Overall, the organization provides a relatively positive work environment that supports employee satisfaction and performance. However, there is still a need for continuous improvement in areas such as employee recognition, career development opportunities, and stress management to further enhance job satisfaction among employees.

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Advanced Network Security Protocols For Secure And Reliable Communication In Modern Distributed Systems

Mr.Manish .K. Sawalkar

Under Guidance Of

Prof. Rhutika .V. Jawarkar

Department Of Computer Science Shri. Dadasaheb Gawai Charitable Trust, Amravati Takshashila
Mahavidyalaya, Amravati, manishsawalkar913@gmail.com , rhutikaujawarkar25@gmail.com

Abstract:

With the rapid development of Internet, network security protocol plays an increasingly important role, which will enhance the security and stability of computer communication. Network security protocol can control the application process of computer communication technology, which will improve the computing communication environment. Through security protocol, we can guarantee the security of computer communication technology. In CTC system, this paper analyzes the practical application of computer security protocol. Through **security protocol, we can** guarantee the practical application effect of computer communication technology, which will promote the strengthening of security protocol in the future. In practical work, the security protocol will transfer information and data through a variety of methods, such as key distribution, identity authentication, data encryption and so on. Firstly, this paper analyzes the common security protocols. Then, this paper analyzes the role of security protocol.

Introduction:

In an increasingly interconnected digital world, network security has become a critical concern for organizations, Governments, and individuals. As the global digital infrastructure expands and relies more heavily on the internet for Communication, commerce, and data management, the need for robust and effective network security mechanisms has Never been more urgent. Cyber threats have evolved significantly over the past few decades, transitioning from simple Viruses and malware to more sophisticated and targeted attacks such as Advanced Persistent Threats (APTs), Ransomware, and zero-day exploits. These attacks not only pose a threat to individual systems but can lead to massive Data breaches, financial losses, and even national security concerns

The proliferation of emerging technologies such as the Internet of Things (IoT), cloud computing, and 5G networks has Further expanded the attack surface, making it more challenging to secure modern networks. With billions of connected Devices and complex, distributed systems, ensuring the security and integrity of digital assets requires a multi-layered And dynamic approach

1. Common security protocols:

1.1. Kerberos network identity authentication protocol :

Kerberos is a kind of network identity authentication protocol, which mainly exists in the upper construction of TCP / IP communication protocol stack. Through DES encryption and authentication, we can provide authentication service for the C / S structure of external network transmission, as shown in Table 1. Through Kerberos, we can obtain the authorization of the network host, which is a way without identity authentication. Through Kerberos, we can read and modify the packets transmitted in the network. Through symmetric key management mechanism, Kerberos technology can authenticate network users, which will request authentication service from clients. The Kerberos database is a mechanism that is responsible for adding and modifying key rules. However, the client, authentication server and encryption key data transmission control can realize the management of communication access and transmission[1].

Table: 1. Kerberos network authentication protocol

1.2. SSL (Security Socket Layer protocol):

SSL secure socket layer protocol is a secure transmission mechanism between network application layer and TCP / IP protocol, including SSL handshake protocol, SSL encryption protocol, SSL alarm protocol, SSL record protocol and other components, as shown in Table 2. SSL,

TLS protocol is a kind of protocol existing in the transport layer of network communication. Among them, SSL handshake protocol is responsible for the authentication of network communication, which will encrypt and exchange the key of data transmission. Data encryption process can be divided into client, SSL protocol and server. However, SSL encryption protocol is the protection protocol of encryption key and message transmission suite, which will be used for the protection between client and server. Finally. If the error byte value of the alarm message is 1, this is a general data communication error. If the error byte value is 2, this is a fatal error.

Application layer:http,FTP
SMTP SSL handshake protocol, SSL encryption protocol, SSL alarm protocol Record Protocol SSL Protocol
TCP
IP

Table: 2. SSL security socket layer protocol

1.3. HTTPS(Hypertext Transfer Protocol Secure):

Security hypertext transfer protocol is a technology to encrypt the data in HTTP network, including HTTP communication encryption, client and server identity authentication. The network communication protocol of HTTPS is in the application layer, which is the way to communicate with TCP. But in the network, we usually have SSL, TLS and other protocols, which requires us to communicate with SSL protocol and TLS protocol respectively. Then, we communicate with TCP through secure socket layer (SSL) interface to provide various services, such as user identification, data information exchange, etc. HTTPS hypertext transmission protocol will use asymmetric encryption algorithm and symmetric encryption algorithm to encrypt and decrypt data. Through authentication, we can detect the security and integrity of TLS / SSL protocol.

2. The role of protocols in cybersecurity:

Protocols are a strong line of defence in the battle against hackers because they prevent people from infiltrating, corrupting, stealing or taking advantage of your communication system. For instance, attackers would have difficulty wiretapping or listening in on communications because encryption would result in them only getting a jumbled set of nonsensical characters. Also, by setting up your security protocols correctly, you can prevent denial of service attacks. For example, you can use IPsec to require that each entity that interacts with your network goes through an authentication procedure. This would prevent hackers from randomly sending thousands or millions of requests to a server in a denial-of-service attack because they wouldn't be able to access the server in the first place.

In addition, many phishing attacks use fake websites to trick people into entering sensitive information. You can leverage SSL/TLS Digital certificates to authenticate the validity of a site an employee may be trying to visit, which would prevent them from going to one a hacker built that only appears to be legitimate. Protocols also play a pivotal role in cybersecurity frameworks. These frameworks provide guidance for security engineers and their teams to help make the network environments they work with as safe and reliable as possible.

Protocols intersect with many facets of cybersecurity frameworks because the frameworks use them as tools to keep communications and data safe. Those who design cybersecurity frameworks often piece together various security protocols like components of a machine to keep the networks that use

the frameworks running smoothly. Without network security protocols, framework designers may have to code their own solutions instead of using proven, effective technologies.[2][3]

3.Application of data encryption technology in computer network security:

3.1. Link encryption technology, virtual private network, practical application:

Compared with the end-to-end encryption technology, the link encryption technology is more complex. During the simultaneous transmission of various types of files before encryption transmission, each link node needs to decrypt the file when passing through. After decryption, it can enter the next link. Encryption and decryption are repeated, and it is finally received by the user on the basis of ensuring the integrity and accuracy of the file information data. Taking "virtual private network" as an example, with the continuous development of society and technology, on the basis of keeping pace with the times, enterprises in different industries and fields, combined with their own business and management, have used modern information technology means to skillfully build virtual private network. Its branch structure should apply LAN in different places, rent private routes, and connect multiple LANs in real time and effectively, Form a wide area network. In the process of information data transmission, enterprises can apply data encryption technology to fundamentally ensure the operation safety of LAN and WAN. In practical application, the link data encryption technology can be applied to the operation of virtual private network. While transmitting files with the help of LAN, the files will pass through each link node to encrypt and decrypt each link file, which can fundamentally improve the security of file transmission and prevent file information data leakage, loss, modification, etc

. On this basis, the application of the link encryption technology will dynamically and rationalize the file information data length under the action of each section and path in the file transmission of the virtual private network, improve the difficulty coefficient for hackers to correctly judge the file information data, effectively prevent the virtual private network from being attacked by hackers in the file transmission, and under the continuous synergy of encryption and decryption, Ensure that all aspects of document information data finally obtained by users have high accuracy. Under the function of link encryption technology, the form of file information in virtual private network can be transformed to realize secure transmission in the form of ciphertext, and the routing information is also in the ciphertext state. The security of all types of file transmission in the operation of virtual private network is fundamentally guaranteed.[3]

3.2. Software encryption based on data encryption technology:

At present, anti-virus software is widely used in computer security management. The use of anti-virus software can provide effective protection for computer security. However, when encrypting data, viruses in the computer will invade the anti-virus software, resulting in the inability of the anti-virus software to play its original protection function and timely verify the effectiveness of data [6]. Therefore, in the process of data encryption, we must first carry out effectiveness detection on the anti-virus software to confirm whether the encrypted information carries viruses. This kind of information has relatively high requirements for confidentiality. Therefore, we should encrypt anti-virus software and anti-virus software with the help of data encryption technology to improve the protection effect.

3.3. End to end encryption technology, e-commerce, practical application:

End-to-end encryption technology is one of the important data encryption technologies that play a role in computer network security. It encrypts the un-transmitted files. There is no need to encrypt and decrypt the files in the file transmission. After the files are received, the files are decrypted and rationalized and applied to practice.

Taking "e-commerce" as an example, in the high development of modern information technology, computer network and e-commerce are increasingly organically connected with people's daily production and life. The efficient development of e-commerce network platform is inseparable from the environment with high safety factor. The continuous emergence of security risks will inevitably affect the operation efficiency and benefit improvement of e-commerce network. In this process, the potential security risks of e-commerce come from the trading platform and trading information under the action of goods and services. The trading parties do not have a comprehensive and in-depth understanding of each other's data information.

High stability and low application cost are conducive to reducing the incidence of safety risks and improving the economic benefits of operation. After receiving the documents, both parties of the transaction need to use information technology means to standardize and decrypt the documents, and then they can directly apply them. Under the function of end-to-end encryption technology, even if there is damage in e-commerce file transmission, the file information data is still true and accurate and can be normally applied to practice, which is convenient for both parties of e-commerce transaction to comprehensively and deeply grasp the actual situation in all aspects of the transaction and ensure the orderly development of subsequent business activities.[4]

3.4 Comprehensive application of various data encryption technologies to protect the security of e-commerce:

In recent years, the continuous development and progress of e-commerce has played a great role in promoting everyone's production and life. If e-commerce wants to make great progress, it must ensure a good and safe network environment and provide a good foundation for the development of e-commerce. Network transaction information security and network platform security are two important parts of e-commerce security system. E-commerce generally selects digital certificates and digital signatures for encryption. The above data encryption methods can provide good protection for transaction information security and prevent illegal personnel or network hackers from stealing or damaging information resources, it is conducive to promoting the sustainable and efficient development of e-commerce.[5]

4. Computer Network Security Requirements:

It becomes simpler to implement appropriate security Policies and safeguards once the sources of potential Threats and the types of potential damage are identified. Organizations have a wide range of options, from antivirus Software packages to network firewalls, intrusion detection Systems, and network security hardware. Methodological Issues in computer network security have their own Characteristics, each of which has advantages and Disadvantages.

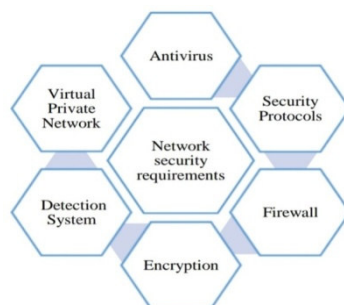


Fig: 1. Computer network security requirements

4.1. Antivirus:

Antivirus software is installed on most computers and handle most virus threats if the software is regularly updated and properly maintained. Antivirus software authors rely on large networks to develop and distribute updates containing information about new viruses. As thousands of new viruses are created every month, it is important to keep a virus database up to date. A virus database is a record stored in an antivirus package that helps detect and identify known viruses. Reputable antivirus software companies will publish changes with the latest virus information on their websites, and the software allows users to download and use new changes. A network security policy should ensure that all computers on the network are up-to-date and, ideally, protected by an anti-virus package. Also, the software itself needs regular updates.

4.2. Security Protocols:

When setting up a network, whether it is a Local Area Network (LAN), Virtual LAN (VLAN), or Wide Area Network (WAN), it is important first to establish basic Security policies. Security policies are rules that are electronically programmed and used in security equipment to control areas such as access rights. Policies in place should control who has access to which parts of the network and prevent unauthorized users from accessing restricted data. The individuals

responsible for the security of the network and its security must have access to all areas of the network. After defining and configuring Security policies, authentication methods and technologies must be used to authenticate users and their access rights. The simplest and most common method is to check whether a certain part of the network is “password protected” and only people with a specific password can Access it. The golden rule for passwords is as follows.

- Change passwords regularly
- Make passwords as obscure as possible
- Never share your password with anyone until you leave the company.[5]

Firewall – A firewall is a hardware or softwareSolution implemented within a network infrastructure to enforce an organization’s security policies by restricting access to specific network resources. A firewall creates a layer of protection between the network and the outside world. As a result, the firewall replicates the network at the access point so authorized data can be received without significant delay. It has filters that can block unauthorized or potentially dangerous material from entering the actual System. It records intrusion attempts and reports them to network experts.

4.3. Encryption:

Encryption technology ensures that messages cannot be received or read by anyone other than the authorized recipient. encryption is often used to protect data transmitted over social networks.

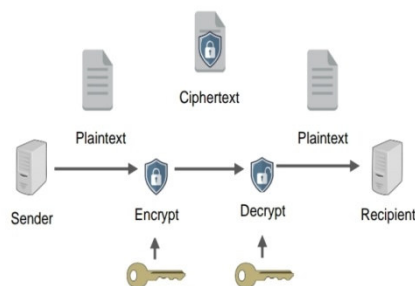


Fig: 2. Encryption

4.4. Intrusion Detection System (IDS):

A network-based intrusion detection system is always monitoring the network. IDS allows users to analyze packet traffic on a network, detect unauthorized activity, Such as hacker attacks, and respond to security breaches before systems are compromised. When an unauthorized Activity is detected, the IDS will send its details to the management and inform other systems and network devices to stop the unauthorized activity. As a physical Analog, IDS is the equivalent of a video camera and motion detector and detects unauthorized or suspicious activity and stops the activity by working with an automated response system such as a watchdog.

4.5. Virtual Private Network:

A VPN is a technology that uses the internet to create a private, confidential network between hosts regardless of geographic location and allows information to be securely transmitted securely without being exposed to any external intrusions. The VPN uses automatic encryption for all Applications and IP or Ethernet to increase security. The VPN system has powerful features and is very flexible and effective.

5. Types Of Attacks:

Networks are subject to attacks from malicious sources. And with the advent increasing use of internet attack is most commonly growing on increasing. The main categories of attacks can be from two categories: “Passive” when a network intruder intercepts data traveling through the network, and “Active” in which an intruder initiates commands to disrupt the network’s normal operation. A system must be able to limit damage and recover rapidly When attacks occur. There are some more types of attack that are also essential to be considered:

5.1. Passive Attack:

A passive attack monitors unencrypted traffic and looks for clear-text passwords and sensitive information that can be used in other types of attacks. The monitoring and listening of the communication channel by unauthorized attackers are known as passive attack. It includes traffic

analysis, monitoring unprotected Communications, decrypting weakly encrypted traffic, and capturing authentication information such as passwords. Passive interception of network operations enables adversaries to see upcoming actions. Passive attacks result in the disclosure of information or data files to an attacker without the consent or knowledge of the user.

5.2. Active Attack:

In an active attack, the attacker tries to bypass or break into secured systems in the going on Communication. This can be done through stealth, viruses, worms, or Trojan horses. Active attacks include attempts to circumvent or break protection features, to introduce malicious code, and to steal or modify information. The unauthorized attackers monitors, listens to and modifies the data stream in the communication channel are known as active attack. These attacks are mounted against a network backbone, exploit information in transit, electronically Penetrate an enclave, or attack an authorized remote user during an attempt to connect to an enclave. Active attacks result in the disclosure or dissemination of data files, DoS, or modification of data.

5.3. Distributed Attack:

A distributed attack requires that the adversary introduce code, such as a Trojan horse or back-door Program, to a —trusted component or software that will later be distributed to many other companies and users distribution attacks focus on the malicious modification of hardware or software at the factory or during distribution. These attacks introduce malicious code such as a back door to a product to gain unauthorized access to information or to a system function at a later date.

5.4. Insider Attack:

According to a cyber security watch survey insiders were found to be the cause in 21 percent of security breaches, and a further 21 percent may have been due to the actions of insiders. More than half of respondents to another recent survey said it's more difficult today to detect and prevent insider attacks than it was in 2011, and 53 Percent were increasing their security budgets in response to insider threats. While a significant number of Breaches are caused by malicious or disgruntled employees – or former employees – many are caused by well-meaning employees who are simply trying to do their job. Body programs and file sharing and collaboration services like dropbox mean that it will be harder than ever to keep corporate data under corporate control in the face of these well-meaning but irresponsible employees.

5.5. Close-in Attack:

A close-in attack involves someone attempting to get physically close to network components, data, and systems in order to learn more about a network. Close-in attacks consist of regular individuals attaining close physical proximity to networks, systems, or facilities for the purpose of modifying, gathering, or denying access to Information. One popular form of close in attack is social engineering. In a social engineering attack, the attacker compromises and the network or system through social interaction with a person, through an e-mail message or phone. Various tricks can be used by the individual to revealing information about the security of company. The information that the victim reveals to the hacker would most likely be used in a subsequent attack to gain unauthorized access to a system or network.[5][6]

5.6. Spyware Attack: A serious computer security threat, spyware is any program that monitors your online activities or installs Programs without your consent for profit or to capture personal information and this capture information is maliciously used as the legitimate user for that particular kind of work.

5.7. Phishing Attack:

In phishing attack the hacker creates a fake web site that looks exactly like a popular site such as the SBI Bank or paypal. The phishing part of the attack is that the hacker then sends an e-mail message trying to trick the user into clicking a link that leads to the fake site. When the user attempts to log on with their account information, The hacker records the username and password and then tries that information on the real site.

5.8. Hijack Attack:

In a hijack attack, a hacker takes over a session between you and another individual and disconnects the Other individual from the communication. You still believe that you are talking to the original party and may send Private information to the hacker by accidently.

5.9. SpoofAttack:

In the spoof attack, the hacker modifies the source address of the packets he or she is sending so that they appear to be coming from someone else. This may be an attempt to bypass your firewall rules.

5.10. PasswordAttack:

An attacker tries to crack the passwords stored in a network account database or a password-protected file. There are three major types of password attacks: a dictionary attack, a brute-force attack, and a hybrid attack. A dictionary attack uses a word list file, which is a list of potential passwords. A brute-force attack is when the Attacker tries every possible combination of characters

5.11. BufferOverflow:

A buffer overflow attack is when the attacker sends more data to an application than is expected. A buffer Overflow attack usually results in the attacker gaining administrative access to the system in a command prompt or Shell.

5.12. ExploitAttack:

In this type of attack, the attacker knows of a security problem within an operating system or a piece of Software and leverages that knowledge by exploiting the vulnerability.[6]

Conclusion:

Network security is an important field that is increasingly gaining attention as the internet expands. The security threats and internet protocol were analyzed to determine the necessary changes in security technology. The security technology is mostly software based, but many common hardware devices are used. The current development in network security is not very impressive. Originally it was assumed that with the importance of the network security field, new approaches to security, both hardware and software, would be actively researched. It was a surprise to see most of the development taking place in the same technologies being currently used. Combined use of ipv6 and security tools such as firewalls, intrusion detection, and authentication mechanisms will prove effective in guarding intellectual property for the near future. The network security field may have to evolve more rapidly to deal with the threats further in the future.

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The Impact of National Education Policy 2020 on Co-Curricular Curriculum and changing trends

Sonal S.Mundhada

Brijlal Biyani Science College Amravati, Maharashtra 444601 *E-mail:sonal.mundhada@gmail.com

Abstract -

The National Education Policy (NEP) 2020 represents a watershed moment in the history of Indian education, fundamentally challenging the long-held dichotomy between "curricular" and "co-curricular" subjects. This research paper investigates the transformative impact of NEP 2020 on the conceptualization, structure, and implementation of co-curricular activities (CCAs) across school and higher education in India. Through a qualitative analysis of policy documents, institutional case studies, and media reports from 2020 to 2026, this study identifies a distinct paradigm shift: co-curricular activities are no longer peripheral supplements but are being systematically integrated into the core curriculum through credit-based frameworks, multidisciplinary pedagogy, and holistic assessment models. The paper further examines emerging trends, including the formalization of folk arts, the rise of experiential learning platforms like case study competitions, and the concurrent implementation challenges related to teacher training and infrastructural preparedness. The findings suggest that while the policy's vision is revolutionary, its success hinges on robust execution, capacity building, and a cultural shift in educational assessment.

1. Introduction

For decades, the Indian education system operated under a rigid hierarchy where academic subjects in science, commerce, and humanities were privileged, while activities like arts, music, sports, and vocational skills were relegated to the periphery as "extra-curricular" or "co-curricular"—terms that implied they were optional enhancements rather than essential components of learning. The National Education Policy (NEP) 2020, approved after a gap of 34 years, seeks to dismantle this artificial division. The core philosophy of NEP 2020 is the development of "good human beings capable of rational thought and action, possessing compassion and empathy, courage and resilience, scientific temper and creative imagination". This holistic objective necessitates a radical restructuring of what is taught and how it is valued. This paper aims to answer the following research questions:

1. How has NEP 2020 redefined the status and structure of co-curricular activities within the formal curriculum?
2. What are the emerging trends in the implementation of these activities in schools and higher education institutions (HEIs)?
3. What challenges and transformative potentials arise from this policy-driven integration?

Literature Review: From Periphery to Core

The Pre-NEP Landscape

Traditionally, co-curricular activities were viewed as "breaks" from academics or as platforms for showcasing talent without significant academic weightage. The system was characterized by rote learning and content-based examinations detached from real-life application. This separation created a siloed approach to student development, where cognitive skills were prioritized over emotional, social, and creative intelligence.

The NEP 2020 Mandate for Integration—The NEP 2020 articulates a clear vision: "No hard separation of content in terms of curricular, extra-curricular, or co-curricular areas, and between arts and sciences, to enable holistic learning". This principle is not merely suggestive; it is foundational to the policy's structure. It mandates that subjects like music, dance, visual arts, and vocational crafts be treated with the same pedagogical seriousness as mathematics or language.

Key policy levers driving this change include:

Multidisciplinary Education: The policy breaks down rigid stream distinctions, allowing students to combine academic subjects with creative and vocational pursuits.

Outcome-Based Education (OBE): Institutions are required to define measurable outcomes for all learning experiences, including co-curricular ones, focusing on skills, knowledge, and attitudes.

Focus on 21st Century Skills: There is an explicit emphasis on fostering critical thinking, creativity, communication, collaboration, and problem-solving—skills inherently developed through well-designed co-curricular engagement.

Methodology

This study employs a qualitative, document-based research methodology. Data was collected from a variety of sources published between 2020 and 2026 to capture both the policy's intent and its on-ground implementation:

1. Policy Documents and Expert Commentary: Analysis of NEP 2020 features and op-eds from educational leaders.
2. Institutional Case Studies: Examination of best practices from higher education institutions (e.g., Sarala Birla University, Allenhouse Business School, Brijlal Biyani Science College Amravati) and schools (e.g., SSRVM, Mithibai College) that have implemented NEP-aligned co-curricular reforms .
3. Media and Industry Reports: News articles documenting emerging trends and challenges in states like Maharashtra and Telangana .
4. Assessment Frameworks: Reports on new evaluation tools like the Holistic Progress Card (HPC) .

Analysis: The Changing Trends in Co-Curricular Curriculum

The impact of NEP 2020 on co-curricular activities can be observed through four major changing trends.

Formalization through Creditization

The most significant trend is the move from informal participation to formal, credit-based learning. Under the NEP's Choice-Based Credit System (CBCS) and Academic Bank of Credits (ABC), students can now earn academic credits for co-curricular engagement .

In Mumbai, colleges like Mithibai and Thakur College have implemented "Credits for Co-Curricular Activities (CC)" courses. Students earn two credits per semester by dedicating 30 hours to learning authentic Garba, alongside theoretical studies on folk dances . This model transforms a festive activity into a structured, assessable, and valuable component of a student's degree. Similarly, case study competitions are being framed not just as events, but as "credentialed coursework" that contributes to internal evaluation, blending theory with real-world problem-solving .Our College **Brijlal Biyani Science College Amravati** introduced Various courses like photography, Fashion designing, Musical Theater, playing musical Instrument, sports event management ,Yoga heath wellness ,Mosaic Art,Lippan Art ,NSS and NCC

Emphasis on Cultural Rootedness and Indigenous Knowledge

NEP 2020 strongly emphasizes "rootedness and pride in India and its culture" . This has led to the institutionalization of Indian Knowledge Systems (IKS). Sarala Birla University, for instance, has inaugurated a Centre for Indian Knowledge Systems and offers value-added courses in Sanskrit, the Bhagavad Gita, and certificate courses in dance, music, and yoga .

The trend extends beyond higher education. The integration of Different courses into Our college Brijlal Biyani Science College curricula in Amravati is a direct response to this policy push, aimed at preserving and promoting authentic art forms that were being diluted by commercial influences . This represents a shift from a western-centric model of co-curricular activities to one that values and preserves indigenous heritage.

Integration with Academics and Skill Development

The "no hard separation" policy is fostering innovative pedagogical practices. Co-curricular activities are no longer standalone events but are being integrated into academic subjects.

Art-Integrated Learning-- The NEP mandates an art-integrated programme based on a common pedagogical framework across subjects. For example, a biology teacher could link biomechanics with Yoga, or a math teacher could explore geometric patterns in classical dance forms like Bharatanatyam or Kuchipudi .

Skill-Based Co-Curriculars: Institutions are linking co-curricular clubs directly to national priorities and future skills. AMJC College utilizes over 10 clubs to engage students with climate action (SDGs), while SSRVM school integrates coding, AI workshops, and design-thinking into its activity framework. **Experiential Learning Platforms:** The NEP's learning outcomes—critical thinking, collaboration, and communication—far more effectively than traditional lectures.

Evolution of Assessment: The Holistic Progress Card

This system aims to provide parents and educators with a clear picture of a student's overall growth, strengths, and interests, thereby validating co-curricular achievement on par with academic scores.

5. Challenges and the Road Ahead

NEP 2020's focus on co-curricular activities for holistic education is a progressive goal, its success is currently hampered by **insufficient infrastructure, a lack of trained teachers, confusing and rapid implementation, and deep-seated equity concerns**. Addressing these will require significant investment, careful planning, and a sustained effort to train educators.

Another challenge is fostering a culture of innovative thinking. Institutions report difficulty in shifting the focus from traditional teacher-centric methods to the student-centric, experiential models required by NEP. This requires not just policy changes, but continuous faculty development programmes, technological interventions, and a mindset shift among parents and educators who are accustomed to valuing only exam scores.

6. Conclusion—The National Education Policy 2020 has irrevocably altered the landscape for co-curricular activities in India. By dismantling the rigid boundaries between academic and co-curricular learning, the policy has initiated a paradigm shift toward truly holistic education. The emerging trends—creditization of arts, institutionalization of indigenous culture, integration with skill development, and holistic assessment—demonstrate that co-curricular activities are being reimagined as essential vehicles for developing critical 21st-century skills and well-rounded human beings.

However, the journey from policy to practice is fraught with challenges. The success of this transformative vision depends less on the policy document itself and more on the capacity building of teachers, the allocation of resources, and a collective societal shift in how we define educational success. As India moves further into this new era, the focus must remain on ensuring that the "lived conversation" of NEP 2020 translates into equitable, enriching, and genuinely holistic experiences for every learner.

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Who Reads When AI Reads? Revisiting the “Death of the Author” in Indian English Literature Classrooms Post-NEP 2020

Sandeep M. Ghutke

PhD. Research Scholar, Department of English, Rashtrasant Tukdoji Maharaj Nagpur University,
Nagpur. sandeepghutke@gmail.com Mob: +917387675512

Abstract

Roland Barthes's 1967 provocation that the death of the author liberates the reader has acquired unexpected urgency in an era when artificial intelligence performs literary reading at scale. This paper examines the pedagogical and theoretical implications of AI-assisted literary interpretation within Indian English literature classrooms, particularly against the backdrop of the National Education Policy 2020's mandates for technology integration across higher education. Drawing on close readings of Arundhati Roy's *The God of Small Things*, Salman Rushdie's *Midnight's Children*, and Aravind Adiga's *The White Tiger*, this study argues that AI tools deployed for literary analysis do not merely supplement human reading but structurally displace the interpretive subjectivity that Barthes, Wolfgang Iser, and Stanley Fish identified as the generative core of literary meaning-making. When machines read, they produce what this paper terms “algorithmic closure”—a foreclosure of semantic ambiguity that runs counter to the radical indeterminacy constitutive of postcolonial Indian English fiction. NEP 2020's vague directives toward technology integration represent an institutional failure to theorize what reading is, who the reader must be, and what is irretrievably lost when that reader is automated.

Keywords: Roland Barthes, death of the author, artificial intelligence and literature, Indian English fiction, NEP 2020, reader-response theory, postcolonial pedagogy, algorithmic interpretation

Introduction

There is a peculiar irony in the moment we inhabit. Roland Barthes, writing in 1967, announced the death of the author as an act of emancipation: the text, freed from the tyranny of biographical intentionality, opens itself to the reader whose interpretive labour brings it into being. The reader, for Barthes, was not a passive recipient but the very space where the multiplicity of writing gathers its meaning, however provisional (Barthes 148). Half a century later, that reader faces a different kind of threat—not from authorial authority but from algorithmic efficiency. When a student in a Delhi University literature classroom submits a ChatGPT-generated close reading of *The God of Small Things* and that response is evaluated by an AI grading tool deployed under NEP 2020's digital pedagogy mandates, one is compelled to ask: who, precisely, is reading?

This question is far from rhetorical. It cuts to the theoretical and institutional foundations of literary education in India at a critical juncture. The National Education Policy 2020, the most sweeping reform of Indian higher education since 1986, mandates the integration of technology into every dimension of university life, including the humanities. Its language on the teaching of literature is aspirational but conceptually sparse, gesturing toward “critical thinking” and “multilingual competence” as educational outcomes without articulating a theory of reading that could distinguish human interpretation from machine-generated textual analysis (Ministry of Education 42). Into this vacuum, universities and individual instructors are drawing consequential decisions about which AI tools to adopt, guided largely by administrative convenience rather than pedagogical principle. The stakes are especially high in Indian English literature, a body of writing that is constitutively ambivalent, composed in the colonial language of the oppressor yet saturated with the cadences, textures, and political memories of the subcontinent. Salman Rushdie's argument that Indian English writers are constructing a new literary idiom capable of mirroring the ambiguities of their world points to a textual complexity that resists reduction to extractable themes or sentiment scores (Rushdie, “Commonwealth Literature” 17). Algorithmic reading does not merely fail to capture this complexity; it actively misrepresents it in ways that carry real consequences for how a generation of Indian students learns to engage with its own literary inheritance. To take that risk lightly, under the banner of modernization, is to mistake technological capacity for pedagogical wisdom. It is a confusion that the present paper intends to unsettle.

Literature Review

The theoretical architecture of this inquiry rests on three intersecting bodies of scholarship. The first is the reader-response tradition inaugurated by Barthes and developed with particular rigor by Wolfgang Iser and Stanley Fish. Iser's foundational argument in "The Reading Process: A Phenomenological Approach" holds that literary texts are characterized by structured gaps or indeterminacies which the reader must actively fill; the literary work exists only in the encounter between text and reading subject, and meaning is the dynamic product of that encounter rather than a stable property of the artifact itself (Iser 279-280). Fish's concept of affective stylistics extends this argument by insisting that meaning is a temporal event, something that happens in the reader's experience rather than something that is extracted from an object (Fish 123-126). Together these positions establish a foundational claim: reading is irreducibly subjective, embodied, and situated, and these properties resist algorithmic formalization. The second body of scholarship concerns the digital humanities and AI's specific relationship to textual interpretation. N. Katherine Hayles has argued that digital reading practices cultivate what she calls "hyper attention," a mode of rapid scanning cognition oriented toward information extraction, as against the deep, immersive engagement that literary reading historically demands (Hayles 187-188). Her argument implies a qualitative difference between human and machine engagement with texts that current enthusiasm for AI-assisted literary analysis tends to suppress. Franco Moretti's project of distant reading represents a related intervention: the quantitative analysis of large literary corpora. Moretti himself acknowledged the essential trade-off, that distant reading gains scale by sacrificing the close attentiveness which has always been the humanist's primary epistemic instrument (Moretti 57). What neither Hayles nor Moretti fully confronts is the institutional context in which AI reading tools are now being deployed: not as research instruments for specialists but as substitutes for pedagogical practice in undergraduate classrooms.

The third framework is postcolonial pedagogy as theorized in the specific Indian context. Meenakshi Mukherjee's influential work on the anxiety of Indianness in English-language fiction argues that Indian English novels negotiate a constitutive doubleness, writing from within a colonial linguistic inheritance while gesturing toward cultural specificities that that language was never designed to accommodate (Mukherjee 2607-2608). This doubleness is not a defect to be corrected but a generative tension to be inhabited, and inhabiting it demands a reader capable of sustaining ambiguity rather than resolving it. Gayatri Chakravorty Spivak's *Death of a Discipline* similarly insists that comparative literary study must resist the bureaucratic impulse to render texts manageable through standardization, an impulse that finds its contemporary institutional avatar in the AI-mediated classroom (Spivak 13-15). When AI tools designed in and for the global North are imported into Indian university curricula, they carry epistemological assumptions about what counts as meaning, what counts as evidence, and what constitutes a valid interpretive claim—assumptions that are not culturally neutral and cannot be pretended to be.

Methodology

This paper employs a tripartite methodology. The first component is theoretical: a close re-reading of Barthes's "The Death of the Author" and Foucault's companion essay "What Is an Author?" in the context of contemporary AI capabilities, arguing that both texts anticipate and complicate algorithmic displacement in ways their authors could not have foreseen but whose conceptual logic they provide precise tools to diagnose. The second component is textual analysis. Close readings of three canonical Indian English novels—selected for their formal and thematic embodiment of postcolonial ambiguity—demonstrate the specific interpretive operations that human reading performs and that AI analysis systematically omits or misrepresents. The three texts, Roy's *The God of Small Things*, Rushdie's *Midnight's Children*, and Adiga's *The White Tiger*, represent different decades of Indian English fiction and distinct formal strategies for generating productive interpretive discomfort. The third component is a policy analysis of NEP 2020's relevant provisions, examining the gap between its aspirations for technology-enhanced literary education and its failure to theorize what literary reading actually requires of the reading subject. This is a theoretical and textual argument rather than an empirical classroom study; it situates the NEP 2020 framework within the intellectual history of reading theory and the specific formal demands of the postcolonial literary tradition.

Analysis and Findings

The God of Small Things presents an immediate and instructive challenge to algorithmic reading. Roy's novel is built around a structural non-linearity that is not merely aesthetic but ideological: the narrative's refusal to proceed chronologically enacts its central argument about historical amnesia and the fragmented temporality of caste suffering. The novel's opening pages, which establish the humid particularity of Ayemenem while quietly absorbing the weight of imminent catastrophe, depend for their full effect on a reader who can hold the pressure of what is coming while experiencing the deceptive innocence of what is being described (Roy 1-5). AI tools that analyse this novel typically identify its themes as caste discrimination, forbidden love, and childhood trauma. This characterization is not exactly wrong. It is something worse: reductive in a way that forecloses the interpretive discomfort Roy has engineered into every sentence. The novel's meaning does not reside in its themes as discrete entities; it resides in the gap between what its sentences say and what they withhold, between the lyricism of its prose and the horror of its content. That gap is precisely the kind of Iserian indeterminacy that requires a human reader to complete, and which produces something different in each reader who attempts it.

Midnight's Children poses a related but formally distinct problem. Rushdie's narrative is constituted by a narrator, Saleem Sinai, who explicitly and repeatedly declares his own unreliability. The novel's insistence that memory is not archival but transformative, that personal and national history are equally subject to the narrator's "chutnification" of the past, makes interpretive uncertainty a formal principle rather than a rhetorical accident (Rushdie, *Midnight's Children* 459). An AI asked to summarize or analyse this novel must decide what the text "says," but the text's most fundamental claim is that saying is always already a distortion. Language models trained on literary corpora are optimized for coherence; they excel at extracting stable propositions from textual evidence. They are, in this sense, structurally opposed to a novel that treats coherence as a political fantasy and narrative reliability as an index of bad faith. The deeper irony is that *Midnight's Children* performs, at the level of narrative form, exactly the kind of epistemological instability that AI reading attempts to stabilize and resolve. To flatten that instability in the name of comprehension is to perform, at the pedagogical level, the same violence of reduction that the novel anatomizes at the historical level. The *White Tiger* complicates the picture further by presenting a narrator whose confessional voice is the novel's entire epistemic apparatus. Balram Halwai writes to the Chinese Premier because he imagines an audience of entrepreneurs who will understand the logic of his violence; the novel's moral meaning depends entirely on the reader's discomfort at finding themselves implicated in that entrepreneurial logic. To read *The White Tiger* with full attention, one must feel the seduction of Balram's reasoning and resist it simultaneously, must be drawn in by the black comedy and troubled by the seduction itself. This is not an operation that can be disaggregated into measurable components or rubric categories. It is a phenomenological event of precisely the kind Iser described as the reading process's defining characteristic: the experience of being modified, however subtly, by the encounter with a literary text. AI analysis routinely flattens this into a narrative about class conflict and social mobility, a description that is accurate at the level of content and deeply misleading at the level of the novel's moral and affective design. What disappears is the discomfort, and the discomfort is the point.

These three close readings converge on a single theoretical claim: the encounter with postcolonial Indian English fiction requires a reader who brings not merely linguistic competence but what might be called postcolonial sensibility, an awareness of the layered histories, cultural ambivalences, and political textures that inhabit these texts at every level of form. This sensibility cannot be trained into a language model, not because the model lacks information about India, but because the response to ambiguity that these texts demand is not informational. It is existential. It requires a self-capable of being troubled, a subjectivity capable of being changed by what it reads. The implications for NEP 2020 are pointed. The policy's insistence on critical thinking, communication skills, and technology integration as the goals of humanities education reflects a competency-based framework imported largely from STEM-oriented educational theory. This framework fundamentally misunderstands what literary reading does. Literary reading does not produce competencies in any quantifiable sense; it produces persons, persons capable of inhabiting uncertainty, holding irreconcilable perspectives in productive tension, and being moved by fictional

experience in ways that have real moral consequences. NEP 2020 has no conceptual vocabulary for this kind of formation, which is why its technology mandates can proceed without any serious reckoning with the pedagogy they are displacing.

Discussion

The implications of this analysis extend well beyond India. As universities worldwide integrate AI tools into humanities pedagogy, the question of what reading is and what it is for becomes newly urgent across multiple institutional contexts. The Indian case is particularly instructive because it places under pressure assumptions that tend to remain invisible in Western theoretical discourse. When AI tools calibrated for English-language corpora and predominantly Western literary traditions are deployed in Indian classrooms to analyse texts written from within the colonial wound, the epistemological displacement is compounded. The reader being automated is already the inheritor of a particular cultural location; the automation does not replace reading in general but replaces a specific, situated, postcolonial form of reading that these texts were designed to summon and that cannot be reproduced by any model trained on other grounds. This is not a technophobic argument, and it should not be read as one. AI tools have genuine utility in literary pedagogy: for corpus-level analysis of large textual traditions, for accessibility accommodation, for introducing students to unfamiliar texts through structured scaffolding. The argument is rather that their deployment requires a theorized account of what they can and cannot do, an account that NEP 2020 conspicuously fails to provide. Without such an account, the default institutional tendency is to treat AI analysis as neutral, comprehensive, and sufficient, which is to say, to treat it as an adequate replacement for human reading rather than an imperfect supplement to it. The distinction is decisive, and ignoring it has pedagogical consequences that no amount of subsequent remediation is likely to correct.

Barthes argued that the death of the author was the birth of the reader. What the present moment confronts us with is the possibility of a second death: the automated foreclosure of the reader's generative freedom by algorithmic efficiency. Foucault asked, not quite rhetorically, what it matters who is speaking; the institutional logic of AI-assisted pedagogy answers, in effect, that it does not matter who is reading either (Foucault 138). If this foreclosure proceeds unchecked in institutions like Indian universities, where a vast generation of students is encountering the complexity of its own literary tradition for the first time, the loss will extend beyond the pedagogical. It will be the loss of a mode of self-formation that literature, when read with full human attention, has always made uniquely possible.

Conclusion

This paper has argued that the deployment of AI reading tools in Indian English literature classrooms, accelerated by NEP 2020's technology integration mandates, represents a structural threat to the kind of reading that postcolonial fiction demands and that reader-response theory has spent half a century theorizing. The close readings of Roy, Rushdie, and Adiga demonstrate that these novels are constituted by indeterminacies which require an active, situated, and culturally attuned human reader to complete. When AI performs this reading instead, it does not produce an incomplete analysis; it produces a misrepresentation that forecloses the very interpretive encounters these texts were designed to provoke. NEP 2020's silence on the theory of reading that its technology mandates presuppose is not a minor administrative oversight. It is a conceptual failure with real consequences for how a generation of Indian students will learn to think, to read, and to inhabit the complexity of their world.

The question "who reads when AI reads?" is not finally a question about technology. Barthes imagined the death of the author as the opening of a space for human interpretation; the present moment confronts literary educators with the possibility of that space being closed, efficiently and without much fanfare, by algorithmic convenience. Whether institutions charged with transmitting the value of literary experience are capable of recognizing and resisting that foreclosure is a question that exceeds the scope of any single paper. But it is, without question, the right question to be asking.

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Challenges of Student-Centered Learning in Higher Education under National Education Policy 2020

Radha Naresh Kale

Research Scholar
Dhanwate National College, Nagpur

Abstract

The National Education Policy 2020 aims to transform the Indian education system by promoting holistic and learner-focused education. One of its key objectives is the adoption of student-centered learning, which encourages active participation, critical thinking, and skill development among students. However, implementing student-centered learning in higher education institutions presents several challenges. This study examines the major barriers faced by institutions in adopting student-centered teaching approaches. The research is based on secondary data collected from academic journals, policy documents, and educational reports. The findings indicate that challenges such as inadequate infrastructure, lack of teacher training, large classroom sizes, and resistance to pedagogical change hinder the effective implementation of student-centered learning. The study suggests that institutional support, professional development programs for teachers, and technological integration are essential for successful implementation.

Keywords: Student-centered learning, NEP 2020, higher education, educational reform, teaching methods

Introduction

Education plays a vital role in shaping the intellectual, social, and economic development of individuals and societies. In the rapidly changing global environment, higher education institutions are expected to develop graduates who possess critical thinking abilities, problem-solving skills, creativity, and adaptability. Traditional teaching approaches in many institutions have largely been teacher-centered, where the instructor acts as the primary source of knowledge and students remain passive recipients of information. Such approaches often emphasize rote memorization and examination performance rather than the development of practical skills and independent learning abilities.

To address these limitations and align the Indian education system with global standards, the Government of India introduced the National Education Policy 2020. This policy aims to bring comprehensive reforms across all levels of education by promoting multidisciplinary learning, flexibility in curriculum design, skill development, and the integration of technology in teaching and learning processes. One of the most significant features of NEP 2020 is the emphasis on **student-centered learning**, which shifts the focus from teacher-dominated instruction to active student engagement in the learning process.

Student-centered learning encourages students to take responsibility for their learning through collaborative activities, discussions, experiential learning, project-based tasks, and continuous assessment. This approach helps in developing higher-order thinking skills, creativity, and real-world problem-solving abilities among students. By focusing on learners' interests, abilities, and learning styles, student-centered education aims to create a more inclusive and effective learning environment in higher education institutions.

However, despite the potential benefits of student-centered learning, its implementation in higher education institutions presents several challenges. Factors such as inadequate infrastructure, large classroom sizes, limited teacher training, resistance to pedagogical change, and traditional assessment practices can hinder the successful adoption of student-centered approaches. Therefore, understanding these challenges is essential for effectively implementing the reforms proposed under NEP 2020.

In this context, the present study aims to examine the major challenges faced by higher education institutions in implementing student-centered learning under NEP 2020 and to suggest possible measures to enhance the effectiveness of this educational transformation.

Objectives of the Study

1. To examine the concept and significance of student-centered learning in higher education under the National Education Policy 2020.
2. To identify the major challenges faced by higher education institutions in implementing student-centered learning.

Research Methodology

The present study is based on a descriptive research design. The research relies on secondary data collected from various sources such as research journals, books, government reports, and policy documents related to the National Education Policy 2020. Relevant literature on student-centered learning and higher education reforms was reviewed to identify the key challenges in implementing student-centered learning in higher education institutions.

Concept and Significance of Student-Centered Learning

Student-centered learning is an educational approach that places the learner at the center of the teaching–learning process. Unlike traditional teacher-centered methods, where teachers primarily deliver knowledge through lectures, student-centered learning emphasizes active participation, collaboration, and independent learning among students. This approach encourages learners to explore concepts, ask questions, engage in discussions, and apply knowledge in practical situations.

The National Education Policy 2020 strongly advocates the adoption of student-centered learning in higher education institutions. The policy highlights the need to move away from rote memorization and passive learning toward experiential, inquiry-based, and competency-based education. By focusing on the individual needs, interests, and abilities of learners, student-centered learning aims to create a more engaging and meaningful educational experience.

In higher education, student-centered learning plays a significant role in developing essential skills such as critical thinking, creativity, communication, and problem-solving. These skills are crucial for students to adapt to the rapidly changing global economy and workplace demands. Through activities such as group discussions, project-based learning, case studies, and internships, students gain opportunities to apply theoretical knowledge to real-world situations.

Another important aspect of student-centered learning under NEP 2020 is the promotion of multidisciplinary education and flexibility in curriculum design. Students are encouraged to choose subjects from different disciplines according to their interests and career goals. This flexibility helps students develop a broader perspective and enhances their overall learning experience.

Furthermore, student-centered learning contributes to the holistic development of learners by fostering curiosity, innovation, and lifelong learning habits. By actively engaging students in the learning process, higher education institutions can create an environment that promotes deeper understanding and academic excellence.

Challenges in Implementing Student-Centered Learning

The implementation of student-centered learning in higher education institutions, as emphasized in the National Education Policy 2020, offers many benefits but also faces several practical challenges. These challenges affect the effective transformation of the traditional teaching–learning system.

1. Lack of Teacher Training

Many teachers are accustomed to traditional lecture-based teaching methods. Student-centered learning requires teachers to adopt innovative teaching strategies such as project-based learning, collaborative learning, and experiential learning. Without proper training and professional development programs, teachers may find it difficult to implement these methods effectively.

2. Large Classroom Size

In many higher education institutions, classrooms consist of a large number of students. Managing interactive discussions, group activities, and individualized learning becomes difficult in such situations, which limits the effectiveness of student-centered learning.

3. Inadequate Infrastructure

Student-centered learning often requires modern infrastructure such as smart classrooms, digital tools, laboratories, and flexible learning spaces. Many institutions lack these facilities, making it challenging to implement interactive and technology-based learning methods.

4. Resistance to Change

Some educators and institutions are reluctant to shift from traditional teaching methods to innovative learning approaches. This resistance to change can slow down the implementation of student-centered learning practices.

5. Traditional Assessment System

The existing examination system in many institutions focuses mainly on rote memorization and written examinations. Student-centered learning requires assessment methods that evaluate critical thinking, creativity, and practical skills, which are not always adequately addressed by traditional evaluation systems.

6. Limited Awareness

Students and teachers may not always be fully aware of the benefits and practices of student-centered learning. Lack of awareness can lead to limited participation and ineffective implementation of this approach.

Suggestions

1. Organizing regular **teacher training and professional development programs**.
2. Improving **digital infrastructure and technological resources** in educational institutions.
3. Encouraging **interactive teaching methods such as group discussions and project-based learning**.
4. Reforming the **assessment system** to focus on skill development and competency-based evaluation.
5. Increasing awareness among teachers and students about the benefits of student-centered learning.

Conclusion

The implementation of student-centered learning under the National Education Policy 2020 represents an important step toward improving the quality of higher education in India. This approach promotes active learning, critical thinking, creativity, and skill development among students.

However, several challenges such as lack of teacher training, inadequate infrastructure, and traditional assessment methods hinder its effective implementation. Addressing these challenges through institutional support, teacher training, and improved resources will help achieve the objectives of NEP 2020 and enhance the overall quality of higher education.

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Online Newspaper Reading Habits & Behaviour Among Pharmacy College Students At NSPM College Of Pharmacy, Darwha.”A Study.

Mr.Praful S. Belsare

Research scholar, SGBAU.Amravati.

Dr. Smita D. Suryawanshi

Librarian, Smt Narsamma Arts, Commerce And Science College Amravati.

Abstract:-

The use of online newspapers has increased rapidly with the growth of digital technology. Students now prefer digital news platforms because they provide quick updates, easy access, and a variety of information. This study explores the online newspaper reading behavior of students at NSPM College of Pharmacy, Darwha.

The research is based on primary data collected through a structured questionnaire. Out of 150 distributed questionnaires, 110 completed responses were received and analyzed using simple percentage analysis. The study examines reading frequency, time spent on online news, preferred devices, favorite newspapers, subject interests, gender differences, and problems faced while accessing online newspapers.

The results indicate that most students spend 10–15 minutes daily reading online newspapers, mainly through their mobile phones. Politics and sports are the most preferred news topics. The findings also show that female students read online newspapers more frequently than male students. However, network issues and power failures are the major challenges affecting regular access to online news.

The study concludes that online newspapers play an important role in improving awareness and general knowledge among pharmacy students. It recommends better internet facilities and encouragement of digital literacy to strengthen effective online reading habits.

Key words :- Online Newspaper, Reading Behavior, Students Of NSPM College Of Pharmacy, Darwha.

1) Introduction

The advancement of digital technology has significantly changed the way of people access and consume information. Online newspapers have emerged as a primary source of news, offering instant updates, multimedia content, and interactive features that make information consumption faster and more engaging compared to traditional print newspapers. For college students, particularly those pursuing professional courses like pharmacy, keeping up with current affairs, healthcare developments, and scientific discoveries is crucial for academic learning and professional development.

Online newspaper reading behaviour refers to how individuals access, select, and interact with digital news. Elements such as convenience, user-friendly interfaces, mobile accessibility, and personalized content influence how readers engage with online news platforms. Studying these behaviours provides valuable insights for educators, media professionals, and researchers about how young adults seek information, stay informed, and develop digital literacy.

The present study focuses on the online newspaper reading behaviour of pharmacy students at the College of Pharmacy, Darwha. It investigates the frequency of reading, preferred platforms, areas of interest, and the key factors that motivate students to engage with online newspapers. Understanding these patterns can help in designing strategies to promote effective information consumption and enhance students' knowledge acquisition in the digital age.

2) About Pharmacy Students, Colleges, and Online News

Pharmacy students learn about medicines and their use in colleges offering **D.Pharm (Diploma in Pharmacy)** and **B.Pharm (Bachelor of Pharmacy)** courses. D-Pharm is a 2-year program teaching basic pharmacy skills, while B.Pharm is a 4-year course with advanced subjects like pharmacology and pharmaceuticals.

Colleges provide labs, libraries, and practical training to give students hands-on experience. Students also read **online newspapers** to stay informed about health news, medical research, and current

events. This helps them improve knowledge for studies, research, and future careers in hospitals, pharmacies, or pharmaceutical companies.

4) Online News Paper Reading Behavior

Online newspaper reading behaviour refers to how students or individuals access and read news using digital newspapers. They usually prefer quick and relevant information, often skim content, and choose sources based on ease of access, personal interest, and academic or professional needs.

5) Review Of Literature

1) **“A Study of Newspaper Reading Habits Among Students of Haryana College of Technology and Management, Kaithal” by Baldev Kumar and Dr. Pinki** presents a systematic analysis of students’ newspaper reading behavior. Using a questionnaire-based survey of 150 undergraduate and postgraduate students, the study examines preferences regarding language, format, frequency, time spent, and sources of access. The findings reveal that a majority prefer English newspapers and favor both print and online formats. Most students read newspapers daily, though many spend less than thirty minutes on reading. The library emerges as the primary source of access. The study effectively highlights the educational importance of newspaper reading in enhancing knowledge, awareness, and communication skills. Although limited to one institution, the research provides valuable insights for librarians and educators to promote reading habits. Overall, the paper is informative, well-structured, and relevant in understanding students’ information consumption patterns in the digital age.

2) **“A Study of Online Newspaper Reading Habits Among University Students in Nigeria” by Ismail Haruna** provides a comprehensive survey-based analysis of digital news consumption among Nigerian undergraduates. Using a large sample of 3,600 students across six geo-political zones, the study effectively examines students’ preferred newspapers, reading frequency, motivations, and challenges. The findings reveal high internet usage (95.89%) and significant online newspaper readership (69.40%), with Vanguard, Daily Trust, Punch, Daily Sun, and The Nation emerging as top choices. The research also highlights gender differences, showing higher male engagement in online news reading. Politics dominates subject preferences, while currency, informativeness, and accessibility motivate readership. Network issues and power failures are identified as major barriers. The study is well-structured and theoretically grounded in Technological Determinism and Uses and Gratifications Theory. However, deeper qualitative insights could have enriched the analysis. Overall, it is a valuable contribution to digital media research in Nigeria.

3) **The research article “Reading Habit of Online Newspapers among Students of Kurukshetra University” by Anil Kumar**, published in the International Journal of Information Movement (2018), examines students’ engagement with online newspapers. Based on a survey of 133 respondents, the study highlights that most students spend less than 30 minutes daily reading online news, primarily through smartphones. Hindi emerges as the most preferred language. The research identifies key motivations such as instant news updates, free access, and ease of use. Important news items, educational news, and sports are the most read sections. However, students face challenges like screen fatigue, small font size, slow internet speed, and excessive advertisements. While over half of the respondents express satisfaction, the study recommends improving digital literacy and minimizing technical barriers. Overall, the article provides useful statistical insights into changing reading habits in the digital era, though deeper analytical interpretation could further strengthen the discussion.

4) **Mondal, A., & Maity, G. (2023)** The research paper Online Newspaper Reading Habit of Young and Elderly People A Comparative Study explores the differences in online newspaper reading behaviors between young (18–40 years) and elderly (41–60 years) readers in Kolkata. Based on a survey of 60 respondents, the study examines motives, device preferences, reading frequency, language choice, and the difficulties encountered while reading online newspapers. The findings show that young readers primarily access online newspapers for real-time updates and academic or career-related news, whereas elderly readers mainly read for leisure or time pass. Mobile phones are the most preferred device for both groups, though elderly readers face more technological difficulties. Issues such as excessive advertisements, eye strain, searching for articles, and poor internet connectivity affect elderly readers more significantly. The study concludes that noticeable generational differences exist in digital news consumption and emphasizes the need for more accessible and user-friendly online newspaper platforms to support elderly users.

4) Aims And Objectives

- ❖ To study how frequently pharmacy students read online newspapers.
- ❖ To explore the devices and platforms students use for online news reading.
- ❖ To determine the news topics and types most preferred by students.
- ❖ To provide suggestions to improve students' online news reading habits and behavior and digital literacy.
- ❖ To examine the time spent to read the newspapers

5) Methodology

The study completely based on the primary data. Data collected from a structure questionnaire. Total 150 questionnaire was distributed among the pharmacy student out of total 110 filled questionnaire were received for data analysis. and this data through simple percentile analysis.

6) Research Questions.

The following are the research questions guided this study

1. What is the online newspaper reading behavior or habits of pharmacy students?
2. What is the gender difference in online newspaper reading among pharmacy students?

7) Data Analysis

Table 1:- Departments wise distribution of the respondents.

Sr.no	Name Of Department	Respondents	Percentage(%)
01	Pharmaceutical Chemistry	25	27.05
02	Pharmacology	19	20.09
03	Pharmaceutics	20	22.00
04	Pharmaceutical Quality Assurance	28	30.08
05	Pharmacognosy	18	19.08

Table number 1 shows that After the distribution of questionnaire among the different departmental students of college of pharmacy darwha.

Out of total, 30.08 % respondents are related to the department of pharmaceutical quality assurance, 27.05% pharmaceutical chemistry, 22.00 % pharmaceutics, 20.09 % pharmacology, and 19.08 % pharmacognosy department.

Table 2 :- Approximately Time Spent on Reading Online Newspapers

Sr.No	Time	Respondents	Percentage(%)
01	10-15 minute	40	44.00
02	15-30	32	35.02
03	30-60	23	25.03
04	More than 1 hours	15	16.05

Table number 2 shows that the time spent on reading online newspaper by the respondents. Majority of the 44.00 % respondents spent between 10 to 15 minutes on reading online newspapers, 35.02 % read 15-30 minutes, 25.03 % read 30-60 minutes. 16.05 % of the respondents spent more than one hour for reading online newspaper daily.

Table 3:- Sources Wise Distribution Of Respondents of Reading Online Newspaper

Sr.No	Source	Respondents	Percentage(%)
01	Personal mobile or laptop	55	60.05
02	PC	40	44.00
03	Tab	15	16.05

Table Number 3 shows that Near about More than half of the respondents 66.92 % read online newspapers on their smart phone, 24.81 % of the respondents read online newspaper on Laptop/PC while remaining 8.27 % respondents read online newspapers on tabs.

Table 4: gender wise distribution of online reading news paper.

Sr.No	Gender	Respondent	Percentage(%)
01	Male	40	44.00
02	female	70	77.00

The table number 4 shows a clear difference in online newspaper readership between genders. Females lead with 70 respondents (77%), while males account for 40 respondents (44%). This means that women are almost twice as likely as men to read news online in this survey

Table 4:- Respondents Favourite Online Newspaper

The following table shows respondents' favourite online newspaper:

Sr.No	Favorite News Paper	Respondents	Percentage(%)
01	Times Of India	30	33.00
02	The Hitwada	22	24.02
03	Loksatta	28	30.08
04	Lokmat	16	17.06
05	Maharashtra Time	14	15.04

The table number 4 shows that **Times of India** is the most popular online newspaper among the respondents, with 33% choosing it. **Loksatta** is the second most preferred at 30%, followed by **The Hitwada** with 24%. Fewer respondents prefer **Lokmat** (17%) and **Maharashtra Times** (15%). This suggests that although Times of India leads, readers' preferences are spread across different newspapers.

Table 5:- The respondents Subject Matter Preference

The following table shows respondents' subject matter preference

Sr.No	Subject Matter	Respondent	Percentage(%)
01	Economy	20	22.00
02	Politics	28	30.08
03	Education	20	22.00
04	Entertainment	16	17.06
05	Sport	26	28.06

The table no 6 shows that **politics** is the most preferred subject, chosen by 30.08% of respondents. **Sports** is the second most popular topic with 28.06%. **Economy** and **education** are equally preferred, with 22% each. **Entertainment** is the least preferred subject, selected by 17.06% of respondents. Overall, most respondents are more interested in politics and sports than other topics

Table 6:- The Problems Encountered while Reading Favorite Online Newspaper

The following table shows problems encountered by respondents while reading their favorite online newspaper:

Sr.no	Problem encounter	Respondent	Percentage(%)
01	Power Failure	32	35.02
02	Network Issue/Problem	64	70.04
03	None	14	15.04

Table number 6 shows that indicates the problems people face when reading their favourite online newspapers. **Network issues** are the most common, affecting **64 respondents (70.04%)**. **Power failures** are reported by **32 respondents (35.02%)**. Only **14 respondents (15.04%)** did not face any problems.

This shows that internet connectivity and electricity interruptions are the main challenges for online newspaper readers.

8) Finding of the study

The study conducted at **NSPM College of Pharmacy, Darwha** provides insights into how pharmacy students read online newspapers.

- 1) Most students read online newspapers regularly, showing that digital news is an important source of information.
- 2) The majority of students spend only 10–15 minutes per day reading news, which indicates short and quick reading habits.
- 3) Mobile phones are the most popular device for reading online newspapers because they are convenient and always accessible.

- 4) Students from all departments, including Pharmaceutical Chemistry, Pharmacology, Pharmaceutics, Pharmaceutical Quality Assurance, and Pharmacognosy, actively read online news.
- 5) Female students are more engaged in reading online newspapers than male students.
- 6) Times of India is the most preferred online newspaper, followed by Loksatta and The Hitavada.
- 7) Politics and sports are the topics that students read the most, while economy, education, and entertainment are less popular.
- 8) Poor internet connection is the main problem faced by students while reading online newspapers, and some also face power failures.
- 9) Overall, students of NSPM College of Pharmacy, Darwha rely on online newspapers because they are easy to access, fast, and convenient, though technical problems sometimes make reading difficult.

Conclusion:-The study indicates that online newspapers are an important source of news for pharmacy students at NSPM College of Pharmacy, Darwha. Most students spend a few minutes each day reading news on their mobile phones, with female students showing higher engagement than males. Politics and sports are the most popular topics, and Times of India is the preferred newspaper. Despite challenges like poor internet connectivity and occasional power outages, online newspapers help students stay informed, improve their general knowledge, and support their academic growth.

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Post-independent India's Socio-economic and Political Scenario and its Future Implications Swapnil D .Athawale

Abstract

The nationalist leadership had expressed its aim and passion in terms of revolutions—political, economic, and social. This revolutionary trend however, on many occasions, vacillated between achievement and failures. The majoritarian governments usually attempted to curb civil liberty, denial of religious freedom and opportunities at the behest of hegemonic power. This entails economic stagnation and societal disharmony. It is the equitable distribution of growth that prospers the nation. For this we need certain policy and legislative measures within our constitutional framework.

Key words

Revolutions, political institutions, societal, economic growth, distribution, policy, legislative.

Introduction

On the eve of independence an idea of freedom to Nehru was to free India through a new constitution, to feed the starving people, to clothe the naked masses, and to give every Indian the fullest opportunity to develop herself according to her capacity. To achieve this end the nationalist leadership had expressed its aim and passion in terms of revolutions—political, economic, and social. While attempting for this revolutionary trend they were equally enthusiastic and unanimous about laying the foundations of a democratic republic and aspiring to create a nation. Nehru's charismatic leadership not only had mesmerized his peers and followers but also the entire people. Realizing the imperatives of the time and dreaming to build a nation, he took revolutionary steps on the roadmaps contemplated and adopted by the constitution makers.

This roadmap for building a nation was followed by successive governments though with certain hesitation or deviations, it nonetheless contributed to our national strength both economic and societal. At times the political institutions appeared to have failed or being hijacked by the majoritarian governments. The economic growth also being cornered by the few. However it is now realized that growth is not enough for the strength of a nation, it is the equitability in distribution of income that makes the nation prosperous.

The objective of the paper is to point out that the majoritarian governments have tended to deviate from its constitutional mandate. This resulted into curbing of civil liberties and fundamental rights and social disharmony and concentration of wealth, which requires policy and legislative measures. The first parts of paper delineates the trajectory of successive governments in laying the foundation of democratic governance and their functioning. Second critically examines the absence of cultural and societal homogeneity. Third points out how economic growth led to the concentration of growth and suggest its equitable distribution. The fourth exposes the existential realities of our socio-economic and political scenario and finally fifth part concludes with suggestions.

I...Trajectory of successive governments.

On the eve of independence in 1947 and establishment of a republic in 1950 it was realized that to achieve this objectives it was essential to end communal conflict that ensued the partition and achieve social cohesiveness by dismantling the entrenched social divisiveness. Granville Austin has pointed out that the constitution makers, while laying the foundations for the achievement of revolutionary objectives, aimed to structure the institutions of governance in a democratic way. The founders adopted a Parliamentary System which was to be more accountable than the stable form of Presidential System of the US (Austin: 1966:26-27). It embodied separation of powers, independent judiciary, and rule of law, fundamental rights, directive principles, secular state, and liberal democracy and basically the representative and accountable government.

The first government, with Congress dominance (1950-67), witnessed planned economic development and institution building. The ascendancy of Indira Gandhi to power, followed by declaration of Emergency (1975-77) meant suppression of civil liberties. It ensued in coalition politics

(1977-1990s) which gave rise to regional, caste, and communal politics. In 1991 economic reforms, were introduced under the premiership of P V Narsimha Rao. Under A B Vajpayee (1998-2004), the socio-economic and political scenario began to drift substantially and saw emergence of the present regime led by PM Modi in 2014.

II...Social Reconstruction and Disharmony

While independence embodied political revolution, the social revolution meant 'to get (India) out of the medievalism based on birth, religion, custom, and community and reconstruct her social structure on modern foundations of law, individual merit, and secular education' (K, Santhanam: Austin: 1966: 26). But post independent India, instead of reconstructing the hierarchical society on the principles of liberty, equality and fraternity, engaged in a tug of war about according certain benefits or fair opportunities to the religiously and historically subordinated elements of society.

In fact the post independent India endured unsuccessful travails of establishing a democracy in a polity and society which remains a 'top-dressing', as Dr. Ambedkar had argued, 'on a soil which essentially is undemocratic'. Democracy in India, as now Pratap Bhanu Mehta, argues "was not the object of ideological passion, it was not born of a deep sense of conviction widely shared, but it was simply the contingent outcome of the conflicts amongst India's different elites"(Mehta: 2003: 5). The by-product has been a pervasive social disharmony.

This social disharmony manifested in distrust, rivalry, and enmity between and among communities. It resulted into several communal riots. Despite constitutional safeguards SC/STs suffered atrocities at the hands of communal majority and polarized the communities giving rise to identity politics. The issue of reservations to SC/STs and OBCs was politicized and instead of resolving the issue within constitutional framework a 'politics of backlash' was resorted to. The emergence of regionalism, separatism, linguistic conflicts and suppression of religious minority rights have been the ugliest manifestations of post –independent India, disproportionate to civil society's assertions.

III...Economic Development and Inequality

The third revolution was an economic one: The transition from primitive rural economy to scientific and planned agriculture and industry' Nehru as a founder of republic had emphasized the need for planned economy with socialistic pattern. Article 39 (b) & (c) envisioned to run economy in such a manner that it does not turn out to the detriment of the common people and pervert to the concentration of property.

Initially Nehru's planning approach was to develop heavy industries at the cost of agriculture and education. Dr. Ambedkar had suggested Nehru for nationalization not only of key industries but also land (Ambedkar: 1946: Vol. 1). However Nehru's approach to planning, Jivanta Schottliin her case study pointed out, is now being criticized pro-capitalist which weakened the hold of state institutions over economy (Schottli: 2012: 94). This institutional drift has substantially occurred during Modi's regime which scholars like Ruchir Sharma has termed as 'socialism of the capitalist.'

Among the contemporary economists the debate on poverty alleviation on global scale has now shifted to distributive aspect of the growth. François Bourguignon argues whether the main focus of development be placed on growth or poverty. It should be "rapid elimination of absolute poverty" which requires "strong, country-specific combinations of growth and distribution policies." The real challenge for establishment of development strategy to reduce poverty "lies in the interactions between distribution and growth and not in the relationship between poverty and growth" (Francois: 2004).

IV...Existential Truth

The contemporary social and political conflicts have given rise to a debate about the need for social harmony and national integrity. In the debate to strengthen national security many argue that the real threat to it is not external but internal in form of communalism and caste divisiveness. What is worst of socio-political realities is equally true of distributive aspect of economic growth. Jagdish Bhagwati and T N Srinivasan argue that direct and salient analysis of the problem of poverty reduction has been in the growth context. The central argument proceeds in two steps—trade promotes growth and growth reduces poverty. They claim that Dennis Robertson long back characterized trade as an "engine of growth" and Adam Smith argued that when society advances "to the further acquisition...the condition of the laboring poor,...seems to be the happiest".(Bhagwati,

Srinivasan: 2002: 180). But we have seen that it is not merely growth which automatically make life easier and happy for the multitude of poor people but it is the equitable distribution of growth that make life happy. The other factor has been the choice for growth “between labor intensive manufacturing and capital intensive industries.” The former led to growth with income distribution and the later transferred the income in few hands (Bhagwati, Panagariya: 2013:2).

V...Conclusion with Suggestions

The contemporary political situation witnesses curb of civil liberty, denial of religious freedom and opportunities to the marginalized at the behest of hegemonic power. This entails disturbance of peace, economic development and social and communal harmony. This must be treated seriously as it compromises national interests and hence be restrained through enactment of the law. The contemporary noteworthy fact is that among the economists the debate on poverty alleviation on global scale has now shifted to distributive aspect of the growth. They perceive the real challenge for establishment of development strategy to reduce poverty “lies in the interactions between distribution and growth and not in the relationship between poverty and growth”. Unfortunately it is found that this distribution is discriminatory to certain identified class. Therefore, it could be suggested that the income distribution mandates non-discriminatory interaction between growth and poverty, mediated through requisite policy or legislative measures by the state.

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AI-Based Personal Fashion Stylist and Wardrobe Recommendation System (Vastra AI)

Sneha Khedkar

M.Sc. Computer Science Sant Gadge Baba Amravati University, Maharashtra, India

Abstract

Fashion is an important part of personal identity and daily life. With the increasing number of clothing choices and rapidly changing fashion trends, selecting suitable outfits has become difficult and time-consuming. This research proposes an AI-Based Personal Fashion Stylist and Wardrobe Recommendation System called Vastra AI. The system uses artificial intelligence techniques such as computer vision, machine learning, and natural language processing to analyze wardrobe images and recommend personalized outfits.

The proposed system recognizes clothing items from user-uploaded images using Convolutional Neural Networks (CNN). A recommendation engine then suggests outfit combinations based on user preferences, occasions, seasonal trends, and weather conditions. An AI chatbot interface allows users to communicate with the system and receive styling advice in natural language. The system aims to simplify daily outfit selection, improve wardrobe utilization, and promote sustainable fashion practices.

1. Introduction

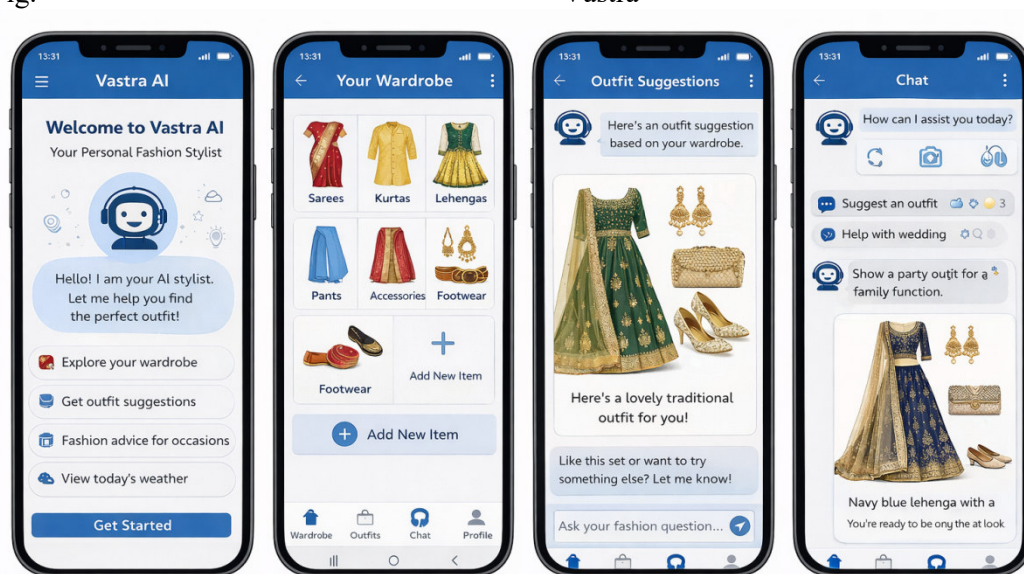
Fashion reflects personality, lifestyle, and cultural identity. However, individuals often face difficulty choosing outfits due to large wardrobe collections and limited time. Traditional fashion recommendation systems mainly focus on online shopping suggestions rather than personal wardrobe management.

The proposed Vastra AI system acts as a virtual fashion stylist. It analyzes wardrobe images, identifies clothing items using deep learning, and recommends suitable outfit combinations for different occasions. The system integrates machine learning models with conversational AI to provide intelligent and personalized fashion assistance.

Fig:

Vastra

AI



2. Motivation

Choosing outfits every day can be confusing, especially when individuals have many clothing options but limited styling knowledge. Most existing fashion applications recommend clothing items from online stores instead of helping users utilize their existing wardrobes.

The motivation of this research is to develop a smart AI-based styling assistant that helps users manage their wardrobe digitally and receive personalized outfit recommendations based on their style preferences, weather conditions, and social events.

3. Objectives

- Develop an AI-based fashion recommendation system.
- Implement clothing recognition using computer vision.
- Generate outfit combinations based on user preferences.
- Provide styling assistance using an AI chatbot.
- Improve wardrobe utilization and reduce fashion waste.

4. Literature Review

Artificial Intelligence has significantly transformed the fashion industry. Several companies use machine learning algorithms to recommend clothing items and predict fashion trends. Systems such as Amazon StyleSnap and Stitch Fix use computer vision to analyze clothing images and suggest similar products.

Research studies also explore deep learning models for clothing classification, outfit compatibility prediction, and personalized recommendation systems. However, many existing solutions focus on e-commerce rather than personal wardrobe management. This research focuses on integrating wardrobe management with AI-driven styling assistance.

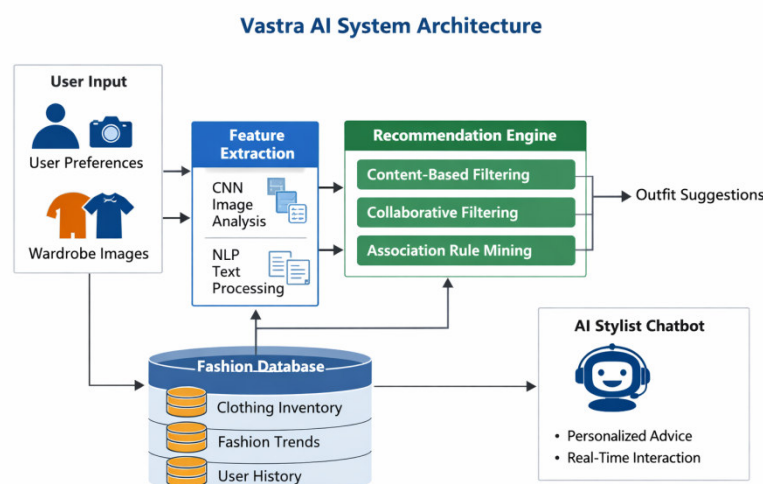
5. Methodology

The proposed Vastra AI system consists of several modules:

1. Data Collection – Wardrobe images uploaded by users.
2. Image Processing – Preprocessing and feature extraction using CNN.
3. Clothing Classification – Identifying clothing categories such as shirts, pants, dresses, and accessories.
4. Recommendation Engine – Generating outfit combinations using content-based filtering.
5. Chatbot Interface – Providing styling advice through natural language interaction.

The system architecture includes a user interface, AI processing modules, recommendation algorithms, and cloud-based storage.

Fig: Vastra AI System Architecture



6. Applications

- Personal fashion styling
- Digital wardrobe management
- Online fashion retail assistance

- Virtual styling platforms
- Sustainable fashion promotion

7. Conclusion

The Vastra AI system demonstrates how artificial intelligence can be used to improve personal fashion styling. By combining computer vision, machine learning, and conversational AI, the system can analyze wardrobe images and provide intelligent outfit recommendations.

The proposed system simplifies outfit selection, enhances user experience, and encourages sustainable clothing usage by maximizing the utilization of existing wardrobe items.

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Foreign Universities In India: Constitutional Morality, Social Justice, And The Future Of Higher Education

Milind B. Sawale

SantGadge Baba Amravati University (SGBAU), Amravati, Maharashtra, 444602

Corresponding Address: msmilind19@gmail.com

Abstract

The regulatory facilitation of foreign universities in India represents a transformative moment in the constitutional trajectory of higher education. Historically, education has functioned as a core instrument of social justice, equality, and democratic deepening under the Indian Constitution. Rooted in the idea of constitutional morality and the commitment to substantive equality, higher education has been central to dismantling caste-based exclusion and advancing inclusive citizenship. The National Education Policy 2020 and the University Grants Commission's regulatory framework enabling foreign university campuses introduce a globalized and market-oriented paradigm into this constitutional landscape. This paper critically examines whether the entry of foreign universities strengthens or unsettles the Constitution's transformative commitments. Through doctrinal constitutional analysis and engagement with Supreme Court jurisprudence on educational autonomy, equality, and federal balance, the paper evaluates the implications of foreign institutional participation for affirmative action, access, and regulatory sovereignty.

The study argues that the arrival of foreign universities constitutes not merely policy reform but a constitutional inflection point. The future of Indian higher education depends on whether globalization can be harmonized with the Constitution's enduring commitment to social justice and plural nation-building.

I. Introduction

Education in India occupies a constitutionally distinctive position. Unlike purely market-based systems, Indian higher education has historically been embedded in a transformative constitutional project aimed at dismantling structural hierarchies and promoting substantive equality.¹

The recent decision to permit foreign universities to establish campuses in India, pursuant to the National Education Policy 2020 and subsequent regulatory frameworks, signals a structural shift.² While framed as a step toward global competitiveness, this reform raises foundational constitutional questions:

1. Does the entry of foreign universities align with the equality code of the Constitution?
2. How does it interact with reservation jurisprudence?
3. What are its implications for federal balance and regulatory sovereignty?

This paper argues that the question is not one of permissibility alone, but of constitutional design.

II. Constitutional Morality and the Transformative Vision of Education

The Indian Constitution envisions more than formal equality. In **State of Kerala v. N.M. Thomas**, the Supreme Court recognized that equality is not merely a prohibition of discrimination but permits differential treatment to remedy historical injustice.³

Similarly, in **Indra Sawhney v. Union of India**, the Court upheld reservations as an instrument of substantive equality, emphasizing that social justice is a constitutional mandate.⁴

Education has repeatedly been understood as central to this mandate. In **Unni Krishnan v. State of Andhra Pradesh**, the Court recognized education as flowing from Article 21's guarantee of life and dignity, later constitutionally entrenched through Article 21A.⁵

These cases reflect what scholars describe as transformative constitutionalism — a constitutional order designed to reconstruct society rather than merely restrain state power.⁶ Education has been one of the principal vehicles of that reconstruction.

III. Educational Autonomy, Regulation, and the Equality Code

The Supreme Court has developed a nuanced jurisprudence balancing institutional autonomy with constitutional obligations.

In **T.M.A. Pai Foundation v. State of Karnataka**, the Court recognized the autonomy of private educational institutions but affirmed that such autonomy remains subject to regulatory measures ensuring fairness and transparency.⁷

Later, in **P.A. Inamdar v. State of Maharashtra**, the Court limited state-imposed reservations in private unaided institutions, emphasizing autonomy concerns.⁸ However, Parliament subsequently enacted the Ninety-Third Constitutional Amendment, enabling reservations in private educational institutions (excluding minority institutions), thereby reaffirming the constitutional primacy of social justice.⁹

In **Ashoka Kumar Thakur v. Union of India**, the Court upheld this amendment, reinforcing the constitutional legitimacy of reservations in higher education.¹⁰

The doctrinal trajectory demonstrates that while autonomy is protected, it cannot eclipse the equality code.

If foreign universities are granted operational autonomy without parallel equality obligations, a constitutional asymmetry may arise. The equality framework cannot operate selectively without undermining the constitutional structure.

IV. Federalism and the Governance of Higher Education

Education falls within Entry 25 of the Concurrent List, enabling both Union and State legislative competence.¹¹

In **Modern Dental College v. State of Madhya Pradesh**, the Supreme Court reaffirmed that regulation of education is a legitimate state interest aimed at maintaining standards and preventing commercialization.¹²

At the same time, central regulatory expansion reflects broader trends of national consolidation. Scholars of Indian federalism note that diversity claims have historically shaped federal accommodation.¹³

The centralized regulation of foreign universities may strengthen national uniformity but risks marginalizing state-level autonomy in higher education governance.

V. Commercialization, Access, and Stratification

The Court has repeatedly warned against commercialization of education. In **Mohini Jain v. State of Karnataka**, capitation fees were held inconsistent with constitutional principles of equality and dignity.¹⁴

Although later jurisprudence moderated aspects of Mohini Jain, the Court has consistently emphasized that education cannot be reduced to a profit-driven enterprise.¹⁵

Foreign university entry raises three interrelated concerns:

1. Fee differentials and economic exclusion
2. Potential non-application of reservation norms
3. Emergence of a dual-track elite system

If regulatory frameworks do not embed equality safeguards, stratification may intensify. Transformative constitutionalism requires that structural reforms reduce inequality rather than entrench new hierarchies.

VI. Constitutional Identity and Global Integration

Constitutional identity evolves through interpretive practice and institutional adaptation.¹⁶ The entry of foreign universities represents a moment of recalibration.

Two normative models are visible:

Transformative Constitutionalism	Market-Integration Paradigm
Education as public good	Education as competitive service
Redistributive access	Merit-market logic
Federal accommodation	Centralized uniformity
Social justice	Global competitiveness

The constitutional challenge lies in harmonization rather than rejection. Global academic participation is not inherently unconstitutional; however, it must operate within India's equality architecture.

VII. Conclusion

The arrival of foreign universities in India constitutes a constitutional inflection point. Supreme Court jurisprudence consistently affirms that education is not a neutral marketplace but a domain deeply embedded in the equality code of the Constitution.

If foreign universities are integrated within reservation norms, transparency requirements, and anti-commercialization safeguards, they may enhance research and academic exchange. If insulated from constitutional equality mandates, however, they risk recalibrating higher education away from social justice toward elite consolidation.

The future of Indian higher education will ultimately depend on whether globalization is constitutionalized — that is, structured within the enduring framework of constitutional morality.

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Online Books E-Shopping Cart

Sakshi Ashok Kuralkar

M.Sc (Computer Science) SMT. Narsamma Arts, Commerce & Science College Kiran Nagar
,Amravati

Abstract:

An online shopping system that permits a customer to submit online orders for items and/or services from a store that serves both walk-in customers and online customers. The online shopping system presents an online display of an order cut off time and an associated delivery window for items selected by the customer. The system accepts the customer's submission of a purchase order for the item in response to a time of submission being before the order cut off time. The online shopping system does not settle with a credit supplier of the customer until the item selected by the customer is picked from inventory but before it is delivered. Therefore, the customer can go online and make changes to the order. In addition, available service windows are presented to the customer as a function of customer selected order and service types and further, the order picking is assigned in accordance with a picker's preference. When ordering goods, many shopping systems provide a virtual shopping cart for holding items selected for purchase. Successive items selected for purchase are placed into the virtual shopping cart until a customer completes their shopping trip. Virtual shopping carts may be examined at any time, and their contents can be edited or deleted at the option of the customer. Once the customer decides to submit a purchase order, the customer may print the contents of the virtual shopping basket in order to obtain a hard copy record of the transaction.

1.INTRODUCTION:

It is known globally that, in today's market, it is extremely difficult to start a new small-scale business and live-through the competition from the well-established and settled owners. Online stationary products shopping system helps in buying of goods, products and services online by choosing the listed products from website (E-Commerce site). The proposed system helps in building a website to buy, sell products or goods online using internet connection. Purchasing of computer goods online, user can choose different products based on categories, online payments, delivery services and hence covering the disadvantages of the existing system and making the buying easier and helping the vendors to reach wider market.

In day to day life, we will need to buy lots of computer goods or products from a shop. It may be stationary items, electronic items, house hold items etc. etc. Now days, it is really hard to get some time to go out and get them by ourselves due to busy life style or lots of works. In order to solve this, B2C E-Commerce websites have been started. Using these websites, we can buy goods or products online just by visiting the website and ordering the item online by making payments online.

In fast paced time of today, when everyone is squeezed for time, the majority of people are finicky when it comes to placing a stationary product order. The customers of today are not only attracted because placing an order online is very convenient but also because they have visibility into the items offered, price and extremely simplified navigation for the order. Online ordering system that I am proposing here, greatly simplifies the ordering process for both the customer and the restaurant. System presents an interactive and up-to-date menu with all available options in an easy to use manner. Customer can choose one or more items to place an order which will land in the Cart. Customer can view all the order details in the cart before checking out. At the end, customer gets order confirmation details. Once the order is placed it is entered in the database and retrieved in pretty much real time. This allows Restaurant Employees to quickly go through the orders as they are received and process all orders efficiently and effectively with minimal delays and confusion.

2.Literature:

1. Bagmare, Girhepunje, and Bisen (2017) presented an early study on the development of an online bookshop management system aimed at replacing manual record-keeping with a faster, automated solution. Their research emphasizes the limitations of traditional bookshops, where maintaining records, updating inventories, and handling customer requests become time-consuming

when done manually. The proposed system enables users to search and purchase books based on title, author, or subject, while providing administrators with efficient tools to store, update, and retrieve book information quickly. The authors highlight that automation improves processing speed, reduces human error, and ensures systematic organization of book data. The study concludes that online bookshop systems significantly enhance user convenience by simplifying book searching, reservation, and purchasing processes. Additionally, the system is flexible enough to be adopted by educational institutions for managing library collections, and it supports secure operations by restricting purchasing functions to authenticated users[1].Mandloi, Pathak, and Sarati (2023) presented a comprehensive study on the evolution and functioning of online bookstores, focusing on their growing influence in the publishing industry. Their research outlines how book selling has shifted from traditional physical stores to digital platforms, offering customers greater convenience, wider availability, and competitive pricing. The study highlights key factors such as user-friendly interfaces, book recommendations, reviews, and dynamic pricing that strongly influence customer purchasing decisions. It also emphasizes the importance of digital rights management and copyright protection, noting their direct impact on publisher revenues and content security. Additionally, the authors analyze various business models adopted by leading online bookstores and assess how customer behaviour, reviews, and ratings contribute to sales performance. The study concludes that online bookstores have significant growth potential, provided they continue to innovate and maintain ethical practices regarding content usage, thereby ensuring long-term trust and sustainability in the digital marketplace[2].Kadam, Jadhav, Parchande, and Gupta (2023) discuss the increasing relevance of e-commerce book platforms as traditional bookstores become less capable of meeting modern consumer expectations. Their study highlights that with improvements in living standards and widespread internet access, customers now prefer fast, convenient, and efficient ways to purchase books. Unlike physical bookstores, which are limited by location, space, and operating hours, online bookstores provide unrestricted access to a wide variety of titles and enable users to search, compare, and buy books easily from any location. The authors emphasize that online book-selling systems must ensure consistency in website design, transaction processes, product availability, promotions, and service quality to maintain customer satisfaction. They also point out crucial factors that influence the success of online book platforms, including multiple payment options, clear terms and conditions, accurate product representation, timely delivery, and legal requirements such as proper invoicing. Overall, the study reinforces that e-commerce bookstores represent an important step toward modernization and digital efficiency, especially in developing regions[3].Several studies highlight the growing importance of online shopping as a preferred mode of purchasing products in India. Pallavi (2020) conducted a detailed study on online shopping behaviour among consumers in Patna and found a significant shift from traditional shopping to digital platforms due to increased internet usage and the rise of smartphones. Consumers are increasingly using online portals not only for communication and entertainment but also for purchasing a wide variety of goods. According to the study, convenience, time saving, variety of products, and the availability of attractive offers are major factors influencing this shift. Popular e-commerce websites such as Amazon, Flipkart, Myntra, and Jabong have gained strong acceptance due to their reputation, reliability, and user-friendly interfaces. The research further reveals that customers frequently purchase books, clothing, electronics, and household items online, showing a diverse demand pattern. The study concluded that most consumers express a high level of satisfaction with online shopping, especially regarding convenience, delivery speed, product quality, and website interactivity. Overall, literature indicates a clear trend toward online purchasing behavior, driven by digital accessibility and enhanced customer experience, emphasizing the need for reliable online shopping systems such as the one developed in this project[4].A recent study published in the *Turkish Journal of Computer and Mathematics Education* analyzes consumer behaviour in the context of online book selling in India.

3.Methodology:

The development of the Online Book ShoppingSystem follows a systematic approach combining software engineering principles and web development best practices. The methodology involves the following key phases:

1. Requirement Analysis

Gathering and analyzing the functional and non-functional requirements of the system

through literature review, user interviews, and studying existing online book shopping platforms. This includes features such as user registration, book browsing, search, cart management, order processing, and admin controls.

2. System Design

Designing the architecture of the application using a layered approach. The system is divided into presentation, business logic, and data access layers to ensure modularity and maintainability. Database schema design is performed to store information about users, books, categories, orders, and payments.

3. Technology Selection

Choosing ASP.NET as the primary web development framework for its robust server-side capabilities, security features, and integration with SQLServer for reliable data storage. Frontend technologies include HTML, CSS, JavaScript, and Bootstrap for responsive UI design.

4. Implementation

Coding the application modules based on the design. Implementing user interfaces for customer and admin, secure authentication mechanisms, book catalog browsing, cart management, and order checkout processes. Emphasis is placed on input validation, session management, and role-based access control.

5. Testing

Conducting unit testing, integration testing, and system testing to ensure that all components function as expected. Testing also includes usability testing to verify the user interface is intuitive and responsive, and security testing to prevent common vulnerabilities such as SQL injection and cross-site scripting.

6. Deployment and Maintenance

Deploying the application on a web server for real-time usage and providing documentation for future maintenance and enhancements. This methodology ensures the development of a reliable, scalable, and user-friendly online book shopping system that meets the project objectives.

4. Proposed System/Model:

The Proposed system is a computerized system but which is maintained at Centralized databases i.e. in automated forms it's a very fast process. And maintaining all the records in online systems database which makes it very easy to access and retrieve data from the database. If they want any record they can easily search all the records. It provides multiple user accessibility and also has different user privileges. So the system is accessible for all the students of the organization.

Modules:

There are some module used in the system which are as follows,

Admin:

➤ Login

Administrator department open after login by admin. Admin department include all information about shops and transaction.

➤ Item Details

Shop keeper may add item, delete item and update item.

View All Order

In this module shows all order placed by user. Also show status of order place and detail information of user.

➤ Action On Order

After placing order by user, shop keeper decides to get the action on which order. shop keeper select order according to preference of user requirement and then place it into transport.

➤ All Reports

This includes reports of all order material of user according to date wise and user wise reports. It also shows report status if it is pending it shows pending report else if it is clear then it shows done report.

User Module

➤ Registration

To purchase any material online, Firstly user want to register with his/her basic information.

➤ Login

After Registration login user should login first and then he/she purchase any material.

➤ **Purchase Item / Place Order**

This module is use to Purchase item. User is able to select only item or User also select number of items at a time

➤ **All Transaction**

Transaction shows all order placed by particular user. It also display date wise order .It shows status of order whether it is pending or done.

The Online Stationary product Order System application would have the following basic functions:

Web Ordering System Module

This module provides the functionality for customers to place their order and supply necessary details. Users of the system, namely restaurant customers, must be provided the following functionality:

- Create an account.
- Navigate the restaurant's menu.
- Select an item from the menu.
- Add an item to their current order.
- Review their current order.
- Place an order.
- Receive confirmation in the form of an order number.
- View order placed.

Menu Management System Module

This module provides functionality for the power user-Administrator only. It will not be available to any other users of the system like Restaurant Employees or Customers. Using a graphical interface, it will allow an Admin to manage the menu that is displayed to users of the web ordering system:

- Add/update/delete stationary product category to/from the menu.
- Update price for a given stationary product item..

Order Retrieval System Module

This is the most simplest module out of all 3 modules. It is designed to be used only by restaurant employees, and provides the following functions:

- Retrieve new orders from the database.
- Display the orders in an easily readable, graphical way.

.SYSTEM DESIGN:

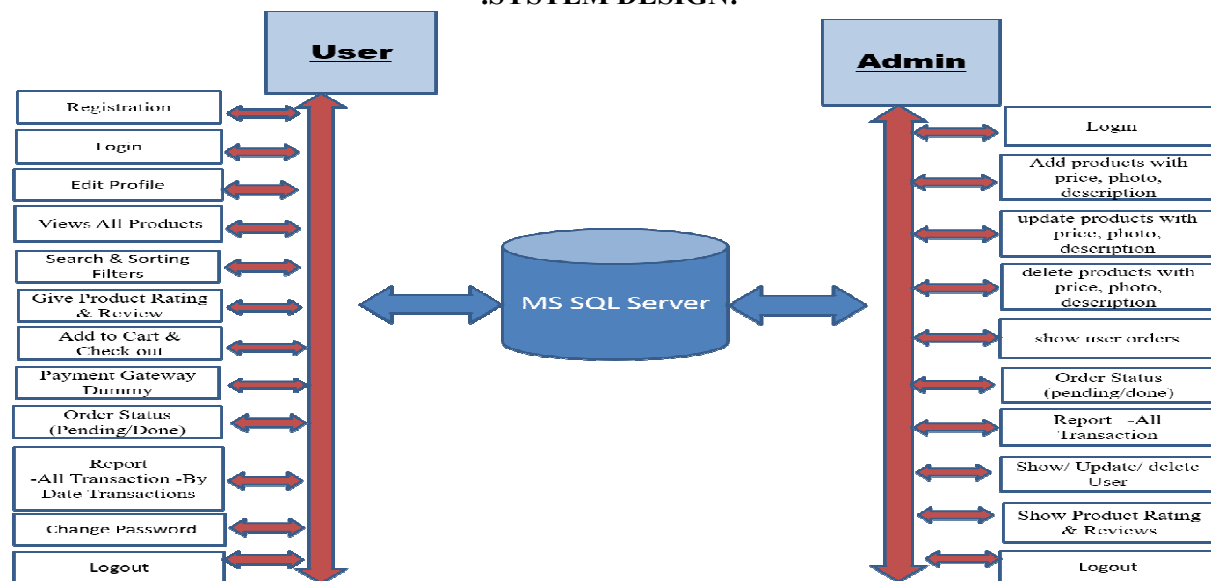


Fig. 4.1 System Design

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Lightweight Explainable Reinforcement Learning Based Intrusion Detection System for Imbalanced Network Traffic

Onkar P. Ghorsade & Dr. Salim Y. Amdani

Department of Computer Science and Engineering, Babasaheb Naik College of Engineering,
Pusad, Maharashtra, India

ABSTRACT

The risk of cyber attacks has increased due to the ongoing growth of cloud platforms, internet services, and linked gadgets. Effective security measures that can detect hostile activity in real time are necessary to safeguard contemporary network systems. For this, intrusion detection systems (IDS) are frequently utilised. However, a number of problems plague many of the current IDS models, such as unbalanced datasets, high processing demands, and a lack of decision-making transparency.

This paper presents a lightweight intrusion detection framework that integrates explainable artificial intelligence methods with reinforcement learning. To lessen the issue of class imbalance in network attack datasets, hybrid data augmentation techniques are employed. In order to reduce model complexity and extract useful characteristics from network traffic, a compact autoencoder is used. A reinforcement learning agent that interacts with network data to make better decisions over time directs the detection process. The model's predictions are explained using SHAP and LIME approaches to enhance interpretability. The NSL-KDD and UNSW-NB15 datasets are used to assess the suggested system. The framework can enhance detection performance while preserving computing economy and interpretability, according to experimental observations.

Keyword: - Intrusion Detection, Data Augmentation, Explainable AI, Autoencoders, Reinforcement Learning, Adversarial Security, Cyber Security.

1. INTRODUCTION

Computer networks are now an essential component of contemporary digital infrastructure. Network systems are crucial to an organization's ability to store data, execute apps, and offer online services. Concurrently, there has been a notable surge in the quantity of cyberattacks directed on these systems. In order to obtain unauthorised access, interfere with services, or steal confidential data, attackers try to take advantage of network vulnerabilities.

The purpose of intrusion detection systems is to keep an eye on network traffic and spot unusual activity. The primary methods used by early IDS models were rule-based or signature-based. While these techniques are capable of identifying known attack patterns, they frequently fall short when confronted with novel or altered threats [3]. Intrusion detection research has used machine learning and deep learning techniques to get over this restriction. These methods enable models to automatically identify anomalous activity and learn patterns straight from network traffic data [16]. Even with these advancements, there are still a number of significant obstacles. Dataset imbalance is one prevalent problem. Certain attack types are quite uncommon in comparison to regular traffic in the majority of intrusion detection datasets. Due to this mismatch, learning algorithms frequently overlook uncommon attacks and concentrate more on majority classes [23]. The computational complexity of deep learning models is another challenge. Although they need a lot of processing power, large neural networks may offer great detection accuracy. Because of this, they are challenging to implement in real-time settings or on devices with limited resources [6].

The lack of transparency in many machine learning models presents another difficulty. Security analysts frequently have to comprehend the reasons behind a system's identification of a certain traffic event as an attack. Nevertheless, a lot of deep learning models function as "black boxes," which restricts their usefulness in security applications [4]. According to recent research, explainable AI and reinforcement learning may be able to assist in resolving these issues. Through interaction with network settings, models can develop adaptive behaviours thanks to reinforcement learning [8]. Explainable AI techniques increase the trustworthiness and usefulness of IDS systems by revealing how a model makes judgements [17].

Inspired by these findings, this paper suggests a lightweight intrusion detection system that blends explainable AI methods with reinforcement learning. Enhancing detection performance for unbalanced datasets while preserving effectiveness and interpretability is the goal.

2. LITERATURE REVIEW

Many machine learning approaches have been used in the extensive study of intrusion detection. Traditional algorithms like Random Forest classifiers, Decision Trees, and Support Vector Machines were the main focus of early research [2]. These methods work well for small detection jobs and are comparatively easy to use. They might, however, find it difficult to handle intricate network traffic patterns. To overcome these constraints, deep learning models have been developed. Neural networks can increase classification accuracy by automatically extracting valuable features from network data [16]. However, these models frequently need a lot of processing power and extensive training datasets.

Recently, reinforcement learning has gained interest as a potentially useful technique for adaptive intrusion detection. In reinforcement learning, an agent gains knowledge by interacting with its surroundings and getting incentives as feedback. Over time, this procedure enables the machine to enhance its detection strategy [8]. Research has demonstrated that IDS models based on reinforcement learning can enhance detection performance and decrease false positives [9]. The application of autoencoders for feature extraction has also been investigated. Important information can be preserved as input data is compressed into lower-dimensional representations using autoencoders. This enhances classification efficiency and lowers computing complexity [18].

In cyber security research, explainable artificial intelligence has grown in importance. By emphasising the most important aspects, methods like SHAP and LIME help academics comprehend how machine learning models generate predictions [4]. This feature increases trust in automated systems and aids security analysts in interpreting IDS results [17]. Addressing class imbalance in intrusion detection datasets is the subject of another field of study. To improve the representation of minority attack classes, methods like cost-sensitive learning and SMOTE have been applied [14]. These techniques enhance the identification of infrequent attacks. A single system that combines explainable AI methodologies, reinforcement learning, and lightweight models is still required, despite the several proposals that have been put out. This research gap is intended to be filled by the framework suggested in this study.

Table 1 summarizes the main contribution with limitations and gaps identified in the previous work according to the main thematic area.

Table1. Research Gap

Thematic Area	Key Studies	Main Contributions	Limitations / Gaps
A. Reinforcement Learning-Based IDS	Abdullahi et al. [1], Ahmad I. et al.[2], Ahmad Z. et al. [3] Dong & Wang [7], Dos Santos et al. [8], Hossain[9], Malik & Singh Saini[15], Rajathi et al. [18], Tang et al. [24]	• Adaptive IDS through RL • Improved long-term decision making • High accuracy (e.g., 97.18% by DQ-IDS) • RL + Autoencoder integration for CPS • Emerging multi-agent RL for attack specialization	• Limited scalability in large networks • Some models still require frequent updates • Few real-world deployments
B. Lightweight Deep Learning & ACA / Model Compression	Ling et al. [13], Dai et al. [6], Sukhadeo et al. [22], Sharma & Guleria [20], Jacob & Habibullah [10]	• Reduced model size via ACA, pruning, quantization, separable convolutions • High efficiency and low latency • Strong accuracy (~97%) in compressed DL models • Feature-sharing strategies for	• Heavy computational requirement remains for some DL models • Need further optimization for IoT/edge devices • Limited real-time deployment studies

		multilevel IDS	
C. Hybrid Data Augmentation & Class Imbalance Solutions	Yang & Shami [25], Mahalakshmi et al. [14], Kabir et al. [11], Talukder et al. [23], Sukhadeo et al. [22], Baklizi et al. [5]	- Hybrid augmentation (GAN + SMOTE) to improve rare attack detection - Cost-sensitive learning and oversampling reduce false alarms - Enhanced minority class representation - Improved IDS reliability	- Computational overhead in generating augmented datasets - Integration with RL and DL frameworks not fully explored
D. Explainable AI (XAI) in Intrusion Detection	Alqaralleh et al. [4], Nandanwar & Katarya [17], Jacob & Habibullah [10], Sukhadeo et al. [22]	- SHAP and LIME for interpretable feature importance - Improved trust, transparency, and auditability - XAI-enabled IDS achieves high accuracy (97%+) - Support for CPS and Industry 5.0 systems	- Limited adoption in lightweight or edge deployments - XAI integration with RL/ACA remains limited
E. Adversarial Robustness & Collaborative Defense	Abdullahi et al. [1], Ahmad et al. [2], Zhu et al. [26], Dai et al. [6], Hossain [9], Kabir et al. [11], Singh et al. [21], Nandanwar & Katarya [17]	- Detection of adversarial attacks (poisoning/evasion) - Collaborative IDS for industrial CPS - Adversarial training improves resilience - Frameworks considering distributed defense	- Adversarial training is computationally costly - Vulnerability to advanced attacks persists - Limited multi-dataset validation and lightweight deployment

3. PROPOSED SYSTEM ARCHITECTURE

Several steps make up the suggested intrusion detection system, which processes network traffic data and detects attacks. The system's primary parts consist of: Preprocessing of data, Hybrid augmentation of data, Autoencoder-based feature extraction, Detection using reinforcement learning and AI analysis that can be explained

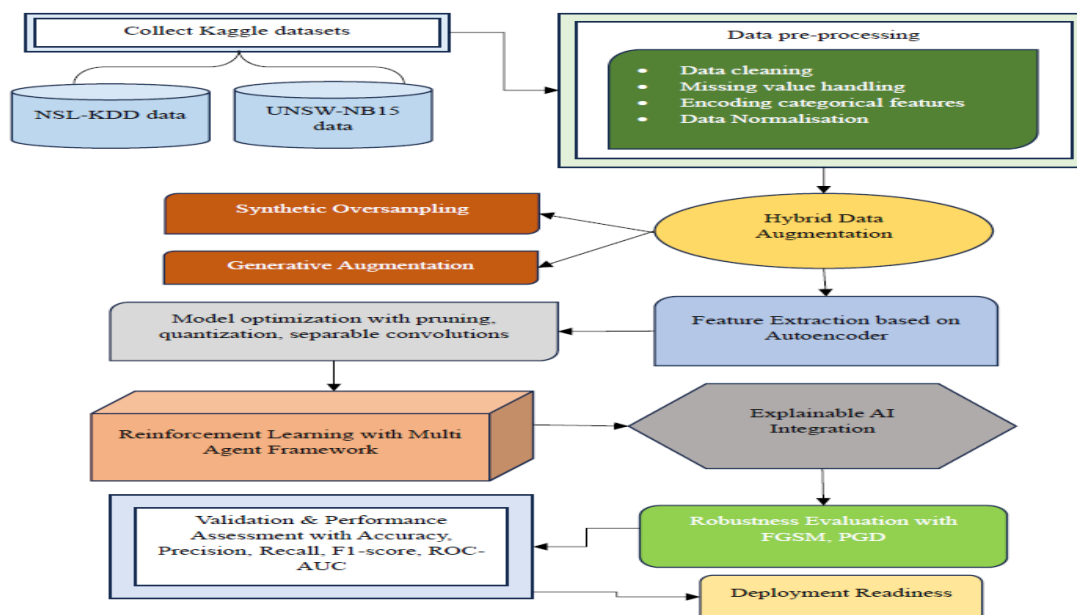


Fig. 1: Propose Flowchart for Intrusion Detection System

4. METHODOLOGY

Data Preparation: The datasets need to be ready before the intrusion detection model is trained. Network traffic is described by a combination of numerical and categorical variables seen in both the NSL-KDD and UNSW-NB15 datasets. Preprocessing entails normalising feature values, transcribing categorical features into numerical form, and eliminating missing data. These actions enhance the quality of the data and make it possible for the learning algorithms to function more efficiently.

Handling Dataset Imbalance: A hybrid data augmentation approach is used to reduce this imbalance, which can negatively impact the performance of classification algorithms. SMOTE is used to create synthetic samples for minority classes, and generative techniques are used to create new data points that resemble realistic network traffic. By combining these approaches, the dataset becomes more

Feature Extraction: Numerous features, some of which may be duplicated, are frequently found in network traffic datasets. A lightweight autoencoder is employed for feature extraction in order to streamline the data representation.

The autoencoder retains the most crucial information while learning a condensed representation of the input data. By doing this, dimensionality is decreased and computing efficiency is increased [6]. **Reinforcement Learning Based Detection:** The intrusion detection procedure is guided by reinforcement learning. With this method, an agent learns to categorise network data as either malicious or normal through interaction with the environment. The reinforcement learning agent progressively enhances its detection policy through repeated interactions [9].

Explainable AI Integration: Explainable AI approaches are integrated into the system to enhance transparency.

There are two approaches used:

1. SHAP determines the significance of every feature in the model.
2. LIME analyses local model behaviour to explain specific predictions.

These methods enable analysts to comprehend the reasons behind the system's classification of specific traffic patterns as attacks [4].

5. EXPERIMENTAL EVALUATION

Common performance criteria used in intrusion detection studies are utilised to assess the suggested solution. Metrics for evaluation consist of: Precision and Accuracy, Recall, F1-Score and ROC-AUC. The suggested reinforcement learning-based framework can increase detection accuracy, particularly for minority attack classes, according to a comparison with conventional machine learning models. While reinforcement learning enhances adaptability to novel assault patterns, hybrid data augmentation aids in the detection of uncommon attacks.

6. ADVANTAGES OF PROPOSED SYSTEM

The suggested system offers a number of advantages. By correcting dataset imbalance, it enhances the detection of uncommon attack types. Computational requirements are decreased by the lightweight autoencoder. Adaptive learning in dynamic contexts is made possible via reinforcement learning. Transparency in detection judgments is offered by explainable AI systems. Real-time network security solutions can use the framework.

6. CONCLUSION

A lightweight intrusion detection framework combining explainable artificial intelligence and reinforcement learning was described in this paper. The system incorporates explainable AI analysis, autoencoder-based feature extraction, reinforcement learning detection, and hybrid data augmentation. The findings will demonstrate that the suggested architecture can increase intrusion detection precision while preserving computational effectiveness. Explainable AI also makes it easier for security analysts to comprehend the system's decision-making process. Future studies can concentrate on strengthening the framework's resistance to sophisticated cyber attacks and testing it using real-time network traffic.

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An Examination of Money Laundering Cases Using Machine Learning and Data Mining Methods

Kirti Akash Nimbhorkar, Dr. Vinod M. Patil

Department of Computer Science and IT, Shri Shivaji College of Art, Commerce and Science, Akola

Affiliated to Sant Gadge Baba Amravati University Amravati, Maharashtra, India

Email: kirtiakashnimbhorkar@gmail.com , vinmpatil21@yahoo.co.in²

Abstract: This thorough examination explores the complex integration of data mining, machine learning, and financial crime prevention, with a specific emphasis on unauthorized financial transactions closely associated with the troubling issue of money laundering. These advanced technologies demonstrate potential for enhancing the detection and prevention of criminal activities in a constantly evolving financial landscape. The research explores the intricacies of money laundering, its financial impacts, and the urgent requirement for improved identification methods. It assesses the incorporation of data-driven efforts to provide a comprehensive understanding of the role that technology has in addressing financial crime. A study examines the possible advantages and challenges of data mining and machine learning, along with their potential applications in identifying intricate money laundering activities. The research adds to discussions on utilizing technology to safeguard financial organizations and maintain economic stability amid rising criminal methods by highlighting the transformative possibilities of these technologies and identifying the obstacles to their implementation.

IndexTerms - Money Laundering, Data mining, Machine learning, supervised learning, financial fraud detection.

I. INTRODUCTION

The existing financial framework is constantly evolving, presenting new challenges for combating illicit actions like money laundering. Consequently, advanced technologies like data mining and machine learning have surfaced as effective approaches for enhancing the detection and prevention of illicit financial transactions associated with money laundering [1]. The aim of this study is to examine the intersection of complex technologies and methods within the field of detecting financial crimes. This research examines the complexity of the money laundering process, its effects on economies, and the critical demand for enhanced detection methods [2], emphasizing the significance of illicit financial activities and their connections to money laundering.

This article aims to provide an in-depth understanding of how technological innovations contribute to combating financial crimes by examining the fundamental ideas of money laundering, assessing the importance of applying data mining and machine learning, and exploring the benefits and drawbacks of these methods [3], [4]. Moreover, this assessment aims to provide insight into the potential of these strategies to transform the battle against money laundering, while also acknowledging the challenges and issues that need to be resolved for successful implementation [5]. This research adds to the broader dialogue on utilizing technology to safeguard financial entities and maintain economic integrity amid evolving criminal methods.

A.BACKGROUND

Money laundering, the complex method of hiding the origin of unlawfully acquired funds, is a significant issue in the current worldwide economy. Conventional detection systems are having difficulty staying abreast of intricate criminal activities that span across borders [6]. A hybrid approach that integrates data extraction with machine learning has emerged as a potential game changer in combating financial crime. These technologies utilize insights from data and learning algorithms to offer a proactive approach for identifying unauthorized activities, particularly concerning money laundering [7]. Implementing these sophisticated methods presents an opportunity to strengthen financial systems against criminal misuse, as digital transactions and complex financial networks elevate the risk of illegal money transfers. This review article explores the significance, challenges, advantages, and issues associated with employing statistical analysis and machine learning

to prevent money laundering, contributing to the ongoing endeavor to uphold economic integrity and legal standards.

B. THE IDEA OF MONEY LAUNDERING

Money laundering is named as such because the name accurately describes the process: illicit or tainted money undergoes various procedures or is cleaned, resulting in it appearing as lawful or legitimate funds on the other side. In a different manner, the source of unlawfully acquired money is concealed through a chain of financial operations and conversations so that the money can ultimately seem like legitimate earnings.

The term "money laundering" is fairly new. At first glance, money laundering appears to be a complex crime that no one in the community should overlook entirely [8]. Compared to street crime, it is a modern form of criminal activity. While often described as a victimless act, it is in fact a deception that implicates every nation, their economies, governments, and the rule of law. The problem of washing money is becoming increasingly common.

Many illegal activities are primarily motivated by the goal of creating monetary profit for the offender, whether it is a person or a group. Consequently, the focus shifts to concealing the origin or intended application of these resources. This intricate process, referred to as money laundering, involves the handling of illicit earnings to hide their unlawful source. Indisputably significant, this method enables offenders to benefit from their profits while protecting the origin, highlighting its essential function in preserving the secretive nature of illegal earnings.

Different criminal actions, such as illegal arms trafficking, fraud, drug smuggling, and operations of criminal enterprises related to tax evasion, can lead to substantial financial profits. Similar to corruption, corrupt actions, and digital fraud schemes, these illegal gains must be disguised as legitimate through money laundering techniques. Whenever unlawful activities produce significant.

C. THE SIGNIFICANCE OF MONEY LAUNDERING

Examining data mining and machine learning techniques aimed at identifying illicit financial transactions in money laundering cases is essential for grasping the complex foundations of money laundering. Money laundering, a vital element of unlawful activities, seeks to conceal the origin and utilization of profits obtained, a process crucial for criminals to relish their wealth without arousing suspicion. This study on data mining and machine learning techniques for identifying illicit financial activities associated with money laundering addresses a pressing modern problem.

These approaches allow regulatory bodies and financial entities to actively detect money laundering patterns, anticipate irregularities, and address illicit financial actions. The research methodology of the study and identification of challenges like imbalanced data and model interpretability contribute to the enhancement of these strategies' real-world implementation. By integrating data mining with machine learning, this study enhances current methodologies and connects insights from various fields to combat money laundering tactics and improve financial integrity.

D. THE IMPACT OF MONEY LAUNDERING ON THE NATIONAL ECONOMY

Money laundering profoundly impacts a nation's economy, leading to numerous adverse effects. Illegitimate funds integrated into lawful financial entities distort economic indicators, complicating the accurate assessment of a nation's economic well-being. This occurrence can lead to inflationary forces, creating asset bubbles and instability in the market. Moreover, money laundering harms a nation's economic well-being by evading taxes on hidden wealth, negatively impacting honest taxpayers and diminishing government income [9]. The funds allocated for anti-money laundering efforts strain state budgets even more, redirecting resources that could have been used in essential sectors such as education and healthcare. Financial institutions implicated in money-laundering cases face reputational damage, regulatory penalties, and diminished investor confidence, which all restrict their ability to foster economic growth [10]. Additionally, money laundering creates an environment conducive to corruption and organized crime, deterring foreign investment and hindering economic growth. Money laundering impacts an economy in diverse ways, such as causing financial instability, undermining market integrity, reducing public services, hindering investment, and obstructing overall economic growth.

II. LITERATURE SYNOPSIS

The previous evaluation explored thoroughly the application of data mining and machine learning techniques to detect illegal financial transactions associated with money laundering. The

evaluation examined various methods, evaluated their advantages and disadvantages, and revealed practical challenges in execution. It also highlighted innovative approaches to improve transaction detection efficiency. By synthesizing current literature, the review provides a thorough overview of advanced techniques, steering future developments in addressing the issue of money laundering.

The proposed methods could transform the national health insurance system by improving security, efficiency, and transparency. Anokye Acheampong Amponsah et al. [11] utilized blockchain cloud technology, enhancing financial security via consensus mechanisms, smart contracts, and decentralized data storage. Jenny Domashova and colleagues [12] proposed utilizing machine learning to identify suspicious bank card transactions, encountering difficulties such as imbalanced data and generalizing models. Jing Li et al. [13] investigated sentiment analysis and machine learning for detecting financial fraud, tackling interpretability and imbalanced data through preprocessing and ensemble methods. M. J. Madhurya et al. [14] investigated the application of ML for detecting financial card fraud, focusing on issues of imbalanced data, feature significance, and real-time analysis. These studies emphasize the transformative possibilities and obstacles of advancements in technology-driven financial systems. The study by Mohammad Wazid et al. [15] presented various techniques that merge machine learning with cyber security, such as consolidating algorithms into hybrid solutions, improving network security, and applying machine learning for malware detection and intrusion prevention. Issues such as adversarial attacks and model interpretability were highlighted, along with suggested solutions like adversarial training and explainable AI. Rohit Saxena and others [16] assessed supervised learning techniques for categorizing Ethereum blockchain addresses, encountering challenges related to data quality and imbalance. Rui Miguel Dantas et al. [17] contributed to using ML for detecting fraudulent credit card usage, but specific techniques were not elaborated.

I. METHODOLOGY

The model for detecting money laundering transactions interprets the data, prepares the data, splits the data, trains the model, tests the model, and evaluates the model, which are the five main phases. The conceptual framework for the investigation is depicted in Fig. 1 [21].

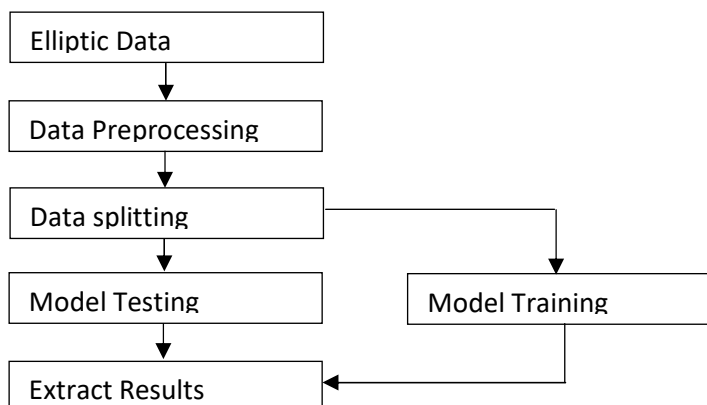


Figure 1. Methodology

In order to efficiently use data mining and machine learning methods, a systematic strategy is used when training models to find unauthorized financial transactions in money laundering instances [22]. This procedure attempts to reduce the risks related to money laundering while improving the accuracy and effectiveness of spotting suspicious actions. The procedure is outlined in the following phases:

3.1 Data Collection:

Obtain raw financial data from a variety of sources, such as transaction histories, account information, timestamps, and other pertinent facts. Make sure the data is diverse in order to identify trends related to both authorised and unauthorised operations.

3.2 Data Preprocessing:

Clean up and preparation the information collected to ensure its accuracy and applicability for learning. Numerical characteristics should be normalised once outliers are removed and missing

values are handled. To make categorical variables compatible with machine learning methods, convert them into numerical representations.

3.3 Data Splitting:

Create two separate subsets from the processed information: an initial set and an evaluation set [23]. The model is trained using the training set, and its efficacy is assessed using the evaluation collection.

3.4 Model Selection:

Depending on the features of the data and the detection process's goals, select the suitable machine learning algorithms [24]. Support vector algorithms, decision trees, random forests, and neural network algorithms are popular options.

3.5 Feature Engineering:

Determine and retrieve pertinent characteristics from the information that are indicative of unauthorized financial transactions. These features may include transaction amount, transaction frequency, party relationships, and temporal patterns.

3.6 Model Training:

Utilize the simulated information to train the chosen machine learning algorithms. Models begin to pick up associations and trends throughout this stage. within the data that distinguish authorized transactions from potentially suspicious ones.

3.7 Model Evaluation:

Utilise the dataset used for testing to assess the models that were taught. To evaluate the algorithm's efficiency, examine performance indicators including precision, recall, precision, accuracy, and F1-score. ability to correctly identify unauthorized transactions and minimize false positives.

3.8 Performance Enhancement:

Analyze the results of model evaluation and identify areas for improvement. If the model's performance is unsatisfactory, consider adjusting hyperparameters, incorporating additional features, or exploring alternative algorithms.

3.9 Iterative Refinement:

Iterate the model training process, refining the models based on evaluation feedback. This iterative approach allows for gradual improvement and adaptation to changing trends in money laundering tactics.

3.10 Interpretability and Transparency:

Pay attention to the interpretability of the trained models. Employ techniques such as feature importance analysis and model explainability to enhance transparency and regulatory compliance.

3.11 Ethical Considerations:

Address ethical concerns related to data privacy and security. Ensure that sensitive financial information is handled with care and adheres to legal and regulatory standards.

3.12 Model Deployment:

Once a satisfactory level of model performance is achieved, deploy the trained models in real-world financial institutions' systems. This enables the automated identification of potentially unauthorized financial transactions.

3.13 Continuous Inspection and Upkeep:

Establish a framework for regular upkeep and evaluation of the implemented simulations.[25]. Regularly update the models to adapt to evolving money laundering tactics and ensure their ongoing effectiveness.

By following this comprehensive methodology, financial institutions can effectively harness the power of data mining and machine learning to detect unauthorized financial transactions associated with money laundering. The iterative nature of the process, combined with continuous monitoring, contributes to the refinement and optimization of detection models over time. This methodology ensures that the fight against money laundering remains proactive, adaptive, and aligned with regulatory requirements.

II. Key Features of the Research

Targeted Focus: This research delivers a precise investigation into the detection of unauthorized financial transactions, placing an insightful emphasis on its relevance within the broader realm of

money laundering. By narrowing its scope, the study effectively hones in on a critical aspect of financial crimes.

Advanced Techniques: Demonstrating a commitment to innovation, the study delves into the latest advancements in data mining and machine learning methodologies. Through this exploration, it showcases how these state-of-the-art technologies can be harnessed to discern intricate trends and anomalies linked to money laundering activities.

Predictive Analytics: With a forward-looking perspective, this research ventures into the realm of predictive analytics. By harnessing historical data, the study illustrates the potential to anticipate potential instances of fraudulent financial transactions. This proactive approach promises to enhance the efficacy of detection mechanisms.

Anomaly Detection: Recognizing the pivotal role of anomaly detection in combatting money laundering, the research underscores the importance of tools capable of identifying irregular and suspicious behaviors within financial transactions. This emphasis enhances the capacity to pinpoint potential cases of illicit financial activities.

Pattern Recognition: Leveraging the power of data mining, the study uncovers the latent ability to unearth concealed patterns and correlations residing within extensive datasets. This capability becomes a critical asset in unraveling the complex web of money laundering operations.

Challenges and Solutions: The research confronts challenges head-on, delving into issues such as unbalanced data and model interpretability. By doing so, it provides valuable insights into strategies to address these hurdles, paving the way for more effective detection systems.

Interdisciplinary Approach: This study embodies a holistic approach to money laundering prevention by seamlessly merging data-driven methodologies with legal and financial acumen. Such a multidisciplinary stance enhances the comprehensiveness of the anti-money laundering efforts.

Regulatory Alignment: Recognizing the necessity of harmonizing detection techniques with regulatory mandates, the research underscores the significance of ensuring that detection outcomes align with transparency and compliance requisites.

Practical Application: Beyond theoretical exploration, the research demonstrates the pragmatic use of ML learning as well as data mining methods. Real-world examples and case studies illustrate how these methodologies can be effectively employed to identify unauthorized financial transactions and combat money laundering.

These core characteristics not only highlight the significance of employing Detection techniques using data extraction and ML of unauthorized financial transactions but also illuminate the progress made and obstacles encountered in the continuous endeavor to combat the intricate menace of money laundering.

V. BENEFITS OF INCORPORATING MACHINE LEARNING FOR DETECTING UNAUTHORIZED FINANCIAL TRANSACTIONS

This section describes the specific benefits derived from incorporating machine learning methods into the domain of detecting unauthorized financial transactions related to money laundering. Utilizing algorithms, these benefits not only improve detection accuracy but also boost the efficiency, adaptability, and range of monitoring and analysis.

Machine learning provides improved detection precision by recognizing intricate patterns and anomalies that could escape human observation. This accuracy enhances the detection of illicit financial activities related to money laundering, increasing overall efficiency. The scalability of machine learning enables the real-time analysis of vast financial data, hastening the detection of suspicious activities among different transactions. These systems stay flexible to changing money laundering methods, consistently adapting based on new information to ensure effectiveness against new tactics. By utilizing automated analysis, machine learning reduces the need for manual intervention, enhancing resource allocation within financial institutions. Fewer false positives occur because algorithms analyze past data, accurately differentiating real alerts from false ones, easing the burden on compliance teams. Finally, real-time monitoring features enable quick detection and action in possibly illegal transactions.

Incorporating machine learning methods into the detection of unauthorized financial transactions greatly enhances efforts in preventing money laundering. By enhancing precision, effectiveness, flexibility, and real-time functionalities, these innovations are set to strengthen financial entities

against the ongoing risk of money laundering. This proactive strategy aligns with the ever-changing landscape of financial crimes, allowing institutions to remain ahead in the continuous fight against illegal activities.

VI. DRAWBACKS OF EMPLOYING MACHINE LEARNING FOR DETECTING UNAUTHORIZED FINANCIAL TRANSACTIONS

Although machine learning has the potential to revolutionize the detection of money laundering, this section highlights the significant drawbacks that come with its use. Recognizing these limitations is crucial for a complete grasp of the challenges linked to incorporating machine learning into the battle against illicit financial activities.

The incorporation of machine learning in detecting unauthorized financial transactions poses difficulties. Data integrity and prejudice can undermine precision, whereas intricate algorithms are opaque, creating challenges for understanding. Overfitting restricts the generalization of models, and development that demands significant resources can obstruct smaller companies. Ongoing upkeep is necessary to adjust to changing strategies. Concerns about privacy emerge from the use of personal data, necessitating careful oversight.

Although acknowledging the significant capabilities of machine learning in transforming money laundering detection, this review also emphasizes the practical challenges and issues inherent to its implementation. The review facilitates a comprehensive evaluation of the challenges by emphasizing these limitations involved in utilizing machine learning for preventing financial crime. Confronting these challenges directly is essential for maximizing the advantages of machine learning while managing the complexities of protecting financial systems from the threat of money laundering.

VII. CONCLUDING REMARKS

This extensive research underscores the important significance of reassessing the function of information extraction and the mL environment in detecting financial crimes, particularly focusing on illicit financial activities associated with money laundering. The integration of these technologies offers a proactive approach to addressing the challenges presented by increasingly intricate criminal activities within the financial ecosystem. The research highlights the significance of improved detection technologies by exploring the intricacies of money laundering and its financial impacts. Although emphasizing the possible advantages of data-driven approaches, the evaluation acknowledges the challenges related to data quality, model interpretability, and resource limitations. The multidisciplinary nature of this study, connecting technology, law, and finance, highlights the collaboration needed to effectively address emerging criminal methods. As financial systems become more interconnected, the concepts and solutions presented in this article greatly enhance the ongoing dialogue regarding the use of technology to safeguard institutions and maintain economic integrity amid emerging financial threats.

VIII. ACKNOWLEDGEMENTS

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Institutional Autonomy and Quality of Higher Education: Governance, HRM and Accountability Perspectives

Nilesh Rangrao Ronghe

Craft Instructor ,Sant Gadge Baba Government Industrial Training Institute, Amravati
Maharashtra, Indiae ,mail- jaygajanan.nrr@gmail.com ,Mob.no.- 9922858876

Abstract

In the rapidly evolving global knowledge economy, higher education institutions are required to demonstrate academic excellence, innovation capacity, governance efficiency, and societal responsiveness. Institutional autonomy has emerged as a central reform strategy aimed at improving quality in higher education. This paper critically examines the multidimensional relationship between academic, administrative, and financial autonomy and quality indicators such as curriculum relevance, faculty productivity, research performance, student engagement, and institutional sustainability. Drawing upon governance theory, Human Resource Management (HRM) frameworks, and contemporary policy reforms including the National Education Policy 2020, this study argues that autonomy enhances institutional effectiveness when integrated with robust accountability systems. The paper further explores challenges in implementing autonomy and proposes strategic recommendations for policymakers and institutional leaders.

Keywords: Higher Education, Institutional Autonomy, Governance, HRM, Quality Assurance, Accountability

1. Introduction

Higher education serves as the backbone of national development by producing skilled human capital, advancing research and innovation, and strengthening democratic and ethical values. In an era characterized by globalization, digital transformation, and knowledge-driven competition, universities and colleges must operate with agility and strategic foresight. However, excessive centralization, rigid regulatory frameworks, and bureaucratic procedures often limit institutional flexibility and innovation. Institutional autonomy has therefore been advocated as a mechanism to empower higher education institutions to take independent decisions in academic, administrative, and financial domains.

Autonomy does not imply the absence of regulation; rather, it represents responsible self-governance within a framework of accountability. Institutions that enjoy greater autonomy are better positioned to design industry-relevant curricula, recruit competent faculty, mobilize resources, and foster research ecosystems. This paper investigates how institutional autonomy contributes to quality enhancement and institutional excellence.

2. Review of Literature

Scholarly literature highlights a strong association between institutional autonomy and improved academic outcomes. Altbach (2016) argues that globally competitive universities operate with significant academic freedom and decentralized governance. OECD (2018) emphasizes that governance reforms promoting autonomy enhance responsiveness and innovation. The World Bank (2017) notes that autonomy combined with accountability mechanisms leads to improved institutional performance indicators such as research output and graduate employability. In the Indian context, the National Education Policy 2020 advocates graded autonomy to promote excellence and multidisciplinary education.

However, research also cautions that unchecked autonomy may lead to commercialization risks, inequity, and governance challenges. Thus, balanced regulation and performance-based monitoring remain essential components of effective autonomy.

3. Conceptual Framework

Institutional autonomy can be categorized into three interrelated dimensions: academic autonomy, administrative autonomy, and financial autonomy. Academic autonomy refers to freedom in curriculum design, evaluation systems, research orientation, and program innovation. Administrative autonomy encompasses decision-making authority related to recruitment, promotions,

organizational structure, and strategic planning. Financial autonomy involves resource mobilization, budget allocation, fee structures, and industry partnerships. Together, these dimensions shape institutional effectiveness and quality enhancement.

4. Academic Autonomy and Quality Enhancement

Academic autonomy enables institutions to introduce interdisciplinary programs, outcome-based education models, skill-oriented courses, and flexible credit systems. By aligning curricula with industry and societal needs, institutions enhance graduate employability and relevance. Continuous internal assessment, project-based learning, and digital integration further strengthen teaching-learning processes. Institutions with academic autonomy can rapidly revise syllabi in response to technological advancements, ensuring curriculum dynamism.

5. Administrative Autonomy and HRM Practices

Administrative autonomy empowers institutions to adopt merit-based recruitment policies, transparent performance appraisal systems, and competency-based promotions. HRM plays a critical role in nurturing faculty motivation, research engagement, and leadership development. Performance-linked incentives, faculty development programs, and mentoring systems foster a culture of excellence. Strategic leadership in autonomous institutions encourages participatory governance and data-driven decision-making.

6. Financial Autonomy and Institutional Sustainability

Financial autonomy allows institutions to mobilize resources through research grants, consultancy services, alumni contributions, and industry collaborations. Flexible budgeting enables investment in infrastructure, laboratories, digital platforms, and innovation hubs. Financial sustainability supports long-term strategic planning and global partnerships. However, financial autonomy must be exercised responsibly to ensure affordability and equitable access.

7. Governance and Accountability Mechanisms

Effective autonomy operates within structured accountability systems including accreditation bodies, Internal Quality Assurance Cells (IQAC), academic audits, and performance benchmarking. Transparent reporting, stakeholder participation, and outcome-based evaluation frameworks ensure institutional credibility. Governance structures must balance freedom with responsibility to prevent misuse of autonomy. Governance and human resource management also plays important role in success of autonomous institution. Beside this, public institution without autonomy are facing the problem of devotion of staff towards students welfare or not accepting accountability at that much level. Hence implementation of autonomy to higher education system tends to improve productivity maintaining quality and output oriented curriculum.

8. Challenges in Implementing Autonomy

Key challenges include resistance to change among stakeholders, leadership skill gaps, financial disparities, political interference, and commercialization pressures. Capacity-building initiatives, leadership training, and regulatory clarity are essential to address these concerns.

9. Policy Recommendations

Policymakers should adopt phased autonomy implementation, strengthen accreditation mechanisms, and provide financial support for capacity building. Institutional leaders should promote participatory governance, invest in faculty research, enhance digital transformation, and build strong industry-academia linkages.

10. Conclusion

Institutional autonomy represents a strategic governance reform aimed at enhancing quality in higher education. When integrated with ethical leadership, HR-driven management, and robust accountability frameworks, autonomy acts as a catalyst for innovation, excellence, and global competitiveness. A balanced and responsible autonomy model ensures sustainable development and equitable access in higher education systems.

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Greening the Educational Framework: An Interdisciplinary Perspective from Environmental Science, Chemistry and Zoology

Mr. Rajesh M. Chavan

Research Scholar, Department of Chemistry Shri Shivaji College of Arts, Commerce and Science, Akola(M.S)

Ms. Swati S. Ambhore

Research Scholar, Department of Zoology Shri R. G. Rathod Arts & Science College, Murtizapur, District Akola(M.S)

Abstract

In the contemporary era, environmental degradation—manifested through climate change, habitat destruction, biodiversity decline, and chemical pollution—has become a defining challenge of human civilization. These crises are not merely ecological but deeply socio-cultural, requiring a reorientation of knowledge systems and educational philosophies. The concept of “greening the educational framework” advocates the integration of ecological ethics, sustainability principles, and scientific awareness into academic curricula and institutional practices.

This paper critically examines the incorporation of Environmental Science and Sustainable Development within an interdisciplinary framework that draws from zoological perspectives such as biodiversity conservation and ecosystem dynamics, and chemical perspectives including biogeochemical cycles, toxicology, and green chemistry. It explores pedagogical strategies, institutional responsibilities, and the transformative potential of sustainability education. The study concludes that a restructured, ecologically informed education system is essential for nurturing environmentally conscious citizens capable of maintaining ecological equilibrium and advancing sustainable development.

Keywords: Ecological Ethics, Biodiversity Conservation, Green Chemistry, Environmental Toxicology, Sustainability Education.

1. Introduction

The rapid expansion of industrialization, urban ecosystems, and technological interventions has significantly altered the natural environment. While these developments have enhanced material well-being, they have simultaneously accelerated ecological imbalance through phenomena such as atmospheric pollution, deforestation, loss of faunal diversity, and disruption of biogeochemical cycles. From a zoological perspective, the extinction of species and the fragmentation of habitats threaten ecosystem stability and trophic interactions. From a chemical standpoint, the accumulation of pollutants, heavy metals, and synthetic compounds has adversely affected air, water, and soil quality, leading to long-term ecological toxicity.

These interconnected challenges necessitate a transition toward sustainable development, which seeks to harmonize human progress with ecological integrity. Education emerges as a powerful medium for cultivating this transformation by reshaping human consciousness, values, and practices.

Greening the educational framework involves embedding sustainability within curricula, pedagogy, and institutional culture. It encourages learners to understand ecological interdependence, analyze environmental degradation, and adopt sustainable lifestyles grounded in scientific reasoning.

2. Conceptualizing a Green Educational Framework

A green educational framework represents a paradigm shift in education, where sustainability becomes a foundational principle rather than a peripheral topic. It integrates ecological literacy, environmental chemistry, and biological conservation into a unified learning model.

Traditionally, environmental studies were compartmentalized. However, the interdisciplinary nature of modern environmental issues requires a synthesis of knowledge across domains. For instance, understanding ecosystem degradation involves both zoological insights into species interactions and chemical analysis of pollutants affecting these systems.

Key dimensions of a green framework include:

Curricular Integration: Inclusion of topics such as ecological energetics, environmental toxicology, and green chemistry across disciplines.

Sustainable Institutional Practices: Adoption of resource-efficient technologies, waste minimization, and carbon footprint reduction.

Experiential Pedagogy: Field-based ecological studies, biodiversity assessments, and laboratory analysis of environmental samples.

Community engagement promotes public involvement in conservation work, wildlife protection actions, and environmental awareness drives..

Environmental Science focuses on the interaction between humans and the natural environment. It covers areas such as climate change, biodiversity conservation, pollution control, and environmental policy. It provides students with scientific understanding of environmental systems.

Sustainable development focuses on harmonizing economic development, social justice, and environmental conservation. It encourages responsible use of resources to ensure long-term sustainability.

Incorporating these subjects into education helps students understand both environmental problems and their solutions, including renewable energy, sustainable agriculture, and waste management.

Education for Sustainable Development (ESD) equips learners with the knowledge, skills, and values needed to make responsible decisions for environmental and social well-being.

This holistic approach fosters an educational environment that aligns knowledge with ecological responsibility.

3. Interdisciplinary Role of Environmental Science, Chemistry and Zoology

Environmental Science serves as a bridge connecting natural and social sciences. It examines ecological processes, environmental degradation, and sustainability strategies.

Chemical Contributions:

Chemistry contributes through the study of environmental pollutants, chemical kinetics of degradation processes, and the functioning of biogeochemical cycles such as the carbon and nitrogen cycles. Concepts like green chemistry promote the design of eco-friendly substances and sustainable industrial processes.

Sustainable Development Perspective:

Sustainable development integrates these scientific insights with socio-economic considerations, advocating for resource management strategies that ensure ecological resilience and social equity.

Together, these disciplines cultivate a comprehensive understanding of environmental sustainability and scientific responsibility.

Zoological Contributions:

Zoology provides critical insights into biodiversity conservation, population dynamics, ethology, and ecosystem interactions. It helps students understand how anthropogenic activities disrupt food chains, ecological niches, and species survival.

4. Significance of a Green Curriculum

A green curriculum is instrumental in fostering ecological consciousness and scientific literacy.

4.1 Ecological Awareness

Students gain an understanding of ecosystem functioning, species interdependence, and environmental degradation.

4.2 Analytical and Critical Thinking

Through the study of environmental chemistry and ecological systems, learners develop the ability to critically evaluate environmental issues and propose scientific solutions.

4.3 Ethical and Civic Responsibility

Exposure to conservation biology and environmental ethics instills a sense of duty toward protecting natural resources and biodiversity.

4.4 Promotion of Sustainable Practices

Students are encouraged to adopt practices such as waste segregation, energy conservation, and the use of biodegradable materials, reflecting principles of green chemistry and ecological sustainability.

5. Core Components of an Interdisciplinary Green Curriculum

5.1 Integrative Learning Approach

Combining ecological theories, chemical analysis, and socio-economic perspectives.

5.2 Field and Laboratory-Based Learning

Activities such as wildlife surveys, ecological sampling, and chemical analysis of pollutants enhance practical understanding.

5.3 Research-Oriented Projects

Projects may include biodiversity mapping, water quality assessment, and studies on the impact of chemical contaminants on living organisms.

5.4 Community and Conservation Engagement

Collaboration with environmental organizations and participation in conservation initiatives strengthen real-world learning.

6. Strategic Implementation

6.1 Curriculum Innovation

Incorporating subjects like environmental toxicology, conservation biology, and sustainable chemistry into academic programs.

6.2 Capacity Building for Educators

Training teachers in interdisciplinary teaching methods and emerging environmental issues.

6.3 Eco-Friendly Campus Development

Implementation of renewable energy systems, green laboratories, and sustainable waste management practices.

6.4 Technological Integration

Use of simulation tools, environmental monitoring software, and digital platforms for data analysis and visualization.

6.5 Curriculum Reform

Incorporate sustainability topics into all disciplines.

6.6 Teacher Training

Provide training programs to improve sustainability teaching.

6.7 Sustainable Campus Practices

Adopt eco-friendly infrastructure and operations.

6.8 Use of Technology

Utilize digital tools for better environmental learning.

7. Role of Higher Education Institutions

Universities play a transformative role by:

Offering specialized programs in environmental and sustainability sciences

Conducting research on climate change, biodiversity conservation, and green technologies

Promoting collaborations with industries, NGOs, and governmental bodies

They can offer specialized programs in environmental studies

Conduct research on environmental challenges

Collaborate with communities and industries for sustainable practices

These efforts help prepare students for careers in sustainability and environmental management.

Such initiatives contribute to the development of environmentally responsible professionals and informed citizens.

8. Challenges in Implementation

Despite its significance, several challenges persist:

Limited interdisciplinary expertise among educators

Inadequate infrastructure for laboratory and field-based studies

Financial constraints in adopting sustainable technologies

Institutional resistance to curricular reforms

Lack of awareness and training among educators

Limited financial and institutional resources

Rigid curriculum structures

Resistance to change within institutions.

9. Future Prospects

Future efforts should focus on:

Strengthening interdisciplinary education

Enhancing policy support and funding

Promoting global collaboration in environmental research

Encouraging innovation in green technologies and conservation strategies

Promote interdisciplinary learning approaches

Increase government support and funding

Encourage collaboration between institutions and organizations

Foster global cooperation for environmental solutions.

10. Conclusion

Greening the educational framework represents a crucial step toward achieving ecological sustainability and social responsibility. By integrating zoological insights into biodiversity and ecosystem health with chemical understanding of environmental processes and pollution, education can offer a holistic approach to sustainability.

Environmental Science and Sustainable Development, when taught through an interdisciplinary lens, empower students with the knowledge, skills, and ethical values necessary to address environmental challenges. Ultimately, such an approach fosters a generation committed to preserving ecological balance and advancing a sustainable future.

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Elements of Environmental Education: Curriculum and Teacher's Perspective.

Role of Home Economics in maintaining Nutrition in Changing Family Structure

Rupali Sureshrao Kale (Bhamburkar)

Ph.D Research Scholar Ramkrishna Mahavidyalaya , Daryapur
email-bamburkarrupali @gmail.com

Abstract

Home Economics is an important discipline that focuses on improving the quality of family life through effective management of resources nutrition and health practices. In modern society rapid social and economic changes have transformed the traditional family structure the transition from joint families to nuclear families increasing urbanization and the participation of women in the workforce have significantly influenced dietary habits and nutritional pattern with households. This study examines the relationship between dietary nutrition and changing family structure within the framework of the home economics. The research highlights how family structure affects food choices, meal preparation and nutritional intake. The findings suggest that proper home economics education and awareness can help families maintain balanced nutrition despite changing lifestyle.

Keywords – Home Economics, Nutrition, Dietary habits, family structure, health.

Introduction :

Home economics is a field that studies the management of household resources, family wellbeing and the development of healthy living practices. One of its key components is nutrition which plays a vital role in maintaining the health and development of family members.

In traditional societies joint families were common and food preparation was often managed collectively. These families usually followed traditional dietary practices that ensured balanced nutrition. However modern industrialization and urban migration have resulted in the emergencies of unclear families. This shift was influenced eating patterns and food consumption behaviour.

Modern families often face challenges such as lack of time for cooking dependence on processed. These changes can affect the nutritional status of family members. Studying dietary nutrition in relation to changing family structures is essential in the field of home economics.

Objectives of the study :

1. To study the importance of dietary nutrition in Home Economics
2. To analyse the effect of changing family structures on dietary habits.
3. To examine the nutritional challenges faced by modern families.
4. To suggest measures for improving family nutrition through Home Economics education.

Review of Literature :

Nickols (2009) explained that Home Economics education plays crucial roles in promoting healthy lifestyle and balanced diets within families.

Devadas (2012) Studied nutrition and health pattern in Indian families and observed that modernization and urban lifestyles have significantly altered traditional dietary practices.

Rao (2015) analysed dietary patterns among urban families and found that nuclear families often rely on convenience foods due to time constraints and work commitments.

Results and Discussion :

The study reveals several important findings regarding nutrition and family structure.

1) Changing family structure –

The shift from joint families to nuclear families has influenced meal preparation and eating pattern. In joint families food preparation is shared among members, which helps maintain traditional and balanced diet.

Table 1 Family structure

Sr. No.	Family type	Number of families	Percentage
1	Joint family	20	40%
2	Nuclear family	30	60%

The data shows the nuclear families are more common in modern society.

2) Influence of modern lifestyles :

Busy work schedules, especially among working parents often reduce the time available for cooking this results in increase consumption of processed and convenience foods.

Table 2 : Dietary practices in families

Sr. No.	Type of diet	Number of families	Percentage
1	Home cooked traditional food	27	54%
2	Fast food / processed food	23	46%

The table indicates that a significant number of families depend on fast food due to busy schedules and lifestyle changes

3) Nutritional Changes :

Families with knowledge of home economics tend to follow healthier dietary practices proper meal planning and awareness about balanced nutrition help improve family health.

Therefore home economics education is essential for guiding families toward healthier dietary choices.

Conclusion :

The study concludes that changing family structure have significantly affected dietary habit and nutritional patterns, and increased work responsibilities has influenced food choices and meal preparation practices.

Home economics provide essential knowledge for managing household resources and maintaining balanced nutrition promoting nutrition education and awareness can help families adopt to modern lifestyle while maintaining healthy dietary practices.

Suggestions :

1. Promote nutrition education in school and communities
2. Encourage families to follow balanced meal planning
3. Increase awareness about healthy and traditional foods
4. Strengthen home economics education programs for pattern family health

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The Emerging Role and Transformative Potential of Artificial Intelligence in Educational Systems: A Conceptual Review

Ms. Samiksha S Gawali , Meena S. Doibale

Department of computer Science BhartiyaMahavidyalayaAmravati, MS, India

samikshagawali06@gmail.com , meena.doibale@gmail.com

Abstract :

The increasing availability of Artificial Intelligence and related tools and technologies has made it possible to use AI in various domains of life. The field of education is also witnessing an increasing use of AI; however, its scope and related challenges remain unclear. In the current paper, we, by using previous empirical and theoretical studies, provided an overview of the use of AI in the education field, its related challenges, and future opportunities. Accordingly, we noted that AI is being used in the Education field as evidenced by global initiatives such as UNESCO. We also noted that AI applications in the education field include enabling the preparation of content, assignments, automated grading, and assistance to students. The benefits of AI in education include greater flexibility in terms of time and space and a changing role of the tutor as a facilitator. We also discussed key challenges including ethical issues such as data privacy, lack of inclusion and equity for students of all backgrounds, and lack of human touch. Based on these themes we concluded that AI's role in education will increase in the future, but the challenges also need to be addressed to fully unlock the benefits of AI in the education field.

Keywords: Artificial Intelligence; Education; Technology; Learners.

Introduction:

Artificial Intelligence refers to the simulation of human intelligence processes by machines, especially computer systems. In recent years, AI has significantly influenced various sectors, including healthcare, finance, and education. The education sector is experiencing a paradigm shift from traditional teacher-centered approaches to technology-driven personalized learning environments.

The increasing availability of digital learning platforms, big data analytics, and machine learning algorithms has accelerated the adoption of AI in education. Educational institutions worldwide are leveraging AI to enhance learning outcomes, reduce administrative workload, and improve student engagement. This conceptual review explores the evolving role of AI in education and its implications for the future.

AI in the education field:

AI in education revolutionizes learning through personalized, adaptive systems (e.g., Dream Box), 24/7 AI tutoring, and automated grading, improving engagement and efficiency. It enables tailored educational content, supports teachers with administrative tasks, and promotes inclusivity for special needs students, while reducing the digital divide.

The use of AI in the field of Education can be traced back to the 1970s when LOGO programming and Turtle robots were introduced to young learners. However, those tools focused more on computational thinking or programming concepts instead of AI. In 1995, a book named "Artificial Intelligence: A Modern Approach" was published and is considered the most standard textbook in the field of AI for computer science undergraduates (Russell, 1995). Accordingly, computer science university students could learn how AI can solve problems, reason, learn, make decisions, communicate, perceive, and act (Russell, 1995). However, the concept remained limited to the field of computer science only. Later the concept of AI in education evolved as the integration of AI into the education management system which facilitates teaching, learning, and decision-making, as well as providing virtual assistance for personalized education. AI can further enable providing individual customized learning for students thus facilitating the learning needs. Educators can deliver the learning content to the students using AI-based technologies such as cloud computing to students in a format and form suitable for various student needs, AI can also provide an opportunity for

students to interact with chatbot thus enhancing their learning and clearing any confusions resulting in facilitating independent learning.[1][2]

The role of AI in education is increasing as evident from global initiatives (e.g., ISTE, UNESCO, DigComp) which started to conceptualize AI education according to the latest educational standards and design guidelines to address digital literacy levels across the globe (Dig Comp, 2022; ISTE, 2022; Miao). These frameworks represent different perspectives on the idea of AI education. For example, Miao reported that eleven countries around the world have incorporated AI into their STEM/computing curricula to promote competitiveness and equip young people for the future workplace. AIK12 (2019) proposed the “five big ideas” about AI that serve as the framework to uncover the necessary AI concepts that students in each grade level should learn. The five big ideas include perception, representation and reasoning, learning, natural interaction, and the societal impact of AI (AIK12, 2019). The ISTE (2022) further designed an AI project guideline and proposed seven standards to prepare students to become

- 1) Empowered learners,
- 2) Knowledge constructors,
- 3) computational thinkers,
- 4) innovative designers,
- 5) digital citizens,
- 6) creative communicators
- 7) global collaborators.

Overall, currently, AI is becoming the next big trend in the education field at all levels including primary, secondary, as well as higher-level studies.[3]

AI application in education field:

Artificial Intelligence (AI) applications in the education field are rapidly expanding, reshaping how students learn and how institutions operate by embedding intelligence into core academic processes. Adaptive learning systems such as DreamBox and Knewton analyze learner behavior and performance data to dynamically adjust lesson difficulty, pacing, and content pathways, enabling truly personalized learning experiences that improve retention and mastery.[4] AI-powered virtual tutors and chatbots provide round-the-clock academic assistance, answering questions, generating explanations, and offering practice exercises, which is particularly valuable in large or remote classrooms. Automated grading and assessment tools use natural language processing and machine learning to evaluate quizzes, essays, and even coding assignments, significantly reducing teachers' administrative burden while providing faster feedback to students. Beyond instruction, AI-driven analytics help institutions predict student dropout risk, optimize course design, and support data-informed decision-making in admissions and resource planning. AI also advances inclusive education through speech recognition, real-time translation, text-to-speech, and personalized assistive technologies that support learners with disabilities and multilingual backgrounds. However, effective deployment requires careful attention to data privacy, algorithmic fairness, infrastructure readiness, and teacher training to ensure AI applications enhance educational quality while maintaining ethical and human-centered learning environments.[5][6]

Benefits of AI in education field:

The benefits of Artificial Intelligence (AI) in the education field are substantial, as it enhances learning outcomes, improves teaching efficiency, and expands access to quality education. AI enables personalized learning through adaptive platforms such as DreamBox, which analyze student performance in real time and tailor lessons to individual learning speeds and styles, leading to better understanding and retention. Intelligent tutoring systems provide 24/7 academic support, allowing students to receive instant feedback and practice opportunities beyond classroom hours, while automated grading tools save teachers significant time on routine assessment tasks and enable faster, more consistent evaluation.[4] AI also supports data-driven decision-making by helping educators identify struggling students early, predict academic risks, and design targeted interventions. Additionally, AI promotes inclusive education through speech-to-text, text-to-speech, language translation, and other assistive technologies that help students with disabilities or language barriers participate more effectively. Administrative processes such as admissions, scheduling, and resource allocation are streamlined through AI analytics, reducing institutional workload and costs. Overall,

when implemented responsibly, AI enhances engagement, efficiency, accessibility, and educational quality while allowing teachers to focus more on mentorship, creativity, and human-centered learning.[7]

AI challenges in the education field:

Artificial Intelligence (AI) in the education field presents significant challenges that institutions must address to ensure responsible and effective implementation. One major concern is data privacy and security, as AI systems—such as adaptive platforms like DreamBox—collect and analyze large volumes of sensitive student data, creating risks of breaches or misuse if proper safeguards are not in place. Algorithmic bias is another critical issue, since AI models trained on incomplete or unrepresentative data may produce unfair or inaccurate recommendations that disadvantage certain groups of learners.[8] The digital divide also remains a serious barrier, as schools and students in low-resource settings may lack the infrastructure, devices, or internet connectivity required to benefit from AI-powered tools, thereby widening educational inequality. Additionally, many educators face insufficient training and resistance to adopting AI technologies, which can limit effective classroom integration.

Conclusion:

The conceptual paper discusses the role of AI in the education field. Our review of previous studies shows that AI in the education field is changing the landscape of education in the domains including course plan, delivery of courses, content creation and distribution, and so on. The application of AI in education delivery is customized and more flexible learning content along with the opportunity to interact with the system.[9] The AI is thus empowering both the teaching staff and the students to become more in control by focusing on more important tasks while leaving the routine repeated simple tasks to the AI system. The key challenges we discussed included ethical issues related to AI in education, lack of human touch, data privacy issues, as well as the cost involved in developing AI systems. Overall, we can conclude that AI is revolutionizing the education field and bringing big changes along with some challenges that need to be addressed properly before real gains can be made.[10][12]

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Impact of Artificial Intelligence on Higher Education

Ajinkya Gulabrao Suroshe , Dr. P. B. Niranjane

Department of Computer Science and Engineering Babasaheb Naik College of Engineering, Pusad,
Maharashtra, India Email: ajinkyasuroshe7@gmail.com

1. Abstract

Artificial Intelligence (AI) is one of the most important technological developments of the 21st century and is transforming many sectors, including education. In recent years, higher education institutions have increasingly adopted AI technologies to enhance teaching, learning, and administrative efficiency. AI-based tools such as intelligent tutoring systems, automated grading software, learning analytics platforms, and virtual assistants help improve the learning experience of students and assist teachers in delivering effective education.

Artificial Intelligence enables personalized learning by analyzing student performance and providing customized educational content based on individual learning needs. AI systems can also help universities analyze large amounts of educational data to improve decision-making processes and student outcomes. However, the implementation of AI in education also raises several concerns, such as ethical issues, data privacy risks, and excessive dependence on technology.

This research paper examines the role and impact of Artificial Intelligence in higher education. The study highlights the applications of AI in education, benefits for students and teachers, challenges associated with AI adoption, and the future potential of AI-driven educational systems. The study is based on secondary data collected from research journals, books, and reliable online sources.

Keywords:

Artificial Intelligence, Higher Education, Personalized Learning, Educational Technology, AI-Based Learning Systems

Introduction

Education systems around the world are undergoing rapid transformation due to technological advancements. Among these technologies, Artificial Intelligence has emerged as one of the most influential innovations in modern society. Artificial Intelligence refers to the capability of computer systems to perform tasks that normally require human intelligence, such as reasoning, learning, problem-solving, and decision-making.

In higher education, AI technologies are increasingly being used to enhance both teaching and learning processes. Universities and colleges are integrating AI-based tools into their educational systems to improve academic performance, increase student engagement, and streamline administrative operations. AI enables educators to provide personalized learning experiences where educational content is adapted according to the learning speed and abilities of individual students.

AI-powered educational platforms can analyze student behavior and performance to identify learning gaps and recommend suitable study materials. In addition, AI tools such as virtual tutors, automated grading systems, and chatbots provide students with instant support and guidance during their learning process.

Despite these advantages, the growing use of Artificial Intelligence in education also raises several challenges. Issues such as academic integrity, data security, ethical concerns, and the risk of excessive dependence on technology need to be carefully addressed. Therefore, it is essential to examine both the opportunities and limitations associated with the integration of AI in higher education systems.

Artificial Intelligence is becoming a key component of modern digital education systems. Universities are increasingly investing in AI-driven technologies to improve the overall quality of education and student support services. These systems can analyze large amounts of educational data to identify patterns in student behavior, learning difficulties, and academic performance.

Objectives of the Study

The main objectives of the present research study are as follows:

1. To understand the role of Artificial Intelligence in modern higher education systems.

2.To analyze the various applications of Artificial Intelligence technologies in teaching and learning processes.

3.To examine the benefits of Artificial Intelligence for students, teachers, and educational institutions.

4.To identify the major challenges and limitations associated with the implementation of Artificial Intelligence in education.

5.To explore the future scope and potential of Artificial Intelligence in transforming higher education systems.

4.Research Methodology-The present research study is based on secondary data. The data used in this paper has been collected from various sources including academic journals, books, conference papers, research reports, and reliable websites related to Artificial Intelligence and educational technology.

The collected information has been analyzed and interpreted to understand the impact of Artificial Intelligence on higher education. This study mainly focuses on reviewing existing literature and identifying key trends, benefits, and challenges associated with the adoption of AI technologies in educational institutions.

In addition to reviewing existing literature, this study also analyzes the findings of previous research studies to identify common trends and patterns related to the adoption of Artificial Intelligence in higher education. The collected information has been systematically organized and evaluated to understand how AI technologies influence teaching methods, learning outcomes, and administrative efficiency in universities.

The research methodology focuses on qualitative analysis of existing academic sources to provide a comprehensive understanding of the opportunities and challenges associated with Artificial Intelligence in education.

Literature Review

Several researchers and educational experts have studied the impact of Artificial Intelligence (AI) in education. **Holmes, Bialik, and Fadel (2019)** explain that AI technologies can significantly improve teaching and learning processes by enabling personalized education. According to their research, AI-based learning systems can analyze student performance and provide customized learning materials that match individual learning styles.

Similarly, **Luckin (2018)** suggests that Artificial Intelligence can assist teachers by automating routine tasks such as grading assignments, managing student records, and organizing course content. This allows teachers to focus more on creative teaching strategies and interactive learning methods.

According to a report published by **UNESCO (2021)**, Artificial Intelligence has the potential to increase access to quality education through online learning platforms and digital educational resources. AI technologies can also support students in remote areas where access to traditional educational facilities may be limited.

These studies indicate that Artificial Intelligence can play a significant role in improving the quality and accessibility of higher education.

Many recent studies also emphasize the importance of ethical considerations in the implementation of Artificial Intelligence in education. Researchers highlight that while AI technologies provide many benefits, it is important to ensure transparency, fairness, and responsible use of data. Educational institutions must develop clear policies and guidelines to regulate the use of AI systems in order to protect student privacy and maintain academic integrity.

Furthermore, several scholars suggest that Artificial Intelligence should be used as a supportive tool rather than a replacement for human teachers. The combination of human expertise and intelligent technology can create a balanced and effective learning environment for students.

Applications of Artificial Intelligence in Higher Education

Artificial Intelligence is widely used in many areas of higher education to improve the quality of learning and teaching. AI technologies help educational institutions manage academic activities more effectively and provide better learning experiences for students.

Some important applications of AI in higher education include:

1.Intelligent Tutoring Systems

AI-powered tutoring systems provide personalized learning support by analyzing students' learning patterns and performance. These systems help students understand concepts according to their individual learning pace.

2. Automated Grading Systems

AI tools can automatically evaluate assignments, quizzes, and examinations. This reduces the workload of teachers and provides faster feedback to students.

3. Smart Content Creation

Artificial Intelligence helps in generating digital study materials, summaries, and interactive learning resources, making educational content more accessible and easier to understand.

4. Student Performance Analysis

AI can analyze student data to identify learning patterns and predict academic performance. This helps teachers identify students who may need additional academic support.

5. Virtual Learning Assistants

AI-based virtual assistants and chatbots provide instant responses to student queries, send reminders about assignments, and guide students through course materials.

7. AI Tools Used in Education

- **ChatGPT**– Helps students understand complex concepts, generate ideas, and receive explanations for academic topics.
- **Grammarly**–Improves writing skills by checking grammar, spelling, punctuation, and sentence structure.
- **Coursera**– Recommends online courses and learning materials using AI-based algorithms based on student interests and progress.
- **edX**– Provides personalized online learning experiences through intelligent course recommendations and adaptive learning systems.

8. Benefits of Artificial Intelligence in Higher Education

Artificial Intelligence offers several advantages in the education sector.

Benefits for Students :

- Personalized learning experience
- Easy access to educational resources
- Faster doubt solving and assistance
- Improved understanding of difficult concepts

Benefits for Teachers :

- Automated grading and evaluation
- Better analysis of student performance
- Time-saving in administrative tasks
- Improved teaching strategies through data insights.

9. Challenges of Artificial Intelligence in Education

Despite its benefits, the use of AI in education also presents several challenges.

- **Overdependence on Technology** : Students may become overly dependent on AI tools instead of developing their own problem-solving skills.
- **Academic Integrity Issues** : AI tools may sometimes be misused by students for completing assignments without proper understanding.

Data Privacy Concerns : AI systems collect large amounts of student data, which raises concerns about data security and privacy.

- **Lack of Human Interaction** : Excessive use of technology may reduce direct interaction between teachers and students.

Educational institutions must address these challenges to ensure responsible use of AI.

10. Future Scope of Artificial Intelligence in Higher Education

The future of Artificial Intelligence in higher education is very promising. AI technologies are expected to play an important role in creating smart classrooms, virtual laboratories, and intelligent educational platforms.

In the coming years, AI may help universities improve research capabilities, provide advanced learning environments, and enhance global access to education through digital learning systems.

AI-based adaptive learning systems may also allow students to learn at their own pace and according to their individual learning styles. These developments will significantly improve the quality and efficiency of higher education systems.

Conclusion- Artificial Intelligence is transforming the higher education sector by improving teaching methodologies, learning experiences, and institutional management systems. AI technologies offer several advantages, including personalized learning, automated administrative processes, and improved academic analytics.

However, the responsible use of Artificial Intelligence is essential to address challenges related to ethics, academic integrity, and data privacy. Educational institutions must develop appropriate policies and guidelines to ensure that AI technologies are used effectively, transparently, and responsibly.

With proper implementation, Artificial Intelligence has the potential to significantly enhance the quality, accessibility, and overall effectiveness of higher education.

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“Cyber security awareness among higher education students”

Ms .Janhavi S.Dahekar , Meena S. Doibale

Department of Computer Science Bhartiya Mahavidyalaya Amravati, MS, India

janhavidahekar2003@gmail.com , meena.doibale@gmail.com

Abstract : Cyber security awareness is a fundamental element in safeguarding individuals, organizations, and nations against cyber threats. Among 759 million active internet users, 399 million users are from rural India. Therefore, the cyber security awareness among rural citizen plays a major role. This paper studied the level of cyber security awareness among rural undergraduate and postgraduate students in India enrolled in various educational institutions. Using a self-constructed tool (Cyber Security Awareness Test), data was collected from 148 students. The analysis revealed a mean score of 16.30 with a standard deviation of 4.97. The findings indicate that 39.19% of rural students scored below the mean, with significant unawareness of key cyber security concepts such as phishing, multi-factor authentication (MFA), pretexting and on other aspects.

UG and PG students exhibited similar levels of awareness but a significant gender disparity was found, with female students scoring lower. The study suggests the need for educational interventions, particularly for female students, to improve awareness and fulfil knowledge gaps.

Keywords: Cyber security awareness, cyber-attacks, rural students, undergraduate students, postgraduate students.

1.Introduction Cyber security awareness among higher education students is critical due to their intense reliance on digital platforms for academics, social interaction, and personal banking, making them prime targets for phishing, ransomware, and identity theft. Despite being tech-savvy, students often lack formal training in cyber safety, frequently reusing weak passwords or neglecting to secure public Wi-Fi usage. As digital transformation accelerates in education, fostering proactive cyber habits and understanding risks is essential to protect personal data, academic integrity, and future professional networks[1][2].

Technology is deeply intertwined with each aspect of our lives globally. This increases our concern towards cyber security. The present era marked by digital transformation; rural areas are also not safe to the growing threats of cyber-attacks. Like other countries, India faced over 13.9 lakh cyber security incidents in 2022. It includes Phishing, ransom ware attacks, website damage and unauthorized network scanning or probing activities, data violation and many dangerous services happened to all types of users.

While out of 759 million active internet users, 399 million users are from rural India, the cyber security awareness among rural citizen plays a major role. Numerous studies emphasize the importance of cyber security awareness in reducing cyber threats. Increased awareness of cyber security can lead to better informed decisions and more secure online behavior. According to a report on Cyber Security by Niti Aayog and Saraswat (n.d.), India ranked among the top five countries to be affected by cybercrime. As Whitman and Mattord (2020) clearly defined cyber security is a field encompassing practices, technologies and strategies aimed at safeguarding computers, networks and data from unauthorized access, attacks and harm. In the advancing world we live in it is crucial to recognize the significance of being aware of cyber security. With our growing dependence, on technology and the internet, for both professional aspects it becomes more essential to grasp and actively participate in cyber security practices. As stated by Disterer (2021), "cyber security awareness is the foundation upon which a strong security posture is built"[3].

Cyber security awareness is a broad notion that includes the skills necessary to identify, comprehend, and counteract cyber security threats. The studies highlight the significance of an all-encompassing approach to awareness that includes not only the technical understanding but also a deeper comprehension of the psychological and social dimensions of cyber security (Solms & Niekerk, 2022). This comprehensive viewpoint acknowledges the necessity for people and organizations to have a proactive and watchful mindset in addition to cyber security knowledge (Dumitraş, 2019).

2. Literature Review

Cybersecurity awareness among higher education students has emerged as an important area of research due to the rapid digital transformation of academic environments and the increasing exposure of students to cyber threats. Although university students are among the most active internet users, existing studies indicate that their practical cybersecurity behaviors often remain insufficient.[4][5] Several empirical studies highlight notable gaps between students' knowledge of cybersecurity and their everyday online practices. For example, research conducted in Malaysia reported that students demonstrated weak security practices in key areas such as password management, safe browsing, and phishing identification, indicating a lack of consistent application of basic security principles. Similarly, cross-sectional studies conducted in various academic institutions have shown that a substantial proportion of students have experienced cybercrime either directly or indirectly. These findings suggest that risky online behaviors, combined with limited knowledge of protective measures, make students particularly vulnerable to cyber threats.

Research conducted in the Indian context also supports these observations. Studies have revealed significant deficiencies in students' awareness of fundamental cybersecurity concepts such as phishing attacks, multi-factor authentication, and secure data practices. In one study, nearly 39% of the participating students scored below the average level of cybersecurity awareness, reflecting considerable knowledge gaps even among digitally active populations.[4][6]

In addition to knowledge deficits, behavioral research indicates that awareness alone does not necessarily translate into secure online practices. Psychological, educational, and behavioral factors significantly influence how students perceive and respond to cyber threats. For instance, students who possess theoretical knowledge about phishing may still fall victim to such attacks due to overconfidence, lack of practical training, or insufficient risk perception.

Overall, the existing literature highlights a persistent awareness–behavior gap among higher education students. While students may possess basic knowledge about cybersecurity risks, this awareness is often not reflected in their daily digital practices. These findings emphasize the need for universities to implement structured cybersecurity education, integrate practical security training into academic curricula, and develop behavior-focused interventions. Such initiatives can help strengthen students' cybersecurity competencies and contribute to building a more resilient digital academic environment.[7][8]

3. Objectives of the Study

1. To assess the current level of cybersecurity awareness among higher education students regarding common cyber threats and safe online practices.
2. To identify risky online behaviors (such as weak passwords, phishing susceptibility, unsafe downloads) practiced by students.
3. To examine the factors influencing cybersecurity awareness, including educational background, digital usage, and prior training.
4. “To evaluate students' knowledge of basic security measures” like multi-factor authentication, antivirus use, and privacy settings.
5. To analyze the gap between awareness and actual behavior in maintaining cyber hygiene.
6. To determine the role of universities” in promoting cybersecurity education and awareness programs.
7. To recommend effective strategies for improving cybersecurity awareness and safe digital practices among higher education students.

4. Research Methodology:

This study adopts a “quantitative descriptive research design” to examine the level of cybersecurity awareness among higher education students. The target population consists of undergraduate and postgraduate students enrolled in universities and colleges. A “stratified random sampling technique” can be used to ensure representation from different academic streams (e.g., arts, commerce, science, IT). The sample size typically ranges between 100–300 students depending on research scope.

Data are collected using a “structured questionnaire” distributed through online platforms such as Google Forms or institutional email. The questionnaire includes sections on demographic details, knowledge of cyber threats, security practices (password management, phishing awareness, antivirus

usage), and prior cybersecurity training. Responses are measured using a “Likert scale” and multiple-choice questions.

The collected data are analyzed using statistical tools such as ‘percentage analysis, mean, standard deviation, and correlation’ to evaluate awareness levels and behavioral patterns. Reliability of the instrument can be tested using ‘Cronbach’s alpha’, and validity ensured through expert review. Ethical considerations are maintained by obtaining informed consent, ensuring anonymity, and using the data strictly for academic purposes.[9][10][11]

This methodology helps in systematically assessing cybersecurity awareness and identifying gaps that require educational intervention.

➤ **Cyber Security Threats faced by Students:**

Higher education students are increasingly exposed to various cybersecurity threats due to heavy reliance on digital platforms for learning, communication, and financial activities. One of the most common threats is ‘phishing’, where attackers send fake emails or messages that appear legitimate to steal login credentials or personal information. Students often fall victim because they frequently access university portals and email systems. Another major threat is “malware infection”, which occurs when students download cracked software, games, or attachments from untrusted sources, allowing malicious programs to damage or control their devices.

‘Social media scams’ are also widespread among students. Cybercriminals create fake profiles, scholarship offers, or job opportunities to trick students into sharing sensitive data or sending money. Similarly, ‘identity theft’ has become a serious concern, where attackers misuse students’ personal information such as Aadhaar numbers, bank details, or academic credentials for fraudulent activities. ‘Online financial fraud’, including UPI and digital payment scams, is rising rapidly as students increasingly use mobile banking and e-wallets.

Another significant risk is ‘weak password practices’. Many students reuse simple passwords across multiple platforms, making it easier for attackers to gain unauthorized access through credential-stuffing attacks. Additionally, the use of “public or unsecured Wi-Fi networks” in campuses, hostels, and cafes exposes students to man-in-the-middle attacks and data interception. “Ransomware attacks” and “data breaches” targeting educational institutions can also indirectly affect students by exposing their academic and personal records.

➤ **Level of cyber security Awareness among students:**

The level of cybersecurity awareness among higher education students is generally “moderate but inconsistent”. Many students possess basic knowledge about common cyber threats such as viruses, hacking, and phishing due to their frequent use of digital technologies and exposure to online environments. They are often aware of the importance of antivirus software, password protection, and privacy settings.

Research consistently shows an “awareness–behavior gap”: although students may know about cybersecurity risks, they do not always follow safe practices. For example, many students still reuse passwords across multiple accounts, ignore software updates, click on suspicious links, or connect to unsecured public Wi-Fi networks. Awareness levels also vary by academic discipline and year of study. Students from IT and computer science backgrounds generally demonstrate higher cybersecurity knowledge and safer behavior compared to those from non-technical fields. Postgraduate students often show better awareness than undergraduates due to greater academic exposure and maturity.

Another important finding is the “lack of formal cybersecurity education” in many higher education institutions. Much of students’ knowledge comes from informal sources such as social media, peers, or personal experience rather than structured training. As a result, their understanding is often fragmented and not practice-oriented.

➤ **Factors affecting cyber security awareness:**

Cybersecurity awareness among higher education students is influenced by multiple academic, technological, and behavioral factors. One of the most significant factors is “educational background”. Students enrolled in computer science or IT-related programs generally demonstrate higher awareness because their curriculum exposes them to security concepts, whereas students from non-technical streams often have limited formal knowledge of cyber risks.

Another important factor is “digital exposure and internet usage. Students who frequently use online platforms, cloud services, digital payments, and social media tend to develop some level of awareness through experience.

‘Psychological and behavioral factors’ also play a crucial role. Convenience, overconfidence, curiosity, and negligence often lead students to ignore security warnings, reuse passwords, or click suspicious links. Many students underestimate their personal risk, which reduces motivation to follow safe practices. Additionally, ‘peer influence and social environment’ affect behavior—students often adopt security habits similar to their friends or classmates.

“Access to security tools and resources” such as antivirus software, password managers, and secure campus networks further impacts awareness and behavior. Students with limited technical support or outdated devices may practice weaker security. Finally, ‘institutional policies and culture’ significantly shape awareness levels. Universities that enforce strong password policies, multi-factor authentication, and regular awareness communication help cultivate better cyber hygiene among students.

➤ **Importance of Cybersecurity Awareness Programs:**

Cybersecurity awareness programs are essential in higher education because students are among the most active digital users and therefore prime targets for cyberattacks. These programs play a crucial role in educating students about common threats such as phishing, malware, identity theft, and online financial fraud, enabling them to recognize risks and respond appropriately. Awareness initiatives help transform theoretical knowledge into practical cyber-hygiene behaviors, such as using strong passwords, enabling multi-factor authentication, avoiding suspicious links, and securing personal devices. Without structured training, many students rely on informal knowledge, which often leads to risky online practices.

Such programs also contribute significantly to the protection of institutional data and infrastructure. Universities manage large volumes of sensitive information—including academic records, research data, and financial details—and a single compromised student account can create entry points for wider network breaches. Regular awareness campaigns, workshops, simulations, and curriculum integration foster a culture of shared cybersecurity responsibility across the campus community. Moreover, awareness programs improve students’ digital literacy, critical thinking, and long-term professional readiness, which are increasingly important in today’s technology-driven workforce.

Overall, effective cybersecurity awareness programs reduce cyber incidents, strengthen institutional security posture, and empower students to become responsible digital citizens.

5. Recommendations

To strengthen cybersecurity awareness among higher education students, universities and policymakers should adopt a comprehensive and proactive approach. First, institutions should integrate basic cybersecurity education into all academic curricula, not only in IT-related programs. Making cyber safety a compulsory foundation module ensures that every student gains essential knowledge regardless of discipline. Regular ‘workshops, seminars, and hands-on training sessions’ should be conducted to translate theoretical understanding into practical skills such as identifying phishing emails, creating strong passwords, and securing personal devices.

Universities should also implement ‘continuous awareness campaigns’ using emails, posters, learning management systems, and social media to keep students informed about emerging threats. Introducing ‘phishing simulation exercises and cyber drills’ can significantly improve students real-world response to attacks. Additionally, institutions must promote the use of multi-factor authentication, password managers, and updated antivirus software across campus systems.

From a policy perspective, higher education institutions should establish clear cybersecurity policies and incident reporting mechanisms so students know how to respond to suspicious activities. Providing ‘secure campus Wi-Fi, regular software updates, and technical support’ further reduces vulnerabilities. Encouraging ‘peer-led cyber awareness clubs and competitions’ can increase engagement and make learning more interactive.

Finally, collaboration between universities, government agencies, and cybersecurity experts is recommended to develop ‘standardized awareness frameworks and training materials’. Continuous evaluation through surveys and assessments should be conducted to monitor improvement in student

awareness levels. Implementing these measures will help build a strong culture of cyber hygiene and significantly reduce cyber risks in higher education environments.

6. Conclusion:

Cybersecurity awareness among higher education students has become increasingly important in the digital era, where academic, social, and financial activities are largely conducted online. The review of existing studies indicates that while many students possess basic knowledge of common cyber threats, their practical security behavior often remains inadequate. The persistent gap between awareness and safe online practices exposes students and educational institutions to risks such as phishing attacks, identity theft, malware infections, and online financial fraud.

The findings highlight that factors such as educational background, digital exposure, institutional support, and behavioral attitudes significantly influence students' cybersecurity awareness. In particular, the lack of formal and structured cybersecurity education in many higher education curricula contributes to inconsistent awareness levels across student groups. This underscores the need for universities to move beyond informal awareness and adopt systematic, continuous, and practice-oriented training approaches.

Strengthening cybersecurity awareness programs, integrating cyber safety into curricula, enforcing institutional security policies, and promoting responsible digital behavior are essential steps toward building a cyber-resilient academic environment. Ultimately, improving cybersecurity awareness among higher education students not only protects individual users but also safeguards institutional data and supports the development of responsible digital citizens prepared for the evolving cyber landscape.

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**Impact of the National Education Policy 2020 on the Roles of Principals,
Teachers, and Students.****Mr. Shankar Vishnu Rane.****(Research Scholer, Department of Economics PDEA'S Baburaoji Gholap College
Old Sangavi, Pune.)****Dr. Sanjay Arun Giri.****(Research Guide, Professor, Department of Economics, Sanskar Mandir Sanstha's Arts & commerce
College, Pune)****Abstract**

The National Education Policy 2020 (NEP 2020), introduced by the Government of India, represents a significant reform aimed at transforming the Indian education system in alignment with global standards and 21st-century requirements. The policy emphasizes multidisciplinary education, flexibility, skill development, and the integration of technology in teaching–learning processes. The present study examines the impact of NEP 2020 on the roles and responsibilities of principals, teachers, and students in higher education institutions. The study is based on a descriptive and analytical research design and utilizes both primary and secondary data. Primary data were collected through a structured questionnaire from selected respondents, while secondary data were obtained from official policy documents and reports published by national and international organizations such as UGC, AICTE, UNESCO, and OECD.

The findings indicate that NEP 2020 has contributed to a shift in institutional functioning. Principals are increasingly taking on leadership and administrative roles, teachers are adopting learner-centerer and technology-based teaching approaches, and students are becoming more actively engaged in the learning process. However, challenges such as infrastructural limitations, lack of training, and digital divide continue to affect the effective implementation of the policy. The study concludes that while NEP 2020 has strong potential to improve the quality and relevance of higher education in India, its success largely depends on effective implementation, institutional readiness, and continuous capacity building.

Keywords:

National Education Policy 2020 (NEP 2020), Higher Education in India, Educational Reforms, Institutional Governance, Teaching–Learning Processes, Student-Centric Pedagogy, Skill Development, Digital Education, Policy Implementation Challenges.

1. Introduction

Education plays a pivotal role in shaping the socio-economic development of a nation. In the context of India, the education system has undergone several reforms over the decades to address emerging challenges and align with global standards. Despite these efforts, issues such as lack of flexibility, limited multidisciplinary exposure, and a gap between education and employability have persisted in the traditional system. In response to these challenges, the Government of India introduced the National Education Policy 2020 (NEP 2020), which represents a comprehensive framework aimed at transforming the entire education system. The policy emphasizes holistic and multidisciplinary education, skill development, critical thinking, and the integration of technology into teaching–learning processes. It also seeks to promote flexibility in curriculum design and encourage innovation in pedagogical practices. One of the key aspects of NEP 2020 is the redefinition of the roles and responsibilities of major stakeholders in the education system, particularly principals, teachers, and students. Principals are expected to function not only as administrative heads but also as academic leaders and institutional visionaries responsible for implementing reforms effectively. Teachers are encouraged to move beyond traditional lecture-based methods and adopt learner-centerer, experiential, and technology-driven teaching approaches. At the same time, students are expected to take an active role in their learning process, focusing on skill development, critical thinking, and problem-solving abilities.

Furthermore, national and international reports, including those by UGC (2021), AICTE (2021), UNESCO (2021), and OECD (2020), emphasize the importance of student-entered learning, digital education, and institutional reforms in improving the quality of higher education. However, these reports also highlight challenges such as infrastructural limitations, digital divide, and lack of adequate training, which may affect the effective implementation of NEP 2020, particularly in developing regions. In this context, it becomes essential to examine how NEP 2020 has influenced the roles and responsibilities of principals, teachers, and students at the institutional level. Understanding these changes is crucial for assessing the effectiveness of the policy and identifying the challenges associated with its implementation. Therefore, the present study aims to analyse the impact of NEP 2020 on key stakeholders in higher education institutions, with special reference to selected institutions in Maharashtra. The study also seeks to provide insights into the opportunities and challenges associated with the implementation of the policy.

2. Review of Literature

- The review of literature provides a theoretical and conceptual foundation for the present study. It helps in understanding the existing body of knowledge, identifying research gaps, and framing the research problem in a systematic manner. According to Kothari (2011), a comprehensive review of literature is essential for developing a clear research framework and avoiding duplication of work.
- The introduction of the National Education Policy 2020 by the Government of India marks a significant reform in the Indian education system. The policy emphasizes multidisciplinary education, flexibility in curriculum, skill development, and the integration of technology into teaching–learning processes (Government of India, 2020). It aims to transform the traditional education structure into a more holistic, learner-entered, and globally competitive system.
- Reports by national bodies such as the University Grants Commission (UGC, 2021) and the All-India Council for Technical Education (AICTE, 2021) highlight the importance of institutional restructuring, academic flexibility, and improved governance in higher education under NEP 2020. These reports emphasize that higher education institutions must adopt innovative practices, promote research culture, and ensure quality enhancement through continuous reforms.
- At the international level, organizations such as UNESCO (2021) and OECD (2020) stress the need for student-centered learning, experiential education, and digital transformation in the education system. UNESCO (2021) advocates for a new social contract for education that focuses on inclusion, equity, and lifelong learning, while OECD (2020) highlights the role of skills, innovation, and adaptability in preparing students for the future workforce.
- Furthermore, the World Bank (2020) observed that the COVID-19 pandemic has accelerated the adoption of digital education and flexible learning systems across the world. This has increased the relevance of policies like NEP 2020, which emphasize the integration of technology and blended learning approaches in education.
- Despite these positive developments, several challenges have been identified in the literature. Reports indicate that issues such as inadequate infrastructure, digital divide, lack of teacher training, and institutional resistance to change continue to hinder the effective implementation of educational reforms, especially in developing regions and semi-urban areas.

2.1 Research Gap

However, most of the existing studies and policy reports focus primarily on the structural and theoretical aspects of NEP 2020 at the national level. Limited attention has been given to the practical transformation of the roles and responsibilities of key stakeholders, particularly principals, teachers, and students, at the institutional level. Moreover, there is a lack of empirical studies examining the implementation of NEP 2020 in specific regional contexts such as Maharashtra, especially in semi-urban and urban higher education institutions. Therefore, the present study attempts to address this gap by analysing the impact of NEP 2020 on the roles of principals, teachers, and students at the institutional level.

3. Objectives of the Study

1. To examine the impact of NEP 2020 on the administrative, leadership, and governance roles of principals in higher education institutions.

2. To analyse the transformation in teaching methodologies, pedagogical practices, and professional responsibilities of teachers under NEP 2020.
3. To study the influence of NEP 2020 on student participation, learning behaviour, and skill development.
4. To evaluate the overall effectiveness of NEP 2020 in improving the quality, equity, and global relevance of higher education in India.

4. Hypotheses

- **H1:** NEP 2020 has significantly redefined the administrative, leadership, and governance roles of principals in higher education institutions.
- **H2:** NEP 2020 has significantly transformed teaching methodologies, pedagogical practices, and professional responsibilities of teachers.
- **H3:** NEP 2020 has significantly increased student participation, engagement, and skill-oriented learning in higher education.
- **H4:** Effective implementation of NEP 2020 significantly improves the quality, equity, and global relevance of higher education in India.

5. Research Methodology

The present study adopts a comprehensive and systematic research methodology to critically examine the impact of the National Education Policy 2020 (NEP 2020) on the evolving roles of principals, teachers, and students in higher education institutions. Research methodology serves as the backbone of any empirical investigation, ensuring that the study is conducted in a structured, objective, and scientifically valid manner. In this study, careful attention has been given to the selection of appropriate research design, sampling methods, data collection techniques, and analytical tools to enhance the reliability, validity, and generalizability of the findings. The methodology integrates both qualitative and quantitative approaches to provide a holistic understanding of the research problem.

5.1 Research Design

The research design adopted for the present study is a combination of descriptive and analytical research design. The descriptive component focuses on systematically describing the existing conditions, practices, and transformations brought about by NEP 2020 in higher education institutions. It helps in capturing the perceptions, experiences, and behavioural changes among principals, teachers, and students. On the other hand, the analytical component goes beyond mere description and attempts to interpret and analyse the collected data to establish relationships between variables. It enables the researcher to draw meaningful conclusions regarding the extent and nature of policy impact. The integration of these two approaches ensures that the study is both exploratory and explanatory in nature, thereby providing a deeper insight into the research problem.

5.2 Study Area

The geographical scope of the study is confined to selected higher education institutions located in the state of Maharashtra. The study area includes both urban and semi-urban regions in order to capture variations in institutional infrastructure, resource availability, and policy implementation practices. Urban institutions are generally better equipped with technological and academic resources, whereas semi-urban institutions may face challenges related to infrastructure and training. By including both types of regions, the study aims to present a balanced and comprehensive view of the implementation and impact of NEP 2020 across different educational contexts.

5.3 Sources of Data

The study is based on both primary and secondary sources of data, ensuring a well-rounded and evidence-based analysis.

Primary data have been collected through a structured questionnaire designed specifically for this study. The questionnaire includes both closed-ended and open-ended questions to capture quantitative responses as well as qualitative insights. The respondents include principals, teachers, and students, who are directly associated with the implementation of NEP 2020.

Secondary data have been collected from a variety of reliable sources, including the official document of the National Education Policy 2020, academic books, peer-reviewed research journals, government publications, reports from educational bodies such as UGC and UNESCO, and online

academic databases. These sources provide theoretical background and support the empirical findings of the study.

5.4 Sampling Technique

The study employs a purposive sampling technique, which is a non-probability sampling method. This technique is particularly suitable for studies where the researcher selects respondents based on their knowledge, experience, and relevance to the research topic. A total sample size of 100 respondents has been selected, comprising principals, teachers, and students from selected higher education institutions. The selection criteria ensure that the respondents have sufficient exposure to the changes introduced by NEP 2020, thereby enabling them to provide meaningful and informed responses. Although the sample size is limited, it is adequate for conducting a focused and in-depth analysis.

5.5 Variables of the Study

In the present study, the National Education Policy 2020 is considered as the independent variable, as it represents the factor that brings about change in the education system. The dependent variables include the roles and responsibilities of principals, teachers, and students. These variables are analysed to understand how policy changes influence institutional leadership, teaching practices, and student engagement. The study examines the interaction between these variables to assess the overall impact of NEP 2020 on higher education.

5.6 Tools of Analysis

The collected data have been analysed using appropriate statistical and analytical tools to ensure accurate interpretation.

The percentage method has been used to simplify and present the data in a clear and understandable manner. Tabulation has been employed to organize the data systematically, making it easier to compare different responses. In addition, comparative analysis has been used to identify patterns, trends, and differences among various groups of respondents. Wherever necessary, qualitative responses have been interpreted using content analysis to capture deeper insights into the perceptions and experiences of respondents.

5.7 Limitations of the Study

Despite careful planning and execution, the study is subject to certain limitations. Firstly, the geographical scope of the study is restricted to selected institutions in Maharashtra, which may limit the generalizability of the findings to other regions. Secondly, the sample size is relatively small, which may not fully represent the diversity of the higher education system. Thirdly, the study relies on respondents' perceptions and self-reported data, which may be influenced by personal biases and subjective interpretations. Additionally, since NEP 2020 is a relatively recent policy, its long-term impact cannot be fully assessed at this stage. These limitations should be taken into consideration while interpreting the findings of the study.

6. Findings

1. The study reveals that the implementation of the National Education Policy (NEP) 2020 has significantly influenced the administrative, leadership, and governance roles of principals in higher education institutions. Principals are increasingly adopting innovative and flexible management practices.
2. It is observed that NEP 2020 has brought considerable changes in teaching methodologies and pedagogical practices. Teachers are gradually shifting towards student-centric, skill-based, and experiential learning approaches.
3. The findings indicate that student participation and engagement in the learning process have increased under NEP 2020. Students are more actively involved in interactive and practical learning activities.
4. The study shows that NEP 2020 has contributed to the development of skills among students, thereby enhancing their employability and overall academic performance.
5. It is found that digital education and the use of technology in teaching and learning have increased significantly due to NEP 2020.
6. The research highlights that NEP 2020 has positively impacted the overall quality and relevance of higher education in India.

7. However, the study also identifies certain challenges in the implementation of NEP 2020 at the institutional level, particularly in terms of infrastructure, training, and awareness.
8. It is observed that the impact of NEP 2020 varies across institutions, especially between urban and semi-urban areas.

7. Suggestions

1. **Effective Implementation Mechanism:**

There is a need to strengthen the implementation mechanism of NEP 2020 at the institutional level. Clear guidelines and continuous monitoring should be ensured to achieve desired outcomes.

2. **Training and Capacity Building:**

Regular training programs, workshops, and orientation sessions should be conducted for principals and teachers to help them understand and effectively implement the provisions of NEP 2020.

3. **Infrastructure Development:**

Higher education institutions should be equipped with adequate infrastructure, including digital facilities, smart classrooms, and internet connectivity, to support modern teaching-learning practices.

4. **Promotion of Student-Centric Learning:**

Institutions should encourage student-centric, experiential, and skill-based learning approaches to enhance student participation and engagement.

5. **Strengthening Digital Education:**

The use of digital tools, online platforms, and e-learning resources should be promoted to make education more flexible and accessible.

6. **Awareness and Orientation Programs:**

Awareness programs should be conducted for students and stakeholders to increase their understanding of NEP 2020 and its benefits.

7. **Focus on Skill Development:**

Institutions should integrate skill development programs, vocational courses, and industry-oriented training to improve students' employability.

8. **Policy Support and Funding:**

The government should provide adequate financial support and policy assistance to ensure the smooth implementation of NEP 2020.

9. **Continuous Evaluation and Feedback:**

A proper system of evaluation and feedback should be established to assess the effectiveness of NEP 2020 and make necessary improvements.

10. **Bridging Urban–Rural Gap:**

Special efforts should be made to ensure uniform implementation of NEP 2020 across urban, semi-urban, and rural institutions to reduce disparities.

8. Conclusion

The present study examines the impact of the National Education Policy (NEP) 2020 on higher education institutions, with special reference to the changing roles and responsibilities of principals, teachers, and students. The findings of the study clearly indicate that NEP 2020 has brought significant transformation in the functioning and structure of higher education in India. The roles of principals have evolved from traditional administrative functions to more dynamic leadership and governance responsibilities. Similarly, teachers are increasingly adopting innovative, student-centric, and skill-oriented teaching methodologies, which enhance the overall quality of the teaching-learning process. Students, on the other hand, are becoming more active participants in the learning process, benefiting from experiential learning, flexibility, and skill development opportunities.

The study also highlights that NEP 2020 has contributed to improving the quality, accessibility, and global relevance of higher education. However, the successful implementation of the policy depends largely on institutional readiness, availability of infrastructure, and effective training of stakeholders. Certain challenges such as lack of awareness, inadequate resources, and regional disparities still exist, particularly in semi-urban and urban institutions. In conclusion, NEP 2020 has the potential to bring a paradigm shift in the higher education system of India. With proper

implementation, continuous monitoring, and adequate support from the government and institutions, the policy can significantly contribute to the development of a more inclusive, flexible, and skill-oriented education system.

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Comparative Study of Higher Education Institutions in India and Western Countries with Special Focus on NEP 2020

Mr.Shreyas Sunil Kalmegh

Abstract

This paper presents a comparative analysis of higher education systems in India and selected Western countries—the United States, United Kingdom, and Germany—with particular emphasis on the transformative vision of India's National Education Policy (NEP) 2020. The study examines governance structures, curriculum design, research ecosystems, and internationalisation strategies across these systems. It finds that NEP 2020 consciously aligns Indian higher education reform with global trends while anchoring reforms in indigenous knowledge traditions. Western systems exhibit distinct governance models: the Anglo-American approach emphasising external board control and market mechanisms, while the Continental European model maintains stronger state coordination with scholar-led governance. NEP 2020's vision of institutional autonomy, multidisciplinary universities, and the National Research Foundation represents a synthesis that borrows selectively from both traditions while adapting to India's federal structure and developmental needs. However, implementation challenges including fiscal constraints, uneven state readiness, and the digital divide risk exacerbating existing inequities if not accompanied by robust public safeguards. The paper concludes with recommendations for a phased, evidence-based approach that balances global competitiveness with equity and inclusion.

Keywords: NEP 2020, higher education, comparative education, India, United States, United Kingdom, Germany, governance, internationalisation

1. Introduction

The National Education Policy (NEP) 2020 represents one of the most ambitious public-policy overhauls in India's recent history, aiming to reconfigure the full education lifecycle from early childhood through higher education. Approved by the Union Cabinet in July 2020, the policy replaced the National Policy on Education 1986, marking the first comprehensive reform in 34 years. It seeks to transform India's higher education landscape to deliver high-quality education with equity and inclusion, targeting a Gross Enrolment Ratio (GER) from 26.3% (in 2018) to 50 % by 2035.

The policy's vision is explicitly global in orientation. It recognises India's position as a leader in information and communication technology and proposes revamping all aspects of the education structure to align with the goals of 21st-century education. At the same time, NEP 2020 uniquely distinguishes itself by anchoring reform in India's indigenous knowledge systems, drawing inspiration from ancient centres of learning such as Takshashila and Nalanda.

This paper addresses three primary research questions:

1. How does NEP 2020's vision for higher education compare with the structural characteristics of Western systems (US, UK, and Germany)?
2. What are the key similarities and differences in governance, curriculum, research, and internationalisation across these systems?
3. What lessons can India draw from Western experiences, and what distinctive challenges must it address in implementing NEP 2020?

2. Theoretical Framework: Understanding Higher Education Systems

Higher education governance encompasses the structures, processes, and traditions through which universities are steered and held accountable. Scholars distinguish between two broad governance traditions in Western higher education: the Continental European model and the Anglo-American model.

The Continental European Model (exemplified by Germany) is characterised by strong state coordination and public funding, scholar-led internal governance through faculty councils and senates, limited external representation in governing bodies, and universities functioning as part of the state administration rather than autonomous corporations. Market mechanisms play a minimal role.

The Anglo-American Model (exemplified by the United States and, to a lesser extent, the United Kingdom) features greater institutional autonomy from the state, external board control through lay governing bodies, strong executive leadership, significant market influence through competition for students and resources, and diverse funding sources including tuition, endowments, and philanthropy.

NEP 2020 proposes a governance framework that borrows selectively from both traditions while adapting to India's federal structure. The policy envisions governance of Higher Education Institutions (HEIs) by highly qualified independent boards having academic and administrative autonomy, "light but tight" regulation by a single regulator, and a tiered structure with three types of institutions: research universities, teaching universities, and autonomous degree-granting colleges.

3. Comparative Governance Structures

3.1 United States: Lay Governance and Market Competition

American higher education encompasses approximately 4,000 degree-granting institutions with a mix of public, private non-profit, and private for-profit entities. Governance typically operates through lay boards of trustees composed predominantly of external members from business and the professions. These boards appoint the president, approve budgets, and set institutional policy. Faculty power is exercised through academic senates with jurisdiction over curriculum, creating a system of "shared governance."

Private universities enjoy substantial autonomy from government, though they are subject to accreditation requirements and federal regulations tied to student financial aid. Accountability is primarily market-driven through competition for students, research funding, and reputational rankings. Funding derives from multiple sources: tuition and fees, state appropriations (for public institutions), federal research grants, private philanthropy, and endowment income.

3.2 United Kingdom: From Collegiality to Managerialism

UK universities traditionally combined European collegial traditions with external representation through lay governing bodies. Most operate under bicameral governance: a court or council (external-dominated) responsible for finance and strategy, and a senate (academic-dominated) responsible for academic matters. The 1988 Education Reform Act strengthened governing body authority and weakened academic tenure.

UK universities retain formal autonomy, but government influence has increased through funding mechanisms and quality assurance frameworks. The Research Excellence Framework (REF) and Teaching Excellence Framework (TEF) create powerful accountability pressures. Public funding is channeled through intermediary bodies, while tuition fees now constitute a major revenue source.

3.3 Germany: State Coordination with Scholar Governance

German universities historically operated as state institutions with limited corporate autonomy. Professors, as civil servants, exercised substantial individual authority. Reforms since the 1990s, including the Excellence Initiative, have strengthened university leadership and introduced performance-based funding. However, compared to Anglo-American systems, faculty governance remains stronger, and external board representation is more limited.

Universities are predominantly publicly funded through state governments, with additional competitive research funding from federal and European sources. Tuition fees were abolished across most states by 2014.

3.4 India under NEP 2020: Synthesis and Adaptation

India's higher education system serves over 43 million students across 1,168 universities and 43,000 colleges. Governance has been characterised by multiple regulators (UGC, AICTE, NCTE), affiliation systems tying colleges to universities, and limited institutional autonomy.

NEP 2020 proposes fundamental restructuring: a single Higher Education Commission of India (HECI) providing "light but tight" regulation; tiered institutional categorisation; gradual movement toward full academic and administrative autonomy based on accreditation; and governance by independent boards with external representation. This vision moves India toward the Anglo-American model while retaining strong national coordination.

4. Curriculum and Multidisciplinary Education

4.1 Western Approaches

United States: The US has the most developed liberal arts tradition globally, with undergraduate curricula typically requiring "general education" across humanities, social sciences, and natural sciences before disciplinary specialisation. Recent decades have seen flexible curricula allowing students to combine majors, minors, and interdisciplinary programs. Emphasis on "transferable skills"—critical thinking, communication, problem-solving—reflects employability concerns.

United Kingdom: UK undergraduate education has traditionally been more specialised, with students studying a single subject throughout their degree. Recent reforms have introduced "combined honours" programs and broader foundation degrees, but these remain exceptions. The employability agenda has encouraged work-based learning and professional skills development.

Germany: The binary system of universities and Universities of Applied Sciences (*Fachhochschulen*) integrates academic and vocational traditions. Universities emphasise disciplinary depth, while *Fachhochschulen* offer professionally oriented degrees with strong industry connections and mandatory internships.

4.2 NEP 2020's Multidisciplinary Vision

NEP 2020 represents a decisive shift toward multidisciplinary education, explicitly linking this reform to both global trends and India's indigenous educational traditions. The policy states that India's "long tradition" of interdisciplinary learning extends back to the ancient universities of Takshashila and Nalanda.

Key provisions include: four-year multidisciplinary undergraduate programmes with multiple entry and exit options; removal of rigid distinctions between arts and sciences, curricular and extra-curricular activities, and vocational and academic streams; the Academic Bank of Credit enabling credit accumulation and transfer; and vocational education integrated from an early stage.

Implementation progress shows 90 per cent of institutions reporting flexible curricula by 2025, though only 36 per cent have implemented multiple entry-exit options. Scores of new liberal arts institutions—mostly private—have emerged. However, uneven faculty readiness and inadequate teacher preparation remain significant concerns.

5. Research Ecosystems

5.1 Western Models

United States: Federal agencies provide competitive research grants through peer-review systems. Top research universities combine graduate education with faculty research, and institutional prestige heavily depends on research performance. Intense competition drives productivity but also creates stratification among institutions.

United Kingdom: The Research Excellence Framework (REF) evaluates research quality every six to seven years, determining allocation of quality-related funding. This creates strong incentives for research excellence but critics argue it encourages risk-averse strategies. International research collaboration is actively pursued.

Germany: Core university funding comes from Länder governments, with competitive research funding from the German Research Foundation (DFG). The Excellence Strategy funds Clusters of Excellence and Universities of Excellence, intensifying competition focused on research clusters and graduate schools. Non-university research institutes (Max Planck, Fraunhofer) create a distinctive ecosystem.

5.2 India's National Research Foundation

NEP 2020 establishes the National Research Foundation (NRF) as a body for promoting research culture and capacity. The NRF will identify research-focused universities, fund outstanding peer-reviewed research, seed research in institutions with limited capacity, and promote interdisciplinary collaboration.

Indian research output remains concentrated in elite institutions—IITs, IISc, and a few central universities. State universities, accounting for over 80 per cent of enrolment, produce only 14.7 per cent of research publications. The NRF aims to broaden the research base while deepening excellence in leading institutions. Challenges include research investment below international peers, limited infrastructure outside elite institutions, underdeveloped industry linkages, and complex regulatory hurdles.

6. Internationalisation

6.1 Western Approaches

United States: The leading destination for international students, hosting nearly 1 million. Attraction factors include prestige, research opportunities, flexible curricula, and post-graduation work options. Policy uncertainties and rising costs have affected growth, but active international recruitment continues.

United Kingdom: Aggressive internationalisation strategies target international student numbers and education exports. The Graduate Route visa facilitates post-study employment. Extensive transnational education programmes reach over 500,000 students studying for UK degrees outside the UK.

Germany: Emerging as a major non-English-speaking destination through tuition-free education and strong research reputation. The DAAD coordinates internationalisation through funding and scholarships. German language requirements limit undergraduate access, though English-medium master's programmes expand.

6.2 NEP 2020's Internationalisation Vision

NEP 2020 articulates an ambitious dual strategy: attracting foreign universities to India and encouraging Indian institutions abroad. Selected top global universities will be facilitated to operate in India with regulatory dispensations. Credits acquired at foreign universities can be counted toward Indian degrees. Leading Indian institutions are encouraged to open campuses abroad, with IITs already established in Zanzibar, Abu Dhabi, and Dubai.

By 2025, foreign universities including Deakin, Wollongong, and Southampton have established campuses in India. However, questions remain about quality equivalence, equity implications of high-fee foreign campuses, and regulatory challenges regarding curriculum and surplus repatriation.

7. Critical Analysis: Convergence, Divergence, and Implementation Risks

7.1 Patterns of Convergence

NEP 2020 aligns with global trends in several areas: multidisciplinary education responding to demand for adaptable graduates; institutional autonomy paralleling reforms in Western systems; competitive research funding through the NRF; internationalisation as a strategic priority; and digital integration accelerated by COVID-19.

7.2 Persistent Divergences

Significant differences remain: India's scale (43 million students across 28 states with 22 official languages) creates implementation challenges of a different order; public funding below Western levels constrains investment; social stratification creates equity challenges more profound than in Western systems; and NEP's emphasis on Indian Knowledge Systems has no Western parallel.

7.3 Implementation Risks

Academic literature identifies substantial risks: uneven state readiness given education's concurrent status; fiscal pressures from ambitious agenda; teacher capacity gaps for multidisciplinary education; digital divide exacerbating inequities; and marketisation without public safeguards deepening privilege.

8. Conclusion and Recommendations

8.1 Summary of Findings

This comparative study reveals that NEP 2020 moves India toward the Anglo-American model of institutional autonomy and external governance while retaining national coordination. Its embrace of multidisciplinary education aligns with global trends, though implementation progress varies. The National Research Foundation parallels competitive funding models in the West, but research investment remains below international peers. Internationalisation strategy positions India as an emerging hub, though implementation is nascent.

8.2 Recommendations

For policy makers implementing reforms in phased, evidence-based manner with pilots before scaling will be crucial ; substantially increase public funding for teacher development, research

infrastructure, and digital access; design internationalisation policies with explicit equity safeguards; build state government capacity; establish robust monitoring systems.

For Institutions: Invest in faculty development for multidisciplinary teaching; pursue accreditation and internal quality assurance; develop focused international partnerships; design outreach programmes for disadvantaged students.

For Researchers: Continue comparative research tracking NEP implementation against international benchmarks; study effects on learning outcomes, equity, and employability; document innovative practices.

8.3 Concluding Reflections

NEP 2020 represents a landmark attempt to transform Indian higher education for the 21st century. Its vision reflects thoughtful synthesis of global best practices and indigenous priorities. Whether it succeeds will depend on implementation quality—translating vision into lived reality for 43 million learners. As India looks to 2047, the transformation of higher education will determine whether its demographic dividend becomes an engine of innovation and inclusive growth or a missed opportunity.

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Quantum networking simulations modeling and analysis

Mr. Durgesh M. Bhilavekar , Ms. Rhutika V. Jawarkar

Department Of Computer Science Shri. Dadasaheb Gawai Charitable Trust,

Amravati's Takshashila Mahavidyalaya , Amravati

Durgeshbhilavekar896@Gmail.Com , Rhutikajawarkar25@gmail.com

Abstract

Quantum networking simulation provides a virtual framework for modeling, testing, and optimizing the behavior of quantum communication systems before physical deployment. Unlike classical networks, quantum networks rely on principles such as superposition, entanglement, and quantum measurement, which introduce fundamentally different behaviors in information transmission. Simulation platforms model components including quantum nodes, entanglement sources, quantum memories, repeaters, and quantum channels (fiber or free-space links). They also incorporate realistic noise models, decoherence effects, photon loss, gate errors, and timing constraints. By emulating protocols such as quantum key distribution (QKD), entanglement swapping, teleportation, and distributed quantum computing, simulations allow researchers to analyze performance metrics such as fidelity, latency, entanglement generation rate, throughput, and scalability under varying physical and network-layer conditions.

Introduction

1. Background on Quantum Networking and Its Challenges

Quantum networking represents the next frontier in communication technology, aiming to interconnect quantum devices across local and global scales to enable secure communication, distributed quantum computing, and enhanced sensing capabilities. Unlike classical networks, which transmit bits encoded as 0s and 1s, quantum networks transmit quantum bits (qubits) that exploit quantum mechanical principles such as superposition and entanglement. Entanglement, in particular, enables non-classical correlations between distant nodes and forms the backbone of applications such as quantum key distribution (QKD), quantum teleportation, and distributed quantum algorithms.

2. Classical vs. Quantum Network Simulations

Classical network simulations—using tools such as NS-3 or OMNeT++—model deterministic packet routing, congestion control, and protocol stacks based on well-established communication theory. In classical systems:

- Data packets can be copied and retransmitted.
- Signal amplification compensates for attenuation.
- Errors are corrected through redundancy and retransmission.
- Channel behavior is typically modeled using stochastic but memoryless noise models.

Quantum network simulation frameworks must therefore model:

- Quantum state evolution using density matrices or state vectors
- Noise channels (e.g., depolarizing, amplitude damping)
- Entanglement generation and swapping operations
- Quantum memory decoherence dynamics
- Hybrid quantum-classical timing coordination
- Fidelity, entanglement rate, and latency metrics

Additionally, quantum simulations often require significantly higher computational resources because the state space of quantum systems grows exponentially with the number of qubits. This computational complexity differentiates quantum network simulation from classical discrete-event network simulation and demands specialized optimization techniques.

Quantum Networking Fundamentals

1. Quantum Entanglement and Teleportation

Quantum entanglement is a uniquely quantum mechanical phenomenon in which two or more particles become correlated such that the state of one particle instantaneously determines the state of the other, regardless of the physical distance separating them. This non-classical correlation forms the foundational resource of quantum networking. Unlike classical correlations, entangled states cannot

be described as independent local states; instead, they must be represented as a joint quantum system. A typical example is the Bell state:

$$|\Phi^+\rangle = \frac{1}{\sqrt{2}}(|00\rangle + |11\rangle)$$

In quantum networks, entanglement enables distributed quantum tasks such as secure communication, synchronization, and distributed computation. However, entanglement is fragile. Environmental interactions introduce decoherence, and photon loss in optical fibers degrades entanglement fidelity over distance. To extend communication range, quantum repeaters are used to perform entanglement swapping and purification.[1]

2. Quantum Key Distribution (QKD)

Quantum Key Distribution (QKD) is one of the most mature applications of quantum networking. QKD allows two parties to establish a shared secret key with security guaranteed by the laws of quantum mechanics rather than computational hardness assumptions.

- Side-channel attacks exploit hardware imperfections.

Recent implementations include fiber-based metropolitan QKD networks and satellite-based experiments such as those conducted using Micius, demonstrating intercontinental secure key exchange.

3. Quantum Network Architectures

Quantum network architectures define how quantum nodes, channels, and control systems are organized to support communication tasks. Unlike classical networks, quantum networks must manage both quantum resources (entanglement, qubits, memory) and classical coordination channels.

Basic Components

- Quantum Nodes: Devices capable of generating, storing, and measuring qubits.
- Quantum Channels: Optical fibers or free-space links transmitting photons.
- Quantum Memories: Store qubits temporarily for synchronization.
- Quantum Repeaters: Extend communication distance via entanglement swapping and purification.
- Classical Channels: Coordinate measurement outcomes and protocol steps.

Architectural Models

Point-to-Point Architecture

The simplest configuration, used primarily for QKD links between two nodes.

1.Repeater-Based Linear Chains

Nodes are arranged in series, with repeaters performing entanglement swapping to extend range. This architecture addresses exponential loss in optical fibers.

2.StarandHub-and-SpokeTopologies

A central node distributes entanglement to multiple clients. Suitable for metropolitan networks.

3.Mesh and Fully Connected Networks

Provide routing flexibility and redundancy. However, entanglement routing introduces probabilistic link management challenges.

4.Layered Quantum Internet Model

Inspired by classical OSI models, proposed architectures separate:

- Physical layer (entanglement generation)
- Link layer (entanglement purification)
- Network layer (routing and entanglement management)
- Application layer (QKD, distributed computing)

Architectural Challenges

- Entanglement routing must account for probabilistic link success.
- Memory lifetimes constrain multi-hop operations.
- Synchronization between quantum and classical channels is critical.

- Resource scheduling directly impacts throughput and fidelity.

Hybrid quantum-classical control systems are essential because measurement results must be communicated classically before corrective quantum operations are applied. This interdependence fundamentally differentiates quantum networks from classical infrastructures.[2]

Simulation Tools and Techniques in Quantum Networking

1. Overview of Simulation Frameworks

Quantum network simulation requires specialized software environments capable of modeling quantum state evolution, probabilistic events, noise processes, and classical control integration. Several frameworks have been developed to address different layers of abstraction—from physical-level quantum dynamics to network-layer protocol evaluation.

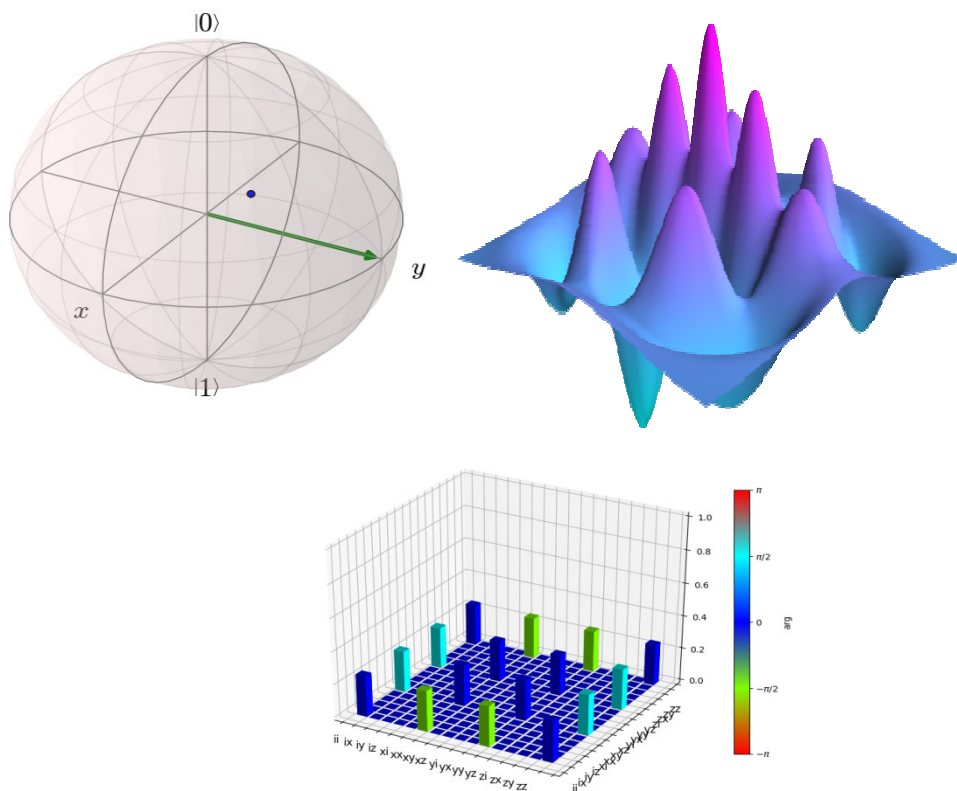
- **NetSquid**

Net Squid (Network Simulator for Quantum Information using Discrete events) is a discrete-event simulation platform specifically designed for quantum networks. Its key features include:

- Time-aware discrete-event engine
- Explicit modeling of decoherence and memory lifetimes
- Support for quantum repeaters and entanglement swapping
- Integration of classical communication and control logic
- Modular node and protocol abstraction

Net Squid allows simulation at different abstraction levels, including state-vector and density-matrix representations. It is particularly suitable for analyzing repeater chains, entanglement distribution rates, and protocol performance under realistic noise models. Because it incorporates timing and synchronization effects, it enables detailed evaluation of hybrid quantum-classical architectures.

- **Qu TiP**



QuTiP (Quantum Toolbox in Python) is a general-purpose quantum mechanics simulation library rather than a dedicated network simulator. It provides:

- State-vector and density-matrix representations

- Master equation solvers (Lindblad form)
- Quantum operators and measurement tools
- Open quantum system modeling

Although QuTiP does not inherently model network topologies or discrete-event timing, it is widely used to simulate physical-layer dynamics such as decoherence, gate errors, and photon interactions. In quantum networking research, QuTiP often complements network-level simulators by validating underlying physical processes.[3]

2. Modeling Quantum Networking Protocols

Modeling quantum networking protocols requires integrating quantum state evolution with classical communication events. Unlike classical protocols, quantum networking protocols are inherently probabilistic and resource-dependent.

(a) Protocol Representation

Protocols such as quantum teleportation, entanglement swapping, and QKD are typically modeled using:

- Quantum circuits (gate-based abstraction)
- Density matrix evolution under noise channels
- Event-driven state transitions
- Stochastic entanglement generation processes

For example, entanglement generation in fiber channels may be modeled as:

$$P_{\text{success}} = \eta e^{-\alpha L}$$

where η represents detector efficiency, α is the attenuation coefficient, and L is channel length.

(b) Noise and Decoherence Modeling

Common noise models include:

- Depolarizing channels
- Amplitude damping
- Phase damping
- Photon loss models

Master equations (e.g., Lindblad form) are often used for continuous-time decoherence modeling. In discrete-event simulators, decoherence may be implemented as time-dependent fidelity degradation.[4][5]

(c) Hybrid Quantum-Classical Control

Protocols require classical messaging for coordination (e.g., teleportation correction operations). Simulation frameworks must therefore:

- Synchronize classical and quantum events
- Track memory expiration
- Implement resource scheduling policies
- Support entanglement routing algorithms

(d) Performance Metrics

Key evaluation metrics include:

- Entanglement generation rate
- Fidelity
- Throughput
- Latency
- Quantum bit error rate (QBER)
- Resource utilization efficiency

Accurate modeling requires repeated Monte Carlo simulations due to inherent randomness in quantum processes.

3. Simulation Challenges and Limitations

Despite their importance, quantum network simulations face substantial theoretical and practical limitations.

(a) Exponential State-Space Growth

Quantum systems scale exponentially with the number of qubits. A system of n qubits requires 2^n complex amplitudes. Large-scale network simulations involving many entangled nodes quickly become computationally infeasible when using full density-matrix representations.

Mitigation strategies include:

- Stabilizer formalism approximations
- Tensor network methods
- Hybrid classical-quantum abstractions
 - Reduced-order modeling

(b) Trade-off Between Accuracy and Scalability

High-fidelity physical modeling (e.g., full noise channel representation) reduces scalability. Conversely, abstract network-level models improve scalability but may oversimplify physical processes. Selecting the correct abstraction layer is a fundamental design challenge.

(c) Timing and Synchronization Complexity

Quantum repeaters require precise timing coordination between entanglement generation, swapping, and classical acknowledgment. Simulating these interactions increases computational overhead and model complexity.

(d) Hardware Parameter Uncertainty

Real-world parameters such as memory coherence time, detector efficiency, and fiber attenuation vary across implementations. Simulations often rely on assumed or estimated values, which may limit predictive accuracy.

(e) Limited Standardization

Unlike classical networking, quantum networking lacks universally standardized protocol stacks. As a result:

- Frameworks implement differing assumptions
- Performance comparisons across simulators can be inconsistent
- Benchmarking methodologies are still evolving

(f) Computational Resource Constraints

Large-scale Monte Carlo simulations require significant CPU and memory resources. Parallelization and high-performance computing techniques are increasingly necessary for realistic modeling.[6][7]

Results and Analysis

1. Simulation Results vs. Theoretical Models

Simulation results are typically validated against theoretical predictions derived from quantum channel models and information-theoretic bounds.

Comparison Areas

- Secure key rate vs. distance curves (QKD theory)
- Fidelity decay vs. exponential attenuation models
- Entanglement distribution rate vs. analytical repeater models

In most studies, simulation results closely follow theoretical exponential decay trends under ideal conditions. However, deviations occur due to:

- Timing mismatches
- Imperfect memory
- Multi-hop synchronization delays
- Finite resource constraints

Simulations provide more realistic performance estimates than closed-form theoretical models, which often assume idealized hardware.[8]

2. Analysis of Quantum Networking Performance Metrics

Key metrics analyzed include:

(a) Fidelity

Measures similarity between ideal and actual quantum states.

- Decreases with decoherence and imperfect operations.
- Improved via purification at cost of throughput.

(b) Entanglement Generation Rate

- Strongly dependent on channel loss and repeater spacing.
- Limited by classical signaling delays.

(c) Latency

- Increases with hop count and probabilistic retransmissions.
- Sensitive to memory coherence constraints.

(d) Throughput

- Influenced by memory allocation policies.
- Impacted by routing congestion in mesh networks.

(e) Scalability

- Large-scale simulations reveal exponential computational growth.
- Hybrid abstraction models improve feasibility.

Overall, performance analysis demonstrates that scalable quantum networking requires coordinated optimization across physical, link, and network layers.[9][10]

Conclusion**Summary of Key Points**

This study examined simulation-based investigations in QKD networks, entanglement distribution, and quantum routing strategies. Key conclusions include:

- Quantum network simulations are indispensable for validating protocol performance before physical deployment.
- QKD simulations confirm exponential distance limitations without repeaters.
- Entanglement distribution efficiency depends critically on memory coherence and repeater spacing.
- Quantum routing requires probabilistic and resource-aware algorithms distinct from classical networking approaches.
- Simulation results align with theoretical models under ideal conditions but provide more realistic estimates under practical constraints.[11][12]

Future Directions for Quantum Networking Simulations

Future research should focus on:

1. Scalable Simulation Techniques

Development of tensor-network and distributed simulation methods to overcome exponential state growth.

2. Standardized Benchmarking Frameworks

Establishing cross-platform performance metrics for fair comparison.

3. Integration with Experimental Testbeds

Hybrid simulation-hardware validation pipelines.

4. AI-Assisted Routing and Resource Management

Machine learning for entanglement scheduling optimization.

5. Satellite-Ground Hybrid Network Modeling

Integration of free-space and fiber-based quantum links.

6. Quantum-Classical Co-Design Approaches

Unified simulation of classical control protocols and quantum operations.

Potential Research Questions

1. How do quantum networking simulations assist in optimizing repeater spacing and memory requirements?
2. What abstraction techniques best balance scalability and physical accuracy in large-scale simulations?
3. How can probabilistic entanglement routing be improved through adaptive algorithms?
4. What role can distributed high-performance computing play in scaling simulations?
5. How can simulations accelerate standardization of quantum internet protocols?

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Review Of Changes In Higher Education Since 1947

Rupali Anilrao Jichkar

Bsc (Agri), M.A Economics SET Qualify (Reserch scholar) Mo.no. 8669879759

ABSTRACT:-

Since India's independence in 1947, higher education has undergone profound structural, qualitative, and quantitative transformations, reflecting the nation's socio-economic aspirations and global engagements. At the time of independence, the higher education system was limited in scope, with only 20 universities and around 500 colleges, primarily designed to serve colonial administrative needs. Post-independence, the Government of India initiated systematic reforms inspired by the recommendations of the University Grants Commission (established in 1956), which played a central role in coordinating standards, funding, and expansion. Landmark policy frameworks such as the National Policy on Education, National Policy on Education, and the recent National Education Policy have significantly reshaped the structure, governance, and vision of higher education in India. The expansion phase between the 1950s and 1990s witnessed the establishment of premier institutions such as the Indian Institutes of Technology and Indian Institutes of Management, aimed at developing scientific, technical, and managerial expertise. The post-liberalization era (after 1991) further accelerated privatization, diversification, and globalization of higher education, leading to a substantial increase in private universities and deemed institutions.

INTRODUCTION:-

At the time of India's independence in 1947, the nation's education system was in dire need of reform. With only 17 universities and 636 colleges serving approximately 2.38 lakh students, the challenges were stark. The literacy rate was a mere 14%, and education expenditure accounted for less than 0.5% of the national income. Vision of educators like Dr. Sarvepalli Radhakrishnan and others, sought to build an educational system that would not only expand access but also improve quality, reflecting India's rich cultural heritage while addressing the demands of an increasingly globalized world. economic liberalization and globalization, the higher education sector underwent significant transformations. Policies such as the National Policy on Education (1986) and the National Knowledge Commission (2005) sought to enhance the sector's global competitiveness, addressing issues like accessibility, quality, and relevance. More recently, the National Education Policy (2020) aims to make India's higher education system more flexible, inclusive, and globally competitive.

LITERATURE REVIEW:-

At the time of India's independence in 1947, the nation's education system was underdeveloped, with only 17 universities and 636 colleges serving approximately 238,000 students. The literacy rate was low, around 14%, and education expenditure was less than 0.5% of the national income. The underdeveloped higher education infrastructure and low literacy rate posed significant challenges for the newly independent nation. However, India quickly recognized the importance of education in national development and social progress.

1. POST-INDEPENDENCE FOUNDATIONAL PHASE (1947-1985)

- A) University Education Commission (1948-49)- Chaired by Dr. Sarvepalli Radhakrishnan, the University Education Commission (1948-49) was the first significant reform of the post-independence education system. This commission proposed several recommendations for improving the quality and accessibility of university education in India.
- Transforming universities from merely affiliating bodies to teaching institutions.
 - Establishing rural universities focused on agriculture and industry.
 - Promoting the use of regional languages in education alongside English.
 - Enhancing research and professional education in fields such as medicine, engineering, and law.
- B) Education Commission (1964-66) - One of the most seminal contributions in this regard came from Dr. Daulat Singh Kothari, who chaired the Education Commission (1964-66). The

Commission's report, often referred to as the Kothari Commission Report, was pivotal in shaping the framework of higher education in India.

C) National Policy on Education, 1968,- The National Policy on Education (NPE) 1968 marked a significant milestone in the development of India's educational framework, setting the stage for the expansion and modernization of higher education in the post-independence period.

2) National Policy on Education, 1986:- The National Policy on Education (NPE) of 1986 was a landmark development in India's educational landscape, marking a shift toward improving the quality, accessibility, and relevance of education in the country.

3) The Contemporary Transformation Phase (2020) :- in India's higher education sector is characterized by rapid digitalization, increased focus on global competitiveness, and a reimagining of educational frameworks in response to emerging global challenges. In this phase, significant policy initiatives like the National Education Policy (NEP) 2020 have laid the groundwork for systemic reforms. The NEP emphasizes multidisciplinary education, greater integration of technology in teaching and learning, and the importance of research and innovation as key drivers of national development.

4) The National Education Policy (NEP) 2020,- a landmark initiative by the Government of India, aims to transform the higher education sector by focusing on accessibility, inclusivity, and global competitiveness. The key features of the NEP 2020 include the promotion of a multidisciplinary approach to learning, greater emphasis on critical thinking, research, and innovation, and the integration of technology in education. One of its significant provisions is the introduction of a 5+3+3+4 curricular structure, aiming to increase flexibility and interdisciplinary learning across different stages of education.

5) OPEN AND DISTANCE LEARNING (ODL) :-

Components in India The Open and Distance Learning (ODL) system has emerged as an essential component of India's higher education landscape, especially for reaching out to non-traditional students, including working professionals, housewives, and those in remote areas. The Indira Gandhi National Open University (IGNOU), established in 1985, was a pioneering institution in promoting ODL in India.

A) Evolution of Open and Distance Learning (ODL) :- Policies in India The evolution of Open and Distance Learning in India has been marked by progressive steps in policy development, particularly in the context of widening access to higher education. The Indira Gandhi National Open University (IGNOU), established in 1985, laid the foundation for ODL in India, aiming to provide education to those who could not attend traditional institutions due to geographical, economic, or social barriers.

B) Gaps in ODL Policies :- Despite its promising growth, several gaps persist in India's ODL policies that hinder its full potential. One significant gap is the quality assurance of ODL Programs. While accreditation mechanisms exist, there is a lack of uniform standards and consistency in the assessment of distance education programs across institutions.

6) REVIEW OF LITERATURE:-

The Indian higher education sector has undergone significant transformation since the country gained independence in 1947. Over the decades, various policies have shaped the trajectory of the sector, aiming to expand access, enhance quality, and address emerging global challenges. The National Policy on Education (1986) aimed at modernizing the system, introducing reforms in curriculum, encouraging vocational education, and improving research output. It observes that this phase saw increased private sector participation, which led to many institutions being established. However, it argues that the liberalization process led to a proliferation of private institutions that were often under-regulated, which led to concerns about the quality of education and widening socio-economic inequalities in access to higher education. The National Knowledge Commission (NKC), established in 2005, focused on reforming the higher education sector to enhance India's global competitiveness. The NKC's recommendations, as discussed by Ghosh (2010), included strengthening research, improving faculty quality, and fostering international collaborations. Despite these recommendations, it suggests that the policy failed to address key issues such as the insufficient funding for research and development and the lack of a robust framework for faculty development. This hindered Indian institutions from achieving a prominent place in global academic rankings. The

National Education Policy (NEP) 2020 represents a contemporary transformation phase for higher education in India.

7) METHODOLOGY:

This research adopts a qualitative methodology based on a systematic review of secondary data, including government reports, scholarly articles, policy documents, and international reports, to analyze the evolution of India's higher education policies and their impact on global competitiveness. The study follows a systematic literature review approach, focusing on key policies such as the Kothari Commission (1964-66), National Policy on Education (1968), National Knowledge Commission (2005), and the National Education Policy (2020).

8) ANALYSIS OF KEY POLICIES AND THEIR IMPACT:-

The Kothari Commission (1964-66) laid the foundation for a comprehensive higher education system, calling for an expansion of access and equity. Its limitations were lack of emphasis on quality and research output. The National Policy on Education (1968) continued this focus on educational expansion and accessibility, emphasizing the need for standardization and reform at the national level. However, it failed to address integration with global standards and neglected the role of research and technology. National Knowledge Commission (2005), India began focusing more intently on the need for knowledge-based growth and higher education reform. It identified the importance of building research capacity and upgrading faculty quality, areas that remain crucial for India's competitive positioning.

9. DISCUSSION AND SUGGESTED REFORMS:-

A) Discussion: India's higher education sector has evolved significantly since independence, marked by a series of key policies aimed at addressing the educational needs of a growing nation. These policies, including the Kothari Commission (1964-66), National Policy on Education (1968), National Knowledge Commission (2005), and the National Education Policy (2020), reflect the country's shifting priorities in response to social, economic, and global demands. The early policies focused on expanding access to education and addressing regional disparities, while later policies incorporated goals of quality improvement, research advancement. Despite these positive strides, significant challenges persist in India's higher education sector.

B) Suggested Reforms:- To enhance India's global competitiveness, a comprehensive and multi-faceted approach, involving policy reforms at various levels of governance, is essential. The All India Council of Higher Education's "Reimagining Indian Universities and the National Education Policy (NEP) 2020 outline a strategic roadmap that aims to make Indian higher education institutions globally competitive. One key reform is increasing investment in research and development, as research quality directly influences a university's international standing. NEP 2020 emphasizes digital literacy and the integration of technology in education, promoting hybrid learning models that blend online and offline education to enhance the learning experience. Furthermore, interdisciplinary education and research are increasingly vital in addressing the complex challenges of the modern world. To thrive in a rapidly changing global environment, India's higher education system must encourage interdisciplinary and multidisciplinary approaches that break down traditional academic silos.

10) CONCLUSION: -

India's higher education sector has undergone a remarkable transformation since independence, with policy initiatives aimed at expanding access, improving quality, and fostering global integration. From the foundational recommendations of the Kothari Commission (1964-66) to the recent National Education Policy (2020), the Indian government has strived to create an educational ecosystem that addresses the needs of a growing nation while aspiring to elevate the global standing of Indian universities. Despite these efforts, significant challenges persist, particularly in terms of global competitiveness. The shift towards interdisciplinary education will better equip graduates to navigate complex global industries and contribute meaningfully to diverse sectors. The success of NEP 2020 will depend on its full implementation, requiring strong political will, public and private investment, and concerted efforts to modernize curricula, improve faculty quality, and build global partnerships. For India to enhance its global competitiveness, investment in research, faculty development, digital infrastructure, and international collaborations must be prioritized. The



government should continue its push for research excellence by increasing funding, fostering public-private partnerships, and creating innovation ecosystems in universities.

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An Analytical Study of NEP 2020 Curriculum Reforms and Economically Focused Educational Schemes in Tribal Schools of Amravati Division (2018–2023)

Jyotsna Tukaram Motghare

Email.ID: jyotsnamotghare@yahoo.com Mobile No: 9527982989

Designation: Research Scholar College Name : TakshashilaMahavidyalaya Amravati

Guide Name: **Dr. B.P. Adhao Sir**

Abstract

Education plays a crucial role in the socio-economic development of marginalized communities. Tribal communities in India often face educational disadvantages due to poverty, geographical isolation, and inadequate educational infrastructure. The introduction of the National Education Policy (NEP) 2020 has brought significant reforms to the Indian education system, focusing on holistic development, inclusivity, and skill-based learning.

This research paper analyzes the impact of NEP 2020 curriculum reforms and economically focused educational schemes on tribal schools in the Amravati division during the period 2018–2023. The study evaluates the effectiveness of financial support schemes, changes in curriculum structure, and their influence on educational accessibility among tribal students.

Year	Male Literacy	Female Literacy	Overall Literacy
2018	66%	52%	59%
2019	67%	54%	61%
2020	68%	56%	62%
2021	70%	58%	64%
2022	71%	60%	66%
2023	73%	62%	68%

Tribal literacy has gradually improved due to **educational schemes and policy reforms**. Female literacy is increasing but still lower than male literacy. The research uses secondary data sources such as government reports, policy documents, and educational statistics. The findings indicate that NEP reforms and educational schemes have contributed to improved enrollment, better learning opportunities, and enhanced educational access for tribal students. However, challenges such as infrastructure limitations, teacher shortages, and socio-economic barriers still hinder effective implementation.

Keywords: NEP 2020, Tribal Education, Educational Schemes, Curriculum Reforms, Amravati Division

1. Introduction

Education is widely recognized as a powerful tool for social and economic development. In India, tribal communities represent one of the most marginalized groups in terms of education and

economic opportunities. Lack of access to quality education, poor infrastructure, and socio-economic challenges have historically limited educational progress among tribal populations.

To address these issues, the Government of India has introduced several policies and programs aimed at improving educational accessibility and quality for tribal communities. One of the most significant reforms in recent years is the **National Education Policy (NEP) 2020**, which aims to transform the education system through structural and pedagogical changes.

In Maharashtra, particularly in the **Amravati division**, tribal communities constitute a significant portion of the population. Therefore, studying the impact of NEP reforms and educational schemes in this region is important for understanding how national educational policies influence tribal education.

NEP 2020 emphasizes:

- ◆ holistic learning
- ◆ skill development
- ◆ multilingual education
- ◆ equity and inclusion in education

The policy gives special importance to **Socially and Economically Disadvantaged Groups (SEDGs)** including tribal communities to ensure equal educational opportunities.

One of the major structural reforms introduced by NEP is the **5+3+3+4 curriculum structure**, replacing the traditional 10+2 system, to ensure better cognitive and developmental learning among students.

In tribal regions such as the Amravati division of Maharashtra, various educational schemes have been implemented to provide financial assistance, scholarships, hostels, and residential schooling facilities. These schemes aim to reduce educational inequality and improve access to schooling among tribal students.

Therefore, this research examines the impact of NEP 2020 curriculum reforms along with financial educational schemes implemented in tribal schools of Amravati division between 2018 and 2023.

2.Review of Literature

2.1 National Education Policy and Educational Reforms

Studies indicate that NEP 2020 introduces significant reforms in curriculum design, teaching methods, and assessment systems. The policy promotes experiential learning, skill development, and multidisciplinary education to prepare students for modern economic challenges.

2.2 Tribal Education in India

Research on tribal education highlights issues such as low enrollment rates, high dropout rates, and lack of infrastructure in tribal areas. Government schemes such as residential schools and scholarships have been introduced to address these challenges.

2.3 Curriculum Reforms and Inclusivity

The new curriculum structure under NEP 2020 aims to provide flexible learning opportunities and reduce rote learning by focusing on conceptual understanding and critical thinking.

2.4 Educational Schemes for Tribal Students

Government programs such as residential schools, hostels, and scholarship schemes play a significant role in improving access to education among tribal communities.

The existing literature highlights the need for more region-specific studies examining the impact of these reforms in tribal regions.

3.Objectives of the Study

The study aims to achieve the following objectives:

- To examine the major curriculum reforms introduced under NEP 2020.
- To analyze economically focused educational schemes implemented for tribal students.
- To study the impact of these reforms and schemes on tribal schools in the Amravati division.
- To identify the challenges faced in implementing NEP 2020 and educational schemes.
- To suggest recommendations for improving tribal education.

4. Research Methodology

4.1 Nature of Research

The present research is **analytical and descriptive in nature**.

4.2 Sources of Data

The study is based on **secondary data**, collected from:

- Government reports
- Ministry of Education publications
- Tribal development department reports
- Research journals
- Educational statistics

4.3 Area of Study

The geographical area of the study is **Amravati Division of Maharashtra**, which includes districts such as:

- Amravati
- Akola
- Washim
- Buldhana
- Yavatmal

District-wise Tribal Population in Amravati Division

District	Total Population (000s)	Tribal Population (000s)	% of Tribal Population
Buldhana	2586	125	4.83
Akola	1814	100	5.51
Washim	1197	81	6.77
Amravati	2889	404	13.98
Yavatmal	2772	514	18.54
Total	11258	1224	10.87%

Interpretation

- Yavatmal district has the **highest tribal population (18.54%)** in the division.
- Amravati district also has a significant tribal population of **13.98%**.
- Buldhana and Akola have comparatively lower tribal population percentages.

These districts represent major areas where **tribal educational schemes are implemented**. These districts contain significant tribal populations.

4.4 Period of Study

The study covers the period **2018–2023**, which includes:

- Pre-NEP educational policies
- Early implementation phase of NEP 2020

5. Major Curriculum Reforms under NEP 2020

NEP 2020 introduced several structural and pedagogical reforms in the education system.

5.1 New Curriculum Structure

The new **5+3+3+4 structure** consists of:

Stage	Age Group	Classes
Foundational Stage	3–8 years	Pre-school to Class 2
Preparatory Stage	8–11 years	Class 3–5
Middle Stage	11–14 years	Class 6–8
Secondary Stage	14–18 years	Class 9–12

This structure emphasizes **early childhood care and education and conceptual learning**.

5.2 Foundational Literacy and Numeracy

The policy focuses on ensuring that all children achieve **basic reading and arithmetic skills by Grade 3** through programs such as NIPUN Bharat.

5.3 Multilingual Education

NEP encourages **mother tongue or regional language as the medium of instruction till Grade 5**, which is particularly beneficial for tribal students who are more comfortable learning in their native languages.

5.4 Vocational and Skill Education

Vocational education has been introduced from **Class 6 onwards**, enabling students to acquire practical skills and improve employability.

5.5 Assessment Reforms

The policy shifts the focus from rote learning to **competency-based assessment and holistic progress evaluation**.

6. Economically Focused Educational Schemes for Tribal Students

Several schemes have been implemented to provide financial support to tribal students.

6.1 Eklavya Model Residential Schools (EMRS)

EMRS are residential schools designed to provide quality education to tribal students in remote areas. These schools aim to provide education equivalent to the best schools in the country.

6.2 Pre-Matric and Post-Matric Scholarships

These scholarships help tribal students continue their education by covering:

- tuition fees
- books
- uniforms
- other educational expenses.

6.3 Ashram Schools

Ashram schools provide residential education facilities for tribal students, especially in remote areas.

6.4 Hostel Facilities

Hostels are provided for tribal students to ensure access to schooling even when educational institutions are located far from their villages.

Major Educational Schemes for Tribal Students

Scheme	Objective	Beneficiaries (Approx.)
Eklavya Model Residential Schools (EMRS)	Residential education for tribal students	5,000
Pre-Matric Scholarship	Financial support for school education	25,000
Post-Matric Scholarship	Support for higher education	18,000
Ashram Schools	Residential schooling in tribal areas	40,000
Tribal Hostels	Accommodation for tribal students	12,000

Interpretation

Ashram schools benefit the largest number of tribal students.

Scholarship schemes play an important role in reducing financial barriers.

7. Impact of NEP Reforms and Educational Schemes in Tribal Schools

The implementation of NEP reforms and educational schemes has led to several positive outcomes:

7.1 Increased Enrollment

Financial assistance and residential schooling facilities have helped increase enrollment among tribal students.

7.2 Improved Learning Environment

Activity-based learning and experiential education have improved classroom engagement.

7.3 Skill Development

Vocational education has helped students develop practical skills.

7.4 Cultural Inclusion

The use of regional and tribal languages has made education more accessible and culturally relevant.

8. Challenges in Implementation

Despite several improvements, the following challenges remain:

- Lack of infrastructure in remote tribal areas
- Shortage of trained teachers
- Limited awareness of government schemes
- Socio-economic barriers such as poverty
- Digital divide affecting online education

Studies show that socio-economic inequality and lack of technological access create educational gaps for disadvantaged groups.

9. Findings of the Study

The study reveals the following findings:

- NEP 2020 has introduced major structural and pedagogical reforms.
- Tribal population in Amravati division is **around 10.87% of total population**.
- Student enrollment among tribal communities has **steadily increased from 2018 to 2023**.
- Educational infrastructure such as **EMRS schools and hostels has expanded**. Government schemes have helped reduce **financial barriers in tribal education**.
- Literacy rates among tribal populations show **continuous improvement**.

10. Suggestions and Recommendations

- Increase funding for tribal education infrastructure.
- Improve teacher training programs for tribal schools.
- Expand residential schooling facilities.
- Promote digital education infrastructure in remote areas.
- Increase awareness about government educational schemes.

11. Conclusion

Education is a powerful instrument for the empowerment of tribal communities. The introduction of NEP 2020 has brought significant reforms in curriculum structure, pedagogy, and assessment systems. Along with these reforms, economically focused educational schemes have played an important role in improving educational opportunities for tribal students in the Amravati division.

However, successful implementation requires better infrastructure, trained teachers, and increased financial investment in tribal education. Strengthening these areas will ensure that NEP 2020 achieves its goal of providing inclusive and equitable education for all.

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Influence of Ancient Knowledge Traditions on The Curriculum of Various Academic Disciplines

Ashvini Arvind Korade

| ashvinikorde96@gmail.com | +91 7262994622

ABSTRACT:

The influence of ancient knowledge traditions on the curriculum of various academic disciplines is profound and multifaceted. These traditions provide foundational concepts, philosophies, and methodologies that continue to shape contemporary educational frameworks. By integrating ancient wisdom into modern curricula, academic disciplines benefit from enriched perspectives and strengthened interdisciplinary connections, enhancing both intellectual depth and cultural relevance. This incorporation underscores the enduring value of historical intellectual legacies in advancing academic rigor and broadening the scope of education. Hereof, this research paper examines the impact of ancient knowledge traditions on the curricula of various academic disciplines. It explores how foundational concepts, philosophies, and methodologies from historical intellectual legacies have shaped contemporary educational frameworks. The analysis highlights the integration of these traditions in modern curricula, emphasizing their role in enriching disciplinary perspectives and fostering interdisciplinary connections. This research underscores the importance of acknowledging and incorporating ancient wisdom to enhance academic rigor and cultural relevance across fields of study.

Keywords:

Ancient knowledge, Curriculum development, Interdisciplinary education, Academic rigor, Cultural relevance, etc.

INTRODUCTION

Ancient knowledge traditions encompass the intellectual, cultural, and epistemological legacies of early civilizations, including those from Greece, Rome, India, China, Egypt, and Mesopotamia. These traditions, developed over millennia, laid the groundwork for systematic inquiry, ethical reasoning, and practical applications that define modern academia. From the philosophical dialogues of ancient Greece to the mathematical innovations of India and the medical practices of China and Egypt, these early systems of thought were not isolated but interconnected through trade, conquest, and cultural exchange. Their influence persists in contemporary curricula, where foundational concepts are taught as prerequisites for advanced study, fostering critical thinking, interdisciplinary connections, and cultural awareness. As observed in an article on TutorsInternational.com of 27th March, 2025 –

Education in today's more familiar form only started to take shape around the 18th century. This was due, in part, to the increased economic demands created by the Industrial Revolution bringing a need for more workers with basic numeracy and literacy skills.¹

The significance of these traditions lies in their holistic approach to knowledge. Unlike modern education's often compartmentalized structure, ancient systems integrated ethics, spirituality, and practicality. For instance, Greek education emphasized the development of rational minds and civic virtue, while Indian Vedic traditions focused on self-realization and harmony with nature. Chinese education prioritized moral character and societal duty, and Egyptian systems stressed administrative precision and astronomical observation. These elements have been adapted into today's curricula, influencing disciplines from philosophy to science. However, their integration varies, with Western curricula often privileging Greco-Roman roots, while global education increasingly incorporates non-Western perspectives to address Eurocentric biases.

This paper examines how ancient knowledge traditions have shaped the curricula of key academic disciplines: philosophy, mathematics, science, medicine, and pedagogy itself. By drawing on historical analyses and comparative studies, it argues that these traditions provide not only foundational content but also methodologies and ethical frameworks essential for modern education. Through this exploration, the paper highlights the need for curricula to embrace multicultural ancient wisdom to promote inclusive, holistic learning in an interconnected world. Ultimately, recognizing

these influences enriches contemporary education, bridging past insights with present challenges like sustainability and ethical innovation.

PHILOSOPHY

Philosophy, as a discipline, owes its core structure and methodologies to ancient knowledge traditions, particularly from Greece and India, which continue to form the backbone of modern curricula worldwide. In ancient Greece, education was democratized in the 5th century BCE under the influence of Sophists, Plato, and Isocrates, emphasizing rhetoric, logic, and ethical inquiry. Plato's Academy, established in 387 BCE, introduced formal lectures on politics, education, and metaphysics, fostering critical thinking through dialogue—a precursor to the Socratic method still used in law schools and humanities courses today. Aristotelian logic, with its emphasis on syllogisms and empirical observation, remains a staple in introductory philosophy courses, influencing analytical reasoning across disciplines. Dr. Ganesh Datt & Dr. Harish Pandey in conclusion of their paper on *Knowledge Traditions and Practices of Bharat* published in JETIR August 2024, Volume 11, Issue 8, states that –

The Knowledge Traditions and Practices of Bharat (KTPB) are integral to understanding India's rich cultural heritage and intellectual legacy. The NCF, as outlined in the NEP 2020, seeks to integrate these traditions into contemporary education, fostering a sense of pride and rootedness among students.²

Roman adaptations further embedded these ideas into Western education. Romans adopted Hellenistic models, integrating Greek rhetoric and philosophy into their curriculum to cultivate oratory skills for statesmanship. Figures like Cicero studied in Athens and Rhodes, blending Greek ideals with Roman pragmatism, which shaped the liberal arts tradition. This Greco-Roman legacy persists in modern curricula, where courses on ethics often begin with Plato's Republic or Aristotle's Nicomachean Ethics, promoting virtues like justice and moderation. The Trivium—grammar, logic, and rhetoric—rooted in classical education, guides contemporary liberal arts programs, emphasizing intellectual virtues over vocational training.

Indian philosophical traditions, drawn from the Vedas and Upanishads, offer a complementary influence, focusing on self-inquiry and metaphysical harmony. Ancient Indian education in Gurukulas integrated philosophy with ethics, viewing knowledge as a path to moksha (liberation). Concepts like dharma (moral duty) and karma influence modern philosophy curricula, particularly in comparative studies, where Eastern and Western thought intersect. For example, Nyaya logic parallels Aristotelian syllogisms, enriching debates on epistemology. In contemporary education, policies like India's NEP 2020 incorporate these elements, mandating Indian Knowledge Systems (IKS) in curricula to foster ethical awareness and cultural pride.

Chinese philosophy, rooted in Confucianism, emphasized moral education and societal harmony, influencing curricula in East Asia and beyond. The Zhou dynasty's formal schools taught rituals and music alongside ethics, a secular approach that contrasts with religious-oriented systems. Today, this manifests in character education programs, where Confucian virtues like ren (benevolence) are integrated into global ethics courses.

These ancient traditions ensure philosophy curricula remain dynamic, addressing timeless questions while adapting to modern contexts like bioethics and environmental philosophy. By incorporating diverse sources, educators mitigate biases and promote global perspectives.

MATHEMATICS

Mathematics curricula in modern education are profoundly indebted to ancient innovations from India, Greece, Egypt, and China, which provided foundational algorithms, theorems, and numerical systems still taught today. Ancient Indian contributions, such as the decimal system, zero, and algebra from scholars like Aryabhata and Brahmagupta, revolutionized computation. The concept of zero, originating around 3000 BCE, underpins binary code in computer science curricula, while trigonometric functions from Aryabhata's work are essential in high school geometry. Indian texts like the Sulba Sutras predate Pythagoras with geometric proofs, influencing modern proofs-based teaching. Heenam Bhagat in her paper *Evolution of Ancient and Medieval Indian Education System to Contemporary* published in International Journal for Multidisciplinary Research (IJFMR), Volume 7, Issue 2, March-April 2025 states that –

With the dawn of Buddhism, the three pitakas :Vinayapitakas, Suttapitakas and Abhidhamma Pitaka, societal structure was laid on the canonical literature and the ethical code of belief of Lord Buddha. The ultimate goal of education during Buddhist period was piety in human character. Inception of Medieval period [8th C.E.] saw Maktab- Madrasah system where the parallel was drawn between the Science and Humanities.³

Greek mathematics, exemplified by Euclid's Elements and Pythagoras' theorem, forms the core of deductive reasoning in curricula. Euclidean geometry, with its axioms and proofs, is a standard in secondary education, fostering logical thinking. Archimedes' principles of levers and buoyancy extend into physics-math integrations. Roman adaptations applied these practically, influencing engineering curricula.

Egyptian mathematics, as seen in the Rhind Papyrus, introduced arithmetic and algebra for practical purposes like pyramid construction, impacting applied math courses. Their fractional systems and surveying techniques are foundational in civil engineering programs.

Chinese contributions, including the Nine Chapters on the Mathematical Art, advanced algebra and geometry, with negative numbers and matrices influencing linear algebra curricula. Modern integration methods include project-based learning, where students build models of ancient instruments, connecting historical contexts to contemporary applications. This holistic approach enhances problem-solving and cultural appreciation in math education.

SCIENCE

Science curricula reflect ancient observational and empirical traditions from Mesopotamia, India, China, and Greece, blending inductive methods with modern experimentation. Mesopotamian and Egyptian astronomy, with calendars and star catalogues, laid foundations for celestial mechanics. Egyptian observations influenced Greek scholars like Ptolemy, whose geocentric model is taught in history of science courses. Dr. Rituparna Manikyal in her paper on *Ancient Education System Of India And Its Modern Day Relevance* published in IJCRT | Volume 11, Issue 12 December 2023 | ISSN: 2320-2882, advocates that –

The ancient education system of India concentrates on the growth of complete character of the students not merely the growth of his or her intellect. So it includes the aspects of Self realization, Self discipline, Self control and character formation. Therefore the ancient education system still has its relevance in the present day.⁴

Greek science, through Aristotle's classification of natural phenomena, shaped biology and physics curricula. His empirical approach informs scientific method units, while Archimedes' hydrostatics is core in physics labs.

Indian Vedic astronomy, including heliocentric ideas in the Rig Veda, predates Copernicus and enriches astrophysics curricula. Atomic theory from Kanad parallels modern particle physics.

Chinese celestial observations for calendars influenced meteorology and agriculture studies. Integration of indigenous knowledge, as in South African curricula blending local traditions with Western science, addresses cultural relevance. Modern science education benefits from these traditions by incorporating historical case studies, promoting interdisciplinary and ethical scientific inquiry.

MEDICINE

Medical curricula draw heavily from ancient holistic practices in India, Greece, China, and Egypt, emphasizing prevention, ethics, and integration with modern biomedicine. Ayurveda's tri-dosha theory and herbal remedies from the Sushruta Samhita influence integrative medicine courses, with surgical techniques predating Western innovations.

Greek Hippocratic medicine, with its oath and humoral theory, forms the ethical foundation of medical education. Roman adaptations, like Galen's anatomy, are studied in history of medicine modules.

Traditional Chinese Medicine (TCM), including acupuncture and qi concepts, is incorporated into complementary health curricula, with herbs like artemisinin yielding modern drugs.

Egyptian practices, such as those in the Ebers Papyrus, advanced pharmacology and surgery, influencing pharmaceutical studies. Contemporary curricula integrate these through electives on global health, fostering culturally sensitive practice.

EDUCATION AND PEDAGOGY

Ancient pedagogical traditions directly influence modern curricula design and teaching methods. The Greek Socratic method promotes inquiry-based learning, while Roman emphasis on rhetoric shapes communication courses.

Indian Gurukula system, with its experiential and value-based approach, inspires holistic education reforms like NEP 2020. Chinese moral education informs character-building programs.

Egyptian scribal schools emphasized discipline and literacy, paralleling modern vocational training. Integrating these fosters blended learning, combining ancient wisdom with digital tools for inclusive education.

CONCLUSION

Ancient knowledge traditions have indelibly shaped modern academic curricula, providing foundational content, ethical depth, and methodological rigor across philosophy, mathematics, science, medicine, and pedagogy. From Greco-Roman logic to Indian holism and Chinese morality, these influences promote well-rounded, culturally aware education. In today's globalized world, their relevance lies in addressing contemporary issues like sustainability and equity. Future curricula should further integrate diverse ancient wisdom, countering biases and enhancing innovation. By doing so, education honors its roots while preparing students for an interconnected future.

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Role of PradhanMantri Mudra Yojana in Fostering a Knowledge-Based Economy through Micro Enterprise Development: An Empirical Study with Special Referenceto Amravati District

Sachin Rajendra Khobragade

Email.ID: khobragade.sachin255@gmail.com Mobile No: 9881291082

Designation: Research Scholar College Name: SantGadgeMaharaj Arts, Commerce & Science College Walgaon ,Dist Amravati

Abstract

In the modern era, the concept of a knowledge-based economy has gained significant importance in economic development. A knowledge-based economy relies heavily on the creation, dissemination, and utilization of knowledge to enhance productivity and economic growth. Micro enterprises play a crucial role in this transformation as they promote innovation, entrepreneurship, and employment generation. In India, the Government has introduced several financial inclusion initiatives to strengthen the micro-enterprise sector. One such significant initiative is the PradhanMantri Mudra Yojana (PMMY), launched in 2015 to provide financial support to micro and small entrepreneurs. The present study examines the role of PMMY in fostering a knowledge-based economy through the development of micro enterprises in Amravati District of Maharashtra. The research adopts an empirical approach using primary data collected from Mudra loan beneficiaries. The findings indicate that PMMY has significantly contributed to entrepreneurial development, skill utilization, technological adoption, and employment generation. The scheme has helped entrepreneurs utilize knowledge and skills to establish sustainable micro enterprises. However, certain challenges such as lack of awareness, financial literacy, and market access still exist. The study concludes that PMMY plays a vital role in strengthening the micro-enterprise sector and promoting a knowledge-driven economic environment in regional economies.

Keywords: Knowledge-Based Economy, Micro Enterprises, Financial Inclusion, Mudra Yojana, Entrepreneurship Development, Amravati District.

1. Introduction

The global economy has gradually transitioned from a traditional resource-based economy to a knowledge-based economy. In such an economy, knowledge, innovation, and human capital are considered the most important drivers of growth and development. A knowledge-based economy emphasizes the use of information, education, research, and technological advancements to enhance productivity and competitiveness. Developing countries like India are increasingly focusing on policies that encourage entrepreneurship, innovation, and skill development to strengthen their economic systems.

Micro enterprises play a vital role in this transformation by providing employment opportunities, promoting innovation, and contributing to economic growth. In India, micro enterprises constitute a significant portion of the Micro, Small and Medium Enterprises (MSME) sector. These enterprises are often operated by individuals with limited financial resources but considerable skills, knowledge, and entrepreneurial abilities.

Recognizing the importance of financial support for micro entrepreneurs, the Government of India launched the PradhanMantri Mudra Yojana (PMMY) in April 2015. The scheme aims to provide financial assistance to non-corporate, non-farm small and micro enterprises through loans up to ₹10 lakh. Under PMMY, loans are categorized into three types: Shishu, Kishore, and Tarun, depending on the stage of business development.

The scheme has played an important role in promoting financial inclusion and encouraging entrepreneurship across the country. By providing access to credit, PMMY enables individuals to establish and expand micro enterprises. These enterprises contribute not only to income generation but also to the development of knowledge-based economic activities such as service innovation, skill utilization, and technological adoption.

Amravati District in Maharashtra has witnessed significant growth in micro enterprises in recent years. Many entrepreneurs have benefited from Mudra loans to start businesses in sectors such as retail trade, manufacturing, services, and agriculture-related activities. These enterprises contribute to local economic development and create employment opportunities.

The present study aims to examine the role of PradhanMantri Mudra Yojana in fostering a knowledge-based economy through the development of micro enterprises in Amravati District.

2. Review of Literature

Several researchers have examined the role of financial inclusion and micro-enterprise development in economic growth.

Sharma (2016) highlighted that microfinance schemes play an important role in promoting entrepreneurship among economically weaker sections. The study emphasized that access to credit is essential for business development and employment generation.

Kumar and Gupta (2018) analysed the impact of Mudra Yojana on small entrepreneurs in India and found that the scheme has significantly improved financial accessibility and encouraged self-employment.

Patil (2019) examined the role of government schemes in micro enterprise development and concluded that financial assistance combined with skill development programs can strengthen the entrepreneurial ecosystem.

Singh (2020) studied the contribution of MSMEs to the knowledge-based economy and observed that micro enterprises act as catalysts for innovation and technological adaptation.

Rao (2021) emphasized that knowledge-based entrepreneurship plays an important role in economic development, especially in emerging economies where skilled individuals utilize knowledge and innovation to establish new ventures.

However, there are limited studies focusing specifically on the role of Mudra Yojana in promoting knowledge-based economic activities at the regional level. Therefore, the present study attempts to fill this research gap by examining the impact of PMMY on micro enterprise development in Amravati District.

3. Objectives of the Study

The major objectives of the study are:

1. To examine the role of PradhanMantri Mudra Yojana in promoting micro enterprise development in Amravati District.
2. To analyse the contribution of Mudra Yojana in fostering a knowledge-based economic environment.
3. To study the impact of Mudra loans on employment generation and entrepreneurial development.
4. To identify the challenges faced by Mudra beneficiaries in establishing micro enterprises.

4. Research Methodology

4.1 Research Design

The study is empirical in nature and focuses on analysing the role of Mudra Yojana in micro enterprise development.

4.2 Data Sources

Both primary and secondary data have been used for the study.

Primary Data:

Primary data was collected through a structured questionnaire from Mudra loan beneficiaries in Amravati District.

Secondary Data:

Secondary data was collected from government reports, journals, books, and official publications related to Mudra Yojana and micro enterprises.

4.3 Sample Size

The study is based on a sample of 120 Mudra loan beneficiaries from different sectors such as retail, services, and manufacturing.

4.4 Sampling Technique

Convenience sampling method was used for selecting respondents.

4.5 Data Analysis Tools

The collected data was analysed using percentage analysis and tabular presentation.

5. Data Analysis and Interpretation

Table 1: Purpose of Mudra Loan Utilization

Purpose	Respondents	Percentage
Starting new business	50	41.67%
Expanding existing business	40	33.33%
Purchasing equipment	20	16.67%
Working capital	10	8.33%
Total	120	100%

Interpretation:

The table indicates that 41.67% of respondents utilized Mudra loans to start new businesses, while 33.33% used the loans to expand existing enterprises. This shows that PMMY has played a significant role in promoting entrepreneurial activities.

Table 2: Impact on Employment Generation

Employment Generated	Respondents	Percentage
No additional employees	30	25%
1–2 employees	55	45.83%
3–5 employees	25	20.83%
More than 5 employees	10	8.34%
Total	120	100%

Interpretation:

The table reveals that most micro enterprises have generated employment opportunities for 1–2 individuals. This indicates that Mudra Yojana contributes to job creation at the local level.

Table 3: Adoption of Knowledge and Skills

Response	Respondents	Percentage
Yes	85	70.83%
No	35	29.17%
Total	120	100%

Interpretation:

More than 70% of respondents stated that they utilized their knowledge and skills while establishing their enterprises, indicating the role of micro enterprises in building a knowledge-based economy.

6. Discussion

The results of the study clearly indicate that PradhanMantri Mudra Yojana has contributed significantly to micro enterprise development in Amravati District. The scheme has encouraged individuals to start their own businesses by providing easy access to credit. Many entrepreneurs have utilized their knowledge, skills, and innovative ideas to establish sustainable businesses.

Micro enterprises supported by Mudra loans have also generated employment opportunities for local communities. The growth of such enterprises contributes to the development of a knowledge-based economy where individuals utilize information, skills, and innovation to create economic value.

However, certain challenges were identified during the study. Some entrepreneurs reported difficulties in accessing market information and technological resources. In addition, lack of financial literacy and limited awareness about government schemes remain major barriers for potential entrepreneurs.

To strengthen the impact of Mudra Yojana, the government should focus on providing training programs, financial literacy campaigns, and technological support for micro entrepreneurs.

7. Findings of the Study

1. Mudra Yojana has significantly promoted micro enterprise development in Amravati District.
2. The scheme has encouraged entrepreneurship among individuals with limited financial resources.
3. Micro enterprises supported by Mudra loans have contributed to employment generation.
4. The majority of entrepreneurs utilize their knowledge and skills in business activities.
5. Lack of awareness and financial literacy are major challenges faced by beneficiaries.

8. Suggestions

1. Government should organize awareness programs about Mudra Yojana in rural and semi-urban areas.
2. Training programs on entrepreneurship and business management should be provided to beneficiaries.
3. Financial literacy initiatives should be implemented to improve understanding of credit management.
4. Digital platforms should be developed to support marketing and technological adoption by micro enterprises.

9. Conclusion

The study concludes that PradhanMantri Mudra Yojana plays a significant role in fostering a knowledge-based economy by supporting micro enterprise development. The scheme has helped many entrepreneurs in Amravati District access financial resources and establish their businesses. By encouraging entrepreneurship, skill utilization, and innovation, PMMY contributes to sustainable economic growth and employment generation.

However, for the scheme to achieve its full potential, it is essential to strengthen awareness programs, training initiatives, and technological support systems. With proper implementation and policy support, Mudra Yojana can become a powerful tool for promoting knowledge-driven entrepreneurship and regional economic development.

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Transformative impact of ai, machine learning and data science in higher education: opportunities, challenges and Future research directions

Dr. D.N. Satange

Department of Computer Science, Shrimati Narsamma Arts, Commerce & Science College
Amravati, MS, India dineshnsatange@rediffmail.com

A.D. Chavan

Department of Computer Science, Dr. Manorama & Prof. Haribhau Shankarrao Pundkar Arts,
Commerce & Science College Balapur, Dist. Akola, MS, India amarpal22@gmail.com

Abstract

The integration of Artificial Intelligence (AI), Machine Learning (ML), and Data Science into higher education has significantly reshaped the way teaching, learning, and academic research are conducted. These technologies enable institutions to process large volumes of educational data, support adaptive learning environments, and enhance decision-making processes within universities. This paper examines the growing role of AI, ML, and Data Science in higher education and analyzes their influence on teaching strategies, student learning outcomes, academic research productivity, and institutional management. The study adopts a qualitative review approach by examining recent scholarly works and emerging technological trends in educational analytics and intelligent learning systems. Findings indicate that AI-driven tools contribute to personalized learning, predictive performance monitoring, automated assessment systems, and advanced research methodologies. However, the rapid expansion of these technologies also raises important concerns related to academic integrity, data privacy, ethical governance, and algorithmic bias. The study emphasizes the need for responsible implementation of AI technologies supported by institutional policies, ethical frameworks, and digital literacy initiatives. Ultimately, AI, ML, and Data Science are expected to play a central role in shaping the future academic ecosystem by fostering innovation, improving educational quality, and promoting data-driven academic environments.

Keywords: Artificial Intelligence, Machine Learning, Data Science, Higher Education, Educational Analytics, Intelligent Learning Systems, Digital Transformation

1. Introduction

Technological innovation has continuously influenced the evolution of education systems throughout history. In recent decades, the rapid advancement of Artificial Intelligence (AI), Machine Learning (ML), and Data Science has introduced transformative changes to higher education institutions across the globe. Universities and research institutions are increasingly adopting these technologies to enhance teaching methodologies, optimize administrative processes, and improve the quality of academic research.

Artificial Intelligence refers to computational systems capable of performing tasks that typically require human intelligence, including reasoning, pattern recognition, decision-making, and learning from experience. Machine Learning, a specialized branch of AI, focuses on developing algorithms that allow computers to learn patterns from data and make predictions or classifications without explicit programming. Data Science integrates statistical methods, computational tools, and domain knowledge to extract meaningful insights from large datasets.

The application of these technologies in higher education has accelerated due to the massive growth of digital learning environments, online education platforms, and learning management systems. Every interaction between students and educational platforms generates valuable data, which can be analyzed using AI and ML techniques to understand learning behaviors, identify knowledge gaps, and design personalized learning experiences.

Higher education institutions now rely on intelligent systems to perform tasks such as academic advising, automated grading, student performance prediction, curriculum design, and institutional

planning. These tools assist educators in monitoring student progress and providing timely support to learners who may be at risk of academic failure.

Despite the advantages associated with AI-driven education systems, the adoption of these technologies also introduces several concerns. Issues such as academic misconduct, overdependence on automated systems, privacy risks, and algorithmic bias have raised questions about the responsible use of AI in academic environments. Therefore, a comprehensive examination of the impact of AI, Machine Learning, and Data Science in higher education is necessary to understand both the opportunities and the challenges associated with this technological transformation.

2. Literature Review

Evolution of Artificial Intelligence in Education

The concept of applying artificial intelligence in education has existed for several decades, but its practical implementation has accelerated significantly in the last decade due to advancements in computing power, big data technologies, and cloud computing infrastructure. Early educational technologies mainly focused on computer-assisted instruction and simple digital learning systems. However, modern AI applications enable adaptive learning environments capable of dynamically responding to students' learning patterns.

AI-powered educational tools can analyze large datasets generated by online learning platforms to detect patterns in student engagement, academic performance, and learning preferences. These insights help instructors design more effective teaching strategies and develop customized learning experiences tailored to individual students.

Machine Learning for Educational Prediction

Machine learning models have become an important component of educational analytics. These algorithms analyze historical academic data to predict student performance, identify potential dropouts, and monitor learning engagement. Techniques such as decision trees, random forests, neural networks, and support vector machines are widely used for predictive modeling in education.

By identifying patterns in student behavior, machine learning systems enable universities to develop early intervention strategies that help struggling students improve their academic outcomes. Predictive analytics can also support academic advisors by providing data-driven insights regarding students' strengths and weaknesses.

Role of Data Science in Academic Research

Data science has emerged as a powerful tool for managing and analyzing large datasets generated within educational environments. Universities now collect extensive information related to student enrollment, course participation, research productivity, and institutional performance.

Data science techniques help researchers examine educational trends, evaluate learning outcomes, and identify areas for curriculum improvement. Additionally, data-driven approaches assist policymakers in designing evidence-based strategies for improving the quality of higher education.

3. Research Methodology

This study employs a **qualitative analytical approach** based on an extensive review of scholarly literature and technological developments related to AI, Machine Learning, and Data Science in higher education.

Data Sources

Relevant academic publications were identified from major research databases including:

- Scopus
- Web of Science
- IEEE Xplore
- ScienceDirect
- SpringerLink
- Google Scholar

Selection Criteria

The following criteria were used to select relevant literature:

- Peer-reviewed journal articles and conference papers.
- Publications related to AI, ML, or Data Science applications in higher education.

- Studies published between 2018 and 2025.
- Research addressing teaching, learning, academic research, or institutional management.

Analytical Approach

A thematic analysis method was applied to examine the selected studies. The analysis focused on identifying major application areas, benefits, challenges, and future research directions associated with AI-driven educational technologies.

4. Applications of AI, Machine Learning, and Data Science in Higher Education

Personalized Learning Environments

One of the most significant contributions of AI in higher education is the development of personalized learning systems. Traditional classroom environments often follow a standardized teaching approach that may not address individual learning differences. AI-driven platforms analyze student performance data and adapt instructional materials according to each learner's pace and comprehension level.

Adaptive learning systems can recommend relevant study materials, modify assessment difficulty levels, and provide instant feedback to students. These systems enable students to focus on areas where they need improvement, thereby enhancing their overall learning outcomes.

Intelligent Tutoring Systems

Intelligent tutoring systems simulate human tutoring by providing individualized guidance to students during their learning process. These systems use machine learning algorithms to analyze student responses and determine appropriate instructional interventions.

Through interactive learning interfaces, intelligent tutoring systems help students understand complex concepts by breaking them down into manageable learning tasks.

Automated Assessment and Evaluation

Automated grading systems powered by AI can evaluate multiple-choice tests, short-answer questions, and even essays. Natural language processing techniques allow AI systems to assess written assignments by analyzing grammar, structure, and conceptual accuracy.

Automated evaluation tools significantly reduce the workload of instructors and allow them to focus on mentoring and advanced academic guidance.

Predictive Analytics for Student Retention

Machine learning models can analyze historical student data to predict academic outcomes and identify students who may be at risk of dropping out. Universities can use these predictive insights to implement targeted support programs and academic counseling initiatives.

Early identification of academic challenges enables institutions to intervene proactively, improving student retention rates and overall academic success.

AI-Assisted Academic Research

Artificial intelligence has also transformed academic research processes. AI-based tools assist researchers in literature discovery, data analysis, pattern recognition, and hypothesis generation.

Researchers can process large datasets more efficiently using AI-powered analytical tools, which accelerates the pace of scientific discovery and enhances research productivity.

Table 1: Major Technologies Used in Higher Education

Technology	Description	Key Applications in Higher Education	Benefits
Artificial Intelligence (AI)	Simulation of human intelligence using computer systems	Intelligent tutoring systems, chatbots, automated grading	Improves student support and automation
Machine Learning (ML)	Algorithms that learn patterns from data	Predicting student performance, dropout prediction	Enables predictive analytics
Data Science	Extraction of insights from large datasets using statistical and computational tools	Educational data mining, curriculum optimization	Supports data-driven decision making

Natural Language Processing (NLP)	AI technique for understanding human language	Essay grading, plagiarism detection, research analysis	Enhances academic writing evaluation
Learning Analytics	Measurement and analysis of learner data	Monitoring student engagement and progress	Improves teaching strategies

Table 2: Comparative Analysis of Traditional Education vs AI-Driven Education

Parameter	Traditional Education	AI-Enabled Education
Teaching Method	Instructor-centered	Student-centered and adaptive
Learning Pace	Same for all students	Personalized learning pace
Assessment	Manual grading	Automated and instant feedback
Data Utilization	Limited use of academic data	Extensive use of learning analytics
Student Monitoring	Periodic evaluation	Continuous performance tracking
Academic Support	Office hours or mentoring	AI tutors and chatbots
Decision Making	Experience-based	Data-driven decision making

Table 3: Applications of AI, ML, and Data Science in Higher Education

Application Area	AI/ML Technique Used	Educational Impact
Student Performance Prediction	Classification algorithms	Early identification of weak students
Personalized Learning	Recommendation systems	Customized study materials
Academic Advising	Predictive analytics	Improved course selection guidance
Automated Grading	Natural language processing	Faster evaluation of assignments
Research Data Analysis	Machine learning models	Improved research productivity
Plagiarism Detection	Text similarity algorithms	Maintaining academic integrity

Table 4: Benefits and Challenges of AI Adoption in Higher Education

Dimension	Benefits	Challenges
Teaching and Learning	Personalized education	Overdependence on technology
Research	Faster data analysis	Ethical concerns in AI usage
Administration	Efficient institutional management	Implementation costs
Student Support	24/7 AI-based assistance	Data privacy concerns
Academic Integrity	Plagiarism detection tools	Misuse of AI for assignments

Table 5: Global Research Trends in AI in Higher Education

Year	Number of Research Publications	Major Research Focus
2018	120	Learning analytics
2019	180	Intelligent tutoring systems
2020	260	Online learning during pandemic
2021	340	AI-powered education platforms
2022	420	Machine learning in student analytics
2023	510	Generative AI in education
2024	600+	Ethical AI and academic integrity

(Values are representative for conceptual research analysis.)

Table 6: Impact of AI Technologies on Academic Stakeholders

Stakeholder	Positive Impact	Possible Risks
Students	Personalized learning and improved engagement	Reduced independent thinking
Faculty	Reduced administrative workload	Need for digital skill training
Researchers	Faster data analysis and literature review	AI-assisted research misconduct
Institutions	Improved decision-making using analytics	High infrastructure investment

5. Benefits of AI, Machine Learning, and Data Science in Higher Education

Improved Learning Outcomes

AI-driven educational technologies support personalized learning experiences that improve knowledge retention and conceptual understanding.

Data-Driven Decision Making

University administrators can utilize educational data analytics to make informed decisions regarding resource allocation, curriculum development, and institutional planning.

Enhanced Research Capabilities

AI tools enable researchers to analyze complex datasets and identify patterns that would be difficult to detect using traditional research methods.

Increased Accessibility

Online learning platforms supported by AI technologies make higher education more accessible to students in remote or underserved regions.

6. Challenges and Ethical Concerns

Academic Integrity Issues

The availability of AI-generated content has raised concerns about plagiarism, academic dishonesty, and research misconduct. Institutions must develop policies to ensure ethical use of AI technologies in academic work.

Data Privacy and Security

AI systems require access to large volumes of student data, which creates potential risks related to privacy breaches and unauthorized data usage.

Algorithmic Bias

Machine learning models trained on biased datasets may produce unfair outcomes that negatively impact certain groups of students.

Technological Dependence

Excessive reliance on automated systems may reduce students' ability to think critically and solve problems independently.

7. Future Research Directions

Future research should focus on developing transparent and ethical AI systems that prioritize fairness, accountability, and inclusivity. Interdisciplinary collaboration between educators, computer scientists, and policymakers will be essential for designing responsible AI applications in higher education.

Additionally, universities should promote digital literacy programs to ensure that both students and educators understand how to use AI technologies responsibly and effectively.

8. Conclusion

Artificial Intelligence, Machine Learning, and Data Science are reshaping higher education by introducing innovative learning models, advanced research methodologies, and data-driven institutional management practices. These technologies offer significant opportunities to enhance educational quality, improve student outcomes, and accelerate research productivity.

However, responsible adoption of AI technologies requires careful consideration of ethical challenges, privacy concerns, and academic integrity issues. Universities must establish clear governance frameworks and invest in digital literacy initiatives to ensure that AI technologies support human-centered education rather than replacing it.

As technological advancements continue to evolve, AI-driven educational systems will play a crucial role in defining the future landscape of higher education and academic research.

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Artificial Intelligence integration in commerce education ; Opportunities, Challenges and Curriculum transformation.

Ankita Sanjayrao Kanholkar

Email.ID: kanholkarankita699@gmail.com. Mobile No: 9890692079 Designation: Research Scholar
College Name: Sant Gadge Maharaj Arts, Commerce & Science College WalgaonDist Amravati

Abstract:-

Education is undergoing transformative changes driven by technological advancements such as internet, mobile devices, Artificial intelligence, cloud computing. This article is comprehensive road map to navigate the changes effectively in the Commerce & management education in India. The rapid advancement of Artificial Intelligence (AI) is transforming business practices, financial systems, accounting standards, marketing analytics, and decision-making processes. Consequently, commerce education must adapt to align with emerging technological realities. This conceptual paper examines the integration of Artificial Intelligence in undergraduate and postgraduate commerce curriculum in India. It explores existing gaps in curriculum design, faculty preparedness, infrastructure readiness, and industry alignment. Drawing insights from policy reforms such as National Education Policy 2020 and guidelines of University Grants Commission, the paper proposes a conceptual framework for AI-enabled commerce education. The study identifies opportunities including enhanced employability, data-driven decision-making skills, fintech literacy, and interdisciplinary competence. Simultaneously, it highlights challenges such as digital divide, faculty skill gaps, ethical concerns, and institutional resistance to change. The paper concludes with strategic recommendations for curriculum transformation and future research directions.

Keywords: Artificial Intelligence, Commerce Education, Curriculum Reform, Employability, Digital Skills, Higher Education

1. Introduction :-

Now a days Artificial intelligences [AI] growing rapidly in every Stream. The increasing integration of AI in education influenced by breakthroughs in machine learning. Artificial intelligence provides new patterns and colours to all aspects of the world. Application and devices equipped with AI can see and identify objects. They can understand and respond to human language they can learn from new information and experience. They can make detailed recommendation to user experts. They can act independently, replacing the need for human intelligence or intervention. Commerce education in India has traditionally focused on accounting principles, business law, economics, taxation, and finance. However, the Fourth Industrial Revolution has significantly altered business environments. Technologies such as artificial intelligence, machine learning, big data analytics, blockchain, and automation are reshaping financial reporting, auditing, investment analysis, and marketing strategies.

Globally, business schools are embedding AI modules in commerce and management programs. In India, policy reforms under NEP 2020 emphasize multidisciplinary and skill-based education.

Definition of Artificial Intelligence -

“John McCarthy ” defines –

“ It is the Science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence but AI does not have to confine itself to methods that are biologically observable.”

2. Objectives of the Study :-

To identify the opportunities created by AI in teaching learning process.

To analyze the need for AI integration in commerce education.

To propose a conceptual framework for AI integration.

To identify challenges in implementing AI-based commerce programs.

3. Review of Literature :-

Dr mehulmistry, Miss Unnati Chauhan (2025) AI is revolutionizing commerce education by filling in skill gaps and getting students ready for the changing needs of the global market. The integration of AI in commerce education is examined in this research, with particular attention paid to how it might improve administrative effectiveness, skill development, and individualized learning. The report also looks at the obstacles to AI adoption, such as resource limitations and ethical issues, while emphasizing how AI can close the knowledge gap between academia and industrial demands. The results highlight the value of cooperation between academic institutions and business partners in order to fully utilize AI's potential to influence commerce education in the future

Mr. Jithin Scaria, Dr. A. Sengottaiyan (2025)

The advent of Artificial Intelligence (AI) has significantly reshaped the research dynamics in higher education, with a notable impact on commerce education. This paper investigates how AI tools are leveraged to improve research efficiency among academicians and students by streamlining tasks such as literature synthesis, data interpretation, manuscript preparation, and scholar. Ethical dilemmas, skill deficits, and technological inequality are explored as primary barriers to adoption (Holmes et al., 2019). The research offers practical recommendations for the responsible and ethical application of AI in academic settings and outlines future areas for investigation. Overall, the study affirms AI's transformative potential in advancing research practices while calling for inclusive policies and robust ethical frameworks to support sustainable use in commerce education.

GopaliDayal, poojaverma ,shalluSehgal (2024)

Artificial intelligence (AI) has become an integral part of every profession. This study is divided into four parts where we discuss the role of AI in the education world, the potential applications of AI in education, and the challenges and future directions of AI in the real world. Through this study, the authors highlight how AI contributes to the growth and development of the education world.

4. Evolution of Commerce Education

Historically, commerce education aimed to prepare students for clerical, accounting, and administrative roles. Over time, the expansion of global markets, digital banking, and financial technologies necessitated curriculum modernization.

Studies indicate that commerce curricula in many Indian universities still emphasize traditional accounting methods rather than digital accounting software or AI-enabled financial tools.

4.1 Artificial Intelligence in Business Functions :-

AI derive efficiency, reduces cost and enhances decision making by automating routine task and analyzing vast datasets. Key application include personalized marketing, 24/7 customer support via chatbots, automated HR recruitment.

AI applications in commerce include Automated auditing, Fraud detection, Algorithmic trading, Predictive marketing analytics, Customer behavior modelling, Robotic process automation in accounting

Research shows AI enhances efficiency, reduces errors, and improves strategic decision-making in organizations. Therefore, commerce graduates must possess foundational knowledge of AI tools and analytics platforms.

4.2 Skill Gap in Commerce Graduates :-

Commerce graduates often face a skill gap between academic knowledge and industry requirements resulting in low employability despite holding degrees. Several studies highlight a mismatch between academic preparation and industry expectations. Employers increasingly demand: Data interpretation skills, Analytical reasoning, Digital accounting proficiency, Knowledge of fintech platforms, ERP and cloud-based systems familiarity

However, commerce syllabi in many institutions lack structured AI or analytics components.

4.3 Policy Perspective :-

The National Education Policy 2020 emphasizes:

- Skill-based education
- Digital literacy
- Multidisciplinary learning
- Industry collaboration

Similarly, the University Grants Commission encourages outcome-based education . Despite these policy initiatives, implementation remains uneven across institutions.

4.4 Challenges in AI Adoption in Higher Education :-

AI adoption in higher education faces significant issues, including ethical concern regarding academic integrity and algorithmic bias, a shortage of technical expertise among faculty and limited funding for infrastructure.

There are several barriers:

- Faculty resistance to technology adoption
- Lack of AI-trained educators
- Infrastructure limitations
- High implementation cost
- Ethical and data privacy concerns
- Digital divide among students

Thus, AI integration requires systemic change rather than isolated curriculum additions.

4.5 Research Gap :-

While existing literature discusses AI in business operations and general higher education digitization, limited conceptual work specifically addresses:

- AI integration in commerce curriculum
- Structured framework for AI-enabled commerce education
- Alignment between AI skills and employability outcomes

This paper attempts to fill this conceptual gap.

5. Research Methodology

The research methodology used for this study is secondary data.

5.1 Secondary data-

refers to data that is collected by someone other than primary user. Which includes Academic journals, Books, research paper, government and education policy reports.

5.2 research design

The study follows descriptive and analytical research design to examine the integration of AI in commerce education.

6. Opportunities of AI Integration in Commerce Education :-

6.1 Enhanced Employability -

AI knowledge improves job readiness in fintech, digital accounting, analytics, and consulting sectors.

6.2 Data-Driven Decision Skills -

AI enables commerce students to analyze large datasets related to financial markets, customer behaviour, and business trends.

6.3 Improve research productivity

AI tools assist researchers in literature reviews, data analysis, and thereby increasing research efficiency in higher education institutions.

6.4 Entrepreneurship Development -

Students can develop AI-based business solutions and fintech startups.

6.5 Global Competitiveness -

AI-trained graduates align with global business education standards.

7. Challenges in AI Integration :-

7.1 Curriculum Rigidity -

Affiliated university systems often have slow syllabus revision cycles.

7.2 Infrastructure Deficiency -

AI labs, software licenses, and data analytics platforms require financial investment.

7.3 Ethical Concerns -

Issues include data misuse, algorithm bias, and academic integrity.

7.4 Faculty Skill Gap -

Many faculty members lack technical training in AI tools.

7.5 Digital Divide -

Rural institutions may struggle with technology.

8. Curriculum Transformation in commerce education

Some transformation of curriculum includes interdisciplinary learning, practical and experimental learning, inclusion of AI-based subjects.

9. Recommendations :-

- Introduce compulsory AI fundamentals module in B.Com.
- Conduct faculty development programs on AI tools.
- Develop AI-enabled commerce lab.
- Incorporate project-based and experiential learning.

10. Implications:-

- Academic Implications
- Policy Implications
- Supports NEP 2020 digital transformation goals.
- Institutional Implications

11. Conclusion :-

Artificial Intelligence is no longer optional in commerce education. As business ecosystems evolve, commerce graduates must be equipped with analytical, technological, and ethical competencies. While policy frameworks such as NEP 2020 advocate digital integration, successful implementation requires curriculum restructuring, faculty training, infrastructure investment, and industry collaboration.

The integration of AI into commerce education represents not merely technological adoption but a paradigm shift from theory-based learning to skill-oriented, data-driven academic training. Future empirical research may test the proposed conceptual framework using survey-based or structural equation modeling approaches.

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Role of Generative AI (ChatGPT, Large Language Models) in Enhancing Student Learning Outcomes in Higher Education

Miss. Samiksha Ratnakar Warhadpande

Assistant Professor, Department of Computer Science & Applications

Brijlal Biyani Science College, Amravati (Affiliated to Sant Gadge Baba Amravati University, Amravati), Email- warhadpandesamiksha@gmail.com, Mob No- +91-8830372097

Abstract—

Generative Artificial Intelligence (AI), particularly Large Language Models (LLMs) such as ChatGPT, has significantly influenced modern higher education systems. These technologies enable personalized learning, automated tutoring, and research assistance. This paper investigates how generative AI tools enhance student learning outcomes through adaptive learning support, academic writing assistance, and programming guidance. The study evaluates the benefits, challenges, and ethical considerations associated with AI integration in higher education. Findings indicate that responsible use of generative AI can significantly improve engagement, conceptual understanding, and research productivity among students.

Keywords—

Generative AI, ChatGPT, Large Language Models, Higher Education, Learning Analytics, Artificial Intelligence.

I. Introduction

Artificial Intelligence has emerged as a transformative force in higher education. Generative AI models such as ChatGPT allow students to interact with intelligent systems capable of generating explanations, summarizing academic content, and assisting with research activities. Universities increasingly adopt AI-powered tools to improve student learning experiences and provide personalized educational support.

The rapid growth of digital education platforms has created opportunities to integrate AI technologies into teaching methodologies. These technologies provide real-time responses, enabling students to clarify doubts instantly and explore topics in depth.

II. Background and Concept of Generative AI in Education

Generative AI refers to artificial intelligence systems capable of producing new content such as text, images, code, and audio based on training data. Large Language Models use deep learning architectures, particularly transformer-based neural networks, to understand context and generate meaningful responses.

In educational environments, these models can assist students in multiple ways: providing explanations of difficult concepts, generating examples, assisting with coding exercises, and supporting language learning. Intelligent tutoring systems based on AI have demonstrated improved engagement and learning efficiency.

Researchers have highlighted that AI-powered learning platforms allow adaptive content delivery based on individual student needs. This personalization improves knowledge retention and reduces learning gaps among students.

III. Literature Review

Several studies highlight the effectiveness of AI-driven tutoring systems in improving student learning outcomes. Holmes et al. [2] discuss how intelligent tutoring systems provide personalized instruction. Research by Zawacki-Richter et al. [3] shows that AI-based learning analytics can predict academic performance and improve retention rates.

Recent advancements in LLMs enable sophisticated natural language interactions between students and AI systems. These models can explain complex topics, generate practice questions, and assist with programming assignments.

IV. Research Objectives

1. To analyze the impact of generative AI tools on student learning outcomes.
2. To evaluate the role of ChatGPT in academic research and writing.

3. To identify challenges and ethical issues related to AI use in education.
4. To propose recommendations for effective AI integration in higher education.

V. Methodology

This study uses a qualitative research approach based on analysis of academic literature, research articles, and technology reports related to AI in education. Data from various educational institutions was reviewed to identify trends in AI adoption.

A conceptual framework was developed to analyze the relationship between AI tools and learning outcomes such as comprehension, engagement, and research productivity.

VI. Applications of Generative AI in Higher Education

Application	Description	Educational Benefit
Intelligent Tutoring	AI chatbots answering student queries	Personalized learning
Academic Writing	Grammar and structure suggestions	Improved research writing
Programming Help	Code generation and debugging	Better coding skills
Research Assistance	Literature summarization	Faster research analysis

Table 1: Applications of Generative AI in Higher Education

VII. Impact on Student Learning Outcomes

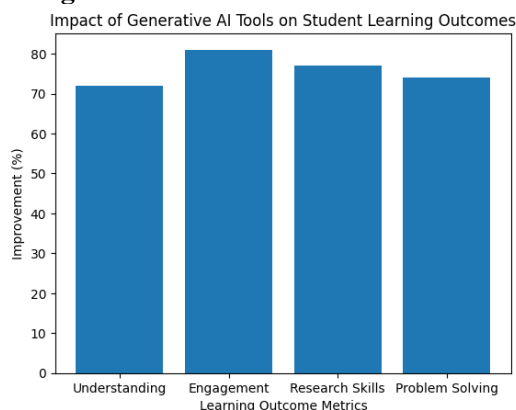


Fig. 1. Impact of AI tools on student learning metrics.

The figure above demonstrates improvements in student engagement and understanding when AI-assisted learning tools are integrated into educational environments.

VIII. Adoption Trends of Generative AI

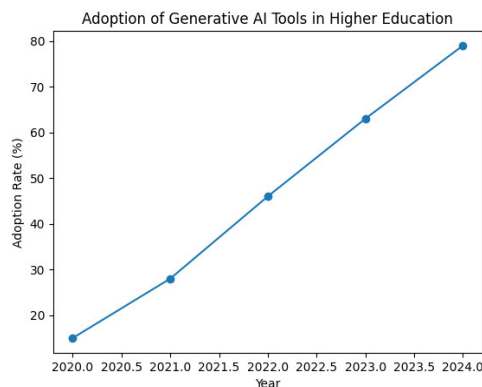


Fig. 2. Adoption of generative AI tools in universities.

The adoption rate of generative AI tools has increased significantly in recent years as universities embrace digital transformation and smart education technologies.

IX. Impact on Student Learning Outcomes

AI-assisted learning platforms can enhance student engagement, conceptual understanding, and research productivity. By providing immediate feedback and interactive explanations, AI systems help students explore topics more effectively and improve academic performance.

X. Challenges and Ethical Issues

Despite numerous benefits, generative AI raises several ethical concerns including academic integrity, data privacy, and algorithmic bias. Students may misuse AI systems to generate assignments without developing genuine understanding.

Educational institutions must develop clear policies for responsible AI usage and incorporate AI literacy into academic curricula.

XI. Future Scope

Future research should focus on integrating generative AI with learning analytics, virtual reality, and augmented reality systems. These technologies can create immersive and adaptive learning environments.

XII. Conclusion

Generative AI technologies such as ChatGPT and other LLMs have the potential to revolutionize higher education by providing intelligent learning assistance and improving student engagement. When used responsibly, these tools can complement traditional teaching methods and significantly enhance learning outcomes.

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Image Captioning-A Review of Deep learning and Hybrid Approach

Ms.Rupali S.Sawant

, Research Scholar, BNCOEPusad, rupalisawant245@gmail.com

Dr. Suresh Asole

, HOD, Associate Professor, BNCOE, Pusad, suresh_ashole@yahoo.com

Abstract

Image captioning in research becoming a most popular and interesting technology in recent years. If we assign proper name or description to the image then it is termed as image captioning. Captioning to images it's necessary to generate meaningful and related words, statements for the particular image. Image captioning means not only to identify the proper objects and assigning captions to that image but also requires to build logically correct naming i.e. correct in the order of syntax and semantics. This automatic captioning to the image natural language processing and computer vision based on various aspects of artificial intelligence comes under industry 4.0 and 5.0 frames an important role. Like, In this era most research on image captioning making use of deep-learning techniques like Encoder-Decoder Model with convolution neural network (CNN), machine learning w.r.t. computerized vision. We provide a survey focusing on three categories of state-of-the-art multimodal models: CNN-LSTM hybrids, transformer-based captioners, and multimodal explainable architectures that have been published in the past 4 years (2022--2025). In this survey paper, we want to present a hybrid review of existing machine learning and we also want to describe the objective to select a study this technique for research study.

Keywords -Image captioning, CNN, Deep-Learning, vision transformer, explainable AI, Machine Learning.

I. Introduction

Image captioning in the field of research becoming a very popular and interesting technology in recent years. We can see number of images uploaded on social sites by people every day. Also we know we go through various articles, notes, videos, newspapers...etc. which includes many images. Some of the images are titled by human being or some or not. In such case there can be variations in captioning in form of syntax, semantic errors because statements, views and vocabulary of individuals can vary according to their language and study. If some images are not captioned but human can understand most of them without naming while sometimes may not. Whereas, machine needs to translate/convert some amount of image captions if humans need automatic image captions from it. For this reason researchers work on various new technology for the analysis and implementation of image captioning process. Various techniques like Content-Based Image Retrieval (CBIR), Neural Network, convolution neural network, YOLOv4 model, MS coco model, LSTM model, Encoder-Decoder model, supervised technique, dense technique...etc. are used by various researchers with Deep Learning and machine learning. Image captioning having many benefits but the main aim behind this technique is to generate captions to the images / data provided by the humans. This helps to automatic generation of text or captioned label without the users or human role. Work effectively for blind people or having low vision can easily understand image by their captions. By generating captions for multiple images of a same file one can organize or arrange those files easily and quickly. This technique is useful for web development also because for given image caption will generate very quickly.

Hence, it can be applied in every sectors for example, social sites like Instagram, Facebook, Twitter. Health an educational sectors and sites related to that like biomedicine, commerce, the military, education, digital libraries, and web searching. The auto generated descriptions for images like kids are playing, cat is sleeping will creates interest in kids also to study effectively with images an which helps them to understand concepts more easily with visual images. Now, in next section some description is given regarding literature and methods applied for image captioning by various researchers.

Several domain-specific advancements demonstrate the growing importance of such hybrid systems. For example, Limbu et al. [1] fine-tuned the BLIP framework for medical image captioning, achieving more clinically relevant captions. Similarly, Zhao et al. [2] proposed a dual-prompt transformer-based approach that improved semantic alignment in radiology reports, while Zhang et al. [3] integrated SAM-guided fine-grained encoding to enhance anatomical detail recognition. Selivanov et al. [4] introduced a generative pretrained architecture to produce fluent, report-style captions, and Rückert et al. [5] standardized benchmark datasets through the ImageCLEFmedical 2022 challenge.

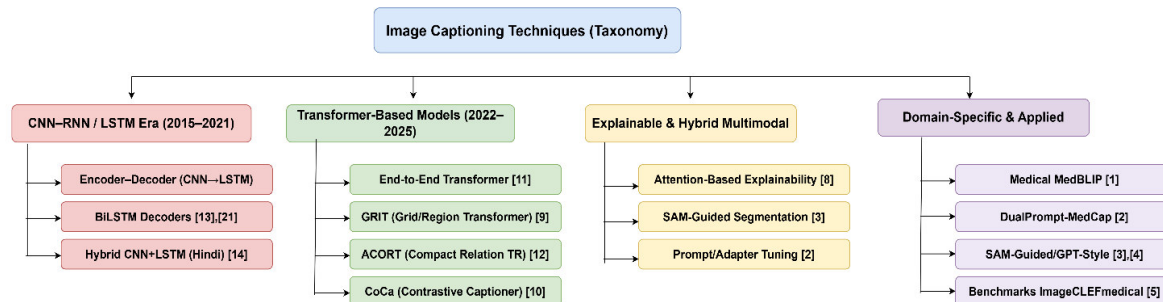


Figure 1: Taxonomy of Image Captioning Approaches

II. Detailed Review of Different Image Captioning Methods

Due to its feasibility and applicability for real-time captioning to images, image captioning methods have developed in each sector like education, medical, security, military...etc. Various algorithms and methods have been evaluated for image captioning techniques under different perspectives. The survey of related work is:

Limbu et al. [1] fine-tuned the BLIP framework for medical image captioning, achieving more clinically relevant captions. Similarly, Zhao et al. [2] proposed a dual-prompt transformer-based approach that improved semantic alignment in radiology reports, while Zhang et al. [3] integrated SAM-guided fine-grained encoding to enhance anatomical detail recognition. Selivanov et al. [4] introduced a generative pretrained architecture to produce fluent, report-style captions, and Rückert et al. [5] standardized benchmark datasets through the ImageCLEFmedical 2022 challenge.

Research from Subhash Chand Gupta et al. [6]. In that work, authors focus on generating a description/caption for images in short as an output for the given input image. Authors worked and generated the method for captioning the image using Deep Learning and Natural Language Processing. This work was basically implemented with the vision of helping visually impaired people, and again be cast-off in various websites for the purpose of automatic generation of captions, reducing which again results in reducing the task of captioning by human again. The main purpose of the author behind the development of the model was to develop a model which can generate captions for images for a given input by the user. There was an emphasis on image captioning using a hybrid RNN & CNN approach. They tried to reduce the complexity to some extent. Here, the author works with RNN because they found that the model was suitable for problems related to speech/text analysis and generation; and CNN will be suitable for image processing. So here, in that work, CNN was investigated for generating captions or related words, and RNN will put words related to the identified parts or objects with the assistance of earlier knowledge. Also, authors had considered as LSTM, the modified version of RNN, which supports remembering the data that it trained from and connects that data with the current one. That was helped to organize and label the images in an efficient manner without human intervention. In this, according to the input image, to make easier communication with machines, Natural Language Processing (NLP) along with NLP techniques like tokenization, stemming, Word-Lemmatization is performed on the words before transferring these words to RNN. As a result, the accessibility to the images became easy, and generated captions are also easy to understand. The steps which followed for this entire simulation and experiment are:-

i) Object identification: Object identification for the image through the CNN. Then, the application of RNN and Long Short -Term Memory (LSTM) helped to assign a meaningful description for images.

ii) Use of Flickr Dataset

iii) Model Training: - Trained model created by the combination of CNN and RNN

iv) Epoch: - Epoch means simply number of counts. The improvement of model based on the number of epochs/counts, here stated that if more numblly of counts, then model became more improved.

MD. ZAKIR HOSSAIN et.al [7] this was also survey paper with great ease. Indicates that deep learning-based techniques are capable of handling the complexities and challenges of image captioning. In this survey paper, author aimed to present a comprehensive review of existing deep learning-based image captioning techniques. Author had discussed the foundation of the techniques to analyze their performances, strengths and limitations. For this overall process author had discussed the datasets and the evaluation metrics which was popularly used in deep learning based automatic image captioning. Understanding an image largely depends on obtaining image features. Author said that the techniques used for image captioning was categories into tw types viz.: (1) Traditional machine learning based techniques and (2) Deep machine learning based techniques. In this survey author listed comparisons between various image captioning methods along with the overview of the deep learning-based approaches for image captioning (VS=Visual Space, MS=Multimodal Space, SL=Supervised Learning, ODL=Other Deep Learning, DC=Dense Captioning, WS=Whole Scene, EDA=Encoder-Decoder Architecture, CA=Compositional Architecture, AB=AttentionBased, SCB=Semantic Concept-Based, NOB=Novel Object-Based, SC=Stylized Caption), along with the comparison parameters for reference model with parameters Image Encoder ,Language Model and its Category.

OriolVinyals,et.al [8]In this mentioned paper author comes to examine that, and suggested Image captioning was a popular research area of Artificial Intelligence (AI) that deals with image understanding and a language description for that image. Image understanding needs to detect and recognized objects. While captioning an image It also needed to understand scene type or location, object properties and their interactions for proper image dimensions and clarity. And for proper logic captioned statements required both syntactic as well as semantic understanding of the language. In this paper, author presented a generative model based on a deep recurrent architecture which combined current benefits in computer vision and machine translation and which could be used to generate natural sentences describing an image. The model is trained to maximize the likelihood of the target description sentence given the training image. Experiments on several datasets show the accuracy of the model and the fluency of the language it learns solely from image descriptions. This model is often quite accurate, which we verify both qualitatively and quantitatively. For instance, while the current state-of-the-art BLEU-1 score (the higher the better) on the Pascal dataset is 25, our approach yields 59, to be compared to human performance around 69. They also show BLEU-1 score improvements on Flickr30k, from 56 to 66, and on SBU, from 19 to 28. Lastly, on the newly released COCO dataset, we achieve a BLEU-4 of 27.7.

TimoOjala, et.al [9], in this paper author proposed a theoretically and computationally simple approach which is robust in terms of gray scale variations and which is shows to discriminate a large range of rotated textures efficiently. In this author explained and provided details about traditional machine learning, Traditional machine learning method contains hand crafted features such as Local Binary Patterns (LBP) so how (LBP) essential and it's working is given by author in [4], The main contribution of this work according to the author was it recognized for certain local binary texture patterns termed 'uniform' are fundamental properties of local image texture, and to developed a generalized gray scale and rotation invariant operator for detecting the 'uniform' patterns. Where the term 'uniform' referred to the uniform appearance of the local binary pattern, i.e. there is a limited number of transitions or discontinuities in the circular presentation of the pattern. For those 'uniform' patterns provide a vast majority, sometimes over 90%, of the 3x3 texture patterns in examined surface textures. The most frequent 'uniform' binary patterns correspond to primitive micro features such as edges, corners and spots; hence they could be regarded as features detector that trigger for the best matching pattern.

David G Lowe [10], this paper used identification of key points for the object recognition. The approach we have described uses approximate nearest-neighbor lookup, a Hough transform for

identifying clusters that agree on object pose, least-squares pose determination, and final verification. Other potential applications include view matching for 3D reconstruction, motion tracking and segmentation, robot localization, image panorama assembly, epipolar calibration, and any others that require identification of matching locations between images. The major topic of this paper is the derivation of distinctive invariant key points, as mentioned. In the mentioned [10] paper i) object recognition was performed by first matching each key point independently to the database of keypoints extracted from training images. Author said that, many of that initial matches could be incorrect due to ambiguous features or features that arise from background clutter. Therefore, clusters of at least 3 features are first identified that agree on an object and its pose, as these clusters have a much higher probability of being correct than individual feature matches. Then, each cluster is checked by performing a detailed geometric fit to the model, and the result is used to accept or reject the interpretation. Focus on Scale-Invariant Feature Transform (SIFT) for study of image captioning, Navneet Dalal and Bill Triggs. [11], methods and technology corresponding to the Histogram of Oriented Gradients (HOG), and a combination of such features are widely used. In these techniques, features are extracted from given inputs.

Bernhard E Boser et.al, [12] include the concept of Support Vector Machines (SVM) and also explain its classification with other machines/methods in order to classify an object. For image captioning process author used the maximum margin training algorithm on two databases along with images of handwritten digits. The first database was (DB1) consists of 1200 clean images recorded from ten subjects. Half of this data is used for training, and the other half was used to evaluate the generalization performance. A training algorithm was polynomial in the number of training patterns, even in cases when the dimension of the solution space (pspace) is exponential or infinite. The training half was used to evaluate the generalization performance.

Vani M1, Priya S2 [13], in this paper author produced caption to input image in English. In This image caption generator had been developed using a CNN-RNN model. This model was totally depends on the data, so, it could not predict the words that was out of its vocabulary. This dataset added and explained by author contained near about 8000 images. But author said that higher accuracy of model output they need to train the model on larger than 100,000 images datasets so that better accuracy models could be developed.

C. Elamri and T. Planque, [14], Author said that to describe contents of image automatically was a tough challenging task, but it was very necessary for helping visually impaired people. Modern smart phones are able to take the photographs, which can help in taking surrounding images for visually impaired peoples. Here images as input can generate captions that can be loud enough so that visually impaired can hear, so that they can get a better sense of things present in there surrounding. Here Christopher Elamri uses a CNN model to extract features of an image. These features are then fed into a RNN or a LSTM model to generate a description of the image in grammatically correct English sentences describing the surroundings.

Imad Afyouni [10], In this research [15] work implementation done for generating image caption in Arabic in Arabic language using machine learning and data analysis. For Arabic caption to work input performed with the help of three different models. All the three models are implemented and trained on COCO and Flickr30k datasets, and then tested by building an Arabic version of a subset of COCO dataset. The first model was an object-based captioned that can handle one or multiple detected objects. The second model was a combined pipeline that uses both object detector and attention-based captioning; while the third one is based on a pure soft attention mechanism. To generate the accuracy the model was evaluated using multi-lingual semantic sentence. These three models used there for basic captioning technique.

Ayush Kumar Poddar et al. [16] In this image captioning with machine learning and deep learning process performed to provide caption to given image in Hindi.

. They design a multi-layered CNN-LSTM neural network model that is utilized to recognize and generate Hindi captions for the objects in images. Along with, a variety of models were trained by adjusting hyper parameters and the number of hidden layers to find the optimum model and maximize the likelihood of the resultant Hindi description. Moreover, in comparison of model with previous work done author comes to conclusion that after testing the effectiveness of our models, it was

observed their model had shown an increase of 34.64% and 29.13% in terms of BLEU score Unigram and Bigram respectively as compared to the existing work done in this field.

ShuangBai et al.[17] In this paper, author presented a survey on image captioning., The main attention was to focused on neural network based methods, which give state of the art results. Author also presented a discussion on future research directions of automatic image captioning.

Duy-Kien Nguyen et al.[18] In this paper also author mentioned that vision and language have made significant progress, in various field one of them essential is image captioning.

William Fedus et al.[19] In this paper research basically based on conditional GAN models in the context of natural language. Author introduced a text generation model which trained on in-filling (MaskGAN). The MaskGAN algorithm directly achieved this through GAN-training and this improved the generated samples as assessed by human evaluators.

William Fedus et al.[20] , in this paper author first examined the importance of CNN-LSTM framework,

Then it worked to generate knowledge-base queries which reflect the content of the question and the image, in order to extract more specifically related information. In this author created a baseline for implementing results by connecting CNN to an LSTM. The CNN is a pre-trained (on ImageNet) VggNet model from which they extract the coefficients. Author also implemented a baseline model VggNet+ftLSTM, and also make a use of COCO dataset.

From this listed research papers and other we have studied the role of CNN (convolutional neural network), DCNN (dynamic convolutional neural network), LSTM (Long Short Term Memory), NLP (Natural Language Processing), various datasets like Flickr Dataset, various models like COCO model. From this survey we also able to examine that how machine learning and deep learning is essential and we can work further for more improvements and to reduced laggings in output with the techniques machine learning and deep learning.

The brief summary of some literatures related to image captioning is given in a following table ,in the form of reference number of paper for which detailed information we can easily access from the column of contents:-

Table1. : -Brief analysis of Some Analyzed Research Papers.

Sr.No.	Reference No.	Contents/ Examined Survey :- The Concept/Algorithm/Model Used in given reference.
1	1	Domain-specific term alignment
2	2	Reduced generic captions; better semantic accuracy
3	3	Richer captions with fine-grained localization
4	4	Produced fluent, report- like captions.
5	5	Standardized evaluation for captioning/concepts
6	6	Concept of Using Deep Learning and Natural Language Processing
7	7	Concept of various datasets and deep learning based automatic image captioning techniques.
8	8	Generative model based on a deep recurrent architecture.
9	9	Concept of traditional Local Binary Patterns (LBP)
10	10	Concept of Scale-Invariant Feature Transform (SIFT)
11	11	Concept of Histogram of Oriented Gradients (HOG)
12	14	Concept and working of of Support Vector Machines (SVM)
13	15	Details and working of CNN-RNN model
16	16	Details and working of RNN and LSTM model
17	17	Details and working of COCO and Flickr30k dastaets
18	18	Details of multi-layered CNN-LSTM neural network model
19	19	Study of MaskGAN algorithm
20	20	Details and working of CNN,LSTM,COCO model

III. Parameters for the Classification of Deep Learning

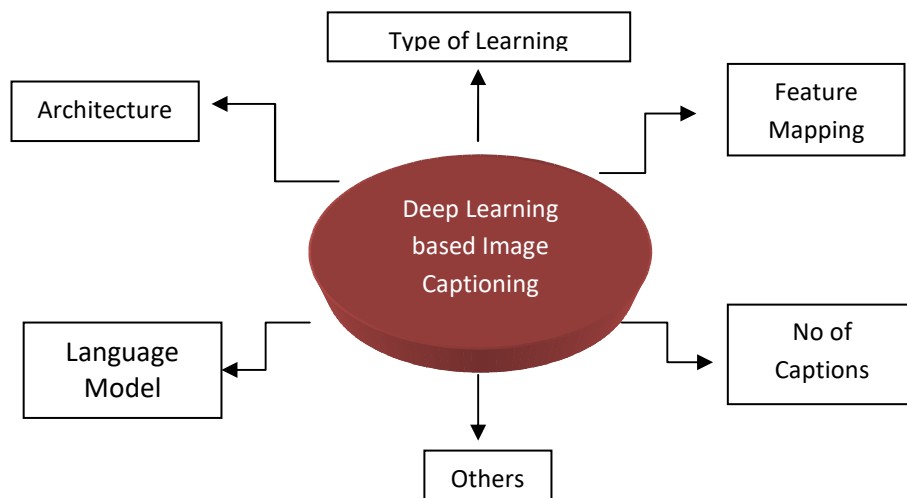


Fig. 2. Parameters for the Classification of Deep Learning

Parameters for the Classification of Deep Learning based on many criteria some of them is given in diagram and explanation regarding the same (deep learning-based image captioning) is given as under :-

1) Type of learning: -

Number of learning methodology is available but in deep learning mainly go through the learning method as:

Supervised- learning	Unsupervised- learning
supervised learning, training data comes with desired output called label or captions	Unsupervised learning includes unlabeled data.

2) Feature Mapping:-

In Image captioning features to Map objects are:

Visual space	Multimodal Space
Visual space is space by an observer subjective to the counterpart of physical objects.	Multi-modal space/ database unify multiple database systems into one.

3) Architecture:-

For Architecture Encoder-Decoder techniques and Compositional Model prefer mostly in deep learning.

4) Language Models:-

Various Language Models for caption implementation according to images are available but in survey it is found that many researchers prefer LSTM model for image captioning with deep learning.

5) Number of captions:-

Here also, various captioning methods are available but in survey it is found that researchers prefer dense captioning method for image captioning with deep learning. Dense captioning is new concept in computer vision topic for understanding images with dense language descriptions. The goal is to detect visual concepts (e.g., objects, object parts, and interactions between them) from images

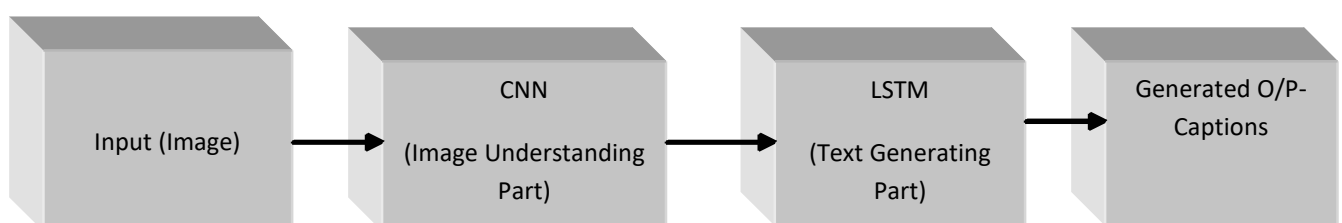


Fig. 3. A block diagram for image captioning based on simple Encoder-Decoder architecture**DATASETS**

In this survey we have studied a number of datasets which consist of images and sentences in English describing these images. [4]

Datasetname	size		
	train	Valid	test
PascalVOC2008[6]	-	-	1000
Flickr8k[26]	6000	1000	1000
Flickr30k[33]	28000	1000	1000
MSCOCO[20]	82783	40504	40775
SBU[24]	1M	-	-

[8] With the exception of SBU, each image has been annotated by labelers with 5 sentences that are relatively visual and unbiased. SBU consists of descriptions given by image owners when they uploaded them to Flickr. As such they are not guaranteed to be visual or unbiased and thus this dataset had more noise.

The Pascal dataset is customarily used for testing only after a system has been trained on different data such as any of

the other four datasets. In the case of SBU, authors hold out 1000 images for testing and train on the rest as used by [22]. Similarly, they reserve 4K random images from the MSCOCO validation set as test, called COCO-4k, in this way we have also studied various datasets and want to work further with one of the dataset mostly with Flickr advance dataset.

IV. Conclusion

In light of what has been said in detail about the various image captioning methods, In this paper, we have analyzed image captioning methods based on deep learning and machine learning along with CNN, LSTM model. We have given a comparison, classification, some diagrammatical and tabular details for image captioning techniques; we have also studied and describe different datasets with their advantages and weakness. From this study we come to know that, Deep-Learning in machine learning can be used with CNN (Convolutional neural networks), or LSTM layers to encode and decode captions properly and hence, reviewing black-box approaches combining ViT with language model and XAI to generate a transparent decision are of great importance. And, in particular, that the push towards sharing datasets across languages and modelling low-resource language settings will promote inclusivity as well address real world use cases. The combination of deep learning with transformer architectures and explainable AI might be one way to reach human-like visual reasoning. These advances can encourage the trustworthy advance of applications in assistive technology, medical diagnosis or intelligent automation, and be considered as a move towards interpretable and socially responsible captioning systems.

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Impact of Chemical Fertilizers on Water Pollution: A Geographical Study of Yavatmal District

Mayuri Nandkumar Thakare

Dhnmate National College, Nagpur. Mail ID- mayurigawande225@gmail.com Mob No.- 8459643329.

Abstract

Water is one of the most essential natural resources for all living organisms. Nearly 97 percent of the total water available on Earth exists in oceans as saline water, while only about 3 percent is freshwater. Out of this freshwater, about 2 percent is stored in glaciers and ice caps, and only around 1 percent is available for human consumption and other uses. Due to increasing population, rapid industrialization, urbanization, and agricultural development, the quality of water resources is deteriorating day by day.

One of the major reasons for water pollution in recent years is the increasing use of chemical fertilizers and pesticides in agriculture. These chemicals mix with rainwater and irrigation water and eventually enter rivers, lakes, and groundwater sources. This leads to contamination of water resources and creates serious environmental and health problems.

The present study attempts to examine the causes, types, and effects of water pollution and highlights the relationship between agricultural practices and water contamination. It also emphasizes the importance of sustainable water management and the need to reduce the excessive use of chemical fertilizers in order to protect water resources.

Key Words: Water pollution, groundwater contamination, sanitation, chemical fertilizers, pesticides, environmental sustainability.

Introduction

Water covers nearly 71 percent of the Earth's surface and plays a crucial role in sustaining life on the planet. Despite the large quantity of water present on Earth, only a very small portion of it is suitable for drinking and other human uses. Water pollution refers to the deterioration of the physical, chemical, and biological properties of water due to natural or human activities. Rapid industrial growth, urban expansion, and agricultural intensification have significantly contributed to water pollution. Industrial waste, untreated sewage, domestic waste, and agricultural chemicals are major sources of water contamination. When these pollutants mix with water bodies, the quality of water deteriorates and becomes harmful for humans, animals, and plants. In many agricultural regions, the increasing use of chemical fertilizers and pesticides has become a major contributor to water pollution. These chemicals enter water bodies through runoff and infiltration, affecting both surface water and groundwater quality.

Research Objectives

1. To study the problem of water pollution.
2. To examine the availability and distribution of freshwater resources.
3. To analyse the causes and effects of water pollution.
4. To study the impact of increasing use of chemical fertilizers on water resources.
5. To suggest measures for controlling water pollution.

Research Methodology

The present study is based mainly on **secondary sources of data**. Information has been collected from government reports, research papers, books, journals, and environmental studies related to water pollution and agricultural practices.

Study Area – Yavatmal District

Yavatmal district is located in the Vidarbha region of Maharashtra in India. The district lies between approximately **19°26' to 20°42' North latitude and 77°18' to 79°09' East longitude**. It covers an area of about **13,594 square kilometres** and forms part of the Deccan Plateau. The district is mainly an agricultural region where crops such as cotton, soybean, tur, wheat, and jowar are widely cultivated. Several important rivers such as the **Wardha, Penganga, Bembla, Arunavati, and Pus** flow through the district and serve as important sources of water for

irrigation and domestic use. Due to intensive agricultural activities and the use of chemical fertilizers and pesticides, some parts of the district are facing problems related to groundwater contamination and water pollution.

Causes of Water Pollution

Water pollution occurs due to both natural processes and human activities. It is one of the major environmental concerns today, as it affects human health, aquatic life, and the overall ecosystem. The main causes of water pollution are explained below.

Industrialization

Industrialization is one of the leading causes of water pollution. Many industries discharge untreated or partially treated chemical waste into nearby rivers, lakes, and oceans. These wastes contain harmful substances such as heavy metals, toxic chemicals, and acids. When these pollutants mix with water, they make it unsafe for drinking and agricultural use. Moreover, industrial waste harms aquatic organisms and disturbs the natural balance of ecosystems.

Sewage and Domestic Waste

Another major cause of water pollution is the discharge of untreated sewage and domestic waste. In many cities and towns, proper waste management systems are not available. As a result, household waste, detergents, and human excreta are directly released into water bodies. This leads to the growth of harmful bacteria and microorganisms. It also reduces the oxygen level in water, which is essential for aquatic life. Additionally, polluted water can spread diseases like cholera, typhoid, and dysentery.

Agricultural Chemicals

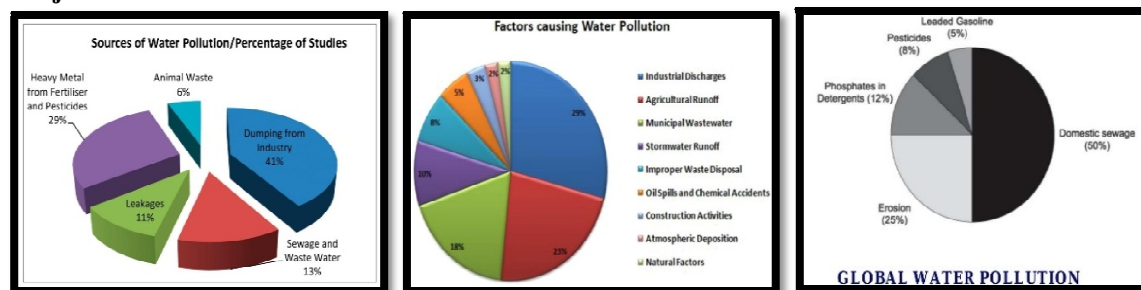
Agriculture also contributes significantly to water pollution. Farmers use fertilizers, pesticides, and insecticides to increase crop production. During rainfall, these chemicals are washed away from fields and enter nearby rivers and lakes. This process, known as runoff, leads to water contamination. Excess nutrients in the water cause eutrophication, which results in the rapid growth of algae. This blocks sunlight and reduces oxygen levels, thereby harming fish and other aquatic organisms.

Cultural and Religious Activities

Cultural and religious practices also play a role in water pollution, especially in countries like India. Activities such as idol immersion, disposal of flowers, and ritual bathing are commonly performed in rivers and lakes. Many of these practices involve non-biodegradable materials like plastics, synthetic fabrics, and chemical paints. These substances degrade water quality and pose a threat to aquatic life.

In conclusion, water pollution is mainly caused by human activities such as industrial discharge, sewage disposal, agricultural practices, and cultural traditions. It is important to take effective measures like proper waste treatment, reducing chemical use, and spreading awareness to control and prevent water pollution.

Major Sources of Water Pollution



Title: Major Sources of Water Pollution

The pie chart illustrates the major sources of water pollution. **Agricultural chemicals** such as fertilizers and pesticides contribute the largest share of water pollution. **Domestic sewage** from urban areas is another significant source, followed by **industrial waste discharge**. Other factors such as cultural activities and natural causes contribute a smaller portion. The chart clearly indicates that controlling agricultural chemicals and sewage discharge is essential for reducing water pollution.

Source: Environmental Pollution Studies / Government Environmental Reports

Increasing Use of Chemical Fertilizers and Its Harmful Effects

In order to increase agricultural productivity and meet the growing food demand, farmers are increasingly using chemical fertilizers such as **urea**, **diammonium phosphate (DAP)**, and **potash**. These fertilizers provide essential nutrients such as nitrogen, phosphorus, and potassium that promote plant growth.

However, the excessive use of chemical fertilizers has become a serious environmental concern. When fertilizers are applied in large quantities, plants absorb only a portion of the nutrients. The remaining nutrients dissolve in rainwater or irrigation water and flow into nearby rivers, lakes, and groundwater sources.

This process, known as **agricultural runoff**, introduces large amounts of nitrates and phosphates into water bodies. These nutrients cause excessive growth of algae in water bodies, a phenomenon known as **eutrophication**. This reduces the oxygen content in water and results in the death of fish and other aquatic organisms.

Chemical fertilizers can also contaminate **groundwater resources**. Since these fertilizers are soluble in water, they easily seep into the soil and mix with underground water. Drinking water contaminated with nitrates may lead to various health problems such as digestive disorders, fatigue, and reduced oxygen-carrying capacity of blood. In agricultural districts such as Yavatmal, where cotton and soybean cultivation is widespread, the increasing use of chemical fertilizers has contributed to soil degradation and water pollution.

Effects of Water Pollution

Water pollution has serious impacts on both human health and the environment.

1. It causes water-borne diseases such as cholera, typhoid, and jaundice.
2. Polluted water leads to health problems such as stomach disorders and skin diseases.
3. Aquatic organisms such as fish and plants are severely affected.
4. Agricultural productivity may decline due to contaminated irrigation water.
5. Water pollution disrupts ecological balance and biodiversity.

Measures to Control Water Pollution

1. Industrial wastewater should be treated before being discharged into rivers.
2. Proper sewage treatment plants should be established in urban areas.
3. Farmers should reduce the excessive use of chemical fertilizers and adopt organic farming practices.
4. Rainwater harvesting should be encouraged to recharge groundwater resources.
5. Public awareness programs should be conducted to promote water conservation.

Conclusion

Water pollution is one of the most serious environmental problems in the modern world. Rapid industrialization, urban growth, and agricultural intensification have significantly contributed to the degradation of water resources.

The increasing use of chemical fertilizers in agriculture has emerged as a major cause of water pollution, particularly in agricultural regions such as Yavatmal district. Therefore, it is necessary to adopt sustainable agricultural practices and implement effective water management strategies. Protecting water resources requires collective efforts from governments, industries, farmers, and the general public. Only through responsible use and conservation of water can we ensure the availability of clean and safe water for future generations.

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Loss Aversion Bias And Investment Decision-Making: An Empirical Analysis Of Individual Investors In Amravati City

Payal Rajesh Sabale , Anisha Vijay Garkal, Vaishnavi Sandip Natkar,
Saima Anjum , Shaikh Mannan

Department of Management Studies, Prof. Ram Meghe Institute of Technology & Research, Badenra-Amravati

Dr.PratikshaA.Kalmegh

GUIDE Assistant Professor Department of Management Studies,
Prof. Ram Meghe Institute of Technology & Research, Badenra-Amravati

ABSTRACT

Behavioral finance highlights the role of psychological factors in shaping investment behavior. Among various behavioral biases, loss aversion bias plays a significant role in influencing the investment decision-making process of individual investors. The present study aims to analyse the impact of loss aversion bias on investors' decision-making patterns in Amravati city. Specifically, the study examines how fear of financial loss affects investors' risk tolerance, portfolio choices, and return expectations.

The research adopts a descriptive research design and utilizes both primary and secondary data sources. Primary data were collected through structured questionnaires administered to individual investors, while secondary data were gathered from academic journals, books, and financial reports. The findings indicate that investors often exhibit behavioral tendencies such as holding loss-making investments for longer periods and selling profitable investments early, primarily due to emotional responses and psychological pressure.

The study concludes that improving financial literacy, adopting disciplined investment strategies, and focusing on long-term financial goals can help reduce the negative influence of loss aversion bias and improve investment outcomes.

Keywords: Loss Aversion Bias, Behavioral Finance, Investment Decision-Making, Individual Investors, Risk Perception, Investment Behaviour.

1. INTRODUCTION

Investment decision-making has traditionally been explained through classical financial theories such as the Efficient Market Hypothesis and Expected Utility Theory, which assume that investors are rational and always make decisions aimed at maximizing their wealth. According to these theories, investors are expected to process all available information logically and select investment alternatives that provide the highest expected return for a given level of risk. However, real-world evidence shows that investors frequently behave irrationally and are influenced by emotions, psychological biases, and cognitive limitations.

The emergence of Behavioral Finance challenged the traditional assumption of perfect rationality by integrating insights from psychology and economics to explain actual investor behaviour. Behavioral finance suggests that individuals often rely on mental shortcuts, emotional reactions, and subjective perceptions while making financial decisions. These psychological influences may lead to systematic errors in judgment, resulting in suboptimal investment choices.

One of the most influential theories explaining investor behaviour is Prospect Theory, developed by Daniel Kahneman and Amos Tversky in 1979. Prospect Theory explains how individuals evaluate potential gains and losses under conditions of uncertainty. **The theory proposes that people value gains and losses differently, giving greater importance to avoiding losses than to acquiring equivalent gains. This psychological tendency is known as loss aversion.**

Loss aversion implies that the pain associated with losing money is significantly stronger than the satisfaction derived from gaining the same amount. For example, losing ₹1000 generally causes more emotional discomfort than the pleasure experienced from gaining ₹1000. As a result, investors may adopt overly cautious strategies, avoid potentially profitable opportunities, or delay selling loss-making investments in the hope of future recovery.

Another important concept related to loss aversion is the Disposition Effect, which refers to the tendency of investors to sell winning investments too early while holding losing investments for longer periods. Research by Terrance Odean and Brad Barber demonstrated that such behaviour often reduces overall investment returns because investors fail to rebalance their portfolios effectively. Similarly, the concept of Myopic Loss Aversion, proposed by Shlomo Benartzi and Richard Thaler, explains why investors focus excessively on short-term losses rather than long-term gains. When investors frequently monitor their portfolios, short-term market fluctuations may create anxiety and lead them to avoid riskier investments such as equities, even when these investments offer higher long-term returns.

Loss aversion bias significantly influences various aspects of investment decision-making, including risk tolerance, portfolio diversification, investment timing, and asset allocation. Investors affected by this bias may prefer safe investment options such as fixed deposits, gold, or government schemes rather than higher-risk financial instruments like equities or derivatives. While such behaviour may provide psychological comfort, it can also limit long-term wealth creation. In emerging financial markets like India, individual investors play a significant role in the capital market. However, many investors lack sufficient financial knowledge and may rely on emotional judgment rather than analytical decision-making. Understanding behavioural biases such as loss aversion becomes essential for improving investment strategies and promoting rational financial behaviour.

Therefore, the present study aims to examine the impact of loss aversion bias on investment decision-making among individual investors in Amravati city. By analysing investor preferences, risk perception, and responses to financial losses, the study attempts to provide insights into how psychological factors influence financial decisions and how investors can adopt more rational investment strategies.

2. LITERATURE REVIEW

The concept of behavioral finance has gained significant attention in recent decades as researchers increasingly recognize that psychological factors influence financial decision-making. Several scholars have examined how cognitive biases affect investment behaviour, particularly the role of loss aversion in shaping investor decisions.

Daniel Kahneman and Amos Tversky (1979) introduced the concept of Prospect Theory, which explains how individuals evaluate potential gains and losses under conditions of uncertainty. According to their research, individuals tend to experience the pain of losses more strongly than the pleasure of equivalent gains. This phenomenon, known as loss aversion, leads investors to avoid risky decisions even when potential returns are attractive. Prospect Theory provided the theoretical foundation for behavioural finance and significantly influenced research on investor behaviour.

Hersh Shefrin and Meir Statman (1985) examined how psychological biases affect portfolio selection and investment behaviour. Their study suggested that investors often behave irrationally due to emotional influences such as regret, mental accounting, and loss aversion. They found that investors frequently hold losing investments for longer periods because they are reluctant to accept losses, which can negatively affect portfolio performance.

Terrance Odean (1998) analysed the trading behaviour of individual investors and found evidence of the Disposition Effect. The study revealed that investors tend to sell profitable investments quickly while retaining loss-making investments for longer periods. This behaviour occurs because investors seek to realize gains to feel successful while avoiding the psychological discomfort associated with acknowledging losses.

Further research by Brad Barber and Terrance Odean (2001) demonstrated that psychological biases such as overconfidence and loss aversion significantly influence trading behaviour. Their findings indicated that investors often engage in excessive trading and make poorly timed investment decisions, which ultimately reduces their overall investment returns.

Shlomo Benartzi and Richard Thaler (1995) introduced the concept of Myopic Loss Aversion. This theory suggests that investors tend to focus excessively on short-term losses rather than long-term gains. As a result, investors may avoid riskier financial assets such as equities and prefer safer investments like fixed deposits or government bonds, even though such assets may provide lower long-term returns.

Overall, previous studies highlight that loss aversion bias plays a significant role in shaping investor behaviour and investment decisions. Investors often demonstrate risk-averse behaviour, emotional reactions to market fluctuations, and reluctance to realize financial losses. These behavioural tendencies can negatively influence portfolio performance and investment outcomes.

3. RESEARCH METHODOLOGY

Research methodology refers to the systematic and scientific approach used to conduct a research study. It involves the methods and procedures adopted for collecting, analysing, and interpreting data in order to achieve the objectives of the study. The present research attempts to examine the influence of loss aversion bias on the investment decision-making behaviour of individual investors.

3.1 Problem Statement

In recent years, investment opportunities for individual investors have increased significantly due to the growth of financial markets and digital investment platforms. However, despite having access to financial information and various investment instruments, many individual investors fail to achieve expected returns. One of the major reasons for this is irrational decision-making influenced by psychological and behavioural biases.

Investors often tend to avoid financial losses rather than focus on potential gains. As a result, they may hold loss-making investments for longer periods, sell profitable investments too early, or avoid risky but potentially rewarding investment opportunities.

Such behavioural tendencies can negatively affect portfolio performance and long-term wealth creation. Therefore, it becomes important to analyse how loss aversion bias influences the investment decisions of individual investors. This study attempts to examine the extent to which loss aversion bias affects the investment behaviour of investors in Amravati city.

3.2 Objectives of the Study

- ✓ The present study is conducted with the following objectives:
- ✓ To examine the presence of loss aversion bias among individual investors in Amravati city.
- ✓ To analyse the impact of loss aversion bias on investment decision-making behaviour.
- ✓ To study the investment preferences and risk perception of individual investors.
- ✓ To suggest measures to reduce the influence of behavioural biases in investment decisions.

3.3 Research Design

The present study adopts a **descriptive research design**. Descriptive research aims to describe the characteristics and behavioural patterns of a particular group. In this study, descriptive research is used to analyse the investment behaviour of individual investors and their responses toward financial losses.

3.4 Universe of the Study

The universe consists of individual investors residing in Amravati city who participate in different investment activities such as stocks, mutual funds, fixed deposits, gold, and other financial instruments.

3.5 Sampling Method

Due to time and accessibility constraints, the study uses the convenience sampling method for selecting respondents. The sample includes individual investors belonging to different age groups, income levels, educational backgrounds, and investment experience in Amravati city.

3.6 Sample Size

A total of 60 respondents were selected for the study.

3.7 Sources of Data

The study is based on both **primary and secondary data**.

- ✓ **Primary Data:** Primary data were collected directly from individual investors through a structured questionnaire and personal interactions.
- ✓ **Secondary Data:** Secondary data were collected from various sources such as: Research journals on behavioural finance, Books and academic publications, financial magazines and market reports, Authentic online resources

3.8 Tools of Data Analysis

The collected data were analysed using **simple statistical techniques** to interpret investor behaviour.

The following tools were used:

- ✓ Percentage analysis
- ✓ Tabular representation
- ✓ Graphical representation (charts and diagrams)
- ✓ These methods helped in presenting the responses of investors in a clear and understandable manner.

6.11 Scope of the Study

The study focuses on analysing the impact of loss aversion bias on the investment decision-making behaviour of individual investors in Amravati city. The research primarily examines investor preferences, reactions to financial losses, and behavioural tendencies in investment decisions.

4. DATA ANALYSIS

Sr. No.	Variable Question /	Response Category	Number of Respondents	Percentage (%)
1	Finance / Investment Education	Yes	42	70%
		No	18	30%
2	Occupation	Students	36	60%
		Salaried	15	25%
		Self-employed / Business	9	15%
3	Preferred Investment Option	Stocks / Shares	15	25%
		Mutual Funds	9	15%
		Fixed Deposits	21	35%
		Gold / Real Estate	15	25%
4	Reaction When Investment is in Loss	Hold and wait	27	45%
		Seek expert advice	18	30%
		Sell immediately	6	10%
		Invest more	9	15%
5	Effect of Past Losses	Become more cautious	33	55%
		Avoid risky investments	18	30%
		Stop investing temporarily	9	15%
6	Choice Between Safe vs Risky Investment	Safe investment (₹1,000 guaranteed)	42	70%
		Risky investment (₹3,000 possible)	18	30%

5. FINDINGS, CONCLUSION AND SUGGESTIONS

5.1 Findings

1. Most respondents have basic knowledge of finance and investment.
2. The majority of respondents are students and young investors.
3. Investors prefer safe investment options such as fixed deposits, gold, and real estate.
4. Most investors hold loss-making investments for longer periods instead of selling them immediately.
5. Past investment losses make investors more cautious and risk-averse.
6. Fear of financial loss significantly affects investment decisions.
7. Investors prefer guaranteed returns over risky investments with higher potential gains.
8. The study confirms that loss aversion bias strongly influences investment behaviour.

5.2 Conclusion

The study concludes that Loss Aversion plays an important role in the investment decision-making process of individual investors in Amravati city. Investors tend to avoid losses rather than focus on potential gains, which leads to cautious and risk-averse investment behaviour. Emotional factors and past investment experiences significantly influence financial decisions. Therefore, improving financial awareness and adopting rational investment strategies can help investors make better financial decisions.

5.3 Suggestions

- ✓ Investors should focus on long-term investment goals instead of short-term market fluctuations.
- ✓ Improving financial literacy and investor education can help reduce behavioural biases.
- ✓ Investors should adopt portfolio diversification to manage risk effectively.
- ✓ Following disciplined investment strategies such as SIPs can help avoid emotional decision-making.
- ✓ Seeking professional financial advice can help investors make more informed investment decisions.

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Changing trends and research in the curriculum of various courses in the faculty of Commerce and Management

Rahul Dilip Chitlange

B.com, M.Com, Llb Akola-444001(MH)

"The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn."

— *Alvin Toffler*

ABSTRACT

Education must shift into future tense." In India, the role of higher education is clearly identified with respect to the fundamental role of higher education for national growth. The achievement of and objectives of higher education can be realized only by qualitatively changing the entire system of higher education. The output from commerce and management education should not only meet the dimensions of the current market but should also meet the highest level of global competitiveness. However, we need to accept that both commerce and management graduates are seriously lacking in practical experience. The professionalization of commerce and management education is being successfully implemented at a slow but consistent pace. Policy-makers and users are beginning to adopt a more positive view toward the faculties of commerce and management education.

There are several new specializations that have been developed along with new curricula and new delivery methods in commerce and management. This change can best be understood by analyzing the changing economic and business environments in India. Globalization, liberalization and privatization are major factors impacting commerce and management education in 2010 and beyond. This research looks into the changing nature of curriculum design in the faculties of commerce and management education. According to the study, skill-based, technology-integrated learning has replaced traditional theoretical education. Digital skills, data analytics, internships, and experiential learning are strongly supported in contemporary commerce and management education, according to survey data from instructors and students.

Keywords: Curriculum Trends, Commerce Education, Management Education, Digital Learning, Experiential Curriculum

1. INTRODUCTION

The way Commerce and Management Education have changed, from their early beginnings in the late 1800s/early 1900s to the increasing significance of commerce today in an interconnected and technologically committed world. Over the past 20 years, commerce has changed significantly due to the effects of globalization, technology and digitalisation on commerce; previously commerce education focused exclusively on accounting, economics, and business law; however, in today's world, commerce education has come to incorporate technology, analytical and industry-oriented knowledge to provide students with skills needed to succeed in today's constantly changing business climate. Universities and business institutes have developed new curricula to incorporate disciplines of emerging fields like artificial intelligence, data analytics, sustainability, and digital business management. The changing nature of commerce has also happened on the management side, as a result of the impact of globalization, digital disruption, artificial intelligence (AI), and changing expectations of employers regarding skills required for work. Historically, management education focused mainly on the functional area of finance, marketing, human resources, and operations, whereas now universities are revising their methodologies to train technologically savvy, analytical, and socially responsible leaders in organisations globally.

The analysis recognizes the necessity for updates to existing curriculum, for working collaboratively with organizations in the sector, and for offering skills that have application to current jobs. Many of the skills being developed for digital platforms (i.e., e-commerce, e-learning, e-banking and e-marketing) are rapidly growing in importance. The researchers compiled and analysed

secondary source information using descriptive methodology to identify some of the key barriers to producing graduates ready to work in industry: many educators continue to use outdated curriculums, have not included digital literacy in their programs and offer limited, if any, exposure to real-world business practices. As such, the demand for more specialised training in e-commerce areas, including online banking systems, web hosting, web page design, digital certificates, electronic payment processing software and shopping cart systems, will become increasingly relevant. These specialised skills will give graduates a distinct advantage in a competitive job market. The overarching purpose of an education is to prepare individuals to meet the challenges that life presents. Education in commerce and management specifically aims to prepare students for meeting challenges they will face in commerce and business. Therefore, for commerce education to be effective, it must be integrated into the business and industry sectors. Commerce education also must be of a practical nature that includes experiential learning through on-the-job opportunities.

Recent research in commerce and management education focuses on:

- Artificial Intelligence in business decision-making
- Digital transformation in organizations
- Sustainable finance and green accounting
- FinTech innovations
- Consumer analytics
- Remote work management
- Ethical AI and data privacy

1.1 OBJECTIVES OF THE STUDY

- To identify key changes in the curriculum of commerce and management courses.
- To analyze stakeholders' perceptions (students, teachers, employers) regarding curriculum relevance.
- To evaluate the impact of new curricular trends on student outcomes.
- To recommend strategies for improved curriculum design.

1.2 NEED FOR THE STUDY

In order to create adequate training programs that meet today's industries needs, commerce and management education should be aligned with present-day industry expectations. Traditional course content/curricula do not address the need for, digital skills, analytical skills, and innovative thinking. The objective of this study is to identify how current education systems fail to prepare students for commerce, as well as to develop research-based recommendations for improvement.

1.3. SCOPE OF THE STUDY

The study covers:

- Undergraduate and postgraduate programs in commerce and management.
- Curriculum innovations such as AI modules, data analytics, sustainability, and digital marketing.
- Opinions from students, faculty, and industry representatives.
- A comparative view of traditional versus modern curricular approaches.

1.4. LIMITATIONS OF THE STUDY

- Limited sample size for primary data.
- Time constraints restricted longitudinal analysis.
- Findings may not generalize across all universities.

2. LITERATURE REVIEW

According to **Bharamappa Padimani**; this paper concluded that "Indian commerce education is undergoing a necessary transformation to align with the demands of a globalized, technology-driven economy. The historical overview and analysis of post-LPG changes highlight the need for a shift from theoretical learning to practical, skill-based education, and research identifies a gap between academic training and industry expectations, particularly in analytical, technical, and presentation skills. To address this, it advocates for job-oriented curricula, industry partnerships, and the integration of digital tools like e-commerce and e-governance. Emphasis is placed on fostering entrepreneurial mindsets and developing soft skills.

Tabasum, H., & Venkatesh, S. noticed that; "India has the strategic advantage of the young population. Under the WTO regime, the relevance of management education has become more imperative; this means marked

changes in the way commerce and management education is perceived in India. Therefore, it is inevitable to make commerce graduation courses more impactful. Commerce education is facing numerous problems nowadays. These problems have a direct bearing on the course Objectives, course contents. Therefore, there is a need for an effort to re-designing commerce education in such a way that it should be relevant to today and tomorrow.

S. Sunil Kumar (2020) stated that; commerce and management in India equips the student as a dynamic manager with emerging trends of commerce skills to face the real challenges of the dynamic business world". Further, LPG has faced unprecedented challenges before in commerce and management in India. Finally, it concluded that commerce and management in India need to be holistic, targeted, and customized, with the of removing to remove the gap between the industry requirements and academic curriculum.

Deswa (2017) opines that "nowadays, commerce education is taking a professional approach. Commerce education has been changed due to industrial and economic advancements. The change in technology provides a new dimension and reduces the paperwork. They also highlight more on the education system. Any exchange of money, any transaction that happens, all relate to commerce. However, there is no business without commerce.

Mankar (2016) states that "today's employment opportunities depend upon qualitative commerce education. Nowadays businesses are changing technology, so skills and training are required to cope up with these changes. In this article, they mention that commerce education has been developed, and now it becomes a business education. Commerce education is just a type of training having the objective of preparing students to enter a business career. The Commerce stream is good for options for the future.

Pratap et al., (2015) highlighted that "through commerce education; students are exposed to the outside environment of the business to the world. It also gives them guidance for them in applying principles while doing business. Commerce education gives them confidence and a positive attitude. They also mention that commerce graduates have a lack of practical knowledge. It ensures better management of its resources; they also understand the concept of savings, investment, and capital formation.

3. RESEARCH METHODOLOGY

In order to describe and analyze the evolving trends in the curriculum of commerce and management courses and investigate stakeholders' opinions regarding the relevance and efficacy of the curriculum, the current study employs a descriptive research design.

The study's focus on the following makes descriptive research appropriate:

- Being aware of the methods used in the current curriculum
- Assessing faculty and student opinions
- Assessing how contemporary curricular trends affect learning outcomes.

To gain a thorough understanding of curriculum transformation, both quantitative and qualitative methods were employed.

Sampling Technique: The study employed **Stratified Random Sampling** to ensure representation from different stakeholder groups.

The population was divided into strata such as:

- Students (Commerce & Management courses)
- Faculty members
- Industry stakeholders

Respondents were selected randomly within each group to minimize bias.

Respondent Category	Number of Respondents
Students	120
Faculty Members	30
Employers/Experts	20
Total Sample	170

Data Collection: Students enrolled in management and commerce programs were given a structured questionnaire. Faculty members' qualitative data was gathered using semi-structured interview guides. Secondary data was gathered from reliable institutional and scholarly sources, such as: peer-reviewed publications; conference papers and research reports; university curricula; policy documents and reports on educational reforms; Books and academic journals about management and commerce education.

Data Analysis Tools The collected data were analyzed using statistical techniques like **Percentage Analysis** [To understand overall response distribution]; **Mean and Standard Deviation** [To measure average perception levels]; **Chi-Square Test** [To examine relationships between variables such as curriculum relevance and employability perception]

Hypotheses of the study

The following hypotheses were formulated:

Null Hypotheses (H₀)

H₀₁: There is no significant relationship between curriculum modernization and students' perceived employability skills.

H₀₂: There is no significant difference in perception between students and faculty regarding curriculum relevance.

H₀₃: There is no significant relationship between Integration of technology in curriculum does and influence student learning outcomes.

Alternative Hypotheses (H₁)

H₁₁: There is a significant difference between Curriculum modernization and improves students' employability skills.

H₁₂: There is a significant difference between student and faculty perceptions regarding curriculum relevance.

H₁₃: There is a significant difference between Technology integration and enhances student learning outcomes.

4. DATA ANALYSIS AND INTERPRETATION**4.1 Awareness of Curriculum Changes**

H₀₁: There is no significant relationship between curriculum modernization and students' perceived employability skills.

H₁₁: Curriculum modernization significantly improves students' employability skills.

Table 4.1: Awareness of Curriculum Changes

Response	Number of Respondents	Percentage (%)
Highly Aware	70	41%
Aware	65	38%
Neutral	20	12%
Not Aware	15	9%
Total	170	100%

Interpretation

Increased exposure to contemporary academic reforms is indicated by the majority of respondents (79%) being aware of curriculum changes. The following are the outcomes of the change in management curricula: increased digital literacy among graduates; better employability skills; Improved conformity to industry demands; enhanced capacity for innovation and leadership; heightened focus on research

4.2 Digital Skills in Curriculum

H₀₂: There is no significant difference in perception between students and faculty regarding curriculum relevance.

H₁₂: There is a significant difference between student and faculty perceptions regarding curriculum relevance.

Table 2: Importance of Digital Skills in Curriculum

Opinion	Respondents	Percentage (%)
Strongly Agree	85	50%
Agree	55	32%
Neutral	18	11%
Disagree	12	7%
Total	170	100%

Interpretation

As indicated in the table above, respondents' perceptions of the importance of digital competencies within the curriculum of commerce and management programming are overwhelmingly positive: 82% of participants indicated explicit agreement that digital skills should be incorporated as core elements of the commerce and management curriculum. This indicates a very strong agreement for incorporating digital competencies such as data analytics, AI tools, fintech, and digital business platforms into academic programs. In addition to the overwhelming majority of respondents indicating agreement with this statement, 11% of respondents had a neutral (i.e., uncertain) position. The neutral responses might suggest some respondents have limited exposure to digital learning environments or are unsure about the relevance of this technology to the field of commerce/management. Only 7% of respondents provided a response in opposition to the inclusion of digital competencies within the commerce and management curriculum, which suggests that very few participants are resistant to advancing curriculum development and modernization initiatives.

Overall, the data indicates a strong majority of stakeholders perceive digital literacy as a critical factor in increasing employability, productivity, and readiness to work within the industries they represent. This high level of consensus about the need for graduates with technology skills reflects the growing need for technologically competent graduates in today's business environments.

4.3 Curriculum Effectiveness in Improving Employability

H₀₃: Integration of technology in curriculum does not significantly influence student learning outcomes.

H₁₃: Technology integration significantly enhances student learning outcomes.

Table 3: Curriculum Effectiveness in Improving Employability

Response	Frequency	Percentage (%)
Highly Effective	60	35%
Effective	72	42%
Moderate	25	15%
Ineffective	13	8%
Total	170	100%

Interpretation According to the data from the table above, respondent opinion on how effective the current curriculum is for improving employability for commerce and management students. The data shows a clear trend showing a majority of respondents (77%) rated the current curriculum as having a positive impact on employability considering that 42% rated the current curriculum 'Effective', and 35% rated it 'Highly Effective'. 15% of respondents rated the current curriculum as "Moderately Effective". This could be due to concerns that although the current curriculum is effective in helping students become more employable, there is need for further refinements such as additional practical experience, internship opportunities, and more advanced technology training. Only 8% of respondents rated the current curriculum as 'Ineffective' which indicates that there is not much dissatisfaction with regards to the current curriculum's effectiveness. This shows that for the most part, institutions are doing a good job of aligning their academic programs to meet the needs of industry expectations.

The overall data supports the idea that more recent curriculums with a focus on skill –based learning, experiential learning, and the use of integrated technology will help increase graduate employability.

4.4 Curriculum Modernization and Employability

H₀: There is no significant relationship between curriculum modernization and employability perception.

H₁: There is a significant relationship between curriculum modernization and employability perception.

Variable Tested	Chi-square Value	Significance (p-value)
Curriculum modernization vs Employability	12.45	0.002

Interpretation

The calculated Chi-square value is 12.45 with a p-value of 0.002. Since the p-value is less than the significance level (0.05), the null hypothesis is rejected. This indicates that curriculum modernization significantly influences employability perception among respondents. The findings suggest that updated curricula incorporating digital skills, industry exposure, and practical learning enhance students' perceived job readiness. The result confirms that modern curriculum practices play an important role in improving employability outcomes. Respondents who experienced updated course structures reported higher confidence in skill development and career preparedness. This aligns with contemporary educational trends emphasizing industry-aligned learning and competency-based education.

CONCLUSION—According to the research results, there is a definite move toward incorporating digital skills and knowledge, analytical capabilities, sustainability, and hands-on experience into commerce and management education. Interviewees stated that current trends in curriculum are better preparing students to adapt to the fast-paced nature of today's working world. However, there are still challenges to successfully implementing these trends, such as limited resources and resistance to change. The curricula for commerce and management degrees are evolving from traditional approaches towards a holistic, competency-based and technology-embedded framework. Although many of the changes to the curriculum reflect positive trends, successful implementation will require institutional support, training of faculty and continuous collaboration with industry stakeholders. Future research should focus on how long-term change in curriculum reforms affects employment opportunities.

"Success in management requires learning as fast as the world is changing."

— Warren Bennis

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Transformative Trends in Environmental Science and Sustainable Development Curriculum: A Comprehensive Analysis of Pedagogical Innovations and Global Educational Paradigm Shifts

Dr. A. P. Gawande

, Assist. Professor, Chemical Engineering Department of Chemical Engineering
College of Engineering & Technology Mumbai, Maharashtra, India
Email: amit.gawande@cet.edu.in

Presented By :- **Harish Godse; Yaduraj Nakat; Dipali Sontakke**

Abstract—The curriculum of Environmental Science and Sustainable Development has undergone profound transformations in recent years, driven by escalating climate challenges, technological advancements, and evolving global sustainability frameworks. This comprehensive review examines the changing trends in environmental education curricula across higher education institutions worldwide, with particular emphasis on pedagogical innovations, interdisciplinary integration, digital technology adoption, and competency-based learning approaches. The paper analyzes the shift from traditional theoretical frameworks to practice-oriented, experiential learning models that incorporate project-based learning, community engagement, and real-world problem-solving. Key trends identified include the integration of United Nations Sustainable Development Goals (SDGs) into curricula, adoption of digital technologies such as virtual reality and augmented reality for immersive learning experiences, emphasis on action competencies and transformative learning, and the development of interdisciplinary approaches that bridge environmental science with engineering, social sciences, and economics. The analysis reveals that modern environmental curricula increasingly emphasize systems thinking, anticipatory competencies, and collaborative problem-solving skills essential for addressing complex sustainability challenges. This paper presents a critical evaluation of curriculum reforms across multiple geographic regions, identifies barriers to effective implementation, and provides strategic recommendations for institutions seeking to enhance their environmental education programs. The findings demonstrate that successful curriculum transformation requires institutional commitment, faculty capacity building, stakeholder collaboration, and alignment with both local contexts and global sustainability imperatives.

Index Terms—Environmental Science Curriculum, Sustainable Development Education, Pedagogical Innovation, Interdisciplinary Learning, Digital Technologies in Education, Education for Sustainable Development, Competency-Based Learning, Higher Education Reform

I. INTRODUCTION

Environmental science and sustainable development education stand at a critical juncture in the 21st century, facing unprecedented demands for curriculum innovation and pedagogical transformation. The intensifying climate crisis, biodiversity loss, resource depletion, and complex socio-ecological challenges have necessitated a fundamental rethinking of how environmental education is conceptualized, structured, and delivered in higher education institutions worldwide[1][2]. Traditional environmental curricula, often characterized by discipline-specific theoretical content delivered through conventional lecture-based pedagogy, are increasingly recognized as insufficient for preparing students to address the multifaceted sustainability challenges of our era[3].

The global imperative for curriculum reform in environmental science has been amplified by international frameworks and commitments, most notably the United Nations 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs)[4]. UNESCO has established an ambitious target to make environmental education a core curriculum component in all countries by 2025, recognizing education as the primary catalyst for transformative change toward sustainability[5]. This global commitment has catalyzed widespread curriculum reforms, policy initiatives, and institutional transformations across diverse educational contexts.

Contemporary trends in environmental science curricula reflect a paradigm shift from passive knowledge transmission to active, participatory learning that emphasizes competency development, critical thinking, and action-oriented education[6]. This transformation encompasses multiple dimensions: pedagogical innovations that prioritize experiential and inquiry-based learning; integration of digital technologies including virtual reality, augmented reality, and simulation platforms; interdisciplinary approaches that transcend traditional subject boundaries; and emphasis on developing specific competencies for sustainability including systems thinking, anticipatory reasoning, normative reflection, strategic planning, and collaborative action[7][8].

The evolution of environmental curricula is further characterized by increasing recognition of the interconnectedness between environmental, social, and economic dimensions of sustainability. Modern curriculum frameworks emphasize holistic approaches that integrate ecological principles with social justice, economic viability, technological innovation, and ethical considerations[9]. This integrative perspective requires students to develop sophisticated understanding of complex systems, recognize feedback loops and interdependencies, and appreciate the context-specific nature of sustainability challenges and solutions[10].

Several factors have converged to drive these curriculum transformations. First, employers and industries increasingly demand graduates with practical sustainability skills, systems thinking capabilities, and competencies in green technologies and sustainable practices[11]. Second, students themselves are demanding more relevant, engaging, and action-oriented education that connects classroom learning with real-world challenges[12]. Third, advances in educational technology have created new possibilities for immersive, interactive, and collaborative learning experiences that were previously unattainable[13]. Fourth, accumulating research evidence demonstrates the effectiveness of innovative pedagogical approaches in enhancing student learning outcomes, environmental literacy, and pro-environmental behaviors[14].

This paper provides a comprehensive analysis of changing trends in environmental science and sustainable development curricula, examining both the nature of these transformations and their implications for educational practice. The analysis draws upon recent literature, policy documents, case studies, and empirical research to identify key trends, evaluate their effectiveness, examine implementation challenges, and provide recommendations for curriculum developers, educators, and institutional leaders. The paper is structured to address the following critical questions: What are the major trends reshaping environmental science curricula? How are pedagogical innovations enhancing learning outcomes? What role do digital technologies play in modern environmental education? How are institutions implementing interdisciplinary and competency-based approaches? What barriers impede effective curriculum transformation? What strategies can facilitate successful curriculum reform?

. THE PARADIGM SHIFT: FROM TRADITIONAL TO TRANSFORMATIVE ENVIRONMENTAL EDUCATION

A. Limitations of Traditional Environmental Curricula

Traditional environmental science curricula have historically been structured around discipline-specific content delivered through conventional pedagogical approaches[15]. These curricula typically emphasized theoretical knowledge of ecological systems, environmental processes, and conservation principles, with limited integration across disciplines and minimal emphasis on practical application, problem-solving, or action competence[16]. Students were predominantly positioned as passive recipients of information rather than active participants in knowledge construction and real-world problem-solving.

Several critical limitations of traditional approaches have become increasingly apparent. First, disciplinary silos prevented students from developing the holistic, systems-based understanding essential for addressing complex sustainability challenges that inherently span multiple domains[17]. Second, emphasis on theoretical knowledge without corresponding emphasis on practical skills, critical thinking, and action competencies left graduates inadequately prepared for professional roles in sustainability-related fields[18]. Third, traditional pedagogies often failed to engage students emotionally and ethically with environmental issues, missing opportunities to cultivate the values, attitudes, and motivations essential for sustained environmental stewardship[19]. Fourth, conventional

curricula frequently lacked relevance to local contexts and real-world problems, reducing student engagement and limiting the practical applicability of learning[20].

B. Education for Sustainable Development: Conceptual Framework

Education for Sustainable Development (ESD) represents a fundamental reconceptualization of environmental education's purpose, content, and pedagogy[21]. As defined by UNESCO, ESD aims to equip every individual with the knowledge, skills, values, and attitudes necessary to shape a sustainable future[22]. ESD transcends traditional environmental education by explicitly integrating social, economic, and environmental dimensions of sustainability; emphasizing interconnections between local and global challenges; promoting participatory, learner-centered pedagogies; and fostering competencies for transformative action[23].

The ESD framework is grounded in several core principles. First, it adopts a holistic approach that recognizes the interdependence of environmental quality, social equity, and economic viability, rejecting simplistic solutions in favor of nuanced understanding of trade-offs and synergies[24]. Second, ESD emphasizes transformative learning that challenges existing assumptions, values, and worldviews, facilitating fundamental shifts in how individuals perceive and relate to sustainability challenges[25]. Third, it prioritizes competency development over mere knowledge acquisition, focusing on cultivating practical capabilities for analyzing complex problems, envisioning alternative futures, and implementing effective solutions[26]. Fourth, ESD incorporates critical pedagogy that empowers learners to question power structures, identify root causes of unsustainability, and advocate for systemic change[27].

C. The Commonwealth Curriculum Framework for SDGs

The Commonwealth Curriculum Framework for the Sustainable Development Goals, recently updated in 2026, provides a comprehensive model for aligning national curricula with global sustainability imperatives[28]. This framework represents a significant evolution from earlier approaches, offering a flexible yet structured approach to integrating sustainability across all educational levels and subject areas. Rather than prescribing fixed content, the framework emphasizes the integration of knowledge, skills, values, and attitudes that prepare learners not only for employment but for meaningful participation in creating sustainable societies[29].

The framework's second edition responds to contemporary challenges including climate change, technological disruption, and persistent inequality by championing sustainability, digital literacy, inclusion, and critical thinking as core educational priorities[30]. Its implementation across diverse contexts—from universities in Canada exploring food security to schools in the Philippines aligning science education with SDGs to vocational training in Africa embedding green skills—demonstrates both its adaptability and its potential for catalyzing educational transformation[31]. The framework invites policymakers, educators, and communities to collaborate in ensuring no learner is left behind and every learner is empowered to contribute meaningfully to sustainability goals.

III. KEY TRENDS IN ENVIRONMENTAL SCIENCE CURRICULUM

A. Integration of Sustainable Development Goals

The integration of the United Nations Sustainable Development Goals into environmental science curricula represents one of the most significant and widespread trends in contemporary environmental education[32]. This integration serves multiple purposes: providing a common global framework that facilitates international collaboration and knowledge exchange; ensuring curricula address the full breadth of sustainability challenges including poverty, inequality, health, education, and justice alongside environmental concerns; and aligning educational outcomes with internationally agreed targets and indicators[33].

Curriculum integration of SDGs takes various forms across institutions. Some programs have restructured entire curricula around SDG themes, organizing courses and modules to explicitly address specific goals and targets[34]. Others have adopted cross-cutting approaches that integrate SDG principles throughout existing courses and programs[35]. Many institutions have developed specific courses focused on understanding the SDG framework, its historical development, implementation mechanisms, and progress monitoring[36]. The most effective approaches combine explicit SDG content with pedagogical strategies that develop competencies essential for SDG achievement, including systems thinking, stakeholder collaboration, and strategic planning[37].

Research evidence suggests that SDG integration enhances student understanding of sustainability's multidimensional nature and interconnected challenges[38]. Students exposed to SDG-integrated curricula demonstrate improved ability to recognize linkages between environmental, social, and economic issues; appreciate the complexity of sustainability challenges; and identify potential synergies and trade-offs between different goals[39]. However, effective integration requires careful attention to avoiding superficial inclusion of SDG rhetoric without substantive changes to content, pedagogy, or assessment approaches[40].

B. Interdisciplinary and Transdisciplinary Approaches

Interdisciplinary education has emerged as a defining characteristic of contemporary environmental science curricula, reflecting recognition that sustainability challenges cannot be adequately addressed through single-disciplinary perspectives[41]. Interdisciplinary environmental programs integrate knowledge, methods, and perspectives from multiple disciplines including natural sciences, engineering, social sciences, humanities, and professional fields to develop holistic understanding of coupled human-natural systems[42].

Research examining interdisciplinary environmental education programs reveals consensus on several core elements of field identity: an applied focus on real-world problems rather than purely theoretical inquiry; integration of natural and social sciences to address human-environment interactions; normative commitment to sustainability as an explicit educational goal; and emphasis on developing practical competencies for addressing sustainability challenges[43]. Three ideal curricular models have been identified in interdisciplinary environmental programs: Systems Science models emphasizing quantitative analysis of complex environmental systems; Policy and Governance models focusing on institutional mechanisms and decision-making processes; and Adaptive Management models integrating science, policy, and practice for iterative learning and improvement[44].

Effective interdisciplinary curricula employ various structural and pedagogical strategies. Team-teaching approaches bring faculty from different disciplines together to co-design and co-deliver courses, modeling interdisciplinary collaboration for students[45]. Capstone projects and real-world problem-solving exercises require students to integrate knowledge and methods from multiple courses and disciplines[46]. Interdisciplinary research experiences provide opportunities for students to work on authentic sustainability problems alongside faculty from diverse fields[47]. Community-engaged learning connects students with external stakeholders, exposing them to diverse perspectives and ways of knowing[48].

Transdisciplinary approaches extend beyond interdisciplinary integration by engaging non-academic stakeholders—including community members, practitioners, policymakers, and indigenous knowledge holders—as equal partners in knowledge production[49]. These approaches recognize that effective sustainability solutions require integrating diverse forms of knowledge and values, not merely academic disciplines[50]. Transdisciplinary environmental education prepares students to navigate boundary-spanning roles, facilitate dialogue across different knowledge systems, and co-produce actionable knowledge with diverse stakeholders[51].

C. Competency-Based Learning and Action Competencies

The shift toward competency-based environmental education represents a fundamental reorientation from knowledge-centered to capability-centered curricula[52]. Rather than focusing primarily on content coverage, competency-based approaches emphasize the development of specific capabilities—combinations of knowledge, skills, attitudes, and values—that enable individuals to contribute effectively to sustainability[53].

Key competencies for sustainability, as identified through extensive international research and policy development, include several interrelated capabilities[54]. Systems thinking competency enables individuals to recognize and analyze complex relationships, feedback loops, and emergent properties in socio-ecological systems[55]. Anticipatory competency involves the ability to envision alternative future scenarios, assess risks and opportunities, and engage in long-term planning[56]. Normative competency encompasses the capacity to understand, reflect upon, and negotiate sustainability values and principles in decision-making contexts[57]. Strategic competency enables the design and implementation of interventions, policies, and actions that advance sustainability goals[58]. Collaboration competency facilitates effective teamwork, stakeholder engagement, and

collective action for sustainability[59]. Critical thinking competency supports the evaluation of assumptions, identification of underlying causes, and questioning of dominant paradigms[60].

Action competence, a particularly important construct in environmental education, refers to the capacity and willingness to take informed, responsible action toward sustainability[61]. Recent research emphasizes that action competence must be explicitly taught and systematically developed through carefully designed learning experiences[62]. Pedagogical approaches for developing action competence include providing opportunities for authentic decision-making and action in real-world contexts; supporting students in navigating the complexity, uncertainty, and value conflicts inherent in sustainability challenges; fostering self-efficacy and empowerment by demonstrating that individual and collective actions can make meaningful differences; and developing specific skills for advocacy, communication, organization, and implementation[63].

D. Experiential and Place-Based Learning

Experiential learning approaches have become increasingly central to environmental science curricula, reflecting recognition that abstract theoretical knowledge alone is insufficient for developing deep environmental understanding and commitment[64]. Experiential learning emphasizes direct experience, active experimentation, and reflective observation as essential components of the learning process[65]. In environmental education contexts, experiential approaches include field studies, laboratory investigations, environmental monitoring projects, restoration activities, and community-based sustainability initiatives[66].

Place-based education represents a particularly powerful form of experiential learning that connects environmental education to local contexts, communities, and challenges[67]. Place-based approaches are grounded in the belief that learning is enhanced when it is relevant to students' lived experiences and connected to places they know and care about[68]. These approaches typically involve studying local environmental issues, engaging with community stakeholders, and developing solutions appropriate to local contexts[69]. Research demonstrates that place-based environmental education enhances student engagement, deepens ecological understanding, fosters sense of place and environmental stewardship, and contributes to community capacity building[70].

The integration of experiential and place-based learning into environmental curricula takes various forms. Some programs incorporate extended field experiences or residential field courses that immerse students in particular ecosystems or communities[71]. Others integrate ongoing community partnerships that provide consistent opportunities for students to engage with local environmental issues throughout their academic programs[72]. Many curricula include project-based learning components that require students to investigate real environmental problems, develop solution proposals, and in some cases implement and evaluate interventions[73].

E. Digital Technologies and Immersive Learning Environments

Digital technologies are fundamentally transforming environmental science education, creating new possibilities for visualization, simulation, collaboration, and engagement[74]. The integration of innovative technologies into environmental curricula represents both an opportunity and a necessity, as these tools can address traditional limitations of environmental education—such as difficulty visualizing large-scale or long-term environmental processes, lack of access to diverse ecosystems, and challenges of collaborative learning across distances[75].

Virtual Reality (VR) and Augmented Reality (AR) technologies offer particularly transformative potential for environmental education[76]. VR can transport students to diverse ecosystems—coral reefs, rainforests, polar regions—that would be otherwise inaccessible, providing immersive experiences that enhance understanding and emotional engagement[77]. AR can overlay environmental data and information onto real-world environments, enabling students to visualize pollution levels, historical landscapes, or future climate scenarios in their actual surroundings[78]. Research indicates that VR and AR experiences in environmental education enhance student motivation, improve spatial understanding of environmental phenomena, and foster emotional connections to environmental issues[79].

Online simulations and modeling tools enable students to explore complex environmental systems, test hypotheses, and observe the consequences of different interventions without the constraints of time, scale, or ethical concerns that limit real-world experimentation[80]. Climate models, ecosystem

simulations, and sustainability scenario planning tools allow students to develop systems thinking skills and understand feedback loops and tipping points in environmental systems[81]. Digital collaboration platforms facilitate global connections, enabling students from different regions to work together on environmental projects, share local perspectives, and develop cross-cultural competencies[82].

Geographic Information Systems (GIS) and remote sensing technologies have become essential tools in environmental science curricula, providing capabilities for spatial analysis, environmental monitoring, and data visualization[83]. These technologies enable students to analyze environmental patterns at multiple scales, integrate diverse data sources, and communicate findings effectively through maps and visualizations[84]. The incorporation of GIS into environmental curricula develops both technical skills valued by employers and conceptual understanding of spatial relationships in environmental systems[85].

IV. PEDAGOGICAL INNOVATIONS IN ENVIRONMENTAL EDUCATION

A. Inquiry-Based and Problem-Based Learning

Inquiry-based learning (IBL) and problem-based learning (PBL) represent pedagogical approaches that position students as active investigators rather than passive recipients of information[86]. These approaches align closely with the goals of environmental education by emphasizing critical thinking, problem-solving, and the development of scientific reasoning skills[87].

In inquiry-based environmental education, students engage in scientific investigation processes: formulating questions, designing investigations, collecting and analyzing data, drawing conclusions, and communicating findings[88]. This approach develops both understanding of environmental concepts and appreciation for how environmental knowledge is generated through scientific inquiry[89]. Inquiry-based learning can be structured along a continuum from guided inquiry, where instructors provide significant scaffolding and structure, to open inquiry, where students exercise greater autonomy in defining questions and methods[90].

Problem-based learning organizes curricula around complex, authentic environmental problems rather than disciplinary content[91]. Students work collaboratively to understand problem dimensions, identify relevant knowledge and skills, conduct research, develop solution proposals, and present recommendations[92]. PBL in environmental education typically addresses real sustainability challenges such as water quality management, energy transitions, urban sustainability, or conservation planning[93]. Research demonstrates that PBL enhances student motivation, develops problem-solving capabilities, promotes collaborative skills, and improves knowledge retention compared to traditional instructional approaches[94].

B. Project-Based Learning and Student Research

Project-based learning (PjBL) extends problem-based approaches by requiring students not only to analyze problems but to develop tangible products, interventions, or solutions[95]. In environmental science curricula, project-based learning might involve designing and implementing campus sustainability initiatives, conducting original environmental research, developing educational materials for community audiences, or creating policy recommendations for environmental management[96].

The shift from theoretical coursework to practical project implementation represents a significant trend in environmental curricula[97]. Students are increasingly engaged in designing and building renewable energy systems, establishing campus gardens and green infrastructure, conducting environmental assessments and restoration projects, and developing sustainability programs for communities or organizations[98]. These projects provide authentic learning experiences that develop technical skills, project management capabilities, and confidence in students' ability to contribute meaningfully to sustainability[99].

Many institutions have established formal structures for supporting student-led sustainability projects, including sustainability challenge competitions, innovation funds, and incubator programs for student environmental startups[100]. These initiatives recognize that student projects can contribute not only to learning but also to institutional sustainability goals and broader societal impact[101]. Research indicates that engagement in authentic sustainability projects enhances student learning outcomes, develops entrepreneurial capabilities, and increases commitment to sustainability careers[102].

C. Community-Engaged Learning and Partnerships

Community-engaged learning, also termed service-learning or community-based learning, connects academic coursework with community needs and priorities through structured partnerships between educational institutions and external organizations[103]. In environmental education contexts, community engagement might involve students working with environmental nonprofits, government agencies, community groups, or businesses on sustainability challenges[104].

The trend toward community engagement in environmental curricula reflects multiple motivations and benefits[105]. For students, community engagement provides authentic learning contexts, exposure to diverse perspectives and ways of knowing, development of professional skills and networks, and enhanced sense of purpose and civic responsibility[106]. For communities, student engagement provides valuable human resources, fresh perspectives, access to university expertise and facilities, and enhanced capacity for addressing local environmental challenges[107]. For educational institutions, community partnerships enhance relevance and impact of educational programs, strengthen town-gown relationships, and contribute to institutional sustainability commitments[108].

Effective community-engaged environmental education requires careful attention to partnership development, power dynamics, and reciprocity[109]. Best practices include involving community partners in course design and student project definition; ensuring that student work addresses genuine community needs rather than serving purely academic purposes; providing adequate preparation and support for students to work effectively in community contexts; facilitating reflection on experiences to enhance learning; and maintaining long-term partnerships that build trust and capacity rather than treating communities as sites for one-off student projects[110].

V. IMPLEMENTATION CHALLENGES AND BARRIERS

A. Institutional and Structural Barriers

Despite widespread recognition of the need for curriculum reform in environmental science and sustainable development education, numerous institutional and structural barriers impede effective implementation[111]. Traditional university structures organized around disciplinary departments create obstacles for interdisciplinary environmental programs, including difficulties in faculty hiring and promotion, challenges in resource allocation and administrative support, and student confusion regarding program requirements and degree pathways[112].

Faculty capacity and workload represent significant barriers to curriculum innovation[113]. Developing and implementing innovative pedagogies requires substantial time investment for course redesign, learning new teaching methods and technologies, establishing community partnerships, and coordinating with colleagues across disciplines[114]. In contexts where faculty are evaluated primarily on research productivity rather than teaching innovation, there may be limited incentive to invest in curriculum reform[115]. Additionally, many faculty members lack training in ESD principles, innovative pedagogies, and assessment methods aligned with competency development[116].

Resource constraints, particularly in resource-limited contexts, pose substantial challenges for curriculum transformation[117]. Experiential learning, field experiences, technology-enhanced instruction, and community partnerships all require financial resources beyond traditional classroom instruction[118]. Institutions may lack adequate funding for equipment, field trip costs, technology infrastructure, community engagement coordination, or additional instructional support[119].

B. Assessment and Evaluation Challenges

Assessing learning outcomes in transformed environmental curricula presents significant challenges, particularly when curricula emphasize competency development, systems thinking, and transformative learning rather than content mastery alone[120]. Traditional assessment methods such as multiple-choice examinations are poorly suited to evaluating complex competencies, critical thinking, or action capabilities[121]. Developing valid, reliable assessment approaches for competencies such as systems thinking, anticipatory reasoning, or collaboration requires sophisticated assessment design and substantial faculty expertise[122].

Performance-based assessments—including portfolios, presentations, project evaluations, and authentic problem-solving tasks—offer more appropriate methods for evaluating competencies but present practical challenges[123]. These assessment approaches are typically more time-intensive for

both students and faculty, require clear rubrics and criteria to ensure consistency and fairness, and may raise concerns about reliability and comparability across students and contexts[124]. Additionally, assessing affective outcomes such as environmental values, sense of responsibility, or commitment to sustainability action raises methodological and ethical questions[125].

C. Resistance to Change and Cultural Factors

Cultural and attitudinal barriers can significantly impede curriculum reform efforts[126]. Faculty trained in traditional disciplinary paradigms may resist interdisciplinary approaches that challenge disciplinary boundaries and traditional ways of organizing knowledge[127]. Students accustomed to conventional pedagogies may initially resist active learning approaches that require greater participation, autonomy, and responsibility[128]. Administrators and policymakers may prioritize conventional metrics of educational quality—such as standardized test scores or disciplinary rankings—that do not align well with transformative environmental education goals[129].

In some contexts, the explicit normative commitment to sustainability inherent in ESD may encounter resistance from those who view education as value-neutral or who hold differing perspectives on environmental issues and appropriate societal responses[130]. Navigating these tensions requires careful attention to academic freedom, intellectual diversity, and the distinction between indoctrination and education that develops critical thinking and informed decision-making[131].

VI. STRATEGIC RECOMMENDATIONS FOR CURRICULUM TRANSFORMATION

A. Institutional Leadership and Policy Support

Successful curriculum transformation in environmental science and sustainable development requires strong institutional leadership and supportive policies[132]. University leaders must articulate clear commitments to sustainability education, align these commitments with institutional mission and strategic plans, and allocate adequate resources for curriculum development and implementation[133]. Institutional policies should recognize and reward teaching innovation in faculty evaluation and promotion processes, provide professional development opportunities for faculty to develop expertise in ESD and innovative pedagogies, and establish administrative structures that facilitate interdisciplinary collaboration[134].

Creating dedicated positions or units for sustainability education coordination can provide crucial infrastructure for curriculum reform efforts[135]. These roles can facilitate faculty collaboration, coordinate community partnerships, support assessment and continuous improvement, and maintain connections with broader sustainability initiatives both within and beyond the institution[136].

B. Faculty Development and Capacity Building

Comprehensive faculty development programs are essential for enabling effective implementation of reformed environmental curricula[137]. Professional development should address multiple dimensions: conceptual understanding of ESD principles, SDGs, and contemporary sustainability challenges; pedagogical knowledge of innovative teaching methods including inquiry-based learning, project-based learning, and community engagement; technological skills for integrating digital tools and platforms; assessment expertise for evaluating competency development and transformative learning; and collaborative capabilities for interdisciplinary teaching and research[138].

Faculty learning communities, where colleagues work together on curriculum development and pedagogical innovation, represent particularly effective approaches for capacity building[139]. These communities provide peer support, facilitate knowledge sharing, and create accountability for implementation[140]. Mentoring programs that pair experienced ESD educators with those newer to sustainability education can accelerate learning and build institutional capacity[141].

C. Collaborative Curriculum Design and Stakeholder Engagement

Curriculum transformation should be approached as a collaborative process involving multiple stakeholders rather than an isolated effort by individual faculty or administrators[142]. Effective curriculum development engages faculty from diverse disciplines, students who can provide perspectives on learning needs and preferences, community partners who can articulate societal needs and opportunities, employers who can identify desired competencies, and education scholars with expertise in curriculum design and assessment[143].

Engaging students as partners in curriculum design represents an emerging trend with significant potential[144]. Students bring valuable insights regarding what motivates engagement, what pedagogies enhance learning, and what competencies they perceive as important for their futures[145]. Student involvement in curriculum development can enhance relevance, increase buy-in, and provide professional development opportunities for students themselves[146].

D. Continuous Assessment and Adaptive Improvement

Effective curriculum transformation requires ongoing assessment, reflection, and iterative improvement rather than one-time reform[147]. Institutions should establish mechanisms for collecting feedback from multiple sources including student learning outcomes data, student and faculty experience surveys, employer and alumni feedback, and assessment of program impacts on broader sustainability goals[148]. Regular curriculum review processes should examine whether learning outcomes align with program goals, pedagogical approaches effectively support intended learning, assessment methods validly measure competency development, and curricula remain current with evolving sustainability challenges and knowledge[149].

Adopting adaptive management approaches to curriculum development—involving cycles of planning, implementation, evaluation, and adjustment—enables continuous improvement responsive to changing contexts, emerging challenges, and accumulating evidence regarding effective practices[150].

VII. CASE STUDIES AND EXEMPLARY PRACTICES

A. Integration of Practical Sustainability Projects

Educational institutions worldwide are increasingly moving beyond theoretical environmental education toward practical implementation of sustainability solutions[151]. Universities are introducing courses on green technologies, sustainable management, and environmental entrepreneurship that require students to design and implement real solutions[152]. Business schools have incorporated modules teaching minimization of corporate carbon footprints, while agricultural universities focus on organic farming and pesticide reduction[153].

Student-led sustainability startups represent a particularly promising trend, with institutions establishing incubators and support systems for students developing environmental innovations[154]. Examples include student projects addressing river cleanup, biomaterial development, waste recycling systems, and renewable energy solutions tailored to local contexts[155]. These initiatives demonstrate how curriculum transformation can extend beyond classroom learning to tangible environmental impact.

B. International Partnerships and Knowledge Exchange

International collaborations between universities enable students to share sustainability experiences, access diverse perspectives, and implement learning in their home contexts[156]. Partnership models include joint degree programs in environmental science, international field courses exploring different ecosystems and sustainability approaches, virtual exchange programs connecting students across countries for collaborative sustainability projects, and faculty exchange programs supporting curriculum development and pedagogical innovation[157].

These international partnerships enrich environmental education by exposing students to diverse environmental challenges, policy contexts, and cultural perspectives on sustainability; facilitating comparison of different approaches to environmental management and sustainable development; building global networks that can support future collaboration; and developing intercultural competencies essential for addressing global environmental challenges[158].

VIII. FUTURE DIRECTIONS AND EMERGING TRENDS

A. Integration of Emerging Technologies

Future environmental science curricula will increasingly incorporate emerging technologies including artificial intelligence and machine learning for environmental monitoring and prediction, blockchain for supply chain transparency and environmental accounting, biotechnology and synthetic biology for environmental remediation and sustainable materials, and advanced sensing and monitoring technologies for real-time environmental data[159]. Curricula must balance teaching technical skills in these technologies with critical examination of their environmental implications, ethical considerations, and social dimensions[160].

B. Focus on Climate Change Education

As climate change intensifies, curricula are placing greater emphasis on climate science, mitigation and adaptation strategies, climate policy and governance, and psychological and social dimensions of climate change[161]. Climate change education is evolving beyond presenting scientific evidence to addressing climate anxiety and empowering action, exploring climate justice and equity dimensions, examining transformative societal changes required, and developing competencies for climate adaptation and resilience[162].

C. Emphasis on Systems Transformation

Future environmental education will increasingly recognize that incremental improvements are insufficient and emphasize the systems transformations required for sustainability[163]. This involves understanding socio-technical systems and transition pathways, examining power structures and political economy of environmental change, exploring alternative economic models beyond growth paradigms, and developing capabilities for social innovation and systems intervention[164].

IX. CONCLUSION

The curriculum of environmental science and sustainable development has undergone remarkable transformation in recent years, evolving from traditional, discipline-specific, theory-focused approaches toward integrative, interdisciplinary, competency-based, and action-oriented education. This evolution reflects growing recognition that addressing complex sustainability challenges requires fundamental changes in how we educate future generations of environmental professionals, citizens, and leaders. The trends examined in this paper—integration of SDGs, interdisciplinary approaches, competency-based learning, experiential and place-based education, digital technology adoption, and innovative pedagogies—collectively represent a paradigm shift toward education that is more relevant, engaging, effective, and transformative.

Despite significant progress, substantial challenges remain in realizing the full potential of curriculum transformation. Institutional structures, resource constraints, assessment challenges, and cultural resistance continue to impede implementation. Addressing these barriers requires sustained commitment from institutional leaders, comprehensive faculty development, adequate resource allocation, and policy frameworks that support and reward innovation in environmental education. The future of environmental science and sustainable development education will be shaped by continued evolution in response to emerging challenges, technological possibilities, and accumulating evidence regarding effective practices. Success will require ongoing collaboration among educators, students, communities, policymakers, and other stakeholders; commitment to continuous assessment and adaptive improvement; and recognition that curriculum transformation is not a destination but an ongoing process of learning and adaptation.

Ultimately, the transformation of environmental science curricula represents not merely an educational reform but a crucial contribution to the broader societal transformation required for achieving sustainability. By equipping students with the knowledge, competencies, values, and commitment to address sustainability challenges, transformed environmental curricula can help catalyze the profound changes necessary for securing a sustainable future for all.

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Voice of the Beneficiary: Measuring the Quality of Maternal and Child Health Services at the District Women Hospital, Amravati

Prof. Dr. Gauri S. Kalmegh,

Janhvi Kharabe, Neha Wadhwani, Disha Shriwas, Bhagyashri Gawali

Emailid: dishadshriwas@gmail.com Phone no: 8855875655

Department of Management Studies, Prof. Ram Meghe Institute of Technology and Research,
Badnera, Amravati, Maharashtra, India, 444701

❖ Abstract

Measuring the Quality of Maternal and Child Health Services at the District Women Hospital, Amravati aims to assess the quality of maternal and child health (MCH) services from the perspective of beneficiaries. Maternal and child health services play a crucial role in reducing maternal and infant morbidity and mortality, and beneficiary satisfaction is an important indicator of service quality. The study adopts a descriptive cross-sectional research design and includes 100 women who utilized antenatal, delivery, and postnatal services at the hospital. Data were collected using a structured questionnaire and analyzed using simple statistical methods such as percentages and averages. The findings indicate that while a majority of beneficiaries are satisfied with certain aspects of care such as availability of services and staff support, gaps still exist in areas like communication, nutritional guidance, waiting time, and overall service quality. A portion of respondents reported only partial satisfaction, highlighting inconsistencies in service delivery. The study concludes that although the hospital is performing an essential role in providing maternal and child health services, there is a need for improvement in quality, patient centered care, and effective communication.

❖ Keywords

Maternal and Child Health (MCH), Institutional Delivery, Patient Perception, Healthcare Services Quality, Public Health System, etc.

❖ Introduction

Government hospitals provide a wide range of healthcare services including preventive care, diagnosis, treatment, rehabilitation, and emergency medical services. They also support the implementation of various national health programs aimed at improving the health status of the population (World Health Organization, 2023).

Maternal and Child Health Services

Maternal and Child Health (MCH) services are an important component of the public health system aimed at improving the health of mothers and children. These services include antenatal care, safe delivery, postnatal care, immunization, and nutritional support. Effective MCH services help reduce maternal and infant mortality and promote healthy pregnancies and child development. In India, government hospitals play a key role in providing these services, especially to economically weaker sections of society.

Importance of Quality in Healthcare Services

The quality of healthcare services significantly influences the health outcomes of mothers and children. High-quality services ensure safe delivery, proper medical care, and timely treatment during pregnancy and after childbirth. Quality also includes factors such as availability of facilities, skilled healthcare professionals, respectful behaviour, and effective communication.

Beneficiary Perspective in Health Services

The beneficiary's perspective is an essential factor in evaluating healthcare services. Mothers who utilize maternal and child health services can provide valuable feedback about the care they receive. Their experiences regarding staff behaviour, waiting time, facilities, and guidance help in understanding the actual effectiveness of healthcare programs.

Maternal and Child Health Programs in India

The Government of India has introduced several programs under the National Health Mission to improve maternal and child health. Programs such as antenatal care services, institutional delivery initiatives, and immunization campaigns aim to ensure safe motherhood and healthy childhood.

❖ Review of Literature

Srivastava et al. (2015) stated that maternal satisfaction is an important indicator of the quality of maternal healthcare services. The study highlighted that factors such as respectful behavior of healthcare staff, privacy, and timely care significantly influence women's perception of services. It also emphasized the need for patient-centered care to improve overall service quality. The authors concluded that measuring beneficiary satisfaction helps in identifying gaps in healthcare delivery.

Bhattarai and Gautam (2019) emphasized that maternal and child health services, including antenatal, delivery, and postnatal care, are essential for reducing maternal and infant mortality. The study pointed out that accessibility and quality of healthcare services directly affect health outcomes. It also highlighted the importance of awareness among women regarding available health services. Improving service quality was identified as a key factor for better utilization.

Vyas, Joseph, and Bhardwaj (2023) found that effective communication and supportive behavior of healthcare providers play a crucial role in improving maternal satisfaction. The study revealed that most women were satisfied with delivery services but expressed concerns about pain management and postnatal guidance. The authors stressed the need for better counseling and emotional support during childbirth. This indicates that both clinical and interpersonal aspects of care are important.

Jain et al. (2025) reported that although awareness regarding maternal and child health services was present among women, the actual quality of services received was not always satisfactory. The study found gaps in areas such as counseling, follow-up care, and service delivery. It emphasized the need for strengthening healthcare systems to ensure better outcomes. The findings suggest that improving service quality is essential for enhancing patient satisfaction.

Singh et al. (2025) highlighted that respectful maternity care, proper infrastructure, and availability of skilled healthcare professionals are key determinants of maternal satisfaction. The study showed that women's experiences during childbirth are significantly influenced by the quality of care provided.

❖ Research Methodology

Research Problem

Despite significant improvements in maternal and child health services under various government initiatives, the quality of care provided in public health facilities still remains a concern. Many beneficiaries experience gaps in services such as inadequate communication, lack of proper nutritional guidance, long waiting times, and insufficient infrastructure. Although the utilization of institutional delivery and antenatal services has increased, the level of satisfaction among beneficiaries is not consistently high. Moreover, the voice and feedback of beneficiaries are often overlooked in evaluating healthcare quality. This creates a need to assess services from the patient's perspective to understand their actual experiences. Therefore, the present study focuses on identifying gaps in the quality of maternal and child health services at District Women Hospital, Amravati.

Objectives

- To understand Maternal & child Health services provided at the district Women Hospital Amravati.
- To measure how satisfied mothers are with the treatment & care received at the hospital.
- To identify the main problem patients face, such long waiting times or extra cost.
- To suggest simple improvements based on patient feedback to make the hospital more user-friendly.

❖ Research Method

The present study is a **descriptive cross-sectional research** conducted to assess the quality of maternal and child health (MCH) services from the perspective of beneficiaries at the District Women Hospital, Amravati. The study focuses on evaluating the level of satisfaction among women who have utilized antenatal, intranasal, and postnatal services, along with identifying gaps in service delivery.

Universe of the Study:

The universe of the study comprises all women beneficiaries who have received maternal and child health services at the District Women Hospital, Amravati. This includes pregnant women, postnatal mothers, and mothers visiting the hospital for child healthcare services such as immunization and check-ups.

Sampling Design:

A **non-probability convenient sampling technique** was adopted for the study. Respondents were selected based on their availability and willingness to participate during the data collection period. This method was considered suitable due to time constraints and ease of access to beneficiaries in the hospital setting.

Sample Size:

A total of **28 beneficiaries** were selected as the sample for the study. The sample includes women who have utilized various maternal and child health services such as antenatal care (ANC), delivery services, and postnatal care (PNC).

Type and Sources of Data:

The study is based on both **primary and secondary data**. Primary data were collected directly from beneficiaries using a **structured questionnaire and personal interviews** to understand their experiences and satisfaction levels. Secondary data were obtained from hospital records, government reports, journals, and previous research studies related to maternal and child health services.

Data Collection Tool:

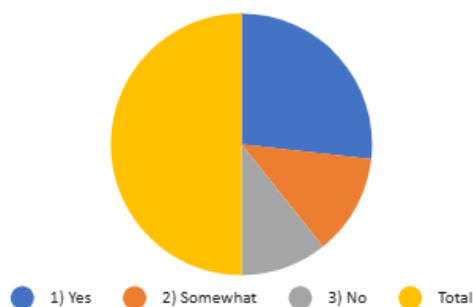
A pre-tested structured questionnaire was used to collect information regarding socio-demographic details, utilization of services, satisfaction level, and perceived quality of care. The questionnaire included both closed-ended and a few open-ended questions.

Data Analysis:

The collected data were classified, tabulated, and analyzed using simple statistical tools such as percentages, averages, and charts to interpret the findings in a meaningful way.

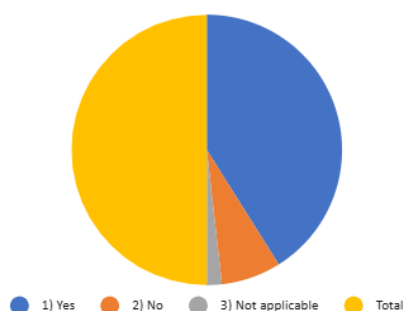
Ethical Considerations:

Informed consent was obtained from all respondents before data collection. Confidentiality and anonymity of the participants were strictly maintained, and the information collected was used solely for academic purposes.

❖ Data Analysis and Interpretation**No. of patients who received proper guidance about nutrition during pregnancy**

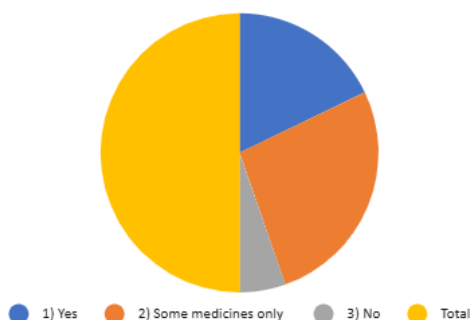
The chart shows that about half of the respondents reported receiving proper nutritional guidance during pregnancy, indicating a relatively positive level of awareness and support. However, a notable proportion answered “Somewhat,” suggesting that the guidance provided may not have been complete or fully satisfactory. Overall, while many beneficiaries are being guided, there is still scope for improving the quality and coverage of nutritional counseling. Strengthening communication and ensuring uniform guidance can enhance maternal health outcomes.

No. of child's received vaccination services at the hospital



This illustrates that a significant majority of respondents answered "Yes," indicating that the hospital is a primary provider for child vaccinations. Specifically, the blue "Yes" segment accounts for nearly 40% of the total, while the orange "No" and grey "Not applicable" segments represent much smaller portions of the data. Interestingly, the chart includes a "Total" category (yellow) that encompasses half of the circle, which visually suggests that the "Yes" group makes up the vast majority of the actual responses collected. Overall, the data reflects a high utilization rate for vaccination services, with only a small minority of participants either opting out or finding the service irrelevant to their situation.

Medicines provided free of cost in the hospital



The chart reveals a **mixed experience** regarding the provision of free medicines, with the largest group of actual respondents (orange) indicating they received "Some medicines only." The "Yes" group (blue) represents the second largest segment, suggesting that while many patients received full coverage, a **greater number faced partial costs**. A small minority (grey) reported receiving no free medicines at all. Because the "Total" category (yellow) occupies half the chart, it highlights that **over 80%** of the individuals surveyed received at least some level of free medication. Overall, the data suggests that while the hospital provides significant financial support for prescriptions, complete coverage is not yet universal for all patients.

❖ Findings

The study reveals that maternal and child health services at the District Women Hospital, Amravati are generally well utilized by beneficiaries, particularly in the area of child vaccination where a majority of respondents reported availing services from the hospital. However, the findings also indicate that only about half of the respondents received proper nutritional guidance during pregnancy, while a significant proportion received only partial information, highlighting gaps in counseling services. In terms of free medicine provision, most beneficiaries reported receiving medicines either fully or partially, with a larger number experiencing only partial availability, suggesting inconsistencies in supply. Overall, while essential services are accessible and functioning, there are noticeable gaps in the quality, consistency, and completeness of care. These findings emphasize the need for improved communication, better resource management, and enhanced service delivery to ensure higher beneficiary satisfaction and better health outcomes. Furthermore, the study indicates that beneficiary awareness and understanding of services vary significantly, which may affect proper utilization of available facilities. It was also observed that interpersonal aspects such as staff behavior and guidance play a crucial role in shaping patient satisfaction. Some respondents expressed concerns regarding incomplete information and lack of continuous support during pregnancy and postnatal periods. Additionally, partial availability of medicines and services may lead

to out-of-pocket expenditure, affecting economically weaker sections. The findings also highlight the importance of regular monitoring and evaluation of services to maintain quality standards. Overall, strengthening patient-centered care and ensuring consistency in service delivery can significantly improve maternal and child health outcomes.

❖ **Suggestions**

It is suggested that the hospital should strengthen the quality and consistency of maternal and child health services by ensuring uniform nutritional counseling for all pregnant women through regular guidance sessions and trained staff. Efforts should be made to improve communication between healthcare providers and beneficiaries to enhance understanding and satisfaction. The hospital should also work towards ensuring the full availability of free medicines to reduce the financial burden on patients. Additionally, maintaining and further improving immunization services is important to sustain high utilization rates. Regular monitoring, feedback from beneficiaries, and adequate resource allocation can help in improving overall service quality and patient-centered care. Further, the hospital should focus on conducting awareness programs and health education sessions to improve beneficiaries' knowledge regarding maternal and child health services. There is also a need to strengthen staff training in respectful maternity care and effective communication skills. Ensuring adequate staffing and infrastructure facilities can help reduce waiting time and improve service efficiency. The hospital administration should also implement a regular feedback mechanism or grievance redressal system to address patient concerns promptly. Overall, continuous quality improvement initiatives can help in delivering more effective and beneficiary-centered healthcare services.

❖ **Conclusion**

The study highlights that the District Women Hospital, Amravati plays a significant role in providing maternal and child health services, with high utilization particularly in immunization services. However, the findings reveal that there are gaps in areas such as nutritional counseling, communication, and complete availability of free medicines. While beneficiaries generally access essential services, the quality and consistency of care need further improvement. The study emphasizes the importance of incorporating the beneficiary's perspective to understand actual service delivery and satisfaction levels. Strengthening patient-centered care, ensuring uniform service provision, and improving resource management can enhance the overall effectiveness of maternal and child health services. Ultimately, improving these aspects will contribute to better maternal and child health outcomes and increased beneficiary satisfaction.

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Curriculum Transformation in Commerce and Management Education: Emerging Trends, Skill Orientation, and Industry Alignment

Mr. Mayur Sudhakar More

M.B.A., M.Com., B.Ed.

Research Guide:

Dr. Mangalawati Ji Pandey

M.Com., NET, Ph.D., M.A. (Economics) M.Phil., D.B.M., B.A. (Hindi Literature), B.Ed. J. D. Patil

Sangludkar Mahavidyalaya, Daryapur Taluka: Daryapur, District: Amravati

Research Centre: J. D. Patil Sangludkar Mahavidyalaya, Daryapur Taluka: Daryapur, District:
Amravati

Research Centre Code: 107

Abstract: Commerce and management education has been demonstrated to have undergone a drastic change in expectations due to the rapid technological change, the digital transformation, and the shifting industry needs. In many higher education systems, curriculum reform has become a strategic answer to the challenges of globalization, Industry 4.0, and the increase in the focus on employability and competency-based learning. Nevertheless, even after these reforms, there are still questions that the skills acquired by graduates are not aligned to what is needed by the labor market, and there is still an industry-academia gap. Conventional courses in business and management are in fact usually viewed as being too theory based, not heavy enough practice based and too slow to conform to new business realities.

The paper analyses change in the curriculum in the field of commerce and management education especially focusing on the emerging trends, skill orientation and industry orientation. The study assumed a qualitative secondary data-based design and is based on the systematic analysis of the documents, including the curriculum structures, course syllabi, accreditation reports, and national policy frameworks. The paper assesses the degree to which institutional reforms are aligned to the current skills demands and regulatory expectations through thematic content analysis and mapping of policy-curriculum alignment.

The results show that there is a trend towards the digital and analytics-oriented curriculum, the focus on soft skills and practical learning, and the formal use of outcome-based education models. Nevertheless, loopholes still exist in the systematic collaboration of industry and in the systematic matching of the objectives of the policy and the implementation of the curriculum. The authors conclude that successful curriculum change must have a robust system of governance, articulate competency models, and long-term involvement in industry to assure long-term currency and quality in commerce and management education. **Keywords:** Curriculum Transformation, Skill Orientation, Industry-Academia Alignment, Outcome-Based Education, Quality Assurance in Higher Education

2. Introduction

2.1 Background

The business environment of the field of commerce and management education has been changing radically in reaction to the fast digitalization and reorganization of the global economic system. The rate of digital technologies adoption, such as artificial intelligence, big data analytics, automation, and cloud computing, has transformed the business operations and decision-making processes. With organizations becoming more dependent on online platforms and data-focused approaches, institutions of higher learning are under growing compulsion to restructure the curricula to be relevant.

This has been exacerbated by the advent of Industry 4.0 which has increased the necessity to reform. The industry 4.0 is marked with intelligent technologies, interconnectedness, and digital innovation and, as such, requires graduates who have not only the traditional knowledge of business but also technological literacy, analytical competency, and adaptive skills. Intellectual capital and innovation have taken centre stage as prime sources of competitiveness in this changing body of knowledge economy.

At the same time, employers focus on employability skills, including problem-solving, leadership, communication, and digital skills. This competency development is illustrated by the increasing popularity of outcome-based education. Furthermore, with the globalisation of business education, in terms of international accreditation standards, transnational co-operations, and international ranking, the level of competition among institutions has risen and institutions have been forced to align their curriculum to international standards and labour markets.

2.2 Problem Statement

- Traditional theory-heavy curriculum

Weak industry alignment

Policy pressure for outcome-based education

Need for systemic transformation

2.3 Research Objectives

- To examine emerging trends in commerce and management curriculum reform

To analyse the integration of skill orientation

To evaluate industry alignment mechanisms

To assess policy-curriculum coherence

2.4 Research Questions

1. What major trends characterize curriculum transformation?
2. How are employability and skill competencies embedded?
3. To what extent do curricula align with industry and policy frameworks?

2.5 Significance of the Study

- Contribution to curriculum governance debate
- Relevance for policy reform
- Implications for quality assurance systems

3. Literature Review

3.1 History of Commerce and Management Education.

Traditionally, commerce education and management education has been based on content-based and discipline-oriented models in which theoretical bases are pivoted in accounting, economics, finance, and organizational theory (Khurana, 2007). Conservative curricula focused more on teaching subjects rather than practical skills. But a growing globalization and complexity in the markets have seen the emphasis on competency-based education models that emphasize on quantifiable learning outcomes and graduate attributes (Spady, 1994). The skill-based and practice-based approaches have been gradually embraced by business schools because of the demands of employers and accreditation (Bennis and O Toole, 2005).

3.2 Higher education Skill Orientation.

The issue of incorporating both soft and hard skills into curricula is becoming more acceptable in higher education institutions. The hard skills in data analytics and financial technologies and digital marketing are the key ones to navigate in the industry 4.0 conditions (Schwab, 2016). At the same time, soft skills such as communication, leadership, and work in a team are stressed to improve performance at the workplace (Robles, 2012). Adaptability, critical thinking, and lifelong learning are also among the meta-skills that became prevalent and are now recognized in the knowledge economy (World Economic Forum, 2020).

3.3 Industry-Academia Alignment Controversy.

The skill gap literatures refer to the long-term discrepancies between graduate competencies and employer expectations (Jackson and Chapman, 2012). Employers often complain of poor skills applied and readiness of graduates to work (Andrews and Higson, 2008). In turn, to address the issue, work-integrated learning (WIL) models, including internships and cooperative education, have been propagated as a solution to narrow the industry-academia gap (Jackson, 2015).

Figure 3.4 shows the perspective of governance and quality assurance.

The accreditation systems and quality assurance models have played an important role in the changes of curriculum in management education (Harvey and Williams, 2010). Outcome-Based Education (OBE) puts an emphasis on the clearly defined learning outcomes based on institutional missions and industry expectations (Spady, 1994). Moreover, NQFs are designed to bring about standardization to competency levels and to make them inter-institutional (Allais, 2014).

3.5 Research Gap

Although the current research covers the skill orientation, industry alignment, and accreditation reforms in separate studies, there are few research which combine the aspects of curriculum transformation with the governance and policy frameworks within the analytical model. Still, there is a gap in the research that relate curriculum reform, quality assurance measures and industry alignment in a single model.

4. Theoretical Framework

This paper incorporates the Human Capital Theory, the Institutional Theory, and the Outcome-Based Education (OBE) as the tools to describe the change in curriculum in commerce and management courses.

4.1 Human Capital Theory

The Human Capital theory approaches education as an investment that increases the productivity of the individual and economic growth. In this view, the education of commerce and management is not only meant to pass information but to equip skills that enhance competencies in graduates to better their performance in the labor market. The focus on digital abilities, analytical skills, leadership, and attributes of employability is also representative of the overall economic demand that higher education institutions create work-ready graduates. As such, curriculum reform may be viewed as a strategic action to changing labor market demands and knowledge economy needs.

4.2 Institutional Theory

The institutional Theory is used to describe the environmental pressures that make organizational structures and practices to develop in accordance with environmental pressures instead of the rational efficiency considerations. Path dependency indicates that historical precedents and academic traditions make universities stick to traditional content-based models. The regulatory forces, including accreditation regulations, national qualification systems, and government regulations compel institutions to implement outcome-based and skill-based curricula. Isomorphic reforms are where the institutions follow the examples of world-renowned business schools or rather adhere to accreditation in order to become legitimate and competitive.

Outcome-based education framework is utilized by the system in adult education, professional education, and higher education.

4.3 Outcome-Based Education Framework. The system uses outcome-based education framework in adult education, professional education, and higher education.

OBE model places the emphasis on inputs to teaching to quantifiable learning outputs. It focuses on well-stated competencies, consistency of the assessment and performance measures that deliver the desired skills in the graduates. Such a model enhances responsibility and industry responsiveness.

4.4 Conceptual Model

The suggested model presupposes that the aspects of curriculum reform (content innovation, pedagogy, assessment, industry engagement) are shaped by the digital transformation, industry needs, policy reforms, and globalization. These reforms influence skill orientation which defines how well the industry is aligned and eventually has effect on institutional competitiveness and educational quality.

5. Methodology (Secondary Data-Based Study)

5.1 Research Design

This paper will use a secondary research design of a qualitative study that involves systematic review of documents. The study uses a comparative institutional design that studies the variation between the chosen public and private universities. The way the curriculum changes conform to the national regulatory expectations and quality assurance mechanisms is evaluated with the help of a policy analytical framework. The design will allow assessing curriculum to change without using primary data collection.

5.2 Data Sources

Secondary sources (publicly available) are employed in the study, which are curriculum

documents in BBA, MBA, and Commerce programs; accreditation and quality assurance (QA) reports; national education and qualification framework policies; industry skill demand reports. Such sources give information about the institutional structures of curriculum, regulatory demands and labour market needs.

5.3 Sampling Strategy

To sample the institutions, purposive sampling will be used, and the selection should fulfil certain criteria: accreditation status, the maturity of the program, and the presence of the full documentation of the curriculum. The number of public and private universities would be included to make comparative analysis easier.

5.4 Data Collection Procedure

Institutional websites and regulatory portals are used to access official documents. The materials gathered are carefully arranged, categorized as well as coded to discover applicable themes and patterns.

5.5 Analytical Strategy

The research uses thematic content analysis, which entails coding the documents because of themes, which include digital integration, skill development, experiential learning and industry linkage. The competency mapping is performed through the comparison of the described graduate qualities with the skills requirements of the industry. The structural differences between the two institutions, namely the public and the private, are brought out by cross-case comparison. The policy-curriculum alignment matrix is created to evaluate the consistency between the regulatory framework and the implementation of the curriculum.

5.6 Validity and Reliability

Analytical rigor is enhanced by triangulation of numerous document sources and cross document verification.

5.7 Limitations

The research is also based on documented evidence only and that might not give full evidence of what is practiced or implemented in the classroom.

6. Findings

6.1 Curriculum Transformation Newsworthy.

The review shows that there are several significant trends in curriculum reform in the field of commerce and management education. To start with, it is obvious that there is an apparent incorporation of digitally and analytics-focused classes, such as business analytics, financial technology, data-driven decision-making, and digital marketing. These additions portray the institutional reaction to the movements in technology and labor market. Second, the ESG topics and sustainability-related modules are gradually becoming part of business programs, which implies the compliance with the agendas of global corporate responsibility. Third, the interdisciplinary modules of business and technology, entrepreneurship, and innovation management are becoming more evident. Lastly, the elements of experiential learning (internship, project-based learning, simulations, and case competitions) have grown signaling the development of the practical exposure and application skills.

6.2 Skill Orientation Analysis

The results indicate an increase in the focus on technical and digital skills especially in analytics, info systems and financial modeling. It seems that institutions respond to the requirements of Industry 4.0 by incorporating data literacy and technology-enhanced management skills into the curriculum. Simultaneously, soft skills like communication, leadership, teamwork, problem-solving are becoming more clearly stated in program learning outcomes. Nevertheless, even in light of these developments, there are scarce mechanisms of the structured competency assessment. Learning outcomes in most instances are associated with development of a given skill without specific performance indicators or a standardized evaluation framework.

6.3 Industry Alignment Mechanisms.

Most institutions make internships formal in terms of completing programs, which implies the acknowledgment of work-integrated learning models. Other universities have had industry advisory boards and have practitioner-led courses or guest lectures. However, there is no uniformity in evidence of systematic and sustained industry collaboration. Advisory positions may seem

consultative as opposed to co-creative and long-term curriculum co-design with industry partners is limited.

6.4 Policy-Curriculum Alignment.

Evidence of the adoption of Outcome-Based Education (OBE) can be seen especially in the areas of structured learning outcome statements and credit mapping. Nonetheless, adherence to national qualification frameworks seems to be insufficient, with different degrees of difference among institutions. There exist implementation gaps between policy intent and a real curriculum design implying that there is a difficulty in action-based reform in translating regulatory requirements into substantive reform.

7. Discussion

The results provoke the issue of whether curriculum reform is a superficial adherence or a radical change. Although digital integration and skill orientation can be observed, the complexity of the structural change can be different. The forces of markets stimulate the use of employability-based reform, although there are still tensions between vocational orientation and academic rigor. Regulations and institutional path dependency are constraints to governance that affect reform paths. Comparative analysis indicates that the private institutions are more flexible and responsive as compared to the public institutions which have greater regulatory and structural constraints.

8. Policy and Governance Implications

8.1 Institutional Level

Curriculum change at the institutional level needs systematic and ongoing review processes as opposed to the periodic review processes that are just necessitated by the accreditation processes. Curriculum review committees that are institutionalized in universities should help in a systematic review of the relevance of courses, learning outcomes, and their alignment to the requirements of the labor market. There is also needed to have stronger industry engagement structures. Instead of the symbolic advisory views, the institutions ought to encourage co-designed curricula, long term partnerships, and collaborative research work with industry stakeholders. Also, faculty development will be important in maintaining reform. The effective delivery of the skill-oriented curricula can be improved by continuous professional training in digital tools, trends in the industry, and strategies of outcome-based assessment. In the absence of capacity building of the faculty, reforms in the curricular will be symbolic as opposed to being substantive.

8.2 Policy Level

Clearer and more operational competency frameworks are required at the policy level to guide curriculum reform. The national qualification frameworks are expected to have measures of descriptors of graduate qualities which are practicable by institutions. Quality measures that can be used to motivate meaningful changes include performance-based quality indicators, e.g., graduation employability rates, internship rates, industry involvement rates, etc. Besides, the policymakers are to develop financial or regulatory incentives to promote collaboration between the industry and academic circles such as tax privileges, joint innovation grants, and structured internship programs. These actions can enhance institutional emphasis on meeting labor market demands.

8.3 Quality Assurance Level

Quality assurance agencies are very important to the process of curriculum transformation whereby transformation is not confined to documentation. Better outcome measurement models, such as standardized competency assessment instruments, are needed to measure the actual skill achievement. Periodic curriculum audits are expected to evaluate the adherence to the regulatory standards as well as the quality of the implementation, the standard of the industry engagement, and alignment of the assessment content.

9. Conclusion

The research comes up with the conclusion that there is continuous change in curriculum in the study of commerce and management but disproportionately spread in institutions. As the sphere of skills is growing, especially in the digital and experience fields, the reforms lack systematic coherence. The alignment initiatives in industries are present but need further institutional reorganization to facilitate sustainability. Finally, the quality of governance, institutional, policy, and quality assurance enables governance to either lead to substantive improvement or compliance in curriculum reform.

10. Future Research Directions

The use of secondary stakeholder's interviews, like faculty, students, and employers, in future research will help to address their perspective. The longitudinal studies would be able to look at the sustainability of the curriculum reforms with time. The international comparative analysis would give information on various models of governance. Lastly, evidence-based policy formulation would be enhanced by empirical research to quantify the effects of digital transformation on the real results of learning.

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Post-Independence Developments in Indian Higher Education: A Review Since 1947

Mr. Devendra Sarvdas Sandmare

Research Scholar, Smt. Radhabai Sarda Atrs, Commerce & Science College, Anjangaon Surji

Abstract:

Higher education in India has undergone significant transformation since independence in 1947. Initially limited in scope and accessibility, the system has expanded into one of the largest in the world. This paper reviews the evolution of higher education in India from 1947 to the present, focusing on its aims, growth, structural changes, and challenges. Special emphasis is placed on the National Education Policy 2020, which represents a paradigm shift toward multidisciplinary, flexible, and skill-oriented education. The paper highlights how higher education has contributed to national development while addressing issues of quality, access, and employability.

Keywords: Higher Education, University Education Commission: (1948-49), National Policy of Education, 1986, Revised National Policy of Education, 1992, National Education Policy 2020

Introduction:

Education is a cornerstone of national development, and higher education plays a crucial role in shaping a country's intellectual and economic future. After independence in 1947, India faced the challenge of restructuring its education system to meet the needs of a democratic and developing society. The University Education Commission (1948–49) laid the foundation for modern higher education by aligning it with constitutional values such as justice, liberty, equality, and fraternity. Over the decades, higher education has expanded significantly in terms of institutions, enrollment, and disciplines. The introduction of the National Education Policy 2020 marks a major reform aimed at addressing long-standing issues and preparing India for the global knowledge economy.

1. University Education Commission: (1948-49)

The Government of India established the University Education Commission in November 1948 to review and reform higher education in the country. The commission submitted its report in 1949 and became the first education commission of independent India. Since it was chaired by Dr. Sarvepalli Radhakrishnan, it is also known as the Radhakrishnan Commission.

The commission consisted of ten members, including Indian and foreign experts such as Sir James Duff, Dr. Arthur E. Morgan, and Dr. John J. Tigert. However, there were no women members in the commission. Its task was to examine the existing system of university education and recommend improvements to meet the present and future needs of the nation.

The report was very detailed, running into 747 pages and containing 207 recommendations. It addressed major aspects of university education such as admissions, course structure, curriculum, teaching and research, examinations, student discipline, and service conditions of teachers. The commission strongly emphasized maintaining high educational standards and warned that compromising on quality would be harmful to the country's progress.

The University Education Commission outlined the aims of universities in India in accordance with the constitutional ideals of justice, liberty, equality, and fraternity. Universities were expected to play a crucial role in shaping a democratic and progressive society.

1.1 Aims of the Universities

- The universities can be of great help in social reformation. So their aim should be to produce such leaders who are far sighted, wise and intellectual adventurers.
- Universities should produce such persons who can take leadership in politics, administration, trade and commerce.
- Universities should produce such intellectuals who can help in spreading education to make democracy a success, can discover knowledge. They can also know the sum and essence of human life; can arrange variety of professions and supply for different physical scarcities of life.
- Universities should be the limbs of civilization. So they should produce intellectual pioneers of civilization.
- The spiritual development of the student is one of the most important duties of the universities.

- A sound mind resides in a sound body'. So the universities should also make efforts for the physical development of its pupils.
- Universities should also find the innate tendencies of the students and develop them by giving training.
- The universities are the nurseries of culture and civilization. If we wish to be called civilized we must have sympathy with the poor and downtrodden; should learn to respect women; should be a lover of peace and liberty and should hate tyranny and injustice.
- Universities should assign the highest place to the literature of language and mother-tongue in its general education system. Universities should also lay emphasis on philosophical studies because these help to develop character and ideals of life. Hence it becomes the duty of the universities to develop the ideal character of their students.
- Universities should also develop the feeling of nationalism and try for international understanding in its students.
- One of the important duties of the universities is to render help in social emancipation. They should help students have unity in diversity.

The University Education Commission (1948–49) stressed the importance of excellence in teaching and urged teachers to keep themselves updated with new knowledge to inspire students effectively. It opposed promotion based solely on seniority and recommended merit-based advancement.

The commission warned against narrow specialization and emphasized that teachers should develop a broad outlook, balanced personality, and holistic understanding among students. Teachers were seen as guardians of culture, responsible for transmitting Indian values such as tolerance, secularism, and social justice. It highlighted that education should promote not only intellectual growth but also moral character, democratic values, and social responsibility. The report also expressed concern over the low social and economic status of teachers and recommended better salaries, working conditions, and professional recognition. Overall, the commission regarded teachers as vital for nation-building, cultural preservation, and the success of democracy, and called for reforms to improve their status and effectiveness.

2. National Policy of Education, 1986

In 1985, the Government of India initiated reforms to improve the education system and released a draft document titled “Challenges of Education” for public discussion. After receiving feedback from nationwide seminars and conferences, the National Policy on Education (NPE), 1986 was announced in May 1986. In August 1986, the government published the Programme of Action (POA) to outline the steps for implementing the policy. Together, these documents formed the New Education Policy of 1986, which was organized into twelve parts covering various aspects of education.

The Programme of Action (POA), 1986 was prepared to implement the National Policy on Education (NPE), 1986. It was based on the recommendations of 23 Task Forces formed by the Government of India to review the existing education system, clarify policy provisions, suggest required actions, set targets, and estimate financial needs. After Parliament adopted the National Policy on Education during the Budget Session of 1986, the Minister of Human Resource Development promised to present the POA in the Monsoon Session. The Ministry then undertook intensive work and constituted 23 Task Forces, including eminent educationists, experts, and senior officials from Central and State Governments, to prepare the Programme of Action.

3. Revised National Policy of Education, 1992

The Programme of Action (POA), 1986 was prepared to implement the National Policy on Education (NPE), 1986. It was based on the recommendations of 23 Task Forces formed by the Government of India to review the existing education system, clarify policy provisions, suggest required actions, set targets, and estimate financial needs. After Parliament adopted the National Policy on Education during the Budget Session of 1986, the Minister of Human Resource Development promised to present the POA in the Monsoon Session. The Ministry then undertook intensive work and constituted 23 Task Forces, including eminent educationists, experts, and senior officials from Central and State Governments, to prepare the Programme of Action.

The Revised National Policy on Education (1992) retained most of the provisions of the NPE 1986, but the Programme of Action (POA) was revised in August 1992 to improve implementation. It introduced key initiatives such as the Total Literacy Campaign, expansion of adult and non-formal education, strengthening of institutions like DIETs and SCERTs, and promotion of open and distance education through IGNOU and state open universities.

The policy emphasized vocationalisation of secondary education, curriculum diversification, examination reforms, internal evaluation, and better facilities in rural areas. It also focused on education for disadvantaged groups, teacher education, minority education, and increasing government expenditure on education to 6% of national income.

Although many programmes were implemented successfully, goals like universal education by 2000 were not fully achieved, and concerns were raised about maintaining educational quality. Overall, the revised policy continued to guide the development of modern education in India.

4. National Education Policy 2020

The New education policy 2020 emphasizes the holistic development of every individual, focusing not only on literacy and numeracy but also on critical thinking, creativity, ethical values, and emotional growth. It aims to nurture both foundational and higher-order cognitive abilities along with social and moral capacities. The policy draws inspiration from ancient Indian knowledge traditions, where education was seen as a path to wisdom, truth, and self-realization. Renowned ancient universities such as Takshashila, Nalanda, Vikramshila, and Vallabhi and scholars like Aryabhata, Charaka, Susruta, Panini, and Chanakya are cited as examples of India's rich educational heritage. The policy stresses preserving, researching, and applying this legacy in modern education.

Teachers are placed at the centre of educational reforms, and the policy aims to restore their status, dignity, and autonomy while ensuring proper training, accountability, and better working conditions to attract talented individuals into the profession. The policy also highlights equitable access to quality education for all students, especially those from disadvantaged and marginalized communities, recognizing education as a powerful tool for social justice, equality, and mobility.

Finally, the policy stresses the importance of promoting Indian culture, diversity, languages, ethics, and national identity while also addressing global needs, so that students develop self-confidence, social responsibility, and a sense of unity in diversity.

The NEP 2020 explains, higher education is essential for both individual development and national progress. It helps India become a democratic, just, and socially responsible nation as envisioned in the Constitution, while also supporting economic growth and sustainable livelihoods. Quality higher education in the 21st century should focus on developing well-rounded, creative, and ethical individuals. It should promote deep knowledge in specialized subjects along with values such as scientific temper, constitutional ideals, critical thinking, and a spirit of service. Education must prepare students for meaningful careers, social participation, and economic independence. The NEP 2020 also stresses that holistic development requires the integration of skills, values, and knowledge at all stages of education, from early childhood to higher education.

At the societal level, higher education plays a key role in building an enlightened, skilled, and innovative nation, capable of solving its own problems and contributing to economic and social progress. Thus, higher education is not only about employment but also about creating a prosperous, cohesive, and progressive society.

This policy envisions a complete overhaul and re-energising of the higher education system to overcome these challenges and thereby deliver high-quality higher education, with equity and inclusion. The policy's vision includes the following key changes to the current system:

- moving towards a higher educational system consisting of large, multidisciplinary universities and colleges, with at least one in or near every district, and with more HEIs across India that offer medium of instruction or programmes in local/Indian languages;
- moving towards a more multidisciplinary undergraduate education;
- moving towards faculty and institutional autonomy;
- revamping curriculum, pedagogy, assessment, and student support for enhanced student experiences;
- reaffirming the integrity of faculty and institutional leadership positions through merit appointments and career progression based on teaching, research, and service;

- establishment of a National Research Foundation to fund outstanding peer-reviewed research and to actively seed research in universities and colleges;
- governance of HEIs by high qualified independent boards having academic and administrative autonomy;
- “light but tight” regulation by a single regulator for higher education;
- increased access, equity, and inclusion through a range of measures, including greater opportunities for outstanding public education; scholarships by private/philanthropic universities for disadvantaged and underprivileged students; online education, and Open Distance Learning (ODL); and all infrastructure and learning materials accessible and available to learners with disabilities.

Conclusion:

Since independence in 1947, higher education in India has experienced significant growth and transformation through various commissions and policies. The University Education Commission (1948–49) laid the foundation for modern higher education, while the National Policy on Education 1986 and its revision in 1992 focused on expansion, equality, and improvement in quality. The National Education Policy 2020 has introduced comprehensive reforms aimed at making higher education multidisciplinary, inclusive, and globally competitive. Overall, these developments reflect India’s continuous efforts to strengthen higher education to support national development, social justice, and global progress.

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Value Addition in Traditional Foods for Skill-Based Education: Development and Nutritional Evaluation of Mushroom Khakhra

Shital Deshmukh

Asst. Prof. (C.H.B.), Matoshri Vimalabai Deshmukh College, Amravati

Email ID: shitaladeshmukh@gmail.com

ABSTRACT

Skill-based education plays an important role in enhancing employability and entrepreneurship in higher education. The development of value-added food products using locally available ingredients can contribute to both nutritional improvement and livelihood generation. Mushrooms are considered highly nutritious due to their rich content of proteins, vitamins and minerals. The present study aimed to develop and standardize mushroom khakhra supplemented with oyster mushroom powder and to evaluate its sensory and nutritional quality. The experimental study was conducted in the Food and Nutritional Biochemistry Laboratory of the Department of Home Science, Sant Gadge Baba Amravati University. Khakhra samples were prepared using different formulations incorporating mushroom powder and evaluated through sensory analysis using a nine-point hedonic scale. Nutritional analysis was performed to estimate protein, ascorbic acid, calcium and iron. The results revealed that mushroom supplementation significantly improved the nutritional quality of khakhra while maintaining high sensory acceptability. The garlic-mushroom khakhra sample showed the highest overall acceptability. The study demonstrates that the development of value-added traditional foods can support skill-based education, entrepreneurship and employment generation in the food processing sector.

Key Words: Value addition, Mushroom Khakhra, entrepreneurship and employment generation.

INTRODUCTION

Traditional foods form an integral part of Indian dietary patterns and provide an opportunity for developing nutritious value-added products. With the changing lifestyle and increasing demand for convenient foods, there is growing interest in improving the nutritional quality of traditional snacks through incorporation of functional ingredients.

Mushrooms are recognized as highly nutritious foods because they contain significant amounts of protein, vitamins and minerals while being low in fat and calories (Chang and Miller, 1993). They are also rich in essential amino acids and micronutrients that are often deficient in cereal-based diets (Rai and Soni, 1988). According to Prasad (1997), mushrooms contain 20–40 percent protein on a dry weight basis and are considered a valuable supplement to cereal-based foods.

The nutritional importance of mushrooms has been widely reported in scientific literature. Mushrooms contain essential amino acids such as lysine, methionine and tryptophan which are lacking in cereal grains (Kumar et al., 1999). They also contain vitamins such as riboflavin, niacin and ascorbic acid along with minerals such as calcium, phosphorus and iron (Robinson, 1994).

Khakhra is a traditional Indian roasted snack prepared from wheat flour and spices. It is widely consumed due to its crisp texture, long shelf life and convenience. Incorporating mushroom powder into khakhra can improve its nutritional value and make it a functional snack product.

In addition to improving nutrition, the development of value-added food products has important implications for skill-based education and entrepreneurship. Food processing and product development activities provide practical learning opportunities for students and promote employment generation in small-scale food industries.

Therefore, the present study was undertaken to develop mushroom khakhra and evaluate its sensory and nutritional quality.

MATERIALS AND METHODS

The experimental study was conducted in the Food and Nutritional Biochemistry Laboratory of the Department of Home Science, Sant Gadge Baba Amravati University, Amravati.

The ingredients used for preparation of mushroom khakhra included wheat flour, oyster mushroom powder, spices, oil, onion, garlic and fenugreek leaves. Oyster mushroom (*Pleurotus sajor-*

caju) was selected because it is widely cultivated and locally available. Mushrooms are known to be rich sources of protein and micronutrients (Rai, 1997).

Khakhra samples were prepared using different formulations by incorporating mushroom powder into wheat flour (Table 1).

The dough was prepared by mixing wheat flour with spices and water. The dough was divided into equal portions, rolled into thin discs and roasted on a pan until crisp.

Table 1: Formulation of Khakhra Samples

SR. NO.	SAMPLE CODE	DESCRIPTION
01	CS	Control Khakhra (without mushroom powder)
02	GM	Garlic+ 2% mushroom powder
03	OM	Onion + 2% mushroom powder
04	MM	Methi + 2% mushroom powder

Sensory evaluation was conducted using a **nine-point hedonic scale** with a panel of ten judges. The parameters evaluated included taste, colour, texture, mouthfeel and appearance. Sensory evaluation is widely used in food quality assessment to determine consumer acceptability (Lawless and Heymann, 2010).

The nutritional composition of the khakhra samples was analyzed using standard AOAC methods. The nutrients estimated included: Protein, Ascorbic acid, Calcium and Iron. These nutrients are important indicators of the nutritional quality of food products (AOAC, 2000).

Mean scores and standard deviations were calculated for sensory attributes. Statistical significance between samples was determined using F-test analysis (Kothari, 2005).

RESULTS AND DISCUSSION

Sensory Evaluation

The sensory quality of mushroom khakhra samples was evaluated based on taste, colour, texture, mouthfeel and appearance.

Table 2: Taste Evaluation

SR. NO.	SAMPLE	MEAN SCORE
01	CS	7.26
02	GM	8.43
03	OM	6.43
04	MM	6.84

The garlic-mushroom sample (GM) obtained the highest score for taste (Table 2). Similar findings were reported by Bhoge (1995) and Mahalle (1996), who observed that mushroom-supplemented foods showed good sensory acceptability.

Table 3: Total Acceptability

SR. NO.	SAMPLE	MEAN SCORE
01	CS	7.40
02	GM	7.78
03	OM	7.10
04	MM	7.42

The GM sample showed the highest overall acceptability among all samples where OM sample showed the lowest (Table 3).

Nutritional Composition

The nutritional composition of control and experimental khakhra samples was analyzed.

Table 4: Nutritional Value of Khakhra (per 100 g)

Nutrient	CS	GM	OM	MM
Protein	4.9 g	5.3 g	5.29 g	5.28 g
Vitamin C	0.6 g	1.8 g	1.5 g	1.7 g
Calcium	0.9 g	1.9 g	1.6 g	1.7 g
Iron	1.3 g	1.6 g	1.5 g	1.6 g

The results indicate that mushroom supplementation significantly improved the nutritional value of khakhra (table 4). This finding is consistent with earlier studies reporting that mushroom

powder enhances protein and micronutrient content in food products (Chang and Miller, 1993; Rai, 1997).

Fig. 1: Conceptual Framework of Study

Value Addition in Traditional Food



Incorporation of Mushroom Powder



Improved Nutritional Quality



Development of Functional Food Products



Skill-Based Education and Entrepreneurship

This framework demonstrates how value-added food product development can support skill development and employment opportunities (Fig. 1).

Conclusion

The study demonstrated that mushroom powder can be successfully incorporated into traditional foods such as khakhra to improve their nutritional quality. The experimental samples showed higher protein, vitamin C, calcium and iron content compared to the control sample.

The garlic-mushroom khakhra sample showed the highest sensory acceptability among the tested formulations. The product is economical, nutritious and suitable for small-scale production.

The development of value-added traditional foods can serve as an effective tool for promoting skill-based education, entrepreneurship and employment generation in the food processing sector.

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Role of computers in digital forensics

Mr. Somdev.S. Kumre

Department Of Computer Science Shri. Dadasaheb Gawai Charitable Trust, Amravati's
Takshashila Mahavidyalaya , Amravati ,Somdevk373@gmail.com

Under Guidance Of

Prof. Rhutika V. Jawarkar

Department Of Computer Science Shri. Dadasaheb Gawai Charitable Trust, Amravati's
Takshashila Mahavidyalaya , Amravati ,Rhutikaujawarkar25@gmail.com

Abstraction

Digital forensics plays a pivotal role in investigating and analyzing digital evidence to uncover cybercrime activities. As the volume and complexity of digital data continue to grow, the role of computers in digital forensics has become indispensable. This paper explores the multifaceted contributions of computers in the digital forensics domain, highlighting key aspects such as evidence acquisition, analysis, and presentation. The evolution of computer technology has provided forensic investigators with powerful tools and techniques to efficiently collect, preserve, and examine electronic evidence. Additionally, advancements in data storage and retrieval, as well as the increasing prevalence of networked systems, pose both challenges and opportunities for digital forensic practitioners. The paper delves into the critical role of computational methods, including data recovery, forensic analysis software, and machine learning, in enhancing the speed and accuracy of investigations.

Furthermore, it examines the ethical considerations and legal implications associated with the use of computers in digital forensics. By elucidating the symbiotic relationship between computers and digital forensics, this paper underscores the importance of ongoing technological advancements and interdisciplinary collaboration to address.

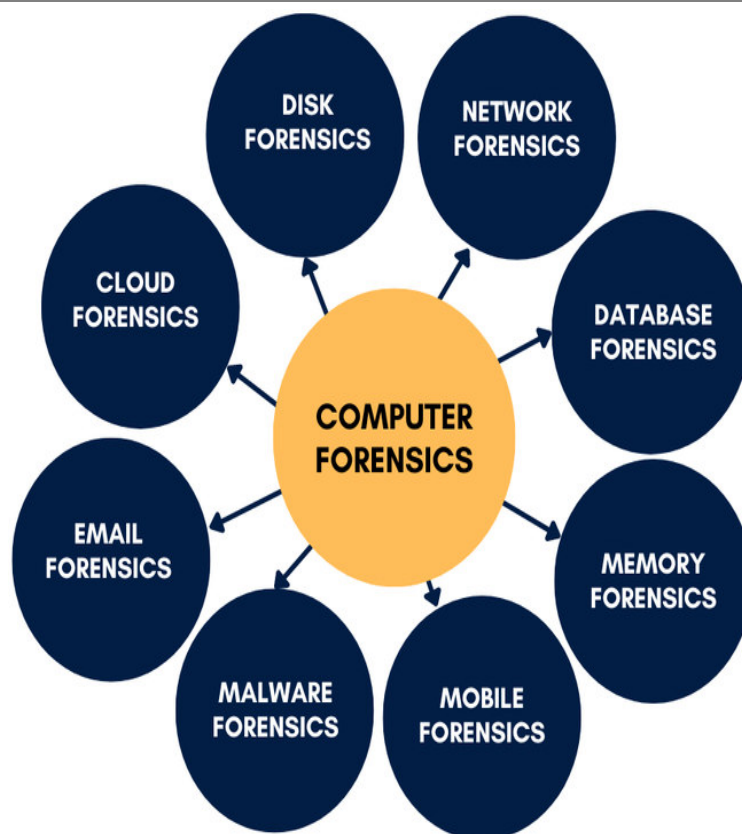
The evolving landscape of cyber threats and ensure the integrity of digital investigations.

Introduction

In today's digital era, computers have become an integral part of nearly every aspect of our lives—from communication and business to entertainment and education. However, this widespread use of computers has also led to a rise in cybercrimes such as hacking, identity theft, fraud, and data breaches. These crimes often leave behind digital traces or evidence stored on computers and other electronic devices. Digital forensics can be defined as the process of collecting, examining, and analyzing digital data from electronic devices in a way that maintains the integrity of the evidence and ensures its admissibility in a court of law.

Importance of Computers in Digital Forensics: Computers play a dual and critical role in digital forensics. First, they are often the source of evidence, as digital crimes typically occur on or involve computer systems. Second, computers serve as the primary platform on which forensic experts use specialized software tools to recover deleted files, analyze system logs, trace cyberattacks, and extract vital information that may be hidden or encrypted. Without computers, it would be almost impossible to handle the vast amounts of data generated in modern investigations. Computers provide the necessary processing power, storage capacity, and analytical capabilities to manage complex forensic tasks efficiently and accurately. Moreover, the constantly evolving nature of technology means that computers and forensic tools must keep pace with new challenges posed by sophisticated cybercriminals.

Digital forensics is the process of collecting, analyzing, and preserving data from electronic devices in a way that is legally acceptable in court. At the center of this process are computers.



They play a dual role: on one hand, they are often used as tools by criminals to carry out offenses; on the other hand, they are used by forensic experts to uncover digital evidence that can solve cases. Computers are used in digital forensics in many ways. Investigators use them to recover deleted files, analyze browsing history, track user activity, and trace cyberattacks. Special forensic software installed on computers can examine large volumes of data quickly and accurately. Additionally, secure storage systems are used to preserve evidence without altering it, which is critical in legal cases. Those involved in computer forensics often do not understand the exact definition of computer forensics. In fact, computer forensics is a branch of forensic science pertaining to legal evidence found in computers and digital storage media.

Definition of Forensics and Forensic Science

The term forensics derives from the Latin “forensis”, which means “in open court or public”, which itself comes from the Latin “of the forum”, referring to an actual location—a “public squarer marketplace used for judicial and other business”. In dictionaries forensics is defined as the process of using scientific knowledge for collecting, analyzing, and presenting evidence. to the courts. The term forensic science is “the application of scientific techniques and principles to provide evidence to legal or related investigations and determinations”. It aims to determining the evidential value of crime scene and related evidence.

I. Definition of Computer Forensics

Computer forensics is a branch of forensic science. The term computer forensics originated in the late 1980s with early law enforcement practitioners who used it to refer to examining standalone computers for digital evidence of crime. Indeed, the language used to describe computer forensics and even the definition of the term itself varies considerably among those who study and practice it. Legal specialists commonly refer only to the analysis, rather than the collection, of enhanced data.

By way of contrast, computer scientists have defined it as valid tools and techniques applied against computer networks, systems, peripherals, software, data, and/or users -to identify actors,

actions, and/or states of interest According to Steve Hailey, Cyber security Institute, computer forensics is “The preservation, identification, extraction, interpretation, and documentation of computer evidence, to include the rules of evidence, legal processes, integrity of evidence, factual reporting of the information found, and providing expert opinion in a court of law or other legal and/or administrative proceeding as to what was found.” In Digital Forensics Research Workshop held in 2001, computer forensics is defined as “the use of scientifically derived and proven methods towards the preservation, collection, validation, identification, analysis, interpretation, documentation and presentation of digital evidence derived from digital source for the purpose of facilitating or furthering the reconstruction of events found to be criminal, or helping to anticipate unauthorized actions shown to be disruptive to planned operations. ”

Some researchers prefer to expand the definition such as definition by Palmer to include the collection and examination of all forms of digital data, including that found in cell phones, PDAs, iPods and other electronic devices From a technical standpoint, Computer Forensics is formulated as an established set of disciplines and the very high standards in place for uncovering digital evidence extracted from personal computers and electronic devices (including those from large corporate systems and networks, across the Internet and the emerging families of cell phones, PDAs, iPods and other electronic devices) for court proceedings.[1]

II. OBJECTIVES OF THE ROLE OF COMPUTERS IN DIGITAL FORENSICS:-

1. Effective Evidence Acquisition :- Develop methodologies for leveraging computer technologies to acquire digital evidence in a forensically sound manner. - Enhance the efficiency and reliability of data extraction from various digital devices.
2. Advanced Analysis Techniques:-Explore and implement cutting-edge computational tools and algorithms for the indepth analysis of digital evidence.Utilize machine learning and data mining techniques to uncover patterns and anomalies within large datasets.
3. Data Recovery and Reconstruction:- Investigate and develop strategies for recovering and reconstructing digital data that may have been intentionally deleted or modified.
4. Employ advanced file carving and data reconstruction techniques to retrieve crucial information.
- 4.Network Forensics: - Develop capabilities for monitoring and analyzing network activities to trace and attribute cybercrimes. - Implement tools for the identification of malicious network traffic and the reconstruction of digital events.
5. Incident Response and Timely Action:- Design and implement protocols for swift response to cyber incidents using computerbased methodologies. Develop automated processes to reduce response times and mitigate the impact of security breaches.
6. Digital Evidence Preservation:-Establish best practices for the secure preservation of digital evidence, ensuring its admissibility in legal proceedings. Develop cryptographic and blockchainbased methods to enhance the integrity and traceability of digital evidence.
7. Collaboration Research: and Interdisciplinary:- Foster collaboration between computer scientists, forensic experts, and legal professionals to address emerging challenges in digital forensics. Encourage interdisciplinary research to stay ahead of evolving cyber threats and technological advancements.
8. Public Awareness and Education:-Raise awareness about the role of computers in digital forensics among the general public, emphasizing the importance of digital hygiene and security.
9. Educate stakeholders on the capabilities and limitations of digital forensic methods to promote informed decision-making in legal and investigative processes.[2][3]

III. PROCESS OF DIGITAL FORENSICS :

The process of digital forensics is a systematic approach to collecting, preserving,analyzing, and presenting digital evidence. It is used to investigate a widerange of cybercrimes, such as data breaches, identity theft, and cyberattacks.



The five phases of digital forensics are:-

1. Identification: The first step in the digital forensics process is to identify the potential sources of digital evidence. This may involve reviewing logs, interviewing witnesses, and conducting site surveys.
 2. Preservation: Once the potential sources of evidence have been identified, they must be preserved to ensure that they are not altered or destroyed. This may involve imaging hard drives, copying files, and securing network traffic.
 3. Analysis: The analysis phase involves examining the collected evidence to extract meaningful information. This may involve using specialized software to search for keywords, identify patterns, and reconstruct events.
 4. Documentation: The findings of the analysis phase must be carefully documented. This documentation should be clear, concise, and admissible in court.
 5. Presentation: The final phase of the digital forensics process is to present the findings of the investigation to the appropriate parties. This may involve writing a report, testifying in court, or briefing law enforcement officials.
- The following are some of the tools and techniques used in digital forensics:

- Forensic imaging: Forensic imaging is used to create a bit-for-bit copy of a digital device. This allows investigators to examine the device without fear of altering the original data.
- Data carving: Data carving is used to recover deleted files from a hard drive. This can be useful for recovering evidence that has been intentionally deleted.
- □ Steganography: Steganography is the practice of hiding data within other data. This can be used to conceal evidence or communicate secretly.
- □ Network forensics: Network forensics is the process of collecting and analyzing network traffic to identify and investigate cybercrimes.
- □ Mobile forensics: Mobile forensics is the process of collecting and analyzing data from mobile devices, such as smartphones and tablets.[4]

IV. DIGITAL FORENSIC TYPES :

Digital forensics is a broad field that encompasses the investigation and analysis of digital evidence. There are many different types of digital forensics, each with its own focus and techniques. Some of the most common types of digital forensics include :

1. Computer Forensics: This is the most wellknown type of digital forensics, and it focuses on the investigation of computers and their storage media. This may involve recovering deleted files, identifying malware, and tracing network activity.
2. Mobile Device Forensics: As mobile devices have become increasingly sophisticated, they have also become a valuable source of digital evidence. Mobile device forensics focuses on the recovery and analysis of data from mobile phones, tablets, and other mobile devices.
3. Network Forensics: Network forensics involves the monitoring, capture, and analysis of network traffic to identify and investigate cyberattacks, data breaches, and other network-related incidents.
4. Database Forensics: Database forensics focuses on the investigation of databases to recover and analyze data that may be relevant to a criminal investigation.
5. Forensic Data Analysis (FDA): FDA focuses on examining structured data, found in application systems and databases, in the context of financial crime.
6. Cloud Forensics: Cloud forensics is a newer type of digital forensics that focuses on the investigation of cloud-based data and services.
7. Memory Forensics: Memory forensics involves the analysis of a computer's volatile memory to recover data that may have been deleted or overwritten.
8. Email Forensics: Email forensics focuses on the investigation of email messages to recover evidence of criminal activity or other misconduct.
9. Image Forensics: Image forensics involves the analysis of digital images to determine their authenticity and identify any modifications that may have been made.
10. Audio Forensics: Audio forensics involves the analysis of audio recordings to identify speakers, verify the authenticity of recordings, and enhance the quality of recordings.
11. Video Forensics: Video forensics involves the analysis of video recordings to identify individuals, verify the authenticity of recordings, and enhance the quality of recordings.

These are just a few of the many different types of digital forensics.

As technology continues to evolve, new types of digital forensics will likely emerge to address the challenges of investigating and analyzing digital evidence in the future types of digital forensics. As technology continues to evolve, new types of digital forensics will likely emerge to address the challenges of investigating and analyzing digital evidence in the future.[5][6]

V. MPORTANCE OF FORENSIC KNOWLEDGE :

Forensic knowledge is crucial across various domains, and its importance extends beyond traditional criminal investigations.

Here are some key aspects highlighting the significance of forensic knowledge:

1. Criminal Investigations :
 - Evidence Analysis : Forensic knowledge is essential for analyzing physical and digital evidence in criminal cases. This includes DNA analysis, fingerprint examination, and digital forensics to uncover crucial information.
 - Crime Scene Reconstruction : Forensic experts use their knowledge to reconstruct crime scenes, providing insights into the sequence of events and helping establish timelines and motives.
2. Legal Proceedings :
 - Expert Testimony : Forensic experts often serve as expert witnesses in court, presenting their findings and providing insights that aid in legal decision-making.
 - Ensuring Admissibility: Understanding forensic procedures is critical for ensuring that evidence collected adheres to legal standards, making it admissible in court.
3. Cybersecurity:
 - Digital Forensics: In the realm of cybersecurity, forensic knowledge is essential for investigating cybercrimes, analyzing digital evidence, and attributing attacks to specific individuals or entities.
 - Incident Response: Forensic techniques are employed in incident response to identify, contain, and recover from security incidents, preserving digital evidence for analysis.

4. Corporate and Financial Investigations:

- Fraud Examination: Forensic knowledge is applied in investigating financial fraud, embezzlement, and other white-collar crimes within corporations.
- Asset Tracing: Forensic accountants use their expertise to trace and analyze financial transactions, uncovering discrepancies and fraudulent activities.

5. Disaster Investigations:

- Accident Reconstruction: Forensic experts contribute to the investigation of accidents, including traffic accidents and industrial mishaps, by reconstructing events and determining causation.
- Identification of Remains: Forensic anthropologists and pathologists play a crucial role in identifying individuals in mass disasters through the analysis of remains.

6. Humanitarian Efforts:

- Mass Graves Investigations: Forensic knowledge is vital in the investigation of mass graves in conflict zones, contributing to human rights efforts and the pursuit of justice.
- Missing Persons Cases: Forensic techniques, such as DNA analysis, are used to identify missing persons and bring closure to families.

7. Medical Examinations:

- Autopsies and Cause of Death Determination: Forensic pathologists apply their expertise to conduct autopsies and determine the cause and manner of death in suspicious or unexplained cases.
- Toxicology: Forensic toxicologists analyze biological samples to identify the presence of drugs, poisons, or other substances that may have contributed to a person's death.

8. Educational and Research Advancements:

- Advancing Scientific Knowledge: Forensic research contributes to the advancement of scientific knowledge and techniques, improving the accuracy and reliability of forensic analyses.
- Training Future Professionals: Forensic knowledge is passed on through education and training programs, ensuring a skilled workforce capable of addressing evolving challenges.

In summary, forensic knowledge is a linchpin in various fields, contributing to justice, security, and the resolution of complex issues. It not only aids in solving crimes but also plays a crucial role in preventing future incidents and advancing our understanding of the intricate relationships between evidence and events.[7]

VI.COMPUTER ROLE IN DIGITAL FORENSICS :**Identification and Preservation**

- Imaging: Computers enable the creation of forensic images, which are exact replicas of digital devices. These images allow investigators to analyze the device's contents without altering the original data.
- □ Data Acquisition: Specialized software tools facilitate the acquisition of data from various sources, including hard drives, mobile devices, and network traffic. This data is crucial for subsequent analysis.

Analysis and Presentation

- □ Data Carving: Computers aid in data carving, a technique for recovering deleted or fragmented files from storage devices. This helps uncover hidden data that may be relevant to the investigation.
- □ Malware Analysis: Specialized software tools enable investigators to analyze malware samples, identifying their behavior, potential damage, and associated threats.
- □ Timeline Analysis: Computers facilitate the creation of timelines, which visualize the sequence of events extracted from digital evidence. This helps investigators understand the chronology of the incident.
- □ Report Generation: Computers support the creation of comprehensive forensic reports that document the investigation findings, including analysis methods, results, and conclusions. These reports serve as evidence in court proceedings.

Additional Role

- Network Forensics: Computers are essential for network forensics, allowing investigators to capture and analyze network traffic to identify and investigate cyberattacks, data breaches, and other network-related incidents.

- Cloud Forensics: Computers play a crucial role in cloud forensics, enabling investigators to collect, preserve, and analyze data stored in cloud environments.
- Mobile Forensics: Computers are essential for mobile forensics, allowing investigators to extract and analyze data from mobile devices, such as smartphones and tablets.

VI. DIGITAL FORENSIC CHALLENGES :

Digital forensics encompasses the investigation and analysis of digital evidence, encompassing a broad spectrum of challenges that stem from the evolving nature of technology and the increasing complexity of digital data. These challenges can be broadly categorized into three main areas: technical, legal, and procedural.[8]

Technical Challenges

- □ Data Volume and Volatility: The sheer volume of digital data generated today poses a significant challenge for digital forensic investigators. With the proliferation of mobile devices, cloud computing, and the Internet of Things, the amount of data to be analyzed is constantly growing. This vast amount of data, coupled with its volatile nature, makes it difficult to collect, store, and process efficiently.
- □ Data Encryption: The widespread use of encryption techniques to protect sensitive data presents a major obstacle for digital forensics. Encrypted data cannot be accessed without the proper decryption keys, making it challenging for investigators to extract relevant evidence.
- □ Emerging Technologies: The rapid pace of technological advancements introduces new challenges as digital forensic investigators must constantly adapt their methodologies and tools to keep pace with emerging technologies. For instance, the rise of artificial intelligence, blockchain, and quantum computing introduces new complexities in data acquisition, analysis, and interpretation.

Legal Challenges

- □ Admissibility of Digital Evidence: The admissibility of digital evidence in court proceedings is often a complex issue due to concerns about data integrity, chain of custody, and authentication. Digital forensic investigators must adhere to strict protocols to ensure that the evidence they collect is preserved and presented in a manner that meets legal standards.
- □ Jurisdictional Issues: Investigating cybercrimes often involves dealing with data stored in different jurisdictions, raising legal and ethical concerns regarding data privacy, access, and cross-border cooperation.
- □ Privacy and Ethical Considerations: Digital forensics must balance the need to investigate crimes with the protection of individual privacy and ethical considerations. Investigators must carefully consider the implications of their actions on individuals' privacy rights and ensure that data is handled responsibly and ethically.

Procedural Challenges

- Standardization and Consistency:-The lack of standardization and consistency in digital forensics methodologies and tools can lead to inconsistencies in the outcome of investigations. Establishing standardized practices and procedures is essential to ensure the reliability and credibility of digital forensics.
- □ Resource Constraints: Digital forensics investigations often require specialized skills, expensive equipment, and access to advanced software. Limited resources can hinder the ability of law enforcement agencies and organizations to conduct thorough and timely investigations.
- □ Training and Expertise: The rapid evolution of technology demand continuous training and specialization for digital forensic investigators. Keeping up with the latest advancements and techniques requires ongoing education and professional development.[9]

VII. ADVANTAGES :

Digital forensics offers several advantages in investigating and responding to cybercrimes and other incidents involving digital evidence.

Here are some key advantages:

1.Evidence Preservation:

- Digital forensics allows for the creation of forensic images, preserving the original state of digital evidence. This ensures data integrity and compliance with legal standards, making the evidence admissible in court.

2.Rapid Response:

- Digital forensics enables quick response to security incidents. Timely analysis and identification of cyber threats can help organizations mitigate the impact of an attack, prevent further damage, and enhance overall cybersecurity.

3.Crime Scene Reconstruction:

- Investigators use digital forensics to reconstruct digital crime scenes, providing insights into the sequence of events, timelines, and potential motives. This aids in understanding how an incident occurred and who may be responsible.

4.Identification of Culprits:

- Digital forensics helps in attributing cybercrimes to specific individuals or entities.

Through the analysis of digital evidence, investigators can identify the source of an attack, track down perpetrators, and support legal actions against them.

5.Detection of Insider Threats:

- Digital forensics is instrumental in identifying insider threats within organizations.

It allows for the monitoring of employee activities, detecting unauthorized access or data exfiltration, and preventing potential breaches.

6.Malware Analysis:

- Malware analysis is a critical aspect of digital forensics, enabling the identification, classification, and understanding of malicious software. This knowledge helps organizations develop effective strategies for malware prevention and mitigation.

7.Data Recovery:

- Digital forensics tools and techniques assist in recovering deleted or damaged digital data. This can be crucial in reconstructing events, uncovering evidence, and restoring valuable information.

In summary, digital forensics plays a pivotal role in modern investigative and security practices, providing a structured and effective approach to handling digital evidence and mitigating the impact of cybercrimes.

VIII. DISADVANTAGES :

While digital forensics is a valuable tool in investigating and preventing cybercrimes, it also has its challenges and disadvantages.

Here are some notable disadvantages:

1.Complexity and Specialization:

- Digital forensics requires specialized knowledge and skills. The complexity of digital systems and the continuous evolution of technology demand ongoing training and expertise, making it challenging for investigators to keep up with the latest developments.

2.Rapid Technological Advancements:

- The fast-paced evolution of technology can lead to obsolescence of forensic tools and methodologies. Investigators may struggle to keep their tools up-to-date and relevant in the face of constantly changing digital landscapes.

3.Encryption Challenges:

- The widespread use of encryption technologies presents a significant challenge for digital forensics. Encrypted data may be difficult or even impossible to access, hindering investigations and preventing the recovery of crucial evidence.

4.Data Overload:

- The sheer volume of digital data generated daily can overwhelm investigators. Sorting through massive datasets to find relevant evidence is time-consuming and resourceintensive.

5.Privacy Concerns:

- The invasive nature of digital forensics raises privacy concerns, especially when investigating individuals who are not necessarily involved in criminal activities. Striking a balance between law enforcement needs and individual privacy rights is a constant challenge.

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6. Anti-Forensic Techniques:

- Perpetrators of cybercrimes may employ anti-forensic techniques to cover their tracks, making it more challenging for investigators to recover and analyze digital evidence. Despite these challenges, ongoing research, collaboration, and advancements in digital forensic techniques aim to address these disadvantages and enhance the effectiveness of digital investigations.[10]

CONCLUSION :

In conclusion, the role of computers in digital forensics is pivotal and indispensable in the face of evolving cyber threats and the increasing digitization of our world. Computers serve as both the battleground for cybercrimes and the crucial toolset for forensic investigators. The intricate relationship between digital technologies and forensic methodologies highlights the need for a nuanced understanding of computer systems to navigate the complexities of modern investigations. From evidence acquisition to advanced analysis techniques, computers play a central role in the digital forensics process. The ability to recover and reconstruct digital data, analyze network activities, and employ sophisticated forensic software has become essential for investigators seeking to uncover the truth behind cyber incidents.

The integration of machine learning and artificial intelligence further enhances the speed and accuracy of investigations, providing valuable insights into patterns and anomalies within vast datasets. Ethical considerations and legal compliance underscore the responsible use of computers in digital forensics, emphasizing the importance of maintaining the integrity of evidence for legal proceedings. The continuous evolution of technology, including encryption challenges, cloud computing complexities, and the emergence of antiforensic techniques, presents both obstacles and opportunities for digital forensic practitioners.

As we navigate the dynamic landscape of cyber threats, the collaboration between computer scientists, forensic experts, and legal professionals becomes paramount. Interdisciplinary efforts foster innovation, ensuring that digital forensics keeps pace with technological advancements. Moreover, comprehensive training programs and public awareness initiatives are vital to equip professionals and the general public with the knowledge needed to address the multifaceted challenges posed by cybercrimes.

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Consumer Trust In Local Healthcare Providers: An Empirical Study In Amravati.

**Dr. Pratiksha A. Kalmegh¹ Chahul Pathare² Shravani Sune³
Rohit Girulkar⁴ Shravani Solav⁵**

Department of Management Studies-MBA

Prof. Ram Meghe Institute of Technology & Research, Bandera, Amravati, 444701, India

Abstract

Consumer trust is a critical component in the healthcare sector, as patients rely heavily on healthcare providers for diagnosis, treatment, and guidance. Trust influences patients' choice of hospitals, treatment compliance, and overall satisfaction with healthcare services. This research study aims to examine the level of consumer trust in local healthcare providers in Amravati city and identify the factors influencing this trust.

The study uses an empirical approach with primary data collected through questionnaires distributed among residents of Amravati. Factors such as service quality, doctor-patient communication, cost transparency, accessibility, and hospital reputation were analyzed. The results indicate that communication, transparency in billing, and perceived competence of doctors significantly influence consumer trust. The study also highlights that word-of-mouth recommendations play an important role in patients' healthcare decisions

1. Introduction

1.1 Background of the Study

The healthcare sector has witnessed rapid growth and transformation due to increasing awareness among patients, advancements in medical technology, and rising expectations regarding quality of care. In this evolving landscape, healthcare is no longer limited to treatment alone but extends to patient experience, satisfaction, and relationship management. One of the most crucial elements influencing patient behavior in this context is **consumer trust**.

Trust plays a vital role in healthcare because patients often face uncertainty, risk, and information asymmetry while making medical decisions. Unlike other service sectors, healthcare decisions directly impact human life, making trust a fundamental component in choosing a healthcare provider.

1.2 Concept of Consumer Trust in Healthcare

Consumer trust in healthcare refers to the confidence patients have in the competence, reliability, and integrity of healthcare providers. It is a multidimensional concept that includes trust in doctors' expertise, hospital infrastructure, ethical practices, transparency, and communication.

Trust influences not only the selection of healthcare providers but also patient satisfaction, treatment adherence, and long-term loyalty. A higher level of trust leads to better patient outcomes, while a lack of trust may result in delayed treatment, doctor-switching, or reliance on informal sources of healthcare.

1.3 Importance of Local Healthcare Providers

Local healthcare providers, including clinics, nursing homes, and small hospitals, play a significant role in delivering primary and secondary healthcare services, especially in tier-II cities. These providers are often the first point of contact for patients and serve as a backbone of the local healthcare system.

In smaller cities, patients tend to rely heavily on personal experiences, family recommendations, and community opinions. Therefore, the reputation and trustworthiness of local healthcare providers become critical factors influencing healthcare choices.

1.4 Context of Amravati City

Amravati, a prominent tier-II city in Maharashtra, presents a unique setting for studying consumer trust in healthcare. The city has a mix of government hospitals, private practitioners, and emerging healthcare facilities. While healthcare accessibility has improved over the years, patients still face challenges related to service quality, affordability, and reliability.

In such an environment, trust becomes a decisive factor guiding patients' preferences. The interplay of traditional beliefs, word-of-mouth communication, and modern healthcare expectations makes Amravati an important case for empirical investigation.

1.5 Need for the Study

Despite the growing importance of trust in healthcare, limited research has been conducted focusing specifically on consumer trust in local healthcare providers in tier-II cities like Amravati. Most existing studies are centered on metropolitan areas, leaving a gap in understanding the dynamics of smaller urban regions.

This study aims to fill this gap by examining the factors that influence consumer trust, such as service quality, doctor-patient communication, cost transparency, and past experiences. Understanding these factors will help healthcare providers improve their services and build stronger patient relationships.

1.6 Scope of the Study

The study focuses on analyzing consumer trust among patients in Amravati city with respect to local healthcare providers. It covers various aspects such as patient perceptions, satisfaction levels, and influencing factors like quality of care, accessibility, affordability, and reputation.

2. Literature Review

2.1 Concept of Trust in Healthcare

Trust is a fundamental component of the patient-provider relationship, especially in healthcare settings where uncertainty and risk are high. According to Thom et al. (2004), trust reflects patients' confidence in the competence, reliability, and integrity of healthcare providers. Similarly, Hall et al. (2001) emphasized that trust plays a central role in clinical interactions and directly affects patient satisfaction and health outcomes.

2.2 Dimensions and Determinants of Consumer Trust

Consumer trust in healthcare is multidimensional and influenced by various factors such as provider competence, communication, ethical behavior, and transparency. Dugan et al. (2005) identified interpersonal aspects, particularly communication and empathy, as critical determinants of trust. In addition, Mechanic and Meyer (2000) highlighted that both individual provider behavior and institutional factors contribute to the development of trust.

2.3 Trust and Healthcare Utilization

Trust significantly influences healthcare-seeking behavior and service utilization. Research by Goold and Lipkin (1999) demonstrated that patients with higher levels of trust are more likely to follow medical advice and maintain long-term relationships with healthcare providers. Conversely, lack of trust can lead to delayed treatment, reduced adherence, and poorer health outcomes.

2.4 Role of Service Quality and Patient Experience

Service quality is a major factor influencing trust in healthcare. Parasuraman et al. (1988), through the SERVQUAL model, identified dimensions such as reliability, responsiveness, assurance, empathy, and tangibles as key determinants of service quality. These factors significantly affect patient perceptions and trust levels. Positive healthcare experiences enhance trust, while negative experiences reduce confidence and lead to switching behavior.

2.5 Trust in Healthcare Organizations

Trust extends beyond individual physicians to healthcare organizations as a whole. Blendon et al. (2014) found that institutional reputation, transparency, and ethical practices play a significant role in shaping patient trust. Similarly, Ozawa and Sripad (2013) emphasized that trust in healthcare systems is essential for improving patient engagement and healthcare delivery outcomes.

2.6 Impact of Technology on Trust

With the advancement of digital healthcare services, trust has expanded to include technological systems. Gefen et al. (2003) highlighted that perceived risk, privacy concerns, and system reliability significantly influence trust in online healthcare platforms. Patients are more likely to adopt digital healthcare services when they perceive them as secure and reliable.

2.7 Research Gap

Although significant research has been conducted on trust in healthcare, most studies focus on developed countries and urban settings. There is limited empirical research addressing consumer trust

in local healthcare providers in tier-II cities, particularly in the Indian context. Therefore, this study aims to bridge this gap by analyzing the factors influencing consumer trust in Amravati city.

3. Research Methodology

3.1 Introduction

Research methodology refers to the systematic process of collecting, analyzing, and interpreting data to solve a research problem. This chapter presents the methodology adopted to study consumer trust in local healthcare providers in Amravati. It includes the research problem, objectives, research design, data collection methods, sampling techniques, and tools used for analysis.

3.2 Research Problem

Despite the availability of healthcare services in Amravati, many patients continue to face several challenges that influence their trust in local healthcare providers. These challenges include:

- Lack of transparency in medical costs
- Long waiting times in hospitals and clinics
- Poor communication between doctors and patients
- Perceived commercialization of healthcare services

These issues create uncertainty and dissatisfaction among patients, which may negatively affect their trust and healthcare decisions. Therefore, it becomes essential to study the level of consumer trust and identify the factors influencing it.

3.3 Objectives of the Study

1. To examine the level of consumer trust in local healthcare providers in Amravati
2. To identify the factors influencing patient trust
3. To analyze the relationship between service quality and consumer trust
4. To study the impact of communication and transparency on trust
5. To provide suggestions for improving consumer trust in healthcare providers

3.4 Research Design

The present study adopts a **descriptive research design**. This design is appropriate as it helps in describing and analyzing consumer perceptions, attitudes, and factors influencing trust in healthcare providers.

3.5 Nature of Data

3.5.1 Primary Data

Primary data was collected through a structured questionnaire administered to patients and residents of Amravati who have experience with local healthcare services.

3.5.2 Secondary Data

Secondary data was collected from the following sources:

- Research journals
- Healthcare reports
- Online databases
- Government publications

These sources provided theoretical and conceptual support to the study.

3.6 Sampling Design

3.6.1 Sample Size

The study is based on a sample of **37 respondents**.

3.6.2 Sampling Technique

A **convenience sampling method** was used, where respondents were selected based on their accessibility and willingness to participate in the study.

3.7 Research Instrument

A **structured questionnaire** was used as the primary data collection tool

3.8 Data Collection Procedure

Data was collected by distributing questionnaires among selected respondents in Amravati. The purpose of the study was explained to the respondents, and confidentiality of their responses was ensured.

4. Data Analysis

Variable	Key Findings (%)	Interpretation
Age Group	18–25 (66.67%)	Majority are young respondents
Healthcare Visits	Sometimes (55.56%), Rarely (30.56%)	Moderate usage of healthcare services
Preferred Provider	Private Hospitals (72.22%)	Strong preference for private healthcare
Trust in Doctors	Neutral (44.44%), Trust (41.67%)	Trust exists but many are uncertain
Satisfaction	Satisfied (63.89%), Very Satisfied (25%)	Overall high satisfaction
Affordability	Affordable (75%), Expensive (19.44%)	Services generally affordable
Waiting Time	15–20 min (44.44%)	Moderate waiting time experienced
Cleanliness	Good (55.56%), Average (30.56%)	Hygiene acceptable but improvable

6. Findings, Conclusion and Suggestions**6.1 Findings**

- The majority of respondents belong to the young age group (18–25).
- Most people visit healthcare providers occasionally, not frequently.
- Private hospitals are the most preferred, indicating higher trust in private healthcare services.
- Respondents show a moderate level of trust, with many still neutral.
- A large proportion of respondents are satisfied with treatment services.
- Most respondents consider healthcare services affordable.
- Waiting time is moderate and acceptable for most patients.
- Cleanliness levels are generally good, but there is room for improvement.

6.2 Conclusion

The study on Consumer Trust in Local Healthcare Providers in Amravati reveals that overall trust in healthcare providers is positive but not very strong. While most respondents are satisfied with treatment, communication, and care provided by doctors, a significant portion remains neutral regarding trust.

Private hospitals dominate the healthcare preference due to better perceived quality and reputation. Factors such as doctor reputation and personal recommendations play a major role in decision-making, more than affordability.

Although healthcare services are largely considered affordable and satisfactory, there is still a need to build stronger trust, reduce neutrality, and improve service quality in certain areas like waiting time and cleanliness.

Overall, the healthcare system in the study area is performing well but requires continuous improvement to enhance patient trust and satisfaction.

6.3 Suggestions/ Recommendations

- Improve Trust Building Measures
- Healthcare providers should focus on transparency, patient engagement, and ethical practices to convert neutral patients into trusting ones.
- Enhance Communication Skills of Doctors

- Although communication is good, training programs can further improve clarity, empathy, and patient understanding.
- Reduce Waiting Time
- Hospitals should adopt better scheduling systems and increase staff efficiency to minimize patient waiting time.
- Upgrade Cleanliness and Infrastructure
- Maintaining higher hygiene standards and improving hospital facilities will increase patient confidence and satisfaction.

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Influence of Ancient Knowledge Traditions on The Curriculum of Various Academic Disciplines

Shri. Sumedh Annasaheb Manwar

PHD Scholar Sitabai Arts, commerce and science college Akola

Email: -sumedhm17@gmail.com ,Mobile no: - 7972826721

Dr. D. R. Khanderao

Research Guide -

ABSTRACT:

In today's era of information technology like AI, the world's wealth of knowledge is open to us with just one click on mobile and computer. Even though the entire world has become a small knowledge village today, we will not be able to move forward in the field of knowledge without studying the ancient Indian knowledge tradition and the brilliant achievements of our ancestors in various fields of knowledge. Our country India has a history of almost 5000 years. Our country India is a country of diversity in terms of caste, religion, sect, language, culture etc. The ancient wisdom tradition shows a beautiful blend of culture and knowledge. Ancient Indian knowledge has reached the present generation through written sources such as the Vedas, Vedangas, Upanishads, Ramayana, Mahabharata, Jataka stories, Tripitaka, inscriptions, and Bhurja letters, and through oral sources such as stories, poems, verses, couplets, and millstone poems. The imprint of ancient Indian knowledge can be seen in various branches of knowledge in today's educational curriculum.

The fact that knowledge was given the highest place in the ancient Indian tradition is clear to us from the 38th verse of the 4th chapter of the Bhagavad Gita, 'Na hi jnanen sadrash pavitramiha vidyate' the meaning of this verse is that there is nothing else in this world as pure as knowledge. We can see from the various texts such as Bhagavad-Gita, Ashtadhyayi, Arthshastra, Budhhacharit etc. and from tools such as sculpture, painting, and caves, that various branches of knowledge such as history, geography, space, astronomy, botany, algebra, geometry, art, music, engineering, agriculture, and medical science flourished in the ancient Indian knowledge tradition.

Epics like Ramayana and Mahabharata still have an impact on the public mind. The curriculum based on their moral values encourages students to live a good life. Techniques like yoga and vipassana, discovered by our ancestors, still help maintain a healthy body and mind. Aryabhata's discovery of zero is India's greatest gift to the world. The foundations of modern democracy are firmly rooted in the Mahajanapadas and republican system of governance of the time of Lord Buddha. The ancient Gurukul system of education, the ongoing Guru-Shishya tradition, and world-famous ancient Indian universities like Nalanda, Vikramshila, and Taxila are our cultural heritage and tell us the importance of the ancient tradition of knowledge. Thus, this article explains the influence of ancient knowledge traditions on our curriculum.

KEYWORDS:-

Indian knowledge system, traditional wisdom, NEP 2020, influence on curriculum

INTRODUCTION:-

Indian knowledge system also known as Bhartiya Gyan Samhita rooted in the ancient traditional wisdom. Ancient Indian Traditions are connected to the environment. Traditional agriculture practices such as organic farming and water management techniques are also integral to Indian knowledge system. Ancient Indian philosophy derived from Hinduism, Buddhism, and Jainism focus on concepts such as Dharma (duty), Karma (actions) and Ahimsa (non - violence). These values encourage individuals to act with more responsibility and compassion. In a holistic manner it approaches ancient Indian knowledge integrates not only spirituality but it touches every part of knowledge i.e. science, mathematics, astronomy, medicine, art, music, commerce, philosophy and every prosperous disciplines and because of this it would not be an exaggeration to say that the traditional ancient Indian knowledge has a profound influence on the curriculum of various academic disciplines. Ancient Indian knowledge and wisdom practices that have been developed and nurtured in India over thousands of years. It is important that we regain the comprehensive knowledge system of our heritage

and demonstrate the 'Indian way' of doing things to the world. This article aims to understand in more detail how the ancient Indian knowledge tradition influences various disciplines in the curriculum.

NEP 2020 AND ANCIENT KNOWLEDGE TRADITIONS:-

The NEP 2020 recognizes the rich heritage of ancient and eternal Indian knowledge and thought as a guiding principle. The Indian knowledge system comprise of Jnan, Vignan, and Jeevan Darshan that have evolved out of experience, observation, experimentation, and rigorous analysis. This tradition of validating and putting into practice has impacted our education, arts, administration, law, justice, health, manufacturing, and commerce. This has influenced classical and other languages of Bharat that were transmitted through textual, oral, and artistic traditions. The main objective is to ensure that our ancient systems of knowledge represented by unbroken tradition of knowledge transmission and developed a Bhartiya Drishti which is used to solve the current and emerging challenges of India and the world. The policy recognizes that the knowledge of the rich diversity of India should be imbibed first hand by learners.

This would mean including simple activities, like touring by students to different parts of the country, which will not only give a boost to tourism but will also lead to an understanding and appreciation of diversity, culture, traditions, and knowledge of different parts of India. Towards this direction under 'Ek Bharat Shrestha Bharat', 100 tourist destinations in the country will be identified where educational institutions will send students to study these destinations and their history, scientific contributions, traditions, indigenous literature, and knowledge, etc., as a part of augmenting their knowledge about these areas. NEP 2020 aims to integrate skill-based learning with academics to create a more employable and adaptable workforce.

Focusing on these areas is essential for achieving India's "Viksit Bharat @ 2047" goal. The initiative ensures youth possess practical skills needed for economic progress and innovation. In order to realize these goals of NEP 2020, a number of activities have been undertaken by the Ministry of Education, Regulatory Bodies (UGC & AICTE) and HEIs.

INFLUENCE OF ANCIENT KNOWLEDGE TRADITIONS ON THE CURRICULUM OF VARIOUS ACADEMIC DISCIPLINES:-

Ancient knowledge traditions—from the Vedic and Buddhist systems of India form the bedrock of modern academia. Rather than being "old ideas," they act as the structural DNA for how we organize and teach information today.

Here is how these traditions influence specific modern disciplines:

1. Mathematics & Geometry

The modern math curriculum is built on the decimal system and the concept of zero (Shunya), which originated in India and was transmitted via Islamic scholars.

Aryabhata's contributions in the Aryabhatiya covered arithmetic, geometry, algebra, and trigonometry, profoundly influencing mathematics in India and across the Islamic world.

He introduced the decimal place-value system and zero as a placeholder, calculated an accurate (3.1416), and developed sine tables.

Geometry: Baudhayana (c. 800 BCE): Author of the Baudhayana Sulba Sutra, which contains the earliest known statement of what is now called the Pythagorean Theorem, used for creating right angles in sacrificial altars.

Brahmagupta (598–668 CE): Famous for establishing formula for the area of a cyclic quadrilateral (Brahmagupta formula), as well as diagonals of a cyclic quadrilateral.

Bhaskara II (1114–1185 CE): Wrote Lilavati and Bijaganita, which contain detailed geometric principles, including advancements in trigonometric ratios and sine identities.

Logic: Ancient Indian logic, often called Prameya-Vidya or Anviksiki, played a critical role in structuring debates and establishing the validity of knowledge.

The Nyaya school (India) founded by Gautama (c. 6th century BCE), which formalized knowledge acquisition into four methods: perception, inference, comparison, and testimony. They created a

unique five-membered syllogism (analogous to formal reasoning) and analysed logic, linguistics (Panini), and debating techniques (Anviksiki), heavily influencing intellectual thought.

Dignāga (c. 5th-6th Century CE): Buddhist philosopher who redefined Indian logic with an emphasis on deductive validity, becoming a pivotal figure.

Dharmakīrti (c. 6th-7th Century CE): Extended Buddhist logic-epistemology.

2. Medicine & Health Sciences

Holistic Approaches: Ayurveda plays a vital role in medicine as a traditional, holistic system focusing on prevention, individualized care, and chronic disease management through diet, lifestyle, and natural therapies. It integrates with modern medicine to promote longevity, enhance immune health, and address root causes of disease, often serving as a complementary or primary healthcare approach.

Pharmacology: Many modern drug studies (Ethnobotany) are based on ancient botanical texts that identified the healing properties of plants centuries ago.

3. Linguistics & Language

Panini's Often considered the "father of linguistics," wrote Ashtadhyayi (Sanskrit grammar) is often cited as the precursor to modern formal language theory and even coding languages. It taught us that language has a logical, mathematical structure.

Bhartṛhari (c. 5th Century CE): Wrote the Vākyapadīya, which advanced the philosophy of language, exploring the relationship between sound and meaning.

4. Astronomy & Physics

Cosmology: Concepts of atomic theory (Vaisheshika School) and the heliocentric model (found in early Aryabhatta texts and later refined by Copernicus) shaped the progression of the physics curriculum. Rishi Kanada proposed that matter is composed of indivisible, tiny particles (anu), founding the Vaisheshika school of philosophy, which focused on natural sciences.

Early concepts describing motion, acceleration, and gravitation were discussed in ancient texts, including the Vaisheshika Sutras.

Mostly use by all Indians 'Panchang' a Hindu calendar based on precise celestial observations.

Observations: Ancient methods of tracking celestial bodies laid the groundwork for modern navigation and astrophysics.

5. Philosophy & Psychology

Mindfulness: Buddhist and Yogic traditions have moved from "religious studies" into mainstream Psychology and Neuroscience curricula through the study of meditation and Cognitive Behavioural Therapy (CBT) precursors.

Yoga and Vipassana: Yoga is vital in physical education for developing holistic wellness, enhancing flexibility, strength, balance, and posture in students.

Vipassana in education serves as a holistic tool to cultivate self-awareness, mental clarity, and emotional regulation, fostering a calmer, more focused learning environment. By practicing this non-sectarian mindfulness technique, students and teachers reduce stress, improve attention span, and develop essential life skills like empathy, compassion, and ethical conduct.

6. Agriculture:

Traditional farming focused on ecological wisdom, using natural manure, and agroforestry to protect the environment. Ancient Indians pioneered agricultural techniques, developing sophisticated irrigation, crop rotation, and soil management systems. Traditional Water Harvesting System is a milestone for drought region.

**7. Economics:**

The kautilya's 'Arthshastra remains highly relevant in the modern world as a foundational text on realism, providing timeless strategies for statecraft, economic policy, and governance in social order.

CONCLUSION:-

The integration of ancient knowledge traditions demonstrates that historical wisdom is the foundational bedrock of modern academia. By bridging the gap between classical logic and contemporary holistic approaches, the curriculum fosters a more comprehensive understanding of human progress. Ultimately, acknowledging these diverse intellectual roots enriches current disciplines, proving that the synergy of ancient insights and modern science is essential for a well-rounded global education.

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From Page to Screen: Transforming the Teaching and Interpretation of Literature in Contemporary Classrooms

Girish Shashikant Bendke

Student ,Girish9421@gmail.com ,+917058449292

Abstract:

This paper examines the shift from text-based to screen-based approaches in the teaching of literature within contemporary classrooms. With the increasing use of film adaptations and digital media, literature is no longer experienced solely through reading but also through visual and auditory forms. Focusing on adaptations such as *Pride and Prejudice* and *The Kite Runner*, this paper explores how the movement from page to screen reshapes interpretation, imagination, and engagement with literary texts. It argues that while screen adaptations make literature more accessible and engaging for students, they also risk simplifying complex narratives and reducing the depth of textual analysis. The paper further analyzes how teaching practices are evolving to incorporate multimedia tools, creating a more interactive learning environment. However, it emphasizes the need to maintain a balance between visual engagement and close reading in order to preserve the richness of literary study. Ultimately, the paper suggests that the shift from page to screen transforms not only how literature is taught, but also how it is understood.

Keywords: Literature Pedagogy, Digital Learning, Film Adaptation, Literary Interpretation, Close Reading, Multimedia Education, Visual Culture, Contemporary Classrooms,

Introduction:

Literature has traditionally been experienced as a deeply personal and imaginative act, rooted in the close reading of texts. For generations, the study of literature within the humanities has emphasized careful attention to language, form, and meaning, encouraging readers to engage actively with the written word. This process of reading allows individuals to construct their own interpretations, guided by imagination and critical thought. However, in recent years, this traditional model has begun to shift. With the rapid growth of digital media and visual culture, literature is increasingly being experienced not only through printed texts but also through screens.

The rise of film adaptations, online platforms, and multimedia tools has significantly transformed the way literature is taught in contemporary classrooms. Novels are now frequently accompanied by their cinematic versions, and students often encounter stories through visual representation alongside, or sometimes even before, reading the text. Adaptations of works such as *Pride and Prejudice* and *The Kite Runner* are commonly used in teaching to provide visual interpretations of literary narratives and to make complex texts more accessible.

This growing reliance on digital and visual media in education has also been supported by research in learning theory. Scholars such as Richard E. Mayer argue that multimedia environments, which combine visual and verbal elements, can enhance understanding by engaging multiple cognitive processes. At the same time, researchers like Christine Greenhow highlight how digital tools are reshaping classroom practices by making learning more interactive and participatory. These developments suggest that the movement from page to screen is not only technological but also pedagogical, influencing how students process and respond to literary texts.

This shift from page to screen has important implications for both teaching and interpretation. While visual media can increase engagement and provide clarity, it also changes the nature of the literary experience. The act of imagining characters, settings, and emotions is partially replaced by ready-made visual representations. As a result, the reader becomes a viewer, and interpretation becomes shaped not only by the text but also by cinematic choices.

This paper argues that the transition from page to screen does not simply introduce a new method of teaching literature, but fundamentally transforms the way literary texts are understood, imagined, and interpreted. By examining the use of film adaptations in the classroom, the paper explores both the opportunities and the limitations created by this shift. It suggests that while screen-based learning can enhance engagement, it must be carefully balanced with traditional close reading practices in order to preserve the depth and complexity of literary study.

Shift from Page to Screen:

In recent years, the teaching of literature has undergone a noticeable shift from a purely text-based approach to one that increasingly incorporates visual media. With the availability of film adaptations, online platforms, and digital tools, literature is no longer confined to the printed page. Instead, it is often experienced through screens, where stories are presented in visual and auditory forms. This shift reflects broader changes in technology, learning habits, and student engagement.

Film adaptations have become one of the most common ways in which literature is introduced and taught in contemporary classrooms. Teachers frequently use them as supplementary material to help students understand complex narratives, historical settings, or cultural contexts. For instance, adaptations of *Pride and Prejudice* provide visual representations of characters, costumes, and social environments, making the world of the novel more accessible. Similarly, the film version of *The Kite Runner* helps students visualize the geographical and emotional landscape of Afghanistan, offering a more immediate connection to the story.

This movement from page to screen changes the mode of engagement with literature. Reading requires time, patience, and active interpretation, whereas watching a film offers a more immediate and structured experience. The viewer is presented with ready-made images, sounds, and emotions, guided by the director's interpretation. As a result, the imaginative space that was once open to the reader becomes more defined and, in some cases, limited.

At the same time, screen-based representations can enhance understanding, especially for students who struggle with complex language or unfamiliar contexts. Visual elements such as facial expressions, settings, and background music can communicate meaning quickly and effectively. This makes literature more approachable and can increase student interest and participation in the classroom.

However, this shift also raises important questions about the nature of literary study. When a text is experienced primarily through its adaptation, there is a risk that the original language and narrative structure may be overlooked. Film adaptations often simplify or modify certain aspects of the story for cinematic purposes, which can lead to partial or altered interpretations. For example, subtle narrative details, internal monologues, or symbolic elements present in the novel may not be fully captured on screen.

Therefore, the shift from page to screen is not simply a change in medium but a transformation in how literature is accessed and understood. While it opens new possibilities for engagement and accessibility, it also introduces new challenges that must be carefully addressed within the teaching process. This transition sets the stage for a deeper examination of how interpretation itself is changing in contemporary classrooms.

Changing Modes of Interpretation:

The shift from page to screen has not only altered the way literature is accessed but has also significantly transformed the way it is interpreted. Interpretation, which was once a deeply personal and imaginative process, is now increasingly shaped by visual representation. This change affects how students understand characters, themes, and narrative meaning.

In traditional reading, interpretation develops gradually through engagement with language. Readers' construct meaning by analyzing descriptions, dialogue, and narrative voice. Characters are imagined differently by each reader, and meaning emerges through individual reflection. However, when a literary text is experienced through a film adaptation, this interpretative process becomes more guided and, in some cases, restricted. The viewer is presented with fixed images, settings, and character portrayals that reflect the director's vision rather than the reader's imagination.

This difference can be clearly observed in the case of *Pride and Prejudice*. In the novel, Elizabeth Bennet's character is revealed through her thoughts, wit, and evolving judgments. Readers interpret her personality through subtle shifts in tone and dialogue. In contrast, film adaptations present a specific visual version of Elizabeth, shaping how audiences perceive her from the outset. Her expressions, gestures, and surroundings are already defined, leaving less space for individual interpretation. As a result, the imaginative role of the reader is reduced, and interpretation becomes more uniform.

A similar transformation occurs in the adaptation of *The Kite Runner*. The novel's emotional depth is largely conveyed through Amir's internal reflections and narrative voice. His guilt, fear, and

longing are expressed through language that allows readers to enter his inner world. In the film, however, these internal states must be translated into visual and performative elements such as facial expressions, dialogue, and background music. While this can make the emotional experience more immediate, it may also simplify complex psychological layers that are more fully developed in the text.

This shift highlights a key difference between reading and viewing. Reading invites interpretation, while viewing often delivers interpretation. The reader actively constructs meaning, whereas the viewer receives meaning that has already been shaped. This does not mean that films lack interpretative value, but rather that they guide interpretation in a more controlled way.

At the same time, it is important to recognize that screen-based interpretations can also open new perspectives. Film adaptations can highlight aspects of the text that may not be immediately visible in reading, such as visual symbolism, setting, and cultural context. They can also make literature more accessible to students who find reading challenging, providing an entry point into the text. In classroom settings, this can lead to richer discussions, especially when students are encouraged to compare the text and its adaptation.

However, the risk lies in allowing the visual version to replace the textual experience entirely. When students rely primarily on films, they may miss the complexity of language, narrative voice, and literary technique. Important elements such as irony, narrative ambiguity, and stylistic detail can be lost or reduced in the process of adaptation.

Thus, the movement from page to screen transforms interpretation in significant ways. It shifts the balance from imagination to visualization, from personal engagement to guided understanding. While this transformation creates new opportunities for learning, it also challenges the traditional role of the reader. In contemporary classrooms, it becomes necessary to find a balance where both forms of interpretation can coexist, allowing students to benefit from visual media without losing the depth of textual analysis.

Pedagogical Implications:

The shift from page to screen has significantly influenced the way literature is taught in contemporary classrooms. Teaching is no longer limited to explaining texts through lectures and discussions; it now includes the use of visual and digital tools that aim to make learning more interactive and accessible. This change reflects a broader movement toward student-centered learning, where engagement and participation are given greater importance.

One of the most noticeable changes is the integration of film adaptations into teaching methods. Teachers often use selected scenes or full-length films alongside texts such as *Pride and Prejudice* and *The Kite Runner* to help students better understand narrative elements, character development, and thematic concerns. Visual representation can clarify complex settings or emotional situations that may be difficult to grasp through reading alone. This is particularly useful in diverse classrooms where students may have different levels of reading proficiency.

Another important change is the use of comparative teaching methods. Instead of studying the text in isolation, students are encouraged to compare the novel with its film adaptation. This approach allows them to identify differences in interpretation, narrative structure, and characterization. For example, students may examine how a particular scene is described in the novel and how it is presented visually in the film. Such comparisons promote critical thinking, as students learn to question how meaning is shaped by different forms of representation.

The use of multimedia tools has also made classrooms more dynamic. Teachers now incorporate video clips, digital presentations, and online resources to support their teaching. These methods can increase student interest and participation, especially in a time when attention spans are often influenced by fast-paced digital content. Literature, which is sometimes seen as difficult or distant, becomes more approachable when presented through multiple modes.

However, these changes also require careful balance. While visual and digital tools can enhance understanding, there is a risk that they may reduce the emphasis on reading. If students rely too heavily on film adaptations, they may engage less with the actual text. This can weaken their ability to analyze language, structure, and literary techniques, which are essential skills in literary studies.

Therefore, the role of the teacher becomes even more important in this changing context. Teachers must ensure that screen-based methods are used as support rather than replacement. Film adaptations should be integrated in a way that encourages students to return to the text, compare interpretations, and develop their own critical responses.

The increasing use of digital tools in literature classrooms also reflects broader changes in educational practice. Christine Greenhow and other scholars note that digital environments encourage collaborative and interactive learning, allowing students to engage with texts in more dynamic ways. When applied to literature teaching, this can create opportunities for discussion, comparison, and critical reflection. However, it also requires careful structuring to ensure that engagement does not replace analytical depth.

In this way, the shift from page to screen has expanded the possibilities of teaching literature. It has made classrooms more interactive and inclusive, but it also demands a thoughtful approach to maintain the depth and rigor of literary study. Effective teaching today lies in combining traditional close reading with modern multimedia tools, allowing students to experience literature in a richer and more balanced way.

Benefits and Limitations:

The shift from page to screen in the teaching of literature offers several important advantages, but it also brings certain limitations that must be carefully considered. Understanding both sides is essential in evaluating how this transformation affects literary study.

One of the major benefits of screen-based approaches is increased accessibility. Film adaptations and visual media make literary texts easier to understand, especially for students who may struggle with complex language or unfamiliar contexts. For example, adaptations of *Pride and Prejudice* help students visualize the social setting, character relationships, and cultural norms of the time. Similarly, the film version of *The Kite Runner* provides a clearer sense of place and emotional atmosphere, making the narrative more immediate and relatable.

Another advantage is engagement. Visual storytelling often captures attention more quickly than text, which can encourage students to participate more actively in discussions. In classrooms where students may find reading demanding or time-consuming, film adaptations can serve as an entry point into literature. They can spark interest and curiosity, motivating students to explore the text more deeply.

Screen-based learning also supports different learning styles. Some students respond better to visual and auditory material than to written text. By combining reading with viewing, teachers can create a more inclusive learning environment that accommodates a wider range of learners. This can make literature feel less distant and more relevant to contemporary students.

However, these benefits are accompanied by significant limitations. One of the most important concerns is the loss of depth. Film adaptations often simplify complex narratives in order to fit time constraints and cinematic structure. Subtle details, internal monologues, and stylistic elements present in the text may be reduced or omitted. As a result, students who rely primarily on films may miss important layers of meaning.

Another limitation is the reduction of imagination. When reading, students actively construct images and interpretations in their minds. In contrast, films provide ready-made visuals, which can limit personal engagement with the text. The viewer receives a fixed interpretation rather than creating one. This shift can weaken the interpretative skills that are central to literary studies. There is also the risk of passive consumption. Watching a film is often a more passive activity than reading, which requires sustained attention and effort. If not guided carefully, students may engage with literature at a surface level, focusing more on the storyline than on language, structure, or deeper themes.

Therefore, while the move from page to screen offers valuable opportunities for engagement and accessibility, it must be approached with caution. The goal should not be to replace reading with viewing, but to use visual media as a supportive tool. A balanced approach ensures that students benefit from both the richness of the text and the accessibility of visual interpretation.

Conclusion:

This paper has explored the shift from page to screen as a significant transformation in the teaching and interpretation of literature within contemporary classrooms. Rather than being a simple

change in medium, this transition reflects a deeper shift in how literature is experienced, understood, and engaged with by students. The movement from text to visual representation has expanded the possibilities of literary learning, making it more accessible and interactive, while also introducing new challenges.

The analysis has shown that traditional methods of teaching literature, which emphasized close reading and imaginative engagement, are increasingly being supplemented by film adaptations and multimedia tools. Through examples such as *Pride and Prejudice* and *The Kite Runner*, it becomes clear that screen-based interpretations reshape how characters, themes, and narratives are understood. While these adaptations can enhance comprehension and engagement, they also guide interpretation in ways that may limit individual imagination and reduce the complexity of the original text.

At the pedagogical level, this shift has led to more dynamic and inclusive teaching practices. The use of visual media encourages participation and allows students to connect with literature in new ways. However, it also requires careful guidance to ensure that the depth of literary analysis is not lost. The role of the teacher becomes crucial in maintaining a balance between traditional reading and modern methods.

Ultimately, the transition from page to screen should not be seen as a replacement of literature but as an expansion of its possibilities. Literature continues to hold its value as a space for critical thinking, imagination, and interpretation. Screen-based approaches can enrich this experience, but only when they are used alongside close reading rather than in place of it. A balanced approach allows students to engage with both the visual and textual dimensions of literature, preserving its richness while adapting to the changing landscape of education.

These changes align with contemporary theories of multimedia and digital learning, which emphasize engagement and accessibility while also pointing to the need for critical balance. In this evolving context, the future of literary studies lies not in choosing between page and screen, but in understanding how both can work together to create a more meaningful and comprehensive learning experience.

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A study of Consumer Satisfaction in Organized and Unorganized Retail Sectors (Amravati & Yavatmal)

Ku. Pooja Subhash Wasankar

Research Scholar

Dr. Sanjay K. Katait

Professor & Head

Department of Commerce & Management
Shri Shivaji Arts & Commerce College, Amravati

Abstract

Higher education plays a significant role in shaping a productive population by developing skills, knowledge, and professional competencies required in various industries. The retail sector is one of the largest contributors to employment and economic growth in India. It consists of organized retail, such as malls and supermarkets, and unorganized retail, such as local shops and street vendors. This study aims to analyse customer satisfaction towards organized and unorganized retail sectors and understand how higher education contributes to developing skilled professionals who improve service quality. The research focuses on customers in Amravati and Yavatmal districts. Primary data was collected through questionnaires from 100 respondents. The findings indicate that organized retail provides better infrastructure and variety, whereas unorganized retail offers convenience and personal relationships. The study highlights the need for higher education institutions to provide retail management and skill-based training to enhance workforce productivity.

Introduction

Higher education is widely regarded as a crucial driver for the development of human capital. It plays a vital role in equipping individuals with advanced technical knowledge, effective communication skills, analytical thinking, and managerial capabilities that are essential in today's competitive and dynamic industrial environment. By enhancing the competencies and employability of individuals, higher education contributes to building a skilled and productive workforce. Such a productive population is a key asset for any nation, as it directly influences economic growth, innovation, and overall social development.

In the context of India, the retail sector has emerged as one of the fastest-growing industries and serves as a significant source of employment for a large segment of the population. The sector not only supports economic activities but also acts as a bridge between producers and consumers, ensuring the smooth distribution of goods and services. With the increasing demand, urbanization, and changing consumer preferences, the retail industry continues to expand at a rapid pace.

The retail sector in India is broadly classified into two main segments: organized retail and unorganized retail. Organized retail includes licensed retailers such as supermarkets, hypermarkets, shopping malls, and chain stores that operate under formal business structures and follow standardized practices. These outlets provide better infrastructure, quality assurance, and enhanced customer service. On the other hand, unorganized retail consists of traditional formats such as local kirana stores, street vendors, and small independent shops, which operate on a smaller scale with limited resources but maintain strong personal relationships with customers.

Both sectors play a significant role in fulfilling consumer needs and contributing to employment generation. However, they differ in terms of service quality, pricing strategies, customer experience, and operational efficiency. Understanding customer satisfaction across these two sectors is essential to evaluate their performance and identify areas for improvement.

Organized Retail Sector

- Supermarkets
- Shopping malls
- Branded retail outlets
- Chain stores

Unorganized Retail Sector

- Local kirana shops
- Street vendors

- Small family-owned stores

Customer satisfaction is an important measure of success for retail businesses. Educated and skilled employees trained through higher education programs can improve customer service, marketing strategies, and operational efficiency in retail businesses.

This research compares customer satisfaction levels in organized and unorganized retail sectors in Amravati and Yavatmal districts.

Review of Literature

Several researchers have studied customer satisfaction and the growth of retail sectors.

- 1.Kotler (2012) explained that customer satisfaction depends on the relationship between customer expectations and perceived performance of products and services.
- 2.Levy and Weitz (2015) stated that organized retail stores provide better infrastructure, technology, and supply chain management, which helps in improving customer experience.
- 3.Gupta (2018) found that unorganized retail stores maintain strong relationships with customers, which increases loyalty and trust.
- 4.Sharma (2020) emphasized the role of higher education in developing managerial and communication skills that improve service quality in retail industries.

These studies highlight that both retail sectors have unique advantages, and skilled human resources are important for improving customer satisfaction.

Objectives of the Study

- 1.To study the expectations from higher education in developing a productive population.
- 2.To compare customer satisfaction towards organized and unorganized retail sectors.
- 3.To identify factors influencing customer satisfaction in retail businesses.
- 4.To analyze the role of skilled employees in improving retail services.
- 5.To examine customer satisfaction levels in Amravati and Yavatmal districts.

Hypothesis of the Study

H₀ (Null Hypothesis):There is no significant difference in customer satisfaction between organized and unorganized retail sectors.

H₁ (Alternative Hypothesis):There is a significant difference in customer satisfaction between organized and unorganized retail sectors.

Research Methodology

Research Design

The study uses a descriptive and comparative research design.

Data Collection

Primary Data

- Collected through structured questionnaires
- 100 respondents from Amravati and Yavatmal

Secondary Data

- Books
- Research journals
- Websites
- Government reports

Sampling Method

Simple random sampling.

Tools for Analysis

- Percentage method
- Comparative analysis
- Tables and charts

Data Analysis and Interpretation

Table 1: Preference of Retail Sector

Retail Sector	Number of Respondents	Percentage
Organized Retail	60	60%
Unorganized Retail	40	40%
Total	100	100%

Interpretation: Most customers prefer organized retail because of product variety and modern shopping facilities.

The above table presents the preference of customers towards organized and unorganized retail sectors based on responses collected from 100 respondents. Out of the total respondents, **60% prefer organized retail**, while **40% prefer unorganized retail**.

This data clearly indicates that a majority of customers are inclined towards organized retail outlets. The primary reasons behind this preference include the availability of a wide variety of products under one roof, better infrastructure, clean and comfortable shopping environments, fixed pricing,

Table 2: Factors Influencing Customer Satisfaction

Factor	Organized Retail (%)	Unorganized Retail (%)
Product Quality	70	55
Price	60	75
Customer Service	65	60
Convenience	55	80
Product Variety	75	50

Interpretation: Organized retail performs better in product variety and quality, while unorganized retail scores higher in convenience and price flexibility.

The data shows that product quality (70%) and product variety (75%) are the most influential factors in organized retail. This indicates that customers prefer organized retail outlets mainly because they offer high-quality products and a wide range of choices under one roof. Additionally, customer service (65%) and price (60%) also play an important role, suggesting that organized retailers are able to maintain a balance between service quality and pricing. However, convenience (55%) is relatively lower, possibly due to factors such as distance, time consumption, or crowd in large stores.

In contrast, in the unorganized retail sector, convenience (80%) and price (75%) are the most significant factors influencing customer satisfaction. This clearly shows that customers value the easy accessibility of local shops, quick service, and flexible pricing options such as bargaining or credit facilities. Customer service (60%) and product quality (55%) also contribute moderately to satisfaction, mainly due to personal relationships and trust with shopkeepers. However, product variety (50%) is comparatively lower, indicating limited stock and choices in small retail outlets.

Findings

1. Organized retail stores provide better infrastructure and shopping experience.
2. Unorganized retail stores are preferred for convenience and flexible pricing.
3. Customer relationships are stronger in unorganized retail.
4. Higher education helps in developing skills such as communication, marketing, and management.
5. Skilled employees contribute to better customer service and satisfaction.

Suggestions

1. Higher education institutions should introduce courses related to retail management and customer service.
2. Retail businesses should provide skill development training to employees.
3. Organized retail should improve personalized customer interaction.
4. Unorganized retailers should adopt digital payment systems and modern retail practices.
5. Government should promote entrepreneurship and retail training programs.

Conclusion

Higher education plays a significant role in shaping a productive population capable of contributing effectively to economic growth and societal development. It equips individuals with the necessary knowledge, skills, and professional competencies required in various sectors, including retail. A well-educated and skilled workforce enhances efficiency, innovation, and service quality, thereby strengthening the overall economy.

The retail sector, being one of the largest employment generators, greatly benefits from such a skilled workforce. The study reveals that both organized and unorganized retail sectors have their own strengths and importance. Organized retail provides better infrastructure, a wide range of products, standardized practices, and improved shopping experiences. In contrast, unorganized retail offers greater convenience, personalized services, flexible pricing, and strong customer relationships, which continue to attract a large segment of consumers.

Therefore, there is a need to bridge the gap between education and industry requirements. By integrating skill-based education, vocational training, and industry-oriented programs, higher education institutions can significantly enhance workforce productivity. This, in turn, will improve customer satisfaction and overall performance in both organized and unorganized retail sectors, particularly in the districts of Amravati and Yavatmal.

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Benthic Macroinvertebrates as Bioindicators of Water Quality: A Study at the Wangeshwar River Confluence, Maharashtra, India

Deepshri Vijay Soni, Dr. Vijay B. Bhagat

Email-id: deepshree.soni@gmail.com

Abstract

Benthic macroinvertebrates are widely recognized as effective bioindicators for assessing the ecological integrity of freshwater ecosystems. These organisms respond sensitively to environmental changes and are widely used in biomonitoring studies. The present study was conducted at the Wangeshwar river confluence in Akola district, Maharashtra, India, formed by the confluence of the Purna, Vidrupa, and Gautama rivers. The investigation spanned two years (October 2022 to September 2024), encompassing seasonal variations. Physico-chemical parameters such as temperature, pH, dissolved oxygen (DO), free carbon dioxide (CO₂), total hardness, and salinity were analyzed following standard protocols (APHA, 2017). A total of 28 taxa belonging to Annelida, Arthropoda, and Mollusca were recorded. Higher diversity and abundance were observed during post-monsoon and winter seasons, whereas monsoon periods exhibited reduced diversity due to increased discharge and habitat disturbance. Pollution-tolerant taxa such as *Chironomus* sp. and *Tubifex* sp. dominated in low DO conditions, while sensitive taxa such as *Baetis* sp. and *Hydropsyche* sp. were associated with better water quality conditions (Ganguly, Patnaik, & Nayak, 2018). The findings demonstrate a strong relationship between physico-chemical characteristics and benthic community structure, highlighting their importance in biomonitoring and sustainable management of river ecosystems.

Keywords

Benthic macroinvertebrates, Bioindicators, Water quality, River confluence, Seasonal variation, Wangeshwar

1. Introduction

Freshwater ecosystems are among the most productive ecological systems and play a vital role in maintaining biodiversity and supporting human livelihoods. However, increasing anthropogenic pressures such as agricultural runoff, domestic sewage discharge, and industrial effluents have led to significant deterioration of water quality in river systems (Sivadas et al., 2016; Wallace & Webster, 1996). Monitoring these ecosystems requires reliable tools that can provide integrated information on environmental conditions.

Benthic macroinvertebrates are widely used as biological indicators due to their ecological sensitivity, relatively long life cycles, and differential tolerance to pollutants (Rosenberg & Resh, 1993; Bonada et al., 2006). These organisms inhabit bottom substrates and include diverse taxa such as aquatic insects, annelids, and mollusks. Because of their limited mobility, they reflect localized environmental conditions and long-term ecological changes (Merritt et al., 2008).

Several studies have established strong relationships between benthic macroinvertebrate diversity and physico-chemical parameters of water bodies. For example, Armitage et al. (1983) developed a biological scoring system based on macroinvertebrates for assessing water quality, while Ghosh and Panigrahi (2018) demonstrated the influence of hydro-environmental parameters on gastropod diversity. Similarly, Mishra et al. (2013) reported that seasonal and physicochemical variations significantly affect benthic fauna distribution in river ecosystems.

Aquatic insects belonging to the orders Ephemeroptera, Plecoptera, and Trichoptera (EPT group) are particularly sensitive to pollution and are commonly used as indicators of good water quality, whereas Dipteran larvae such as *Chironomus* are known to tolerate polluted conditions (Bonada et al., 2006; Merritt et al., 2008).

River confluences represent ecologically dynamic zones where the mixing of water bodies results in complex hydrological and biological interactions. These areas often support unique biodiversity patterns influenced by upstream inputs and local environmental conditions. The Wangeshwar river confluence in Akola district, Maharashtra, formed by the merging of the Purna, Vidrupa, and Gautama rivers, represents an ecologically significant yet understudied habitat.

The present study aims to assess benthic macroinvertebrate diversity and evaluate their role as bioindicators in relation to physico-chemical parameters at the Wangeshwar river confluence.

2. Materials and Methods

2.1 Study Area

The study was carried out at the Wangeshwar river confluence located in Akola district, Maharashtra, India. This confluence is formed by the meeting of three rivers Purna, Vidrupa, and Gautama and is characterized by dynamic hydrological conditions and varying anthropogenic influences.

2.2 Sampling Design and Duration

Sampling was conducted monthly over a period of two years from October 2022 to September 2024. The data were categorized into three seasons:

- Post-monsoon (October-January)
- Summer (February-May)
- Monsoon (June-September)

2.3 Collection and Identification of Benthic Macroinvertebrates

Benthic samples were collected using Tray Sampler and hand net method from selected sampling sites. The collected organisms were sieved, sorted, and preserved in 70% ethanol. Identification was carried out up to genus level using standard taxonomic keys.

2.4 Physico-Chemical Analysis

Water samples were analyzed for temperature, pH, dissolved oxygen (DO), free carbon dioxide (CO₂), total hardness, and salinity following standard procedures described by APHA (2017).

3. Results

3.1 Physico-Chemical Parameters

Table 1: Seasonal Variation in Physico-Chemical Parameters (Mean ± SD)

Parameter	Post-Monsoon	Summer	Monsoon
Temperature (°C)	24.5 ± 1.2	31.2 ± 1.5	27.8 ± 1.3
pH	7.6 ± 0.2	8.2 ± 0.3	7.4 ± 0.2
DO (mg/L)	7.8 ± 0.5	5.6 ± 0.4	6.2 ± 0.3
Free CO ₂ (mg/L)	3.2 ± 0.6	6.5 ± 0.8	4.8 ± 0.7
Total Hardness (mg/L)	120 ± 10	180 ± 15	140 ± 12
Salinity (ppt)	0.3 ± 0.05	0.5 ± 0.07	0.4 ± 0.06

The results indicate clear seasonal variation, with higher temperatures and hardness during summer and elevated dissolved oxygen during post-monsoon. Such seasonal fluctuations have been reported in freshwater systems influenced by climatic factors (Mishra et al., 2013).

3.2 Benthic Macroinvertebrate Composition

Table 2: Taxonomic Composition of Benthic Macroinvertebrates

Phylum	Group	Representative Taxa
Annelida	Oligochaeta	<i>Tubifex</i> sp., <i>Nais</i> sp.
Arthropoda	Diptera	<i>Chironomus</i> sp.
Arthropoda	Ephemeroptera	<i>Baetis</i> sp.
Arthropoda	Trichoptera	<i>Hydropsyche</i> sp.
Arthropoda	Diptera	<i>Culex</i> larvae
Mollusca	Gastropoda	<i>Lymnaea</i> sp., <i>Planorbis</i> sp., <i>Bellamya</i> sp.

3.3 Seasonal Abundance of Benthic Macroinvertebrates

Table 3: Seasonal Variation in Abundance

Season	Abundance (Ind./m ²)
Post-Monsoon	320
Summer	210
Monsoon	150

Higher abundance during post-monsoon indicates favorable environmental conditions, while reduced abundance during monsoon reflects habitat disturbance.

4. Discussion

The present study clearly demonstrates that benthic macroinvertebrate diversity is closely linked with physico-chemical parameters of the aquatic environment. Dissolved oxygen emerged as a key factor influencing species composition, with higher DO levels during post-monsoon supporting sensitive taxa such as *Baetis* sp. and *Hydropsyche* sp. These taxa are well-known indicators of good water quality and are typically associated with well-oxygenated habitats (Bonada et al., 2006; Merritt et al., 2008).

In contrast, summer conditions characterized by elevated temperature and reduced dissolved oxygen resulted in the dominance of pollution-tolerant organisms such as *Chironomus* sp. and *Tubifex* sp. Such taxa are commonly reported in organically enriched or polluted waters due to their ability to survive under low oxygen conditions (Rosenberg & Resh, 1993; Ghosh & Panigrahi, 2018).

The observed increase in free carbon dioxide and total hardness during summer indicates higher organic load and reduced water quality, which further supports the dominance of tolerant species. Similar seasonal trends have been documented in river systems where physicochemical fluctuations significantly influence benthic community structure (Mishra et al., 2013).

During the monsoon season, reduced abundance and diversity of benthic macroinvertebrates were observed, which can be attributed to increased water flow, sediment disturbance, and habitat instability. Hydrological disturbances during high discharge periods are known to negatively impact benthic assemblages and reduce species richness (Wallace & Webster, 1996).

The dominance of insect taxa, particularly members of Class Insecta (orders Diptera, Ephemeroptera, and Trichoptera), highlights their ecological importance in freshwater systems. The presence of EPT taxa during favorable conditions further reinforces their role as reliable indicators of ecological health (Armitage et al., 1983; Bonada et al., 2006).

Overall, the findings of the present study are consistent with previous research and confirm that benthic macroinvertebrates serve as effective bioindicators for assessing water quality and ecological integrity of freshwater ecosystems.

5. Conclusion

The present study highlights the significant relationship between physico-chemical parameters and benthic macroinvertebrate diversity at the Wangeshwar river confluence. Seasonal variations play a crucial role in shaping community structure and distribution patterns.

The dominance of pollution-tolerant taxa during certain periods indicates environmental stress, whereas the presence of sensitive taxa reflects relatively better water quality conditions. Thus, benthic macroinvertebrates can be effectively utilized as bioindicators for routine monitoring of river water quality. Continuous assessment using these organisms can support sustainable management and conservation of freshwater ecosystems.

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Consumer Perception of UPI Reward Programs & Their Influence on Transaction Frequency: A Study in Amravati City

Prof.K.S. Bijawe

Research Supervisor

Prof. Ram Meghe Institute of Technology & Research, Badenera - Amravati

Email: karandemadhuri01@gmail.com

Mobile: +91-8010833902

Miss. Madhuri Karande

Research Scholar

Abstract

The rapid growth of digital payment systems has transformed the financial landscape of India. The Unified Payments Interface (UPI) has become the most popular platform for electronic transactions. This growth is driven by advances in technology, widespread smartphone use, affordable internet access, and government initiatives promoting a cashless economy. UPI has become an essential part of daily financial activities. Along with convenience and speed, reward programs like cashback, scratch cards, discount coupons, referral bonuses, and loyalty points have encouraged consumers to adopt and frequently use UPI platforms.

This study looks at consumer perception of UPI reward programs and analyzes their influence on transaction frequency in Amravati city, a semi-urban region of Maharashtra. A descriptive research design was used, gathering both primary and secondary data. Primary data came from a structured questionnaire administered to 100 UPI users, while secondary data was obtained from academic journals, RBI and NPCI reports, government publications, and reliable online sources. The study evaluates factors such as awareness of reward programs, perceived value, ease of redemption, trust, security concerns, and overall satisfaction.

The findings show that reward programs significantly boost transaction frequency, especially among young users, students, and middle-income groups. Consumers see cashback and instant rewards as more effective than delayed or point-based incentives. However, issues like declining reward value, lack of transparency, and concerns about data security negatively affect long-term consumer engagement. The study concludes that while UPI reward programs effectively promote frequent digital transactions, sustainable growth requires clear reward mechanisms, better security measures, and ongoing consumer awareness initiatives.

Keywords: UPI, Digital Payments, Reward Programs, Consumer Perception, Transaction Frequency

1. Introduction

1.1 Background of Digital Payments in India

Over the past decade, India has witnessed a remarkable transformation in its financial ecosystem, marked by a gradual yet steady shift from cash-based transactions to digital payment systems. This transformation has been driven by multiple factors such as rapid technological advancement, increasing penetration of smartphones, affordable internet access, and proactive government initiatives aimed at promoting a cashless economy. Digital payment systems have emerged as a crucial instrument for enhancing efficiency, transparency, and financial inclusion within the Indian economy.

Government initiatives such as Digital India, Pradhan Mantri Jan Dhan Yojana, Direct Benefit Transfer (DBT), and policy reforms following demonetization have significantly accelerated the adoption of digital payments. These initiatives encouraged individuals and businesses to move away from traditional payment methods like cash, cheques, and demand drafts toward electronic alternatives such as debit cards, credit cards, mobile wallets, internet banking, and real-time payment platforms. Digital payments offer several advantages, including convenience, speed, reduced transaction costs, traceability, and improved access to formal financial services.

As a result, digital payment systems have become deeply integrated into everyday economic activities, ranging from utility bill payments and retail purchases to peer-to-peer fund transfers and merchant transactions. Among the various digital payment platforms available in India, the Unified

Payments Interface (UPI) has emerged as the most widely accepted and frequently used system due to its simplicity, interoperability, and instant transaction capability.

1.2 Unified Payments Interface (UPI) and Its Growth

The Unified Payments Interface (UPI) was launched in 2016 by the National Payments Corporation of India (NPCI) with the objective of creating a secure, fast, and interoperable payment system. UPI allows users to link multiple bank accounts to a single mobile application and perform transactions using a Virtual Payment Address (VPA), thereby eliminating the need to share sensitive bank details such as account numbers or IFSC codes.

UPI supports both peer-to-peer (P2P) and peer-to-merchant (P2M) transactions, making it suitable for a wide range of financial activities. The availability of popular UPI-enabled applications such as Google Pay, PhonePe, Paytm, BHIM, and Amazon Pay has further contributed to its rapid acceptance across urban, semi-urban, and rural areas. The ease of use, minimal technical requirements, and real-time transaction processing have positioned UPI as a preferred payment mode among consumers of different age groups and income levels.

The exponential growth of UPI transactions in terms of both volume and value reflects the increasing trust and dependence of consumers on digital payment platforms. UPI has played a significant role in enhancing financial inclusion by enabling individuals with basic smartphones and bank accounts to participate in the formal digital economy. However, with growing competition among UPI service providers, retaining users and encouraging frequent transactions has become a critical challenge. To address this challenge, banks and FinTech companies have adopted various promotional strategies, among which reward programs play a pivotal role.

1.3 Role of Reward Programs in UPI Adoption

Reward programs have emerged as an important strategic tool used by digital payment platforms to attract new users and increase transaction frequency among existing users. These programs are designed to provide additional value to consumers beyond the basic utility of payment services. In the context of UPI, reward programs typically include cashback offers, scratch cards, discount coupons, referral bonuses, and loyalty points.

Such incentives serve as extrinsic motivators that influence consumer behavior by making digital transactions financially attractive and psychologically rewarding. Cashback offers provide immediate monetary benefits, while scratch cards and coupons introduce elements of excitement and uncertainty, enhancing user engagement. Referral bonuses encourage network expansion by motivating existing users to invite new participants, thereby accelerating platform growth.

Reward programs are particularly effective during the initial stages of adoption, as they reduce perceived risk and increase trial usage. Over time, these incentives can contribute to habit formation, encouraging consumers to repeatedly use UPI for routine transactions. However, the effectiveness of reward programs depends largely on how consumers perceive their value, transparency, fairness, and ease of redemption. Declining reward values, complex terms and conditions, and inconsistent offers may reduce consumer satisfaction and weaken long-term engagement.

1.4 Consumer Perception and Transaction Frequency

Consumer perception refers to the process through which individuals select, organize, and interpret information to form meaningful views about products and services. In digital payment systems, consumer perception is shaped by factors such as perceived usefulness, ease of use, trust, security, reliability, and the perceived value of associated benefits like reward programs. Positive consumer perception enhances satisfaction and increases the likelihood of repeated usage, while negative perception may discourage continued adoption.

Transaction frequency is a critical indicator of the success and sustainability of digital payment platforms. While initial adoption reflects awareness and accessibility, frequent usage indicates consumer trust, satisfaction, and behavioral commitment. Reward programs play a significant role in influencing transaction frequency by providing immediate incentives that reinforce usage behavior. However, excessive dependence on rewards without strengthening core service quality may lead to short-term engagement rather than sustained usage.

Understanding how consumers perceive UPI reward programs and how these perceptions influence transaction frequency is essential for designing effective digital payment strategies.

Differences in age, income, education, and occupation further shape consumer responses to rewards, making it important to study these dynamics in specific socio-economic contexts.

1.5 Importance of Studying Semi-Urban Context: Amravati City

Semi-urban regions represent a critical transition zone between urban and rural digital adoption. Cities like Amravati in Maharashtra exhibit diverse consumer profiles, combining traditional financial habits with increasing exposure to digital technologies. Studying consumer perception in such regions provides valuable insights into the challenges and opportunities associated with expanding digital payment systems beyond metropolitan areas.

Amravati city presents an ideal setting for examining UPI usage behavior due to its growing population, expanding educational institutions, and increasing penetration of smartphones and internet services. Consumers in semi-urban areas are often more sensitive to incentives and security concerns, making reward programs an influential factor in shaping payment behavior. Analyzing the impact of UPI reward programs on transaction frequency in Amravati helps bridge the research gap between metro-centric studies and rural-focused research.

1.6 Research Gap and Significance of the Study

Although several studies have examined digital payment adoption and UPI usage in India, most existing research focuses on metropolitan cities or national-level data. Limited empirical evidence is available on how UPI reward programs influence consumer transaction frequency in semi-urban regions. Moreover, few studies specifically analyze consumer perception of different reward types and their long-term impact on usage behavior.

This study addresses this research gap by examining consumer perception of UPI reward programs and their influence on transaction frequency in Amravati city. The findings of this research are expected to contribute to academic literature by offering region-specific insights and to provide practical implications for banks, FinTech companies, policymakers, and regulators aiming to promote sustainable digital payment adoption.

2. Review of Literature

Several studies have looked into digital payment adoption and the role of incentives in influencing consumer behavior.

Bhatt and Singh (2022) examined consumer adoption of digital payment systems in India and found that perceived ease of use, usefulness, and security are key factors for adoption. Their study stressed that reward-based incentives significantly motivate first-time users.

Sharma and Gupta (2021) investigated factors that affect UPI usage and noted that cashback and promotional offers significantly boost transaction frequency. However, they pointed out that the impact of rewards lessens over time if incentives are reduced or eliminated.

According to RBI (2023), UPI transactions have grown rapidly in both volume and value, showing high consumer acceptance. The report emphasizes the importance of consumer protection, transparency, and cybersecurity to maintain trust in digital payment systems.

Existing literature indicates that while reward programs effectively drive short-term engagement, long-term usage relies on trust, service quality, and perceived value. This study adds to the literature by focusing on consumer perception of UPI reward programs in a semi-urban context.

3. Objectives of the Study

The objectives of the study are:

- To study the various UPI reward schemes offered by major platforms.
- To assess consumer awareness regarding different UPI reward schemes.
- To identify the factors and types of rewards that influence consumers to use UPI more frequently.
- To examine the relationship between UPI rewards and consumers' transaction frequency in Amravati city.
- To study the impact of UPI reward schemes on overall customer satisfaction with digital payment platforms.

4. Research Methodology

4.1 Introduction to Research Methodology

Research methodology refers to the systematic framework used to plan, collect, analyze, and interpret data in order to achieve the research objectives. It provides a logical structure that ensures

the research findings are reliable, valid, and meaningful. In social science research, especially studies related to consumer behavior and digital finance, an appropriate methodology is essential to accurately capture perceptions, attitudes, and behavioral patterns.

The present study adopts a structured methodological approach to examine consumer perception of UPI reward programs and their influence on transaction frequency in Amravati city. Since the study focuses on understanding opinions, awareness levels, satisfaction, and behavioral responses of consumers toward reward-based digital payment systems, a descriptive and empirical research framework is considered most suitable.

4.2 Research Design

The research design defines the overall strategy that integrates the different components of the study in a coherent and logical manner. For the present research, a descriptive research design has been adopted.

Descriptive research is appropriate when the objective is to describe characteristics of a population, analyze behavioral patterns, and examine relationships between variables without manipulating them. This design is widely used in consumer perception and financial behavior studies because it allows the researcher to collect quantitative data and analyze trends, preferences, and opinions as they exist in real-life situations.

In this study, the descriptive research design helps in:

- Understanding the level of awareness of UPI reward programs among consumers
- Examining consumer preferences for different types of rewards
- Analyzing the influence of reward programs on transaction frequency
- Identifying satisfaction levels and challenges faced by UPI users

The design provides a realistic and accurate representation of consumer behavior in a semi-urban context like Amravati city.

4.3 Nature of the Study

The nature of the study is empirical, as it is based on firsthand data collected directly from respondents through a structured questionnaire. Empirical research relies on observation and experimentation rather than theory alone, making it suitable for studies involving consumer behavior and usage patterns.

The study is also cross-sectional in nature, as data was collected from respondents at a single point in time. This approach helps in capturing current consumer perceptions and transaction behaviors related to UPI reward programs.

4.4 Sources of Data

The study is based on both primary and secondary data sources, ensuring comprehensive analysis and strong theoretical support.

4.4.1 Primary Data

Primary data was collected directly from UPI users residing in Amravati city. The data was gathered using a structured questionnaire designed specifically for the objectives of the study. The questionnaire captured information related to:

- Demographic profile of respondents
- Awareness and usage of UPI applications
- Types of reward programs used
- Perception toward reward value and transparency
- Frequency of UPI transactions
- Satisfaction level and security concerns

Primary data provides original insights into consumer perception and enables accurate measurement of behavioral patterns.

4.4.2 Secondary Data

Secondary data was collected from various reliable and authentic sources to support the conceptual framework of the study. These sources include:

- Academic journals and research articles
- Books related to marketing, finance, and consumer behavior
- Reports published by RBI and NPCI

- Government publications and policy documents
- Reputed websites and online databases

Secondary data helped in understanding existing research, identifying research gaps, and developing the theoretical foundation for the study.

4.5 Sampling Design

Sampling design refers to the process of selecting a subset of individuals from the target population to represent the entire population.

4.5.1 Population of the Study

The population for the study includes all UPI users in Amravati city who actively use digital payment applications for personal or commercial transactions. Since the total population of UPI users is very large and undefined, sampling was necessary.

4.5.2 Sample Size

A sample size of 100 respondents was selected for the study. This sample size is considered adequate for descriptive studies and allows for meaningful statistical interpretation while remaining manageable in terms of time and resources.

4.5.3 Sampling Technique

The study used convenience sampling, a non-probability sampling technique. Respondents were selected based on accessibility and willingness to participate in the survey. This technique was chosen due to:

- Time constraints
- Ease of data collection
- Availability of respondents

Although convenience sampling may limit generalizability, it is widely accepted in exploratory and perception-based studies.

4.5.4 Area of Study

The geographical scope of the study is limited to Amravati city, Maharashtra. The city represents a semi-urban region with growing digital infrastructure and increasing adoption of UPI platforms.

4.6 Data Collection Instrument

The primary tool used for data collection was a structured questionnaire. The questionnaire was designed after reviewing previous studies and relevant literature to ensure content validity.

Structure of the Questionnaire

The questionnaire was divided into five sections:

- Demographic Information – Age, gender, education, occupation, and income
- UPI Usage Pattern – Frequency and purpose of transactions
- Awareness of Reward Programs – Types of rewards known and used
- Consumer Perception – Perceived value, ease of redemption, transparency
- Satisfaction and Challenges – Security concerns, trust, and overall satisfaction

Most questions were close-ended, using multiple-choice and Likert-scale (5-point) formats to facilitate quantitative analysis.

4.7 Variables of the Study

- Independent Variables
 - Types of UPI reward programs (cashback, scratch cards, coupons, loyalty points)
 - Awareness of reward schemes
 - Perceived value of rewards
- Dependent Variable
 - Transaction frequency of UPI users
- Moderating Variables
 - Age
 - Income level
 - Occupation

4.8 Data Analysis Techniques

The collected data was systematically coded, classified, and analyzed using appropriate statistical tools.

The following techniques were used:

- Percentage analysis to understand respondent distribution
- Tabular analysis for clear data presentation
- Graphical representation (bar charts and pie charts)
- Comparative interpretation to analyze variations among different groups

These techniques helped in simplifying complex data and drawing meaningful conclusions.

4.9 Reliability and Validity of the Study

- Reliability refers to the consistency of the measurement, while validity refers to the accuracy of the instrument in measuring what it is intended to measure.
- The questionnaire was pre-tested on a small group of respondents to improve clarity and reliability.
- Questions were framed based on established literature to ensure content validity.
- Standardized Likert scales were used to enhance measurement accuracy.

4.10 Ethical Considerations

Ethical standards were strictly followed throughout the research process. Respondents were informed about the purpose of the study, and their participation was voluntary. Confidentiality and anonymity of respondents were maintained, and the collected data was used solely for academic purposes.

4.11 Summary

This chapter outlined the research methodology adopted for studying consumer perception of UPI reward programs and their influence on transaction frequency in Amravati city. The use of a descriptive research design, structured questionnaire, and appropriate sampling techniques ensured systematic data collection and analysis. The methodology provides a strong foundation for data interpretation and supports the reliability and validity of the research findings.

5. Data Analysis and Interpretation

The analysis of data collected from 100 respondents indicates that Google Pay (38%) and PhonePe (34%) are the most preferred UPI applications, reflecting their strong market presence. Convenience (35%) and ease of use (25%) are the primary factors influencing UPI usage, while rewards and trust each account for 20%, showing that incentives play a supportive role in consumer decisions.

The frequency of UPI usage is high, with 45% of respondents using it daily and 30% using it 3–5 times a week, indicating strong dependence on digital payments. Awareness of reward schemes is also significantly high at 85%, demonstrating effective promotion by UPI platforms. Additionally, 75% of respondents reported that rewards influence their choice of UPI app either directly or occasionally.

Cashback emerged as the most received (50%) and preferred (55%) reward type due to its immediate financial benefit. However, most users (60%) receive cashback below ₹50, indicating relatively low reward value. Despite this, reward programs strongly impact transaction behavior, with nearly 90% of respondents stating that rewards influence their payment frequency.

Convenience remains the primary reason for using UPI (40%), but a considerable proportion of users (45%) are influenced by rewards either fully or partially. Overall satisfaction levels are positive, with 70% of respondents being satisfied or highly satisfied, and 60% rating reward schemes between 4 and 5.

6. Findings of the Study

Based on the analysis and interpretation of data collected from 100 UPI users in Amravati city, the following key findings were derived:

High Awareness of UPI Reward Programs

The majority of respondents demonstrated a high level of awareness regarding UPI reward programs. Cashback offers, scratch cards, and referral bonuses were the most widely recognized incentives. Awareness levels were significantly higher among younger respondents, students, and salaried employees, indicating a strong relationship between demographic factors and exposure to digital promotions.

Cashback as the Most Preferred Reward Type

Among various reward schemes, cashback emerged as the most preferred form of incentive. Respondents perceived cashback as transparent, immediate, and financially beneficial compared to loyalty points and discount coupons, which often involved delayed redemption and complex conditions.

Positive Influence of Rewards on Transaction Frequency

The study revealed a strong positive relationship between the availability of reward programs and the frequency of UPI transactions. Respondents reported increased usage during promotional campaigns, festive seasons, and limited-time offers, indicating that incentives act as effective motivators for repeated usage.

Demographic Differences in Reward Sensitivity

Younger users (18–30 years) and middle-income groups were found to be more sensitive to reward programs compared to older users. Students and working professionals showed a higher tendency to increase transaction frequency when rewards were offered, whereas older respondents emphasized convenience and security over incentives.

Impact on Customer Satisfaction

Reward programs were found to enhance overall customer satisfaction with UPI platforms. Users who perceived rewards as fair and easy to redeem reported higher satisfaction levels and greater loyalty toward specific UPI applications.

Security and Trust Concerns

Despite the popularity of reward programs, a significant number of respondents expressed concerns regarding data privacy, fraud, and transaction security. These concerns negatively affected long-term engagement and willingness to rely exclusively on UPI platforms.

Declining Effectiveness of Rewards Over Time

The study observed that the motivational impact of reward programs tends to decline when reward values decrease or when terms and conditions lack transparency. This indicates that incentives alone may not sustain long-term usage without consistent service quality and trust.

7. Conclusion

The present study examined consumer perception of UPI reward programs and their influence on transaction frequency in Amravati city, a semi-urban region of Maharashtra. The findings clearly indicate that reward-based incentives play a significant role in promoting the adoption and frequent usage of UPI platforms. Cashback offers, in particular, emerged as the most influential reward mechanism due to their immediate and tangible benefits.

The study highlights that consumer perception toward reward programs is shaped by factors such as perceived value, ease of redemption, transparency, trust, and security. Positive perception enhances satisfaction and encourages repeated usage, whereas concerns related to declining reward value and data security reduce long-term engagement. Demographic factors such as age, income, and occupation also influence how consumers respond to reward programs.

While UPI reward programs have been successful in increasing transaction frequency in the short run, sustainable growth in digital payments requires a balanced approach. Incentives must be supported by strong security measures, transparent communication, and reliable service quality. The study contributes to existing literature by providing empirical evidence from a semi-urban context and offers practical insights for digital payment service providers and policymakers.

In conclusion, UPI reward programs are effective tools for influencing consumer behavior; however, their long-term success depends on building consumer trust, ensuring data security, and maintaining consistent value delivery.

8. Recommendations

Based on the findings and conclusions of the study, the following recommendations are proposed:

Design Consistent and Transparent Reward Programs

UPI service providers should ensure that reward schemes are simple, transparent, and consistent. Clear communication of terms and conditions can enhance consumer trust and reduce dissatisfaction arising from unmet expectations.

Focus on Cashback-Oriented Incentives

Given the strong preference for cashback, digital payment platforms should prioritize cashback-based rewards over complex point-based systems. Immediate rewards are more likely to encourage frequent usage and improve customer satisfaction.

Enhance Security and Fraud Prevention Measures

Banks and FinTech companies must strengthen cybersecurity frameworks and educate users about safe digital payment practices. Improved security will increase trust and encourage long-term reliance on UPI platforms.

Segment-Based Reward Customization

Reward programs should be customized based on demographic segments such as age, income, and occupation. Personalized offers can improve relevance and effectiveness while reducing unnecessary incentive costs.

Increase Consumer Awareness and Digital Literacy

Regular awareness campaigns and educational initiatives should be conducted, especially in semi-urban areas, to improve understanding of UPI features, rewards, and security practices.

Reduce Over-Dependence on Incentives

While rewards are effective, service providers should also focus on enhancing core service attributes such as transaction speed, reliability, and customer support to sustain long-term engagement.

Policy Support and Regulatory Oversight

Regulatory bodies such as RBI and NPCI should monitor reward practices to ensure fairness, transparency, and consumer protection, thereby promoting sustainable growth of digital payment systems.

9. Limitations of the Study

Despite careful planning and systematic execution, the present study has certain limitations that should be acknowledged while interpreting the findings.

Geographical Limitation

The study is confined to Amravati city in Maharashtra. Consumer perception and usage behavior may vary across different regions due to differences in economic conditions, digital infrastructure, literacy levels, and cultural factors. Therefore, the findings may not be fully generalizable to other cities or regions in India.

Sample Size Constraint

The study is based on a sample size of 100 respondents. Although the sample size is adequate for descriptive analysis, a larger sample could have provided more robust and statistically generalized results.

Sampling Technique

Convenience sampling was used for data collection due to time and accessibility constraints. This non-probability sampling method may introduce selection bias and limit the representativeness of the sample.

Time Constraint

The research was conducted within a limited time frame. Consumer perception and transaction behavior toward UPI reward programs are dynamic and may change over time due to policy changes, market competition, or technological advancements.

Dependence on Self-Reported Data

The study relies on self-reported responses from respondents, which may be influenced by personal bias, memory errors, or social desirability bias. As a result, actual transaction behavior may differ from reported behavior.

Limited Scope of Variables

The study primarily focuses on reward programs, transaction frequency, and consumer perception. Other influencing factors such as service quality, technical issues, customer support, and platform-specific features were not examined in detail.

Exclusion of Advanced Statistical Techniques

The analysis mainly uses descriptive statistical tools such as percentage analysis and comparative interpretation. Advanced statistical techniques could provide deeper insights into causal relationships.

10. Scope for Future Research

The present study opens several avenues for future research in the area of digital payments and consumer behavior.

Expansion to Other Regions

Future studies can extend the research to rural areas, metropolitan cities, or multiple states to compare consumer perception of UPI reward programs across different geographical contexts.

Comparative Study of UPI Platforms

Researchers can conduct comparative studies among different UPI applications such as Google Pay, PhonePe, Paytm, and BHIM to analyze differences in reward effectiveness and user loyalty.

Longitudinal Research Design

Future research may adopt a longitudinal approach to study changes in consumer perception and transaction behavior over time, especially as reward structures evolve or reduce.

Inclusion of Advanced Analytical Methods

The use of advanced statistical techniques such as regression analysis, factor analysis, or structural equation modeling (SEM) can help in identifying causal relationships between reward programs and transaction frequency.

Study on Non-Monetary Incentives

Further research can explore the impact of non-monetary incentives such as gamification, badges, social recognition, and personalized experiences on digital payment adoption.

Behavioral and Psychological Factors

Future studies can examine psychological factors such as trust, risk perception, habit formation, and behavioral biases to gain deeper insights into consumer decision-making in digital payments.

Policy and Regulatory Perspective

Researchers can analyze the role of regulatory policies, data protection laws, and consumer protection measures in shaping trust and long-term sustainability of UPI platforms.

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Determinants of Buying Behavior toward Organic Fruits and Vegetables among Retail Consumers in Amravati City

Prof. G.D. Pachaghare

Research Supervisor

Prof. Ram Meghe Institute of Technology & Research, Badenera - Amravati

Email: yashgawande235@gmail.com

Mobile: +91-9579020854

Mr. Yash K. Gawande

Research Scholar

ABSTRACT

In the contemporary era, rapid urbanization, rising disposable income, and changing lifestyle patterns have significantly influenced consumer food consumption behavior. Increasing awareness about health and lifestyle diseases such as diabetes, obesity, and cardiovascular disorders has encouraged consumers to adopt healthier dietary habits. As a result, the demand for organic fruits and vegetables has increased due to their perceived health benefits and chemical-free nature.

Organic products are grown using natural methods without synthetic fertilizers, pesticides, or genetically modified organisms, making them safer and environmentally sustainable. However, despite growing awareness and positive perception, the adoption of organic food remains limited, particularly in semi-urban areas like Amravati city. Factors such as high price, limited availability, and lack of trust in certification systems create a gap between consumer intention and actual buying behavior.

The present study aims to analyze the determinants influencing the buying behavior of retail consumers toward organic fruits and vegetables in Amravati city. The study is based on primary data collected from 100 respondents through a structured questionnaire, along with relevant secondary data sources. Key factors examined include health consciousness, price sensitivity, awareness, availability, and trust.

The findings reveal that a majority of respondents are aware of organic products; however, only a small proportion purchases them regularly, indicating an attitude-behavior gap. Health consciousness is identified as the primary motivating factor, while high price, limited availability, and lack of trust act as major barriers.

The study concludes that although demand for organic food is increasing, its widespread adoption is restricted by economic and accessibility issues. Improving affordability, enhancing availability, and building consumer trust through effective certification and awareness initiatives are essential to promote organic food consumption.

Keywords: Organic Food, Consumer Buying Behavior, Health Consciousness, Price Sensitivity, Awareness, Trust, Availability, Amravati City.

1. INTRODUCTION

1.1 Background of the Study

In the modern era, consumer lifestyles have changed significantly due to rapid urbanization, globalization, and technological advancement. With increased access to digital media and information, consumers are now more aware of health, nutrition, and environmental sustainability. As a result, food choices are no longer based only on taste and price, but also on quality, safety, and long-term health benefits.

The growing prevalence of lifestyle diseases such as obesity, diabetes, and hypertension has further encouraged consumers to adopt healthier eating habits. At the same time, environmental issues caused by chemical-based farming such as soil degradation and water pollution have increased awareness about sustainable food production. These factors have led to a gradual shift toward organic food consumption.

1.2 Concept of Organic Food

Organic food refers to agricultural products grown using natural methods without synthetic chemicals, pesticides, fertilizers, antibiotics, or GMOs. Organic farming focuses on maintaining ecological balance and sustainability.

Organic fruits and vegetables are considered beneficial due to their safety, higher nutritional value, better taste, and environmentally friendly production methods. Additionally, organic farming supports ethical practices such as animal welfare and fair labor.

1.3 Growth of Organic Food Market

The global organic food market has experienced significant growth due to rising health awareness, environmental concerns, and increased income levels. Consumers are increasingly willing to pay premium prices for organic products.

In India, the organic market is developing with support from government initiatives and certification programs. However, growth is uneven metro cities show higher adoption, while semi-urban areas like Amravati are still developing. This creates a gap between awareness and actual purchasing behavior.

1.4 Changing Consumer Behavior

Consumer behavior is influenced by psychological, social, economic, and cultural factors. Today's consumers are more health-conscious, environmentally aware, and information-driven. They focus on quality and are willing to pay more for better products.

However, actual purchasing decisions are often affected by practical factors such as high prices, limited availability, and lack of trust in organic labels.

1.5 Importance of Studying Consumer Buying Behavior

Studying consumer buying behavior helps in understanding how consumers make decisions and what factors influence them. It identifies key drivers and barriers such as price, availability, and awareness.

This information is useful for businesses to improve marketing strategies, for policymakers to promote organic farming, and for encouraging sustainable consumption.

1.6 Problem Statement

Although awareness about organic food is increasing, its actual consumption remains low, especially in semi-urban areas. Many consumers show interest but do not purchase regularly, leading to an attitude behavior gap.

Major issues include high prices, limited availability, lack of trust in certification, and insufficient awareness about benefits.

1.7 Significance of the Study

The study is important for businesses, policymakers, consumers, and researchers. It helps businesses understand consumer preferences, supports policy development, promotes awareness, and contributes to academic research.

1.8 Scope of the Study

The study focuses on consumers in Amravati city, particularly on organic fruits and vegetables and the factors influencing their buying behavior. The findings may not be applicable to other regions.

1.9 Objectives of the Study

- To analyze consumer awareness about organic food
- To identify factors influencing buying behavior
- To examine the role of price, availability, and trust
- To study the gap between awareness and actual purchase
- To suggest recommendations for increasing adoption

2. LITERATURE REVIEW

2.1 Introduction to Literature Review

A literature review is a systematic analysis of existing research studies, articles, and publications related to the research topic. It helps in understanding previous work, identifying research gaps, and building a theoretical base. In this study, the literature focuses on consumer buying

behavior toward organic fruits and vegetables, covering factors like health consciousness, price sensitivity, awareness, trust, and environmental concern.

2.2 Concept of Organic Food in Previous Studies

Several researchers have defined organic food as products produced using natural farming practices without synthetic chemicals and genetically modified organisms. Studies highlight that organic food is associated with health benefits and environmental sustainability.

Previous studies indicate that consumers perceive organic fruits and vegetables as:

- Safer due to absence of harmful chemicals
- More nutritious compared to conventional products
- Environmentally friendly
- Better in quality and taste

However, consumer perception may not always align with scientific evidence.

2.3 Consumer Buying Behavior toward Organic Food

Consumer buying behavior is influenced by psychological, economic, and social factors.

According to studies:

- Consumers with higher education are more likely to buy organic food
- Younger consumers show more interest
- Income affects purchase decisions

The buying process includes:

- Need recognition
- Information search
- Evaluation of alternatives
- Purchase decision
- Post-purchase evaluation

Many consumers show a positive attitude but do not always purchase.

2.4 Role of Health Consciousness

Health consciousness is one of the most important factors influencing purchase decisions.

Consumers believe organic food is:

- Free from harmful chemicals
- Better for long-term health
- Helpful in preventing diseases

Health-conscious consumers are more willing to pay higher prices, though awareness levels vary.

2.5 Impact of Price Sensitivity

Price is a major barrier to organic food consumption.

Studies show:

- Organic products are expensive
- Consumers prefer cheaper alternatives
- Organic food is often seen as a luxury
- Purchase is occasional rather than regular

2.6 Importance of Awareness

Awareness refers to knowledge about organic food and its benefits.

Consumers with higher awareness:

- Understand benefits
- Recognize certification labels
- Make informed decisions

However, lack of awareness remains a challenge, especially in semi-urban areas.

2.7 Role of Trust and Certification

Trust is an important factor in organic food purchase.

Research suggests:

- Trust in certification increases purchase intention
- Lack of transparency reduces confidence
- Consumers rely on brand reputation

2.8 Environmental Concern

Environmental concern also influences buying behavior.

Consumers prefer organic food because it:

- Reduces pollution
- Promotes sustainable farming
- Conserves natural resources

However, this factor alone is not always sufficient.

2.9 Availability and Accessibility

Availability plays a key role in influencing buying behavior.

Studies highlight:

- Limited availability reduces purchase
- Consumers prefer easily accessible products
- Poor distribution restricts growth

2.10 Attitude Behavior Gap

The attitude behavior gap refers to the difference between positive attitude and actual purchase.

Reasons include:

- High price
- Limited availability
- Lack of trust
- Convenience issues

2.11 Research Gap

The following gaps are identified:

- Limited studies in semi-urban areas like Amravati
- Lack of focus on combined factors
- Need for updated data
- Gap between awareness and actual purchase

3. RESEARCH METHODOLOGY

3.1 Introduction to Research Methodology

Research methodology refers to the systematic and scientific approach used to conduct research in an organized manner. It provides a clear framework for collecting, analyzing, and interpreting data to achieve the objectives of the study. A well-defined research methodology ensures that the research findings are reliable, valid, and meaningful.

In the present study, which focuses on analyzing the determinants influencing the buying behavior of consumers toward organic fruits and vegetables, the research methodology plays a crucial role. Since consumer behavior is influenced by multiple psychological, social, and economic factors, it is essential to adopt a structured and appropriate methodology to capture accurate data and draw valid conclusions.

This chapter explains the research design, nature of the study, data sources, sampling design, data collection methods, variables, tools of analysis, and limitations of the study.

3.2 Research Design

Research design is the blueprint or plan of the research study. It outlines how the data will be collected, measured, and analyzed. A good research design ensures that the research problem is addressed effectively and systematically.

For this study, a descriptive research design has been adopted.

Descriptive research is used to describe the characteristics of a population or phenomenon. It focuses on answering questions such as:

- What is the level of awareness about organic food?
- What factors influence consumer buying behavior?
- What are the barriers to purchasing organic products?

This design is appropriate because the study aims to understand and analyze existing consumer behavior rather than establishing cause-and-effect relationships.

3.3 Nature of the Study

The nature of the study is empirical and cross-sectional.

Empirical Study

The study is based on real-world data collected directly from respondents. It involves observation and measurement of actual consumer behavior rather than relying on theoretical assumptions.

Cross-Sectional Study

The data has been collected at a single point in time. This helps in capturing the current behavior, perception, and attitude of consumers toward organic food.

This approach is suitable for analyzing present market conditions and consumer trends.

3.4 Sources of Data

The study is based on two types of data:

3.4.1 Primary Data

Primary data is the original data collected directly from respondents for the specific purpose of the study.

In this research:

- Data was collected using a structured questionnaire
- Respondents were retail consumers in Amravati city

Questions were designed to capture:

- Awareness level
- Buying behavior
- Preferences
- Factors influencing purchase decisions

Primary data is highly reliable because it is collected firsthand and is specific to the research objectives.

3.4.2 Secondary Data

Secondary data refers to data that has already been collected and published by others.

Sources include:

- Research papers and journals
- Government reports
- Books and academic publications
- Online articles and databases

Secondary data helps in understanding theoretical concepts and supporting the research findings.

3.5 Sampling Design

Sampling design refers to the process of selecting a representative group from the population.

3.5.1 Population of the Study

The population includes all retail consumers in Amravati city who purchase fruits and vegetables. Since it is not feasible to study the entire population, a sample is selected.

3.5.2 Sample Size

The sample size for the study is 100 respondents.

This size is considered adequate for descriptive analysis and helps in obtaining meaningful insights within limited time and resources.

3.5.3 Sampling Technique

The study uses convenience sampling, a non-probability sampling method.

In this method:

- Respondents are selected based on availability
- Data is collected from easily accessible participants

Advantages:

- Simple and quick
- Cost-effective
- Suitable for exploratory research

Limitations:

- May not represent the entire population
- Possibility of bias

3.5.4 Area of Study

The study is conducted in Amravati city, a semi-urban region in Maharashtra.

This area is selected because:

- Awareness about organic food is emerging
- Adoption is still limited
- It provides scope for analysis

3.6 Data Collection Instrument

The primary tool used for data collection is a structured questionnaire.

Structure of Questionnaire

The questionnaire is divided into different sections:

1. Demographic Details

- Age
- Gender
- Income
- Occupation

2. Awareness

- Knowledge about organic food
- Sources of information

3. Buying Behavior

- Frequency of purchase
- Type of products purchased

4. Influencing Factors

- Health
- Price
- Availability
- Trust

5. Perception and Satisfaction

- Attitude toward organic food
- Satisfaction level

Type of Questions

- Close-ended questions
- Multiple-choice questions
- Likert scale (Strongly Agree to Strongly Disagree)

This structure helps in easy analysis and interpretation.

3.7 Variables of the Study

- Independent Variables
- Health consciousness
- Price sensitivity
- Awareness
- Availability
- Trust
- Dependent Variable
- Consumer buying behavior

These variables help in analyzing how different factors influence purchase decisions.

3.8 Data Analysis Techniques

The collected data is analyzed using basic statistical tools:

1. Percentage Analysis

Used to calculate the proportion of responses.

2. Tabular Analysis

Data is presented in tables for clarity.

3. Comparative Analysis

Used to compare responses across different categories.

4. Graphical Representation

Charts and graphs are used for better understanding.

3.9 Limitations of the Study

- Small sample size
- Limited geographical area
- Convenience sampling bias
- Time constraints

4. DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

Data analysis is a crucial part of any research study as it helps in converting raw data into meaningful information. It involves organizing, summarizing, and interpreting the collected data to identify patterns, relationships, and trends. In the present study, data has been collected from 100 respondents in Amravati city using a structured questionnaire.

The analysis is carried out using percentage method, tabular presentation, and interpretation to understand consumer buying behavior toward organic fruits and vegetables.

4.2 Awareness of Organic Fruits and Vegetables

The analysis reveals that 78% of respondents are aware of organic fruits and vegetables, while 22% are not aware.

Interpretation:

This indicates that awareness about organic food is relatively high among consumers. It reflects the impact of increasing health consciousness, social media, and marketing efforts. However, a significant portion of consumers still lack awareness, which suggests the need for more educational campaigns.

4.3 Purchase Behavior of Organic Products

Out of 100 respondents, only 30% purchase organic fruits and vegetables regularly, while 70% do not purchase them frequently.

Interpretation:

This clearly highlights the presence of a gap between awareness and actual purchase behavior. Although consumers are aware of organic food, they do not convert this awareness into regular buying behavior.

4.4 Frequency of Purchase

The analysis shows:

- 30% purchase regularly
- 40% purchase occasionally
- 30% never purchase

Interpretation:

Most consumers fall into the “occasional buyers” category. This indicates that organic food is not yet a regular part of consumer lifestyle and is treated as a secondary or occasional purchase.

4.5 Factors Influencing Buying Behavior

The study identifies the following major factors:

- Health consciousness (highest influence)
- Price
- Availability
- Trust

Interpretation:

Health is the strongest motivating factor, as consumers associate organic food with better health and safety. However, price and availability act as major barriers, limiting actual purchases.

4.6 Impact of Health Consciousness

A large proportion of respondents agreed that they prefer organic food because it is healthier and safer.

Interpretation:

This shows that consumers are highly influenced by health-related concerns. Organic food is perceived as a preventive measure against diseases, which increases its attractiveness.

4.7 Price Perception

- Most respondents believe that organic food is expensive.

- Majority consider it “high priced”
- Few consider it “reasonable”

Interpretation:

Price is the biggest barrier affecting buying behavior. Consumers are not willing to pay a premium price regularly, which reduces demand.

4.8 Availability of Organic Products

Many respondents reported that organic products are not easily available in local markets.

Interpretation:

Limited availability reduces accessibility and convenience. Consumers prefer products that are easily available, and lack of availability discourages purchase.

4.9 Trust and Certification

A significant number of respondents expressed doubts about the authenticity of organic products.

Interpretation:

Lack of trust in certification systems reduces consumer confidence. Consumers are unsure whether products labeled as organic are genuinely organic.

4.10 Environmental Concern

Some respondents showed concern for environmental sustainability.

Interpretation:

Although environmental concern exists, it is not the primary factor influencing buying behavior. Consumers prioritize personal benefits (health) over environmental benefits.

4.11 Attitude Behavior Gap

The study clearly shows:

- Awareness: 78%
- Regular Purchase: 30%
- Gap: 48%

Interpretation:

This gap indicates that consumers have a positive attitude but do not act on it due to barriers like price, availability, and trust.

4.12 Consumer Segmentation

Based on behavior, consumers can be classified into:

1. Regular Buyers (30%)

- Health-conscious
- Higher income
- Less price-sensitive

2. Occasional Buyers (40%)

- Aware but price-sensitive
- Purchase sometimes

3. Non-Buyers (30%)

- Low awareness or high price sensitivity

Interpretation:

This segmentation helps in understanding different consumer groups and their behavior.

4.13 Overall Interpretation

The overall analysis shows that:

- Consumers are aware but not regular buyers
- Health drives intention
- Price and availability restrict behavior
- Trust influences final decision

This confirms that buying behavior is influenced by multiple factors, not just awareness.

5. FINDINGS, SUGGESTIONS AND CONCLUSION

5.1 Key Findings

Based on the data analysis and interpretation of responses collected from 100 respondents, the following key findings have been derived:

1. High Awareness but Low Adoption

The study reveals that 78% of respondents are aware of organic fruits and vegetables, but only 30% purchase them regularly.

Explanation:

This indicates a significant gap between awareness and actual buying behavior. Consumers know about organic food and its benefits, but they do not include it in their regular consumption. This reflects a failure in converting awareness into action.

2. Health Consciousness as the Strongest Driver

Health consciousness is identified as the most influential factor affecting buying behavior.

Explanation:

Consumers believe that organic food is:

- Safer
- Chemical-free
- Beneficial for long-term health

This perception motivates them to prefer organic products over conventional ones.

3. Price as the Major Barrier

The majority of respondents perceive organic food as expensive.

Explanation:

- Organic products are considered premium
- Price-sensitive consumers avoid regular purchase
- Many consumers treat organic food as a luxury

Thus, price acts as the biggest obstacle to adoption.

4. Limited Availability Affects Purchase

Respondents reported that organic fruits and vegetables are not easily available.

Explanation:

- Limited retail stores
- Weak supply chain
- Lack of local availability

This reduces convenience and discourages frequent buying.

5. Lack of Trust in Certification

Many consumers expressed doubt about authenticity.

Explanation:

- Lack of knowledge about certification
- Fear of fake labeling
- Low trust in sellers

Trust becomes a critical factor in final purchase decisions.

6. Environmental Concern Has Limited Impact

Although some consumers are environmentally conscious, it is not a primary factor.

Explanation:

Consumers prioritize personal health benefits over environmental benefits.

7. Presence of Attitude–Behavior Gap

A clear gap exists between what consumers think and what they actually do.

Explanation:

- Positive attitude toward organic food
- Low actual purchase

This gap is mainly due to price, availability, and trust issues.

5.2 Suggestions / Recommendations

Based on the findings, the following recommendations are suggested to improve the adoption of organic fruits and vegetables:

1. Reduce Price Barrier

- Introduce affordable pricing strategies
- Provide discounts and promotional offers
- Government subsidies for organic farming

This will make organic food accessible to price-sensitive consumers.

2. Improve Availability and Distribution

- Increase number of retail outlets
 - Expand supply chain network
 - Promote online delivery platforms
- Easy availability will encourage regular purchases.

3. Increase Consumer Awareness

- Conduct awareness campaigns
 - Use social media and digital marketing
 - Educate consumers about benefits
- Awareness should go beyond basic knowledge to deeper understanding.

4. Build Trust through Certification

- Promote certified organic labels
 - Ensure transparency in production
 - Educate consumers about certification systems
- This will reduce confusion and increase confidence.

5. Use Effective Marketing Strategies

- Influencer marketing
- Health-focused advertisements
- Branding and packaging improvements
- Marketing should highlight health and quality benefits.

6. Government Support

- Provide financial support to farmers
- Strengthen certification systems
- Promote organic farming policies
- Policy-level support is essential for long-term growth.

5.3 Conclusion

The present study analyzes the factors influencing the buying behavior of consumers toward organic fruits and vegetables in Amravati city. The findings show that although awareness is relatively high, actual consumption remains limited. Consumers have a positive attitude toward organic products, mainly due to health and safety benefits, but high prices, limited availability, and lack of trust act as major barriers.

The study also highlights an attitude–behavior gap, where consumers are interested in organic food but do not purchase it regularly due to practical constraints. Different consumer groups such as regular buyers, occasional buyers, and non-buyers were identified.

To increase adoption, it is important to reduce prices, improve availability, and build trust through proper certification and awareness. Overall, organic food has growth potential but remains a niche market in cities like Amravati.

5.4 Limitations of the Study

- Limited sample size (100 respondents)
- Study restricted to Amravati city
- Convenience sampling may cause bias
- Time constraints

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Interpretable Deep Learning Models for Healthcare Decisions Support: A Comprehensive Review

Jaykumar Meshram

Research Scholar

Smt. Narsamma Arts, Comm & Sci. College

Kiran Nagar Amravati

Email : Jaykumarmeshram1996@gmail.com

Dr. Dinesh Satange

Assistant Professor

Smt. Narsamma Arts, Comm & Sci. College

Kiran Nagar Amravati

Email : dineshnsatange@rediffmail.com

Abstract:

Deep learning transformed healthcare through applications in medical imaging, genomics and predictive analysis. Despite its high accuracy, limited interpretability remains a barrier to clinical adoption. This paper reviews methods for explainable DL in healthcare, critically evaluating their methodologies and addressing technical, practical and ethical, challenges. Focusing on emergent directions such as hybrid neuro symbolic systems, federated learning, and human in the loop frameworks, emphasizing the importance of trust and accountability in overcoming the black box nature of AI models.

AI demonstrated performance in automating critical healthcare tasks, including diagnostic imaging and predictive modeling, often better human capabilities. Its integration gives faster diagnoses, personalized treatment and improved patient outcomes. However, challenges such as inconsistency across patient populations and lack of transparency. This review paper discovers various AI applications, identifies key limitations, and suggests strategies to guide the development of innovative, transparent, and clinically reliable AI solutions

Keywords: Artificial Intelligence, healthcare, electronic health record. Deep learning

Introduction:

AI and DL are transforming healthcare industry by empowering innovations in medical imaging, predictive analytics and personalized medicine. These technologies have demonstrated outstanding capabilities in disease diagnostic and disease prediction, often achieving performance levels that exceed human experts. Their integration into healthcare promises faster diagnosing, improved treatment and enhanced patient outcomes [Zarana gajjar et. al. 2025]

Despite these developments, a major barrier is limited interpretability of AI models. DL systems function as black boxes, making their decision-making process difficult for clinicians and patients to understand. This lack of transparency raises concerns about trust, accountability and generalize ability across varied patient. Consequently, explainable AI has emerged as a critical area of research, aiming to clarify model outputs and adoptive confidence in AI driven healthcare [Deepak Verma 2019].

This review paper examines understandable DL models in healthcare, with LIME, SHAP, and neuro symbolic approaches. Also evaluate their applications in pathology, and radiology, while addressing ethical challenges and highlighting future directions.

This paper provides researchers and healthcare providers with approaches to develop innovative, and clinically reliable AI solutions. Our objective is to ensure that future AI implementations not only enhance diagnostic accuracy and efficiency but also maintain trust and patient safety.

Literature Survey:

[Lundberg & Lee 2017] developed an interpretability in DL and introduced saliency maps for CNN, along with LIME and SHAP in healthcare. These models assumed specific domains like class activation Maps CAMs for medical imaging, and attention-based models for analyzing electronic health records. Recent advances include federated interpretability methods that preserve patient privacy while enabling collaborative learning, neuro symbolic models that combine statistical learning with symbolic reasoning for more transparent decision-making, and trust frameworks designed to evaluate and communicate the reliability of AI outputs in clinical settings.

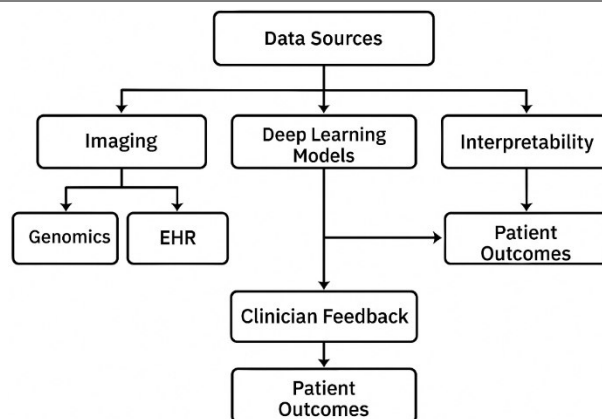


Fig1: Workflow Diagram

This development highlights a shift from basic visualization techniques toward more sophisticated, context-aware interpretability approaches. These innovations aim not only to improve transparency but also to address critical challenges in healthcare, such as data heterogeneity, and clinician trust in AI-assisted decision-making.

Research gap

Current approaches lack standardized evaluation metrics, ethical and trust issues. Also insufficiently integrated into practice.

Methodology:

Interpretability methods in healthcare AI can be divided into three main approaches: posthoc explanations, intrinsic interpretability, and hybrid models.

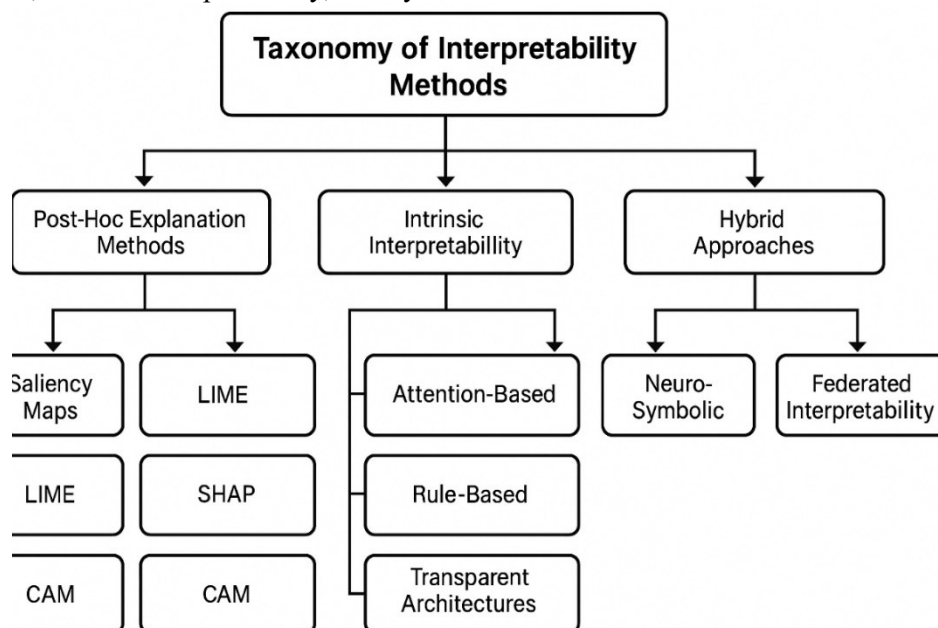


Fig 2 taxonomy diagram

Post-hoc explanation methods: includes saliency maps, LIME, CAM and SHAP. They are relatively easy to apply but risk producing [Lundberg & Lee 2017]. CAMs are widely used for medical imaging [Yashbir Singh et. al. 2024]

Intrinsic Interpretability: includes attention-based architectures or rule-based systems. They enhance clarity, and sacrifice predictive accuracy compared to more complex DL models [Thanveer Shaik et. al. 2025]

Hybrid models: Includes neuro symbolic and federated interpretability. They are complex to design and implement [yashraj singh et. al. 2025]

Interpretable models have demonstrated improvements in cancer detection and disease prediction in clinical decision making.

Conclusion and Future Direction:

Federated learning gives opportunities for privacy-preserving in hospitals, medical imaging, and genomics while maintaining transparency. Integrating clinician feedback during training strengthens trust and ethical standards. Understandable Deep Learning advances in attention-based models, hybrid neuro symbolic systems, and federated learning frameworks demonstrate encouraging progress toward achieving transparency without compromising accuracy. However, future research must continue to address the trade-offs between performance, interpretability, and ethical considerations.

Future work include:

- Establishing standardized evaluation metrics for interpretability in clinical practice.
- Designing adaptive explanation interfaces tailored to diverse healthcare professionals and patient needs.
- Exploring uncertainty quantification to improve trust in AI-driven decisions.
- Advancing federated and privacy-preserving interpretability methods for multi-institutional collaborations.
- Integrating ethical and accountability frameworks to ensure fairness and reduce bias in healthcare AI

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Impact of the National Education Policy 2020 on the roles of principle, teachers, and students

Mr.Adinath S Waghmare

Department of Computer Science Bhartiya Mahavidyala Amravati, MS, India
adinathwaghmare03@gmail.com

Dr.Bhargavi S. Chinchamalature

Under Guidance of Department of Computer Science Bhartiya Mahavidyalaya Amravati, MS, India
Bhargavicm16@bmvamt.ac.in

Abstract:

The National Education Policy (NEP) 2020 serves as a blueprint for a paradigm shift in India's scholastic framework, pivoting from an industrial-age model to a learner-centric ecosystem. This research highlights the systemic recalibration of roles for principals, teachers, and students. Under the new \$5+3+3+4\$ pedagogical structure, the Principal's role expands from administrative oversight to "Instructional Leadership," where they act as the primary drivers of institutional innovation and community synergy.

Teachers undergo a professional rebirth, transitioning from lecturers to "Pedagogical Facilitators" who prioritize critical thinking and socio-emotional development over syllabus completion. Concurrently, Students are repositioned as "Active Knowledge-Creators," empowered by a multidisciplinary curriculum that bridges the gap between vocational skills and academic rigor. By analysing these shifting identities, this study underscores the policy's objective to create a resilient, flexible, and equitable educational environment tailored for the 21st-century global landscape.

Keywords: National Education Policy 2020, role of Principle, students, teachers.

Introduction:

The National Education Policy (NEP) 2020 is not just a set of new rules, it's a complete software update for the Indian education system. It shifts the focus from rote learning memorizing for exams to holistic development learning.

The National Education Policy is blueprint for education and students, principle and teachers. There are three main types students, principle and teachers. Teachers are considered the backbone of NEP 2020, shifting from mere content deliverers to facilitators, mentors, and curriculum designers. Similar to principals, teachers must undergo 50 hours of CPD annually to update skills in digital pedagogy and inclusive education.

The NEP 2020 envisions a classroom that is less of a factory and more of a laboratory. It's an ambitious leap, but its success depends entirely on how well these three groups adapt to their new identities.

The National Education Policy (NEP) 2020 represents a transformative reform in India's education system aimed at promoting holistic, flexible, and multidisciplinary learning. This paper examines how NEP 2020 has redefined the roles of principals, teachers, and students. The policy shifts education from rote learning to competency-based, student-centred learning, thereby requiring institutional leaders, educators, and learners to adapt to new responsibilities. The study highlights the evolving leadership role of principals, the transformation of teachers into facilitators, and the active participation of students in their learning journey. The National Education Policy 2020 is the first major reform in Indian education after 34 years. It focuses on equity, quality, accessibility, and accountability in education. The policy introduces structural changes such as the 5+3+3+4 curriculum model, integration of technology, and emphasis on skill-based learning. The National Education Policy (NEP) seeks to transform India into a superpower in the knowledge economy. The goal of the new education policy is to make the educational system well-resourced and multifunctional by combining various educational institutions and specialties. The research revealed that there should be a consolidation of (800 universities and 44,000 colleges) into 15,000 leading institutions.[1]

Literature Review

Role of Principle

Research indicates that NEP 2020 redefines principals as instructional leaders rather than administrative heads. They are expected to guide curriculum implementation and ensure quality teaching-learning processes. implementing competency-based curriculum and Promoting inclusive education Managing institutional change. Effective leadership is essential for translating policy into practice. Principle plays important roles on developing students career. Support teacher professional development and Ensure accountability and performance monitoring.[2]

However, research also points to challenges such as lack of training and infrastructure in many schools.

Role of Teachers

Several studies indicate a major shift in the teacher's role from knowledge transmitter to facilitator of learning.

Encourage critical thinking and Promote experiential learning to students to grow and gain wide knowledge of education also teachers Use interactive teaching methods. Teacher play important role in student life. Teachers must design learning experiences rather than deliver content.

Outcome-based education and Skill Development Activity-based learning for students

Literature consistently highlights the importance of continuous training programs such as NISHTHA and DIKSHA platforms. Teachers are required to integrate digital tools into teaching.[2][3]

- Online learning platforms
- Digital assessments

Role of Students

The National Education Policy (NEP) 2020 brings a major shift in the role of students from passive recipients of knowledge to active participants in the learning process. The policy emphasizes holistic, flexible, and skill-based education, making students responsible for their own learning and development. Students are expected to actively engage in:

Classroom discussions

Group activities

Project-based learning

Objectives of the Study:

To assess awareness among professors regarding the NEP 2020.

To understand the challenging and opportunity in the execution on NEP 2020.

To study the evolving role of teachers as facilitators, mentors, and innovators in the teaching-learning process.

To explore the need for training, infrastructure, and policy support for effective implementation of NEP 2020.

To recommend effective strategies for improving cybersecurity awareness and safe digital practices among higher education students.[4]

Research Methodology:

This study only made use of secondary sources. Because the primary goal of the study is to draw attention to methodological issues with the National Education Policy estimates, a review of related research is conducted to provide context. In the context of specific secondary sources that are employed purposefully to elaborate on the issues, some crucial themes are clarified. This study upholds originality by stressing the advantages and disadvantages of the National Education Policy, as well as the results of studies on sparsely populated areas and the effects of corrective actions that have already been taken. Study conducted by official agencies and individual academics is regularly compared and contrasted in order to give readers a more thorough understanding of the themes highlighted for the assessment.[5]

The author benefited from conversations with academics in addition to the books, journals, and papers cited in the reference. Data are collected using a "structured questionnaire" distributed through online platforms such as Google Forms or institutional email. The questionnaire includes sections on demographic details, knowledge of cyber threats, security practices (password

management, phishing awareness, antivirus usage), and prior cybersecurity training. Responses are measured using a “Likert scale” and multiple-choice questions.[5][6]

The collected data are analyzed using statistical tools such as ‘percentage analysis, mean, standard deviation, and correlation’ to evaluate awareness levels and behavioral patterns. Reliability of the instrument can be tested using ‘Cronbach’s alpha’, and validity ensured through expert review. Ethical considerations are maintained by obtaining informed consent, ensuring anonymity, and using the data strictly for academic purposes. This methodology helps in systematically assessing cybersecurity awareness and identifying gaps that require educational intervention.

➤ **Historical Development**

The first National Education Policy in 1968 was formed during the time of the Indira Gandhi Government. The second National Education Policy was 1986 and was formed during the Rajiv Gandhi Govt. It was modified in 1992 by P.V. Narsimha Rao Govt. Now after 34 years, the new National Education Policy 2020 (NEP2020) is coming to society. In the new Central Government of 2014, a new committee was formed on New Education Policy in 2015 under the chairmanship of T.S.R. Subramanian. The Report was submitted on 7th May 2016. The main objectives of the committee include - (i) To improve the quality of the Education, (ii) Credibility of Education, (iii) Addressing the gaps in implementation. Another New committee was formed and made up of 9 members and they drafted the National Education Policy in 2019 under the chairmanship of Dr.KrishnaswamyKasturirangan.

National Policy on Education, 1986 Historically, since independence, various education policies have emphasized equality in education. Particularly, the National Policy on Education (NEP) 1986/1992 laid special emphasis on the removal of disparities. Education should be used as an agent of basic change in the status of women. It was envisaged that the policy would neutralize the accumulated distortions of the past through a well-conceived edge in favour of women. It would foster the development of new values through redesigned curricula, and textbooks, the training and orientation of teachers, decision-makers and administrators and the active involvement of educational institutions.[7][8]

The removal of women’s illiteracy and obstacles inhibiting their access to, and retention, in elementary education will receive overriding priority, through the provision of special support services, setting of time targets and effective monitoring. The policy of non-discrimination will be pursued vigorously to eliminate sex stereotyping in vocational and professional courses and to promote women’s participation in non-traditional occupations, as well as in existing and emergent technology.

➤ **National Education Policy 2020**

National Education Policy 2020 The NEP 2020 is embarked upon a vision of “transforming the system to meet the needs of 21st century India.” More than two decades ago, UNESCO published a ground-breaking report Learning The Treasure Within for the International Commission on Education for the Twenty-first Century⁷, chaired by Jacques Delors. It argued for an integrated vision for education and learning worldwide, which influenced our educational policies for many years. With free market economic reforms and the socio-economic transformation of the societies post-1990s, it is relevant to revisit the report and revisit the educational policies adopted. One of the prominent recommendations for the education sector was to underline the concept of ‘learning to be’, which emphasizes an individual’s autonomy to grow in a specific direction of inherent interest, call it a passion, and achieve one’s dream in life. Our policymakers in the north east region need to re-emphasize this point in coming years as it is also supported by the guidelines of NEP2020.[8]

➤ **Impact on Students:**

NEP 2020 will open up new learning opportunities to the students. Its biggest impact would be the change in the learning environment and the learning process for the students. The new education policy will:

- Increase focus on the skill improvement and competency development of the students. Make the students future-ready by building 21st-century skills. Make students focus on both academic and non-academic pursuits.
- Provide various learning opportunities for pre-primary, open, and distance-learning students

- Give access to counselling and other services for students.

Therefore, this new national policy on education will also provide multiple exit options for mid-term drop-out students with 1 year of training or 2 years of Diploma.

➤ **Impact on Teachers**

Therefore, the Government of India has decided to make their teachers more skilled and equipped with futuristic teaching skills. See what teachers will get from the new education policy:

- Introduction of professional teaching standards.
- Clearer outlined roles and responsibilities.

Training to monitor and improve their capabilities. More focus on 21st-century teaching skills. A transparent recruitment and selection process for teachers to motivate them and improve their performance.

Teachers not only guide the students for their academic excellence but also mentor them in taking the right career decisions. Therefore, they should equip themselves with new-age teaching methods

➤ **Curricular Integration of Essential Subjects, Skills, and Capacities**

While students must have a large amount of flexibility in choosing their individual curricula, certain subjects, skills, and capacities should be learned by all students to become good, successful, innovative, adaptable, and productive human beings in today's rapidly changing world. In addition to proficiency in languages, these skills include: scientific temper and evidence-based thinking; creativity and innovativeness; sense of aesthetics and art; oral and written communication; health and nutrition; physical education, fitness, wellness, and sports; collaboration and teamwork; problem solving and logical reasoning; vocational exposure and skills; digital literacy, coding, and computational thinking; ethical and moral reasoning; knowledge and practice of human and Constitutional values; gender sensitivity; Fundamental Duties; citizenship skills and values; knowledge of India; environmental awareness including water and resource conservation, sanitation and hygiene; and current affairs and knowledge of critical issues facing local communities, States, the country, and the world.

Concerted curricular and pedagogical initiatives, including the introduction of contemporary subjects such as Artificial Intelligence, Design Thinking, Holistic Health, Organic Living, Environmental Education, Global Citizenship Education (GCED), etc. at relevant stages will be undertaken to develop these various important skills in students at all levels. It is recognized that mathematics and mathematical thinking will be very important for India's future and India's leadership role in the numerous upcoming fields and professions that will involve artificial intelligence, machine learning, and data science, etc. Thus, mathematics and computational thinking will be given increased emphasis throughout the school years, starting with the foundational stage, through a variety of innovative methods, including the regular use of puzzles and games that make mathematical thinking more enjoyable and engaging. Activities involving coding will be introduced in Middle Stage.[8][9]

➤ **National Curriculum Framework for School Education (NCFSE)**

The formulation of a new and comprehensive National Curriculum Framework for School Education, NCFSE 2020-21, will be undertaken by the NCERT - based on the principles of this National Education Policy 2020, frontline curriculum needs, and after discussions with all stakeholders including State Governments, Ministries, relevant Departments of the Central Government, and other expert bodies, and will be made available in all regional languages. The NCFSE document shall henceforth be revisited and updated once every 5-10 years, taking into account frontline curriculum.

➤ **Continuous Professional Development (CPD)**

Teachers will be given continuous opportunities for self-improvement and to learn the latest innovations and advances in their professions. These will be offered in multiple modes, including in the form of local, regional, state, national, and international workshops as well as online teacher development modules. Platforms (especially online platforms) will be developed so that teachers may share ideas and best practices. Each teacher will be expected to participate in at least 50 hours of CPD opportunities every year for their own professional development, driven by their own interests. CPD opportunities will, in particular, systematically cover the latest pedagogies regarding foundational literacy and numeracy, formative and adaptive assessment of learning outcomes, competency-based

learning, and related pedagogies, such as experiential learning, arts-integrated, sports-integrated, and storytelling-based approaches, etc.[10]

School Principals and school complex leaders will have similar modular leadership/management workshops and online development opportunities and platforms to continuously improve their own leadership and management skills, and so that they too may share best practices with each other. Such leaders will also be expected to participate in 50 hours or more of CPD modules per year, covering leadership and management, as well as content and pedagogy with a focus on preparing and implementing pedagogical plans based on competency-based education.

➤ **Special educators**

There is an urgent need for additional special educators for certain areas of school education. Some examples of such specialist requirements include subject teaching for children with disabilities/Divvying children at the Middle and Secondary school level, including teaching for specific learning disabilities. Such teachers would require not only subject-teaching knowledge and understanding of subject-related aims of education, but also the relevant skills for understanding of special requirements of children.

Therefore, such areas could be developed as secondary specializations for subject teachers or generalist teachers, during or after pre-service teacher preparation. They will be offered as certificate courses, in the pre-service as well as in-service mode, either full time or as part-time/blended courses - again, necessarily, at multidisciplinary colleges or universities. Greater synergy will be enabled between the course curriculum of NCTE and RCI to ensure adequate availability of qualified special educators who can handle subject teaching as well.

➤ **Approach to Teacher Education**

Recognizing that the teachers will require training in high-quality content as well as pedagogy, teacher education will gradually be moved by 2030 into multidisciplinary colleges and universities. As colleges and universities all move towards becoming multidisciplinary, they will also aim to house outstanding education departments that offer B.Ed., M.Ed., and Ph.D. degrees in education.

Conclusion:

The drafting committee of NEP 2020 has made a comprehensive attempt to design a policy that considers diverse viewpoints, global best practices in education, field experiences and stakeholders' feedback. The mission is aspirational but the implementation roadmap will decide if this will truly foster an all-inclusive education that makes learners industry and future ready.[11]

Principals are no longer limited to administrative duties; they now play an important role in guiding academic improvement and supporting teachers. Teachers are expected to adopt new teaching methods and act as guides who help students learn through activities, discussion, and practical experiences rather than only lectures. Students are placed at the center of the learning process. They are encouraged to take an active role, think independently, and develop important life skills. This change helps students become more confident, responsible, and prepared for real-world challenges. In conclusion, NEP 2020 creates a more flexible and modern education system. However, proper implementation, training, and resources are necessary to achieve its full benefits.

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AI-Based Fire Detection and Control System for Indoor Positioning

Mr. Abhijit Kalbande

M.Sc. (Electronics) Brijlala Biyani College, Amravati

Abstract

With the rapid evolution of the internet and the widespread development of the Internet of Things (IoT), modern buildings are becoming increasingly intelligent by integrating advanced technologies that improve safety, efficiency, and operational management. One of the most important applications of these technologies is the development of intelligent emergency management systems capable of detecting hazards and guiding occupants safely during critical situations such as fires. Wireless Sensor Networks (WSNs) play a vital role in these systems by providing continuous environmental monitoring and real-time data collection. In emergency conditions such as fire outbreaks, sensor networks assist occupants by identifying the safest and fastest evacuation routes based on real-time environmental data. Sensors installed throughout the building continuously monitor parameters such as temperature, smoke levels, gas concentration, and other hazard indicators. The collected information is transmitted to a centralized processing system that analyzes the data and dynamically determines safe evacuation paths. This intelligent guidance helps reduce congestion during evacuation, prevents panic among occupants, and ensures a safer and more organized emergency response. The integration of Artificial Intelligence (AI) with IoT technologies has significantly enhanced the capabilities of intelligent building systems. Machine learning algorithms can analyze large volumes of sensor data to predict fire risks, detect hazards at an early stage, and provide automated safety responses. These systems can also learn from historical data and improve their performance over time. Additionally, the flexibility of AI-driven systems allows them to be deployed in various environments such as residential buildings, commercial complexes, hospitals, educational institutions, and industrial facilities.

Keywords: Internet of Things (IoT), Wireless Sensor Networks (WSNs), Indoor Positioning System, Emergency Navigation, Smart Buildings, Fire Detection System, Artificial Intelligence.

1. Introduction

The rapid advancement of modern technologies has led to the emergence of intelligent infrastructures that integrate smart devices, communication systems, and automated control mechanisms. Among these technologies, the Internet of Things (IoT) has played a transformative role in the development of smart buildings. IoT enables the interconnection of multiple devices, sensors, and computing systems that work together to improve building efficiency, energy management, security, and safety.

One of the most critical applications of IoT in smart buildings is the development of emergency detection and evacuation systems. Traditional fire detection systems typically rely on simple smoke alarms or manual intervention, which may not provide sufficient guidance during emergencies. These systems often lack the ability to dynamically adapt to changing environmental conditions, which can lead to delays in evacuation and increased risks for building occupants.

Wireless Sensor Networks (WSNs) have emerged as an effective solution for monitoring environmental conditions in real time. These networks consist of multiple interconnected sensors placed at different locations within a building. The sensors continuously collect data such as temperature, smoke density, humidity levels, and gas concentration. This information is transmitted to processing units where it is analyzed to detect potential hazards.

During a fire emergency, the ability to provide dynamic evacuation instructions becomes crucial. Traditional evacuation systems typically rely on predefined escape routes that are printed on building maps or displayed on signboards. However, these static routes may become unsafe if fire spreads quickly or if certain exits become blocked. In such situations, occupants may become confused or trapped due to the lack of real-time guidance.

To overcome these limitations, intelligent evacuation systems that combine IoT sensors, artificial intelligence, and indoor positioning technologies have been proposed. These systems

continuously monitor environmental conditions and dynamically calculate the safest evacuation routes based on real-time information. The integration of indoor positioning systems allows the system to identify the exact location of occupants within the building and guide them through the most appropriate escape path.

The proposed Smart Escape system integrates AI-based fire detection with indoor positioning technologies to create a dynamic evacuation guidance system. By using mobile devices, sensor networks, and intelligent algorithms, the system provides personalized navigation instructions that help individuals escape safely during fire emergencies. This approach significantly improves evacuation efficiency and reduces the risks associated with traditional emergency management systems.

The proposed AI-based fire detection and control system combined with indoor positioning technology aims to improve emergency response efficiency and ensure the safety of occupants by enabling intelligent navigation during fire emergencies. By combining real-time sensing, AI-based analysis, and indoor location tracking, the system provides accurate hazard detection and dynamic evacuation guidance, significantly improving building safety and emergency preparedness.

2. Motivation

Fire incidents in indoor environments represent one of the most dangerous emergencies that can occur in residential, commercial, and industrial buildings. These incidents often develop rapidly, leaving occupants with very limited time to respond. In many cases, fires spread quickly due to combustible materials, poor ventilation, or delayed detection, resulting in severe property damage and loss of life.

Conventional fire detection systems primarily rely on smoke detectors and alarm systems that alert occupants when a fire is detected. While these systems are useful for providing early warnings, they often fail to provide sufficient guidance for safe evacuation. Occupants may not know which exit routes are safe, especially when visibility is reduced due to smoke or when fire blocks certain pathways.

Recent advancements in Artificial Intelligence and Machine Learning provide new opportunities to improve fire detection and evacuation systems. AI algorithms are capable of analysing large volumes of sensor data and identifying patterns that indicate potential fire hazards. These technologies can detect fire incidents at an early stage, predict how fires may spread within a building, and generate optimized evacuation routes for occupants.

The motivation behind this research is to design an intelligent system that integrates fire detection, indoor positioning, and evacuation guidance into a unified framework. By combining IoT sensors, AI algorithms, and communication technologies, the proposed system can monitor environmental conditions in real time and provide accurate hazard detection.

Furthermore, the system can guide occupants toward the safest evacuation routes using indoor navigation technologies. This capability not only improves safety for building occupants but also assists emergency responders by providing real-time information about the fire location and building conditions.

The development of such intelligent systems is essential for enhancing building safety and reducing the impact of fire-related disasters in modern urban environments.

3. System Architecture

The architecture of the proposed AI-based fire detection and indoor positioning system is designed to ensure efficient monitoring, accurate hazard detection, and reliable evacuation guidance. The system consists of several interconnected components that work together to detect fire incidents and guide occupants safely during emergencies.

The first component of the system is the sensor layer, which includes multiple sensors deployed throughout the building. These sensors include smoke detectors, temperature sensors, gas sensors, and surveillance cameras. The primary function of these sensors is to continuously monitor environmental conditions and detect signs of fire such as rising temperature levels, smoke formation, or gas leakage.

The data collected by the sensors is transmitted to the processing layer, where artificial intelligence algorithms analyse the information. Machine learning models are used to identify patterns associated with fire incidents and determine the severity and location of the hazard. The processing

unit can quickly evaluate the situation and generate evacuation strategies based on real-time environmental data.

The system also includes a communication layer, which ensures seamless data exchange between sensors, processing units, and user devices. Wireless communication technologies such as Bluetooth Low Energy (BLE) beacons, Wi-Fi modules, and wireless sensor networks are used to maintain connectivity within the building.

The indoor positioning system plays a critical role in determining the exact location of individuals inside the building. Using technologies such as Bluetooth beacons, Wi-Fi signals, or RFID tags, the system can accurately track the movement of occupants and provide personalized navigation instructions during emergencies.

Finally, the user interface layer delivers evacuation instructions to building occupants through mobile applications, digital displays, or emergency communication systems. These instructions guide individuals along the safest routes while avoiding areas affected by fire or smoke.

To ensure system reliability, backup power supplies and redundant communication channels are incorporated into the design. This ensures that the system remains operational even in situations where power outages or network disruptions occur during emergencies.

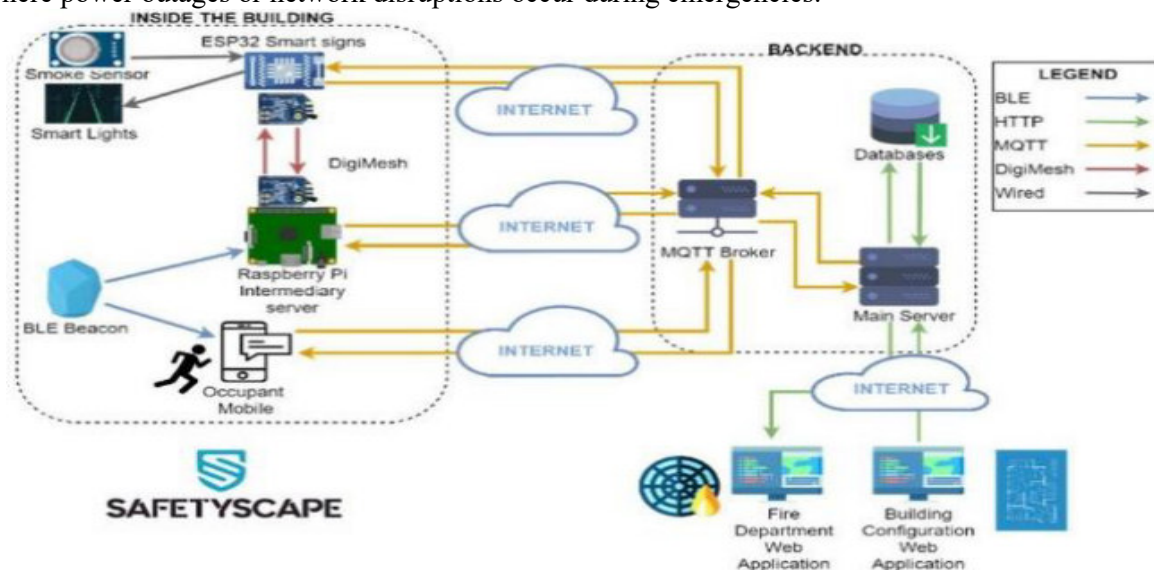


Fig 1 System Architecture

4. Literature Review

Several researchers have investigated the application of indoor positioning systems and intelligent fire detection technologies for improving emergency evacuation strategies.

Rebal Jurdi, Hao Chen, and Yuming Zhu proposed an indoor positioning system based on WiFi Round-Trip Time (RTT) measurements. Their approach improves location accuracy in indoor environments where GPS signals are unreliable or unavailable. Accurate indoor positioning is essential for navigation systems that guide occupants during emergency evacuations.

Christian Fragner and Christian Krutzler introduced the LEDPOS system, which uses visible light communication technology and machine learning algorithms for indoor positioning. In this approach, LED lights function as sensors that detect user positions based on variations in light intensity. Machine learning models analyze these signals to determine the location of individuals with high accuracy.

Another study conducted by N. Syazwani C.J. and colleagues reviewed multiple indoor positioning technologies including WiFi, Bluetooth, RFID, and visible light communication. Their research compared the strengths and limitations of each technology and identified future research opportunities for improving indoor navigation systems.

Fuyu Wang, Xiao Xu, and Mengkai Chen explored evacuation strategies for large public buildings using Building Information Modeling (BIM) and fire simulation software. Their study simulated different evacuation scenarios to determine the most effective strategies for ensuring safe evacuation during fire emergencies.

Additional research has focused on combining IoT devices, sensor networks, and machine learning techniques to develop intelligent fire detection systems capable of real-time monitoring and automated emergency response.

5. Proposed Methodology

The proposed methodology focuses on developing an intelligent fire detection and evacuation guidance system by integrating Artificial Intelligence (AI), Internet of Things (IoT), Wireless Sensor Networks (WSNs), and indoor positioning technologies. The main objective of this methodology is to detect fire incidents at an early stage and provide dynamic evacuation guidance to building occupants in real time.

The system begins with the deployment of IoT-based sensors throughout the building. These sensors include temperature sensors, smoke detectors, gas sensors, and cameras. Each sensor continuously monitors environmental conditions such as temperature variations, smoke density, and the presence of hazardous gases. The collected data is transmitted through a wireless communication network to a central processing unit where the information is analysed. The use of Wireless Sensor Networks enables continuous monitoring of the building environment and ensures that any abnormal changes are detected immediately.

After collecting the environmental data, the system applies Artificial Intelligence and machine learning algorithms to analyze the sensor readings. These algorithms are trained to recognize patterns associated with fire hazards, such as sudden increases in temperature, the presence of smoke particles, or unusual gas concentrations. Once the system detects a potential fire incident, it determines the location and severity of the fire by analyzing data from multiple sensors. This early detection mechanism allows the system to trigger alarms and initiate evacuation procedures before the fire spreads extensively.

The proposed system also incorporates an Indoor Positioning System (IPS) to identify the real-time location of individuals inside the building. Technologies such as Bluetooth Low Energy (BLE) beacons, Wi-Fi signal triangulation, or RFID tags are used to track user positions accurately. By combining indoor location data with fire detection information, the system can determine which evacuation routes are safe and which areas should be avoided due to fire or smoke.

Once the safe evacuation routes are determined, the system uses path optimization algorithms to guide occupants toward the nearest and safest exit. Algorithms such as Dijkstra's algorithm or shortest path algorithms can be used to calculate optimal evacuation paths while avoiding hazardous areas. These navigation instructions are then delivered to occupants through mobile applications, digital display boards, or emergency guidance systems installed within the building.

Additionally, the proposed methodology includes real-time communication with emergency responders. The system continuously updates information about fire location, building conditions, and occupant positions, allowing firefighters and rescue teams to make informed decisions during rescue operations.

Overall, the proposed methodology combines intelligent sensing, AI-based analysis, and indoor navigation technologies to create a smart evacuation system capable of detecting fire hazards quickly and guiding occupants safely during emergencies.

Although significant progress has been made in the development of intelligent fire detection and evacuation systems, several challenges remain. One of the primary challenges is the complexity associated with processing large volumes of sensor data in real time. As the number of IoT devices increases within smart buildings, systems must efficiently manage high data traffic while maintaining fast response times.

Another important challenge is interoperability between different IoT devices. Many smart building systems use devices from multiple manufacturers, which may operate using different communication protocols. Integrating these devices into a single unified system requires standardized frameworks and compatible communication technologies.

Privacy and security concerns also present major challenges for indoor positioning systems. Since these systems track the location and movement of individuals within buildings, there is a risk that sensitive data could be misused or accessed without authorization. Therefore, robust security mechanisms must be implemented to protect user privacy and prevent cyber-attacks.

Future research should focus on improving system scalability, developing standardized communication protocols, and implementing advanced cybersecurity measures to ensure the safe deployment of intelligent evacuation systems.

6. Future Scope

The future scope of the AI-based fire detection and control system for indoor positioning lies in enhancing the intelligence, scalability, and reliability of emergency management systems in smart buildings. With continuous advancements in Artificial Intelligence, Internet of Things (IoT), and sensor technologies, future systems can become more efficient in predicting fire hazards before they occur. By integrating advanced machine learning models and predictive analytics, the system can analyze historical sensor data and environmental patterns to identify potential fire risks in advance. This predictive capability will allow building management systems to take preventive actions such as activating safety mechanisms, notifying authorities, or isolating high-risk areas before a fire spreads. Another important future direction is the integration of advanced indoor positioning technologies and real-time building information systems. Emerging technologies such as ultra-wideband (UWB) positioning, 5G communication, and digital twin models of buildings can significantly improve the accuracy and efficiency of evacuation guidance systems. By creating a digital representation of the building infrastructure and continuously updating it with real-time sensor data, the system can simulate fire propagation and dynamically calculate safer evacuation routes. This will allow the system to guide occupants more effectively during emergencies while also providing valuable information to firefighters and emergency responders for rescue operations.

Furthermore, future developments may focus on improving system interoperability and security to support large-scale smart city environments. Intelligent fire detection systems can be integrated with other smart infrastructure systems such as smart traffic management, emergency response networks, and public safety platforms. This integration will enable coordinated responses during large-scale emergencies, improving overall disaster management capabilities. Additionally, incorporating advanced cybersecurity techniques such as blockchain-based data protection and secure communication protocols will ensure that sensitive building data and occupant information remain protected while maintaining reliable system performance.

7. Conclusion

The proposed AI-based fire detection and control system integrated with indoor positioning technology represents a significant advancement in smart building safety systems. By combining IoT sensors, wireless communication technologies, and artificial intelligence algorithms, the system can monitor environmental conditions continuously and detect fire hazards in real time. The intelligent evacuation guidance provided by the system allows occupants to follow dynamically generated escape routes that adapt to changing fire conditions. This capability greatly improves emergency response efficiency and reduces the risks associated with traditional evacuation systems that rely on static routes. Overall, the integration of AI, IoT, and indoor positioning technologies offers a powerful solution for improving safety in modern buildings. The system enables faster decision-making during emergencies, enhances situational awareness for emergency responders, and helps protect human life by ensuring efficient and reliable evacuation processes.

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Consumer Purchase Behaviour in Organized and Unorganized Retail Clothing Markets: A Comparative Study in Tier-II City. Student of Department of Management Studies.

Rasika Chokhat**Ranu Kachawe**

Guide

Prof. Dr. P. A. Kalmegh

(Assistance Professor Department of Management Studies)

Prof. Ram meghe institute of technology and Research Anjangaon bari road, badnera-amravati,
Maharashtra-444701 (an autonomous institute) _

➤ABSTRACT

India started its Retail Journey since ancient time. In Ancient India there was a concept of weekly HAAT, where all the buyer and seller gather in a big market for bartering. It takes a pretty long times to and step to shape the modern retail. The Indian retail industry is now beginning to evolve transformation that has swept other large economies. There is a vast change in India retail, the liberalization of the cosumer good industry initiated in the mid-80's and accelerated through the 90's has begun to impact the structure and cduct of the retail industry. As the study made on the organised &unorganised retail, the customer those who are having the income of less than twenty thousand they would like to purchase more from the unorganised store but the customer having the budget more than twenty thousand they would like to purchase more from the organised store. The customer are satisfied with the atmosphere of the organised store, but the customer are feeling that there is price difference & the facility provided by the organised retail store. The customer are feeling that the payment mode of the organised retail store is better than the unorganised retail store.

Keywords : Cosumerbehavior, organised clothing retail, unorganised clothing retail, retail brand

1. INTRODUCTION

The retail sector in india is one of the fastest-growing industries and plays a crucial role in the country's economic development. Over time, the Indian retail market has evolved from traditional systems such as weekly markets (haats), street vendors, and small family-run shops to modern formats like shopping malls, branded outlets, and larger retail chains. This transformation has led to the emergence of two major segments in the retail industry-organised and unorganised retail.

The **Organised retail sectore** includes licensed retailers such as branded clothing store, malls, and chains outlets that offers standardised products, fixed pricing, better infrastructure, and enhanced shopping experience. These stores focus on quality assurance, visual merchandising, digital payment systems, and customer services. With increasing urbanization, higher disposable income, and changing rapidly, especially among the young generation.

On the other hand, the **unorganised retail sector** consists of small local shops, street markets, and independent vendors. This sector is characterized by low pricing, flexible bargaining, personalised customer relationships, and easy accessibility. Despite the growth of organised retail, unorganised retail continues to dominate in many parts of India, particular in tier-2 cities, due to its affordability and convenience.

1.2 CosumerBehavior

Refers to the process by which cosumers select, purchase, and use clothing products. Influenced by factors like price, quality, brand image, fashion trends, and convenience. In tier-2 cities, consumers show mixed behavior-traditional (price-focused) and modern (branded-focused). Youth prefer trendy and branded clothes, while older consumers focus on durability and cost.

1.3 Organised Retail

Includes malls,branded stores, and retail chains. Offers fixed pricing, better quality, wide variety, and modern shopping experience. Attracts middle and higher-income comsumers. Provides facilities like digital payment, return policy and customer services.

1.4 Unorganized Retail

Includes local shops, street vendors, and weekly markets. Known for low prices, bargaining options, and personal relationships. Preferred by low and middle-income consumers. Limited variety and basic shopping environment but high accessibility.

1.5 Retail Brands

Branded clothing represents quality, status, and fashion trends. Popular among youth and urban consumers. Builds trust through consistency and brand image. Higher prices compared to local products but offers better durability and design.

Retailing broadly involves :

- Understanding the consumers needs
- Developing good merchandise assortment and
- Display the merchandise in an effective manner.

2. Review of Literature

Kumar, M. (2023). Indian Retail Market Evolution in the Current Situation. -Indian retail ranks among the world's ten largest. The changing attitudes of Indian consumers and the rise of organized retail formats have transformed the selling landscape in India. As India's economy recovers, retail purchasing will become a significant opportunity. Hence, Indian companies prioritize strategic retail marketing to optimize resource use, develop core competencies, and achieve competitive advantage. Over 10% of the country's GDP and 8% of employment are attributed to it. India is the fifth-largest retail destination worldwide.

The World Bank ranks India as the fifth-largest retail destination worldwide, ranking 63 in the 2020 Doing Business report. As urban Indian consumers' purchasing power rises, branded items in sectors such as apparel, cosmetics, footwear, watches, beverages, cuisine, and jewelry are becoming famous for business and pleasure. Research by the Boston Consulting Group (BCG) predicts that the retail sector in India will be worth US\$ 2 trillion by 2032.

•**Organized Retailing** : Defined by large-scale operations, standardized processes, and branded stores. Studies highlight factors like convenience, variety, and quality driving consumer preferences.

•**Unorganized Retailing** : Comprising small, family-owned shops, street vendors, and local markets. Affordability, proximity, and personal touch are the primary factors influencing consumers.

M. Gupta (2004) observed that consumer has multiple options to choose- ranging from the shopkeeper to the most sophisticated supermarkets, departmental stores, plazas and malls which provides the latest and better quality products and it made India the top spot among the favored retail.

Swinyard, Shopping patterns of US consumers are more sophisticated, they expect high level of services and merchandise quality. Moreover economic and demographics trends are dramatically affecting the retail industry.

3. Research Methodology

Research methodology refers to the systematic process used to collect and analyze data for the research study.

3.1 research problem

The Indian clothing retail market is divided into two major sectors-organised (branded stores, malls) and unorganised (local shops, street vendors). In tier-2 cities, both sectors coexist and compete to attract consumers. However, consumer purchase behaviour is changing due to factors like rising income, urbanization, fashion awareness, and digital influence.

The main problem is that it is **unclear which factors influence consumers more**-whether they prefer organised retail for quality and brand value or unorganised retail for low prices and convenience. There is also a lack of clear understanding about **how consumer preferences differ between these two sectors**.

3.2 Objective of Study

1. To study consumer purchase behaviour in the organised clothing market (malls, branded stores).
2. To analyze consumer buying behaviour in the unorganized clothing market (local shops, street vendors).

3. To compare the factors influencing purchase decisions in both organized and unorganized markets.
4. To examine customer preference regarding price, quality, variety, and convenience.
5. To identify satisfaction level of consumers in both sectors.
6. To understand the changing trends of consumer in a tier-2 city.

3.3 Research Design

The study is Descriptive and Comparative in nature, as it describes consumer behaviour and compares organised and unorganised clothing markets.

- Descriptive research helps in explaining consumer behaviour and preferences.
- Comparative research helps in comparing organised and unorganised clothing markets.

3.4 Data collection methods

Primary data

Primary data is collected directly from consumer using:

- Structured Questionnaire

Questions include multiple choice, rating scale (1-5), and yes/no type.

- Personal interaction

Helps to understand deeper opinion of consumers.

Secondary data

Secondary data is collected from:

- Research papers
- Journal and articles
- Books, Wikipedia and websites

3.5 Data collection instrument

The data for this study is collected using a structured questionnaire as the primary instrument. The questionnaire consists of both closed-ended and few open-ended questions, designed to gather information about consumers' demographic detail, shopping preference, factors influencing purchase decision, and satisfaction level in both organised and unorganised clothing markets.

4. Findings

- ✓ Preference towards organised Retail is Increasing: A majority of respondents prefer organised retail stores due to better quality, branded products, and a comfortable shopping environment. This trend is especially strong among young consumers and working professionals.
- ✓ Unorganised Retail Still Dominates for Price-Sensitive Consumers: Consumers with lower and middle income groups prefer unorganised markets because of low prices, bargaining options, and flexible payment methods like credit (udhar).
- ✓ Price vs Quality Trade-off : Consumers in organised retail focus more on quality, durability, and brand image, whereas in unorganised retail, price is the most important factor influencing purchase decisions.
- ✓ Influence of Brand and Fashion Trends: Branded clothing and latest fashion trends attract consumers to organised retail. Social media and advertisements also play a major role in influencing buying behaviour.
- ✓ Shopping Experience Matters: Organised retail provides a better shopping experience (AC store, trial rooms, fixed pricing), which increases customer satisfaction compared to unorganised markets.
- ✓ Impact of Income Level: Higher income groups prefer organised retail, whereas lower income groups rely more on unorganised markets.

5. Suggestions

For Organised Retailers

1. Adopt Competitive Pricing Strategies: Organised retailers should offer discounts, seasonal sales, and combo offers to attract price-sensitive customers from unorganised markets.
2. Affordable Product range: Introduce budget-friendly clothing lines to target middle and lower-income groups.
3. Focus on Local Preference: retailers should include region-specific designs, traditional wear, and affordable options to match local tastes.
4. Improve Customer Engagement: Personalised services, loyalty programs, and membership benefits can increase customers' retention.

For Unorganised Retailers

5. Improve Product Quality: Focus on better fabric, stitching, and durability to compete with branded products.

6. Build Stronger Customer Loyalty Programs: Providing small discounts or offers to regular customers can increase repeat purchases.

7. Introduce Fixed Price Options: Reducing excessive bargaining can build trust and transparency among customers.

Adopt Basic Display and Store Improvements: Better product arrangement, cleanliness, and lighting can enhance customer experience.

6. Conclusion:

The study on consumer purchase behaviour in organised and unorganised clothing markets in a Tier-2 city concludes that consumer preference are gradually shifting toward organised retail due to factors such as a better shopping experience, fixed pricing, availability of branded products, and attractive store ambience. However, unorganised retail continues to play a significant role, especially among low and middle-income groups, because of its affordability, bargaining options, and personalised services. Consumers in Tier-2 cities often balance their choice based on purpose-preferring organised retail for quality, fashion, and branded clothing, while relying on organised markets for economical and daily purchases.

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Determinants of Customer Loyalty in Organized Fashion Retail: Evidence from Tier-II Cities

Om V. Dhanodkar , Prathmesh P.Pathak , Maheshs.Dhotre , Parth M. Haware

Department of Master of Business Administration, Prof. Ram Meghe Institute of Technology & Research, Badnera, Maharashtra, India

➤ Abstract

Customer loyalty plays an important role in the success of organized fashion retail stores. In Tier-II cities, customers often show lower loyalty toward a single retail brand due to moderate income levels and high price sensitivity. The purpose of this study is to identify the factors influencing customer loyalty in organized fashion retail stores in Tier-II cities. The study focuses on variables such as **price sensitivity, promotional offers, product quality, service quality, and loyalty reward programs**. Primary data was collected using a structured questionnaire from **100 respondents** who purchase clothing from organized fashion retail stores. The findings suggest that price competitiveness and promotional offers strongly influence purchasing decisions. Product quality, service quality, and loyalty reward programs also contribute to customer satisfaction and repeat purchases. The study recommends that retailers offer competitive pricing, promotional offers, and loyalty rewards to improve long-term customer loyalty.

➤ Introduction

1.1 Retail Industry in India

The retail industry in India has emerged as one of the fastest-growing sectors of the economy over the past decade. Rapid urbanization, rising disposable income, and increasing exposure to global fashion trends have significantly influenced the purchasing behavior of Indian consumers. Traditionally, the Indian retail market was dominated by small, unorganized shops such as local garment stores, street vendors, and family-owned retail outlets. These retailers generally operated on a small scale and offered limited product variety, flexible pricing, and personalized customer interaction. However, with economic development and modernization, the structure of the retail industry has undergone a substantial transformation.

In recent years, organized retail formats such as shopping malls, branded retail chains, and exclusive brand outlets have become increasingly popular among consumers. These organized retail stores provide a modern shopping experience through well-designed store layouts, fixed pricing systems, product displays, and professional customer service. They also offer a wide range of branded clothing and fashion products that attract customers who are seeking quality, style, and reliability. As a result, both national and international fashion brands have expanded their operations across different regions of India.

Another important factor contributing to the growth of the retail sector is the increasing penetration of digital media and online marketing. Consumers are now more informed about fashion trends, brand reputation, and product quality through social media platforms, advertisements, and e-commerce websites. This exposure has created a higher demand for branded apparel and fashionable clothing. Furthermore, the expansion of organized retail in shopping malls and commercial complexes has made branded products more accessible to consumers.

The growth of the retail industry is not limited to metropolitan cities such as Mumbai, Delhi, and Bangalore. In recent years, retail companies have increasingly focused on expanding their presence in Tier-II and Tier-III cities. These cities are experiencing economic growth, rising purchasing power, and improved infrastructure, which makes them attractive markets for retail businesses. Consumers in these cities are becoming more fashion conscious and are gradually shifting from traditional unorganized stores to organized retail outlets. This transition has created new opportunities for fashion retailers to establish strong customer relationships and brand loyalty.

Despite this rapid growth, the retail sector in India also faces several challenges. High competition among brands, price sensitivity among consumers, and changing customer preferences

require retailers to continuously innovate and improve their strategies. Retailers must focus not only on attracting new customers but also on retaining existing customers through better service, quality products, and attractive promotional offers. In this context, customer loyalty becomes a critical factor for the long-term success of retail businesses.

1.2 Customer Loyalty

Customer loyalty is one of the most important concepts in modern retail marketing. It refers to a customer's willingness and commitment to repeatedly purchase products or services from the same brand or retail store over a period of time. Loyal customers tend to prefer a particular brand even when alternative options are available in the market. They are also more likely to recommend the brand to their friends, family members, and social networks, thereby contributing to positive word-of-mouth promotion.

For retail businesses, customer loyalty is extremely valuable because it helps in generating stable and continuous revenue. Acquiring new customers often requires significant marketing efforts and promotional expenses, whereas retaining existing customers is generally more cost-effective. Loyal customers usually develop a sense of trust and emotional connection with a brand. This trust is built through consistent product quality, fair pricing, reliable service, and a satisfying shopping experience.

In the fashion retail industry, customer loyalty is influenced by several factors. Price plays a crucial role because many customers compare prices before making purchasing decisions. Product quality is another important factor that determines whether customers will continue to purchase from the same store. If customers are satisfied with the durability, design, and comfort of the clothing products, they are more likely to remain loyal to the brand.

Customer service also plays a significant role in building loyalty. Friendly staff behavior, quick assistance, and a pleasant shopping environment enhance the overall customer experience. When customers feel valued and respected by the store staff, they are more likely to return to the same store for future purchases. In addition, promotional offers such as discounts, seasonal sales, and membership programs encourage customers to shop more frequently.

Many organized retail stores introduce loyalty programs to strengthen their relationship with customers. These programs may include reward points, membership cards, exclusive discounts, or special benefits for regular customers. Such initiatives motivate customers to continue purchasing from the same brand in order to enjoy additional benefits. Over time, these strategies help retailers build a loyal customer base, which ultimately contributes to long-term business growth and competitiveness.

However, maintaining customer loyalty in the fashion retail sector can be challenging. Fashion trends change rapidly, and customers are often influenced by new styles, brands, and marketing campaigns. Therefore, retailers must continuously update their product collections, improve service quality, and implement innovative marketing strategies to retain their customers. Understanding the factors that influence customer loyalty is therefore essential for retailers to develop effective customer retention strategies.

1.3 Organized Fashion Retail

Organized fashion retail refers to a structured and professionally managed retail system that sells branded clothing and fashion products through well-established retail outlets. These outlets are usually located in shopping malls, commercial complexes, or high-traffic urban areas. Organized retail chains follow standardized business practices, including fixed pricing, attractive store displays, modern infrastructure, and trained staff members who assist customers during the shopping process.

One of the major advantages of organized fashion retail is the availability of a wide range of branded products under one roof. Customers can choose from various styles, sizes, colors, and designs according to their preferences. Organized retailers also ensure consistent product quality, which increases customer confidence in the brand. In addition, these stores often provide comfortable shopping environments with proper lighting, music, air conditioning, and organized product displays that enhance the overall shopping experience.

In India, the growth of organized fashion retail has been particularly noticeable in recent years. Major fashion brands have expanded their retail networks to reach a larger customer base. Shopping malls and branded stores have become popular destinations for consumers who prefer a

modern and convenient shopping experience. As a result, organized fashion retail has become an important part of the Indian retail industry.

The expansion of organized retail is also evident in Tier-II cities, where consumers are gradually adopting modern retail practices. These cities are witnessing increased demand for branded apparel due to higher income levels, better education, and greater awareness of fashion trends. Young consumers, in particular, are more inclined toward branded clothing as it reflects their lifestyle, personality, and social status. Retail companies recognize this potential and are therefore expanding their operations into these emerging markets.

However, despite the increasing popularity of organized fashion retail, retailers in Tier-II cities face certain challenges. One of the main challenges is the high level of price sensitivity among customers. Many consumers in these cities still prefer affordable options and often compare prices before making purchasing decisions. As a result, customer loyalty toward a single brand may not always be strong, especially when competitors offer similar products at lower prices or provide better promotional offers.

Another challenge is the presence of strong competition from local retailers and unorganized markets that offer flexible pricing and personalized service. Therefore, organized retailers must focus on delivering superior value through product quality, customer service, and effective loyalty programs. By understanding customer expectations and preferences, retailers can develop strategies to build long-term relationships with their customers and strengthen brand loyalty.

Overall, organized fashion retail continues to play a crucial role in shaping the modern retail landscape in India. As the retail market continues to evolve, understanding the factors that influence customer loyalty becomes essential for retailers seeking to achieve sustainable growth and maintain a competitive advantage.

➤ 2. Literature Review

2.1 Study by Jain, Raju, and Sharma (2017)

Rakesh Jain, Raju Kumar, and Sharma (2017) conducted a study on customer loyalty in the organized retail sector in India. The objective of their research was to identify the factors that influence customer loyalty in retail stores. The study found that price competitiveness, promotional offers, product quality, and customer service significantly influence customer satisfaction and loyalty. The researchers concluded that organized retailers must provide better service quality and attractive promotional schemes to retain customers and encourage repeat purchases.

2.2 Study by Kumar and Shah (2015)

V. Kumar and Denish Shah (2015) studied the role of loyalty programs in customer retention. Their research examined how reward programs influence consumer behavior in retail markets. The study revealed that loyalty programs such as reward points, discounts, and membership benefits motivate customers to make repeat purchases. The authors concluded that well-designed loyalty programs can strengthen long-term relationships between customers and retailers and increase customer lifetime value.

2.3 Study by Gupta and Kim (2007)

Sunil Gupta and Hyeong Min Kim (2007) analyzed the relationship between customer satisfaction and loyalty in retail markets. The researchers found that satisfied customers are more likely to become loyal customers and continue purchasing from the same brand or store. Their findings emphasized that product quality, service quality, and overall shopping experience play a crucial role in influencing customer satisfaction and long-term loyalty.

2.4 Study by Sivadas and Baker-Prewitt (2000)

Eugene Sivadas and Jamie Baker-Prewitt (2000) conducted research on the relationship between service quality and customer loyalty in retail stores. The study concluded that high levels of service quality improve customer satisfaction and encourage repeat purchases. The authors suggested that retailers should focus on improving employee behavior, store environment, and customer interaction to strengthen customer loyalty.

2.5 Study by Oliver (1999)

Richard L. Oliver (1999) developed a conceptual framework explaining customer loyalty. According to the study, loyalty is formed through a process that begins with customer satisfaction and gradually

develops into a strong emotional attachment toward a brand. Oliver emphasized that businesses must consistently provide value and positive experiences to maintain customer loyalty over time.

➤3. Methodology

Research Design

The study uses a **descriptive research design** to analyze the determinants of customer loyalty in organized fashion retail stores.

Data Collection

The study used both **primary and secondary data**.

Primary

Data

Primary data was collected through a **Google Form survey questionnaire** distributed to customers who purchase clothing from organized fashion retail stores.

Secondary

Data

Secondary data was collected from research journals, books, academic articles, and online sources related to retail marketing and customer loyalty.

Sample Size

The survey collected responses from **100 respondents**.

Sampling Method

A **convenience sampling method** was used to collect responses from customers who shop at organized fashion retail stores.

Data Analysis

The collected responses were analyzed using:

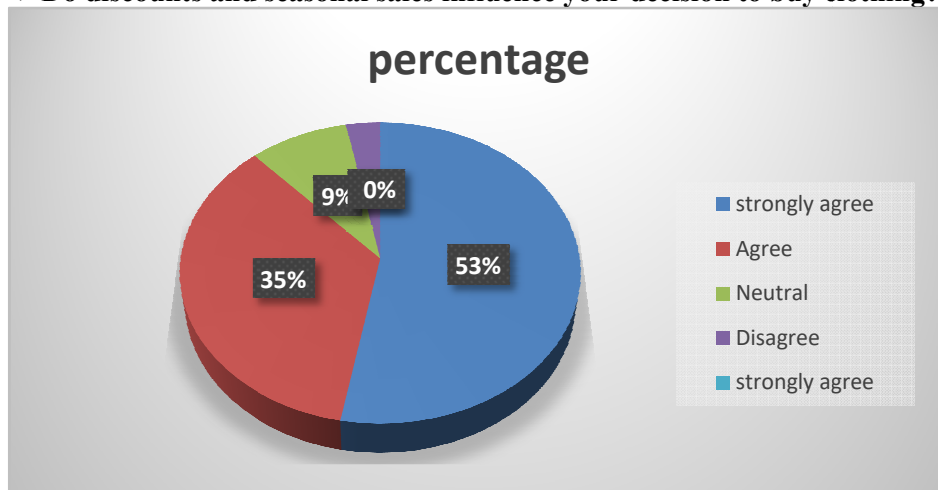
- Percentage analysis
- Tables
- Pie charts and graphs

➤Combined Table of Survey Responses

Question	Option	Percentage
How often do you purchase clothing from organized fashion retail stores?	Weekly	14.7%
	Monthly	58.8%
	Occasionally	14.7%
	Rarely	11.8%
Do discounts and seasonal sales influence your decision to buy clothing?	Strongly Agree	52.9%
	Agree	35.3%
	Neutral	8.8%
	Disagree	2.9%
	Strongly Disagree	0%
Do you compare prices between different stores before purchasing clothes?	Always	50%
	Sometimes	35.3%
	Rarely	5.9%
	Never	8.8%
Do you prefer buying from the same retail store repeatedly?	Yes	41.2%
	Sometimes	52.9%
	No	5.9%
Would you switch to another store if it offers better discounts or prices?	Yes	61.8%
	Maybe	26.5%
	No	11.8%
How satisfied are you with product quality offered by organized	Very Satisfied	17.6%

Question	Option	Percentage
fashion retail stores?	Satisfied	61.8%
	Neutral	20.6%
How important is customer service when choosing a fashion retail store?	Very Important	67.6%
	Important	26.5%
	Neutral	5.9%
Would loyalty reward programs encourage you to shop more from the same store?	Strongly Agree	20.6%
	Agree	73.5%
	Neutral	5.9%
How likely are you to recommend your favorite fashion retail store to others?	Very Likely	11.8%
	Likely	76.5%
	Neutral	11.8%

➤ Do discounts and seasonal sales influence your decision to buy clothing?



options	Percentage
Strongly agree	53.00%
Agree	35.00%
Neutral	9.00%
Disagree	0.00%
Strongly Agree	0.00%

➤ 4. Findings, Discussion

Findings

- Price sensitivity is high among customers in Tier-II cities.
- Most customers prefer buying clothes during discount periods or seasonal sales.

- Promotional offers, discounts, and special deals strongly influence purchase decisions.
- Customers consider product quality an important factor when selecting a fashion retail store.
- Customer service and staff behavior also affect the shopping experience.
- Many customers are willing to switch stores if they find better prices or discounts at another store

Discussion

- Organized fashion retailers must balance affordable pricing and good service quality.
- Even if customers like a brand, high prices may reduce loyalty.
- Discounts and promotional offers help attract and retain customers.
- Providing good product quality and a positive shopping experience increases the chances of customer loyalty.
- Retailers that combine competitive pricing, quality products, and good service are more likely to maintain long-term customer relationships.

➤ Conclusion

Customer loyalty in organized fashion retail stores depends on multiple factors including price, promotional offers, product quality, service quality, and loyalty programs. In Tier-II cities, customers are highly price sensitive and often compare different stores before making a purchase. Therefore, retailers must focus on offering value for money while maintaining high product quality and service standards.

➤ 5. Recommendations (Bullet Points)

- Organized fashion retail stores should adopt effective strategies to improve customer loyalty.
- Stores should divide products into different price segments, such as:
 - Affordable
 - Mid-range
 - Premium
- This store segmentation helps customers easily find products according to their budget and preferences.
- Retailers should introduce loyalty reward programs to encourage repeat purchases.
- A possible strategy is to set a monthly purchase target for customers.
- After completing the target, customers can receive rewards such as:
 - Free product
 - Discount coupon
 - Reward points
- These reward programs can motivate customers to continue shopping from the same store.
- Retailers should maintain consistent product quality across all price ranges.
- Stores should also focus on providing good customer service to improve customer satisfaction.
- By combining competitive pricing, loyalty rewards, and better store organization, retailers can build strong long-term relationships with customers.

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Digital Transformation in Higher Education: AI, ML, and Data-Driven Insights

Miss. Aaditi Pramod Bhad

Department of Computer Science Bharatiya Mahavidyalaya Amravati, MS, India
aaditibhad@gmail.com

Meena S. Doibale

Under Guidance Of Department of Computer Science Bhartiya Mahavidyalaya Amravati, MS, India
meena.doibale@gmail.com

Abstract:

Digital transformation is strategically understood as the process of integrating technological innovations to achieve benefits such as operational efficiency, enhanced customer experience, and business model innovation. Like other sectors, higher education institutions (HEIs) are increasingly interested in this process due to the need to adapt to new business and management models. This transformation entails the strategic exploration of emerging technologies to improve performance, streamline operations, and automate processes, aligning with a society and marketplace that are increasingly technology driven. Digital transformation (DT) has become a top priority for higher education (HE), driven by technological advances such as artificial intelligence (AI), artificial general intelligence (AGI) and Generative Open AI. It serves as a catalyst for the reshaping of mainstream processes in academic institutions, emphasizing teamwork, collaborative projects and critical thinking in research, learning and assessment strategies. In this chapter, the authors contextualize the use of this DT, highlighting its potential to improve learning experiences, business efficiency and upskill students and faculty.[1]

The rapid rise of Artificial Intelligence (AI) has accelerated the digital transformation of higher education, reshaping teaching learning processes, administrative operations, and student engagement. This transformation presents significant opportunities, including personalized learning experiences, data-driven decision-making, enhanced accessibility, and innovative pedagogical tools such as intelligent tutoring systems and virtual classrooms.[2]

However, the adoption of ML in higher education also presents challenges, including data privacy concerns, algorithmic bias, infrastructure costs, and the need for faculty training. Institutions must balance innovation with ethical considerations to ensure equitable and transparent use of technology.

Keywords: Higher Education Management; Artificial Intelligence (AI); Digital Transformation; Inclusive Education; Educational Technology.

Introduction:

Digital transformation in higher education is accelerating, driven by AI, machine learning (ML), and data-driven insights to revolutionize teaching, learning, and administration. Artificial Intelligence refers to the simulation of human intelligence processes by machines, especially computer systems. In recent years, AI has significantly influenced various sectors, including healthcare, finance, and education.

➤ Digital Transformation in Higher Education:

Higher education refers to the education imparted by universities, research centers and colleges. Digital transformation is the use of technology to increase efficiency and effectiveness of teaching-learning and curriculum delivery. Digital transformation is more than just updating existing technology. It is the adoption of procedures and processes to incorporate digital technology to create better results.1 It does this by removing space and time barriers to education and expands student's access to quality learning. Digital resources include e-books, webinars, websites, social media, cloud computing, virtual reality and artificial intelligence. From the perspective of students, this cutting-edge technology boosts their cognitive retention and improves their learning. Technology increases productivity of teachers. Colleges and universities use it to develop new tools that add value to their teaching and learning.[3]

➤ The Use of Artificial Intelligence in Education:

Artificial Intelligence (AI) is a branch of science and technology that deals with the creation of programmes and systems that can perform tasks that were previously considered exclusively to be human. Artificial intelligence includes such areas as machine learning, deep learning, neural networks, expert systems, natural language, and others. Artificial intelligence is used to create computer programs and systems that can recognise images, understand speech, analyse large amounts of data, make decisions, and much more. These technologies are used in various industries, including medicine, finance, transport, industry, science, and many others.

Future education should focus on three aspects: 1) the transformation of educational concepts, the destruction of standard education and the way it is taught, the promotion of evolution from "industrialised education" to "smart education" and the implementation of personalised learning; 2) educational changes in organisational methods, moving out of classrooms, disciplines and campuses, which forms a new educational paradigm 3) in innovative educational operational mechanisms and implementation of data-driven educational decisionmaking, creation of a group intelligence decisionmaking system based on human-machine interaction, as well as in helping governments, schools and society to manage shared governance as a factor of social responsibility of governments.[4][5]

➤ **AI in Higher Education Digital Transformation:**

AI refers to systems that can perform tasks typically requiring human intelligence, such as learning, reasoning, problem-solving, and decision-making. In higher education, AI is becoming a key driver of innovation, enabling institutions to modernize and remain competitive in a global knowledge economy.

Digital transformation in universities involves adopting technologies like cloud computing, big data, and AI to improve efficiency, accessibility, and learning outcomes. AI plays a central role in this shift by automating processes, personalizing education, and enhancing decision-making.

Artificial Intelligence (AI) is rapidly reshaping higher education as part of a broader digital transformation that integrates advanced technologies into teaching, learning, research, and administration.[6]

➤ **Machine Learning (ML) in Higher Education Digital Transformation**

Machine Learning refers to algorithms and statistical models that allow computer systems to learn from data and improve their performance without being explicitly programmed. In higher education, ML is a key component of digital transformation, helping institutions leverage large volumes of academic, administrative, and behavioral data to enhance decision-making and learning experiences.

Digital transformation in higher education involves integrating advanced technologies to improve teaching, learning, research, and institutional management. ML contributes significantly by uncovering patterns, predicting outcomes, and automating complex processes.

Emergence of Data-Driven Insights

The emergence of data-driven insights has become a cornerstone of digital transformation in higher education. As institutions increasingly adopt digital platforms—such as learning management systems, online assessments, and student information systems—they generate vast amounts of structured and unstructured data. This data, when analyzed effectively, provides valuable insights that enhance decision-making, improve student outcomes, and optimize institutional performance.[7]

Technologies Enabling Data-Driven Insights

- Big data analytics platforms
- Machine learning algorithms
- Cloud computing systems
- Data visualization tools (dashboards, reports)

➤ **Benefits of AI in education field:**

The arrival of AI (Artificial Intelligence) in the classroom is more than just a technological breakthrough; it raises fundamental questions about the current education system.

This fusion of technology and teaching is not only transforming the way students learn, but is also generating a huge debate about its implications, challenges, and opportunities in the academic sector.

The benefits of Artificial Intelligence (AI) in the education field are substantial, as it enhances learning outcomes, improves teaching efficiency, and expands access to quality education. AI enables

personalized learning through adaptive platforms such as DreamBox, which analyze student performance in real time and tailor lessons to individual learning speeds and styles, leading to better understanding and retention. Intelligent tutoring systems provide 24/7 academic support, allowing students to receive instant feedback and practice opportunities beyond classroom hours, while automated grading tools save teachers significant time on routine assessment tasks and enable faster, more consistent evaluation.[8]

As of 2026, Artificial Intelligence has transitioned from an experimental "add-on" to a foundational engine of modern education. It is no longer just about automation; it's about creating a learner-centered ecosystem that bridges the gap between traditional instruction and individual needs. Below is an overview of the key benefits of AI in education, categorized by their impact on students, educators, and the broader system.

One of the key benefits of AI in education is personalized learning. AI-powered systems can analyze students' learning patterns, strengths, and weaknesses to deliver customized content, allowing each learner to progress at their own pace. This helps improve understanding and retention compared to traditional one-size-fits-all teaching methods.[9][10]

Conclusion: The conceptual paper discusses of AI in the Digital Transformation in Higher Education. the integration of Artificial Intelligence into higher education represents a transformative shift driven by Digital Transformation. By leveraging technologies such as Machine Learning and data-driven systems, educational institutions are able to enhance teaching-learning processes, improve administrative efficiency, and provide personalized and inclusive learning experiences.[11]

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A study of perception of teachers about nep 2020 with special reference to faculty of commerce and mangemnt in amravati city

Dr.G.S.Kalmegh, Anjali S. Ugale, Divya S. Kale, Komal R. Deoche, Sakshi G. Gawande

Prof. Ram meghe institute of technology and research anjangaon bari road – badnera amravati
444701 [an autonomous institute]

ABSTRACT: The National Education Policy 2020 introduced by the Government of India aims to transform the Indian education system by promoting multidisciplinary learning, flexibility, skill development, and quality improvement in higher education. The successful implementation of this policy largely depends on teachers, as they play a crucial role in translating policy reforms into effective classroom practices. Therefore, understanding teachers' perceptions and attitudes toward NEP 2020 is essential. The present study focuses on examining the perception of teachers regarding NEP 2020 with special reference to the faculty of commerce and management in colleges located in Amravati city. The study aims to analyze the level of awareness, acceptance, and readiness of teach. The National Education Policy 2020 (NEP 2020) marks a significant transformation in the Indian education system, aiming to make education more holistic, flexible, multidisciplinary, and aligned with global standards. This research paper focuses on analyzing the perception of teachers regarding NEP 2020, with special reference to faculty members from commerce and management colleges in Amravati.

The primary objective of the study is to examine the level of awareness, understanding, and attitude of teachers towards various provisions of NEP 2020, such as curriculum restructuring, multidisciplinary education, skill development, digital learning, and assessment reforms. The study also seeks to identify the challenges faced by educators in implementing the policy at the institutional level.

The research is based on primary data collected through structured questionnaires distributed among teachers of selected commerce and management colleges in Amravati city. A descriptive research design has been adopted to analyze teachers' perceptions, opinions, and readiness for change. Secondary data has been collected from journals, reports, and official policy documents related to NEP 2020.

The findings of the study reveal that most teachers have a positive perception of NEP 2020 and appreciate its focus on student-centric learning, flexibility in subject choices, and emphasis on skill-based education. Teachers believe that the policy will enhance the quality of higher education and improve employability among students. However, the study also highlights certain concerns, including lack of adequate infrastructure, insufficient training programs for faculty, challenges in adopting digital teaching methods, and difficulties in implementing continuous assessment systems. Furthermore, the study indicates that while senior faculty members demonstrate better understanding of policy provisions, younger teachers show greater adaptability towards technological and pedagogical changes. The research also finds that institutions in semi-urban areas like Amravati may face additional constraints in terms of resources and administrative support.

The study concludes that although NEP 2020 is a progressive and transformative initiative, its successful implementation largely depends on effective teacher training, institutional preparedness, and government support. It suggests that continuous professional development programs, infrastructure enhancement, and clear implementation guidelines are essential to achieve the objectives of the policy.

Overall, this research contributes to understanding teachers' perspectives on NEP 2020 and provides valuable insights for policymakers, educational institutions, and stakeholders involved in higher education reform

Keywords:**❖ Introduction :**

Education plays an important role in the social, economic, and technological development of a country. In India, various educational reforms have been introduced to improve the quality of education and make it globally competitive. The National Education Policy 2020 was introduced by the Government of India to transform the entire education system. NEP 2020 replaced the earlier National Policy on Education 1986 and focuses on modernizing the education structure. The policy emphasizes multidisciplinary education, skill development, flexibility in course selection, and quality improvement in higher education. NEP 2020 also introduces reforms such as multiple entry and exit options, Academic Bank of Credits (ABC), and emphasis on research and innovation. Teachers play a key role in the successful implementation of any educational policy. Their awareness, attitude, and perception greatly influence how effectively the policy is implemented. Faculty members in commerce and management education are particularly important because these fields are closely related to business, entrepreneurship, and economic development. Understanding teachers' perception helps to identify their level of awareness, readiness, and challenges in implementing NEP 2020. Amravati city has several colleges offering commerce and management education, making it an appropriate area for studying teachers' perception about NEP 2020. Therefore, the present study aims to analyze the perception of teachers regarding NEP 2020 with special reference to commerce and management faculty in Amravati city.

The education system plays a crucial role in shaping the economic, social, and intellectual development of a nation. In India, higher education has been undergoing significant transformation to meet the demands of a rapidly changing global economy. To address emerging challenges and improve the quality, accessibility, and relevance of education, the Government of India introduced the National Education Policy (NEP) 2020, which aims to reform the entire educational structure from school to higher education. The policy emphasizes multidisciplinary learning, flexibility in curriculum, skill development, and integration of technology to create a holistic and learner-centric education system (Ministry of Education, 2025).

NEP 2020 represents a paradigm shift in higher education by promoting innovation, research orientation, and competency-based learning. One of the major objectives of the policy is to make education more practical and aligned with industry requirements so that students can develop entrepreneurial and employability skills. The policy also encourages interdisciplinary education, multiple entry and exit options, academic credit transfer, and outcome-based education to enhance the quality and flexibility of undergraduate and postgraduate programs (Saxena & Agarwal, 2022). Commerce and management education plays a vital role in developing professionals capable of contributing to business, industry, and economic growth. With the implementation of NEP 2020, commerce and management institutions are expected to adopt new pedagogical approaches such as experiential learning, project-based learning, internships, and skill-based courses. These reforms aim to equip students with critical thinking, leadership, problem-solving abilities.

2 Review of Literature

Bagga, T., Gupta, P. K., Ola, M. O., & Gilani, P. (2025) The study analyzed the implementation challenges of NEP 2020 in higher education institutions in India. The authors found that institutions face several challenges such as curriculum restructuring, governance issues, lack of infrastructure, and resistance to change. The study emphasizes the importance of leadership support, faculty involvement, and institutional commitment for the successful implementation of NEP reforms. Kumari, S. (2024) This study reviewed university autonomy under NEP 2020 and highlighted that the policy promotes institutional autonomy to improve academic quality and innovation. The research suggests that graded autonomy encourages healthy competition among universities and colleges while improving governance and academic flexibility in higher education.

Tayade, P. N. (2025) The study critically analyzed the objectives and reforms introduced by NEP 2020. It highlighted that the policy aims to make the education system multidisciplinary, flexible, and skill-oriented. The research concluded that NEP 2020 focuses on developing creativity, critical thinking, and problem-solving skills among students, which are essential for modern commerce and management education.

Shah, P. (2021) This research examined the flexible curriculum framework proposed by NEP 2020. The study emphasized the importance of multidisciplinary education, credit-based systems, and flexible learning pathways. The findings suggest that such reforms can improve student employability and academic mobility in higher education.

Nayak, V., & Hegde, K. (2024) The study focused on the integration of technology in commerce and management education under NEP 2020. It revealed that digital tools, online resources, and innovative teaching methods are essential for effective NEP implementation. However, the study also identified barriers such as lack of training, limited technological infrastructure, and resistance among faculty members.

Hariramani, S., & Narang, K. (2024) This study explored educators' perceptions regarding NEP 2020 reforms. The results indicated that teachers generally support the policy but highlighted the need for professional development, administrative support, and technological training to successfully adopt the new education system.

Research Methodology

The present study uses the survey method of research. The survey method is suitable because it helps in collecting information directly from teachers regarding their opinions, attitudes, and perceptions about NEP 2020. Through this method, data is collected using questionnaires from the respondents to understand their views about the implementation and impact of NEP 2020 in commerce and management education. The research design adopted for this study is descriptive research design. It aims to describe and analyze the perception of teachers regarding the changes introduced by NEP 2020 in higher education.

Objectives of study

1. To examine the level of implementation of NEP 2020 in selected commerce and management colleges in Amravati.
2. To study the impact of NEP 2020 on skill development and employability of commerce and management students
3. To study the impact of NEP 2020 on skill development and employability of commerce and management students
4. To provide suggestions for improving the effective implementation of NEP 2020 in commerce and management education

Area of the Study

The area of the study is Amravati City. The research focuses on teachers working in commerce and management faculties of selected colleges in Amravati city.

Sources of Data

The study is based on both Primary Data and Secondary Data.

Primary data will be collected directly from the teachers of commerce and management faculties through a structured questionnaire and rating scale. Secondary data will be collected from:

- Books
- Research journals
- Government publications
- Educational websites
- Articles related to NEP 2020

Sampling Method

The convenience sampling method is used in this study. Teachers who are easily available and willing to participate from selected colleges in Amravati city are included in the sample.

Sample Size

The sample size of the study consists of around 50 teachers from commerce and management faculties of selected colleges in Amravati city.

Data Collection Tools

A structured questionnaire with a five-point Likert rating scale will be used as the main tool for data collection.

Method of Data Analysis

The collected data will be classified, tabulated, and analyzed using simple statistical techniques such as:

- Percentage method
- Tables and charts
- Graphical representation

These techniques help in interpreting the perception of teachers about NEP 2020.

❖ Limitations of the Study

1. The study is limited to Amravati city only.
2. The number of respondents is limited.
3. The study depends on the opinions and perceptions of teachers, which may vary.

Findings General Awareness of NEP 2020

Most teachers are aware of the key features of National Education Policy 2020, but the depth of understanding varies. Senior faculty tend to have better conceptual clarity compared to junior faculty. Positive Attitude Towards NEP 2020 A majority of teachers have a positive perception, especially regarding flexibility, multidisciplinary approach, and skill-based education. Support for Multidisciplinary Education Teachers in commerce and management streams support the integration of subjects, believing it enhances students' overall competence and employability. Concerns About Implementation Many respondents expressed concerns about practical implementation, including lack of infrastructure, insufficient training, and administrative challenges. Need for Faculty Training A significant number of teachers feel the need for orientation programs and workshops to understand new teaching methodologies proposed under NEP 2020. Impact on Curriculum Design Teachers believe NEP 2020 will bring major changes in syllabus structure, focusing more on practical knowledge, internships, and industry exposure.

❖ Conclusion

The study on teachers' perception of National Education Policy 2020 with special reference to commerce and management faculty in Amravati reveals a diverse yet generally supportive viewpoint. The data indicates that the majority of responses were received from institutions like Shri Shivaji College, followed by Brijlal Biyani and Bhartiya College, while comparatively fewer responses came from PRIMTR and other categories. This distribution shows that awareness and engagement with NEP 2020 is stronger in major institutions, suggesting a higher level of involvement and understanding among their faculty members. Overall, teachers demonstrate a positive attitude towards NEP 2020, appreciating its focus on flexibility, skill development, and multidisciplinary education. However, the study also reflects certain challenges, such as the need for better training, clarity in implementation, and infrastructural support, especially in smaller or less-represented institutions. In conclusion, while the perception of NEP 2020 among teachers is largely favorable, its effective implementation in Amravati city will depend on equal participation of all institutions, proper guidance, and continuous professional development of teachers.

❖ Suggestions

Increase Awareness and Understanding of NEP 2020

Many studies show that teachers have moderate awareness of NEP provisions NCERT Journals Conduct Workshops Seminars Orientation programs Special focus on commerce & management curriculum changes

Provide Proper Training & Faculty Development

Lack of training is a major challenge in NEP implementation Bijmrdr Suggestions: Regular Faculty Development Programs (FDPs) Training in: Multidisciplinary teaching Outcome-based education Skill-based learning

Improve Digital & Infrastructure Support NEP promotes technology integration, but many institutions lack resources Suggestions Smart classrooms Access to LMS platforms Internet facilities .

Reduce Workload and burden career growth opportunities



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History of Heterocyclic Compounds and its Derivatives in Medicine.

Dipti D. Gaurkhede

Y.D.V.D. Art's Commerce & Science College Tiosa. Department of Chemistry
diptigaurkhede645@gmail.com , Mob-8600585369

Abstract :

Heterocyclic compounds have gained a lot of attention because of their numerous significant in medicine. Heterocyclic compounds constitute the largest and most varied family of organic compounds. Today there are a lot of heterocyclic compounds known, day by day the number is increasing rapidly due to the enormous synthetic research and also their synthetic utility. Heterocyclic compounds have a role in most fields of sciences such as medicinal chemistry, biochemistry also another area of sciences. In this review, we cover most biological active heterocyclic compounds that it's recently synthesized or extracted from the plants such as antifungal, anti-inflammatory, antibacterial, antioxidants, anticonvulsant, antiallergic, herbicidal and anticancer.

Keywords : Heterocyclic compounds, Biological activity, Medicinal chemistry, heteroatom, Anticancer, Antiviral, Antimalarials.

Introduction :

Heterocyclic compounds are cyclic rings of the atoms that contain at least one hetero atom. The most frequent hetero-atoms are nitrogen, oxygen, sulfur and halogens but heterocyclic rings including additional hetero-atoms, i.e. phosphorus, iron, magnesium, selenium etc. are also common. Heterocyclic compounds constitute one of the most significant classes of organic compounds. In these compounds, the ring structure contains one or more. Because of their wide structural diversity, heterocyclic compounds are fundamental components of numerous biological active substances, including pharmaceuticals, agrochemicals, dyes and naturally occurring products. A heterocyclic compound is defined as a cyclic organic molecule in which at least one atom within the ring is a hetero atom other than carbon. Heterocycles involve a wide range of uses, including agrochemical, medicinal, and veterinary. Such compounds are also used in sanitizers, antioxidants, copolymers, corrosion inhibitors, dyestuff. Various heterocyclic compounds like triazine analogues have been utilized as medicinal agents, urinary anti-septic, and anti-inflammatory medicine in the treatment of variety ailment. Antibacterial, antifungal, antiviral and anthelmintic properties have been demonstrated for benzimidazole derivatives. Taking all these aspects into account, this Special Issue has collected new studies and new perspectives on the topic, further emphasizing the challenges that are still open and possible in the field of medicinal chemistry.

History of Heterocyclic compounds:

1. Early Discoveries (18th – Early 19th century)

1776 -Furan derivatives

Carl Wilhelm Scheele isolated mucic acid from natural sources, which later led to the understanding of furan-type compounds.

1818- First heterocycle isolated

Alloxan, a heterocyclic compound, was obtained from uric acid, marking one of the earliest recognized heterocycles.

1818 – Isolation of alkaloids such as quinine from plants.

1826 – Pyridine

Discovered by Thomas Anderson during the distillation of bone oil, Pyridine became one of the most important nitrogen-containing heterocycles.

2. Development of structural Theory (Mid- Late 19th century)

1857 – Synthesis of heterocyclic compound pyridine by Thomas Anderson.

1870s – Identification of indole and other nitrogen-containing heterocycles.

Natural heterocyclic compounds found in plants, fungi, and microorganisms were among the earliest medicines used in traditional treatments.

Examples include:

Quinine (antimalarial)

Morphine (analgesic)

Nicotine (alkaloid)

These discoveries laid the foundation for medicinal heterocyclic chemistry.

3. Development of Synthetic Drugs (Late 19th – Early 20th Century)

1882 – Antipyrine (pyrazolone heterocycle) used as a pain reliever.

1900s – Barbiturates developed from heterocyclic barbituric acid.

Sulfonamide antibiotics (1930s) were among the first synthetic antibacterial drugs.

Example:

Sulfanilamide – one of the first antibacterial drugs.

4. Development of Heterocyclic Chemistry in the 20th Century

During the 20th century, heterocyclic chemistry expanded rapidly due to advances in organic synthesis and pharmaceutical research.

Key milestones include:

4.1 Sulfonamide Drugs

The first synthetic antibacterial drugs were sulfonamides.

The discovery of Prontosil in 1935 by Gerhard Domagk marked a major breakthrough in antimicrobial therapy.

Sulfonamides contain heterocyclic structures that interfere with bacterial folic acid synthesis.

4.2 Antibiotics and Heterocycles

Many antibiotics contain heterocyclic rings.

Examples include:

Penicillin – contains a β -lactam heterocyclic ring

Cephalosporin – another β -lactam antibiotic

Tetracycline

These drugs revolutionized medicine by enabling effective treatment of bacterial infections.

4.3 Antimalarial Drugs

Several antimalarial drugs are heterocyclic derivatives.

Example:

Chloroquine

These compounds contain quinoline heterocyclic structures, which interfere with parasite metabolism.

5. Biological and Medicinal Importance (20th Century)

Purines and pyrimidines in DNA and RNA

Alkaloids such as quinine, caffeine and morphine

Pharmaceutical revolution:

Development of heterocyclic drugs such as Penicillin, Antibacterial, antifungal, antimalarials.

Expansion of heterocycles in dyes.

5. Modern Era (Late 20th Century – present)

Advances in spectroscopy (NMR, MS, IR) enabled rapid structure elucidation.

Heterocyclic compounds may be classified according to the following criteria:

1. Type of Hetero Atom

Nitrogen – containing heterocycles: Pyridine, Pyrrole, Imidazole

Oxygen -containing heterocycles: Furan

Sulfur – containing heterocycles: Thiophene

2. Ring Size

Three membered rings: Oxirane, Aziridine

Five membered rings: Furan, Pyrrole, Thiophene

Six membered rings: Pyridine, Pyrimidine

3. Number of Hetero Atoms

Monocyclic heterocycles: Pyridine

Fused or bicyclic heterocycles: Indole, Quinoline

4. Aromatic Character

Aromatic heterocycles: Pyridine, Thiophene

Non- aromatic heterocycles: piperidine, Tetrahydrofuran

Applications:**1. Pharmaceutical and Medicinal Applications.**

Heterocyclic compounds form the core structures of many therapeutic agents. Anti-malarial drugs, Anti-cancer agents, Antiviral and antibacterial drugs, Central nervous system drugs.

2. Biological Importance.

Heterocyclic compounds are essential components of living systems. Nucleic acids: Purines and pyrimidines in DNA and RNA. Vitamins: Thiamine (B1), riboflavin (B2), pyridoxine (B6). Natural products: Alkaloids such as nicotine, morphine, and caffeine.

3. Agricultural Applications:

Agrochemicals, Herbicides, pesticides, fungicides, and insecticides often contain heterocyclic rings. Examples: Atrazine, carbendazim. Plant growth regulators.

4. Industrial Applications

Dyes and pigments: Heterocycles like indigo and azo dyes. Rubber and polymer industry: Vulcanization accelerators and stabilizers. Solvents and intermediates: Pyridine, tetrahydrofuran (THF).

5. Material Science and Advanced Technologies

Conducting polymers: Polypyrrole, polythiophene. Organic electronics: OLEDs, organic solar cells, semiconductors.

6. Analytical and Research Applications

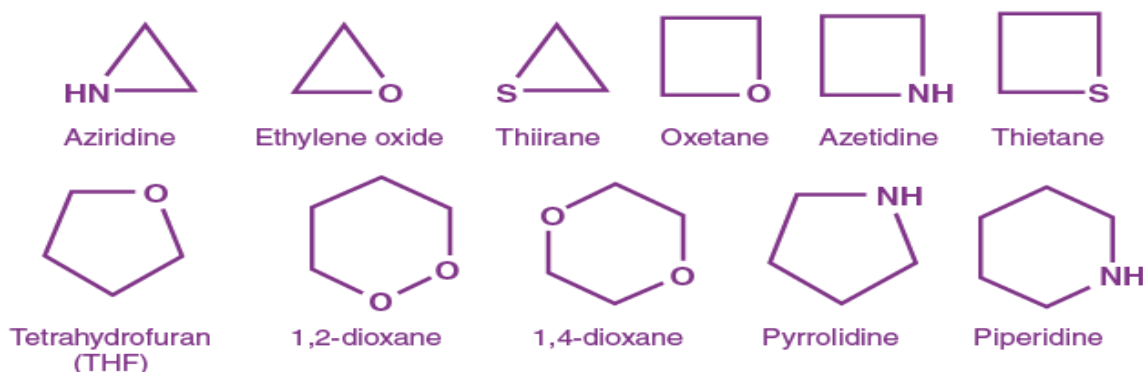
Used as ligands in coordination chemistry. Employed as fluorescent probes and analytical reagents. Important scaffolds in drug design and molecular modelling.

Conclusion and Result

The history of heterocyclic compounds reflects the evolution of medicinal chemistry from early natural products to advanced synthetic derivatives. Heterocyclic compounds have played and continue to play a central role in drug discovery and therapy. A lot of heterocycles are employed in medicine as medications to treat a variety of ailments and injuries. As medicinal chemistry continues to evolve with modern technologies, heterocyclic compounds will remain essential in the discovery of new and effective drugs.

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Impact on Higher Education on arrival of Foreign Universities in India: Quality and Competition Impact

Mr. Abhijeet A. Satpute

Department of Computer Science Bharatiya Mahavidyalaya Amravati, MS, India
Abhijeetsatpute457@gmail.com

Meena S. Doibale

Under Guidance of Department of computer Science Bhartiya Mahavidyalaya Amravati, MS, India
meena.doibale@gmail.com

Abstract :

In the contemporary knowledge economy, providing sufficient access to diverse and globally competitive higher education institutions for the younger generation is a critical responsibility of the state. However, given India's vast population, it is not feasible for the government alone to meet the immediate demand for higher education opportunities for all eligible individuals. While the domestic private sector can complement government initiatives in offering higher education, the presence of foreign educational institutions is vital for demonstrating esteemed educational practices in developing countries like India. All the pros and cons of opening the door to foreign Universities have been looked into the details of the paper. It has been concluded that the entry of foreign universities in India will definitely raise the overall standard of education system in India. Every coin has two faces, so the aspect discussed here also has its own advantages as well as disadvantages. Good things can not be kept away just because of the fear of entrance of bad things. There is no flower without a thorn. To remove all the bad aspects an appeal of formulating strict and continuous monitoring agencies have been made. Some guidelines have been suggested the way such agencies should work and the power they hold. To summarize it will prove to be beneficial but monitoring is definitely mandatory. It has been determined that the addition of international colleges to India will undoubtedly increase the country's overall educational level. Since every coin has two sides, the feature under discussion also has benefits and drawbacks of its own.

Keywords: Foreign universities, impact, Foreign Students, International Education System.

Introduction:

In this millennium, people all across the world are beginning to live in borderless societies. Competition on a global scale and shifts in cultural norms have both become increasingly important in modern life. In the realm of both traditional and professional education, the unrestricted flow of knowledge is throwing open previously inaccessible doors and windows. To keep one step ahead of the competition. The biggest challenge is ensuring equal access for all eligible youngsters in the sector. Even now, India is able to ensure that only one-fourth of its relevant population is in the higher education sector. That means a huge gap in human resources is not being filled in the country even now. Another issue is with regard to the quality of facilities in the available institutions.

The state is expected to provide more freedom to private parties to invest in the sector. That is essential for rapid reforms and the expansion of the higher education infrastructure in the country. Similarly, the presence of foreign universities is also expected to get encouraged in the country. Their presence will bring both financial investment and global practices of knowledge making in to the country which will boost up the higher education opportunities here. Several foreign governments permitted such institutions to operate in their countries and it provided an additional leap forward in higher education initiatives there. The policies that are now in place in India do enable international universities to run their own academic programs within the country, but they must do so in partnership with an Indian university. According to the words of Sibal, "Any foreign higher-educational institution that is allowed into India, if unaided by the Indian government, will be able to determine its own tuition and curricula." However, it will be necessary for it to obtain certification in India, and it will be impossible for it to repatriate revenues.

Define Education:

Education may be thought of as either the practice or the art of passing on one's skills and knowledge to others. The verb "to educate" is where we get the term "education." Formal and informal settings can both be used for educational purposes. The key to realizing the full potential of an individual through education is to focus on developing their skills and interests. On the other hand, formal education refers to when a person makes a concerted effort to acquire the knowledge, competencies, and abilities that are seen as essential for a specific career or activity. The topic of discussion here is the conventional schooling system. A formal education has the potential to bring about a great deal of specialization.[1]

Education in India has a history stretching back to the ancient urban centers of learning at Taxila and Nalanda. Western education became ingrained into Indian society with the establishment of the British Raj. India has made a huge progress in terms of expanding literacy to approximately two thirds of the population. India's improved education system is often cited as one of the main contributors to the economic rise of India. Much of the progress in education has been credited to various private institutions. The private education market in India is estimated to be worth \$40 billion in 2008 and will increase to \$68 billion by 2012. However, India continues to face challenges.[2][3]

These knowledge-intensive sectors not only drive economic growth but also contribute to addressing global challenges, such as sustainable development, healthcare innovation and environmental conservation. In this context, nations that prioritize investments in human capital, foster collaborative networks and embrace lifelong learning and knowledge-sharing practices are better equipped to navigate the complexities of the knowledge economy and capitalize on the opportunities presented by globalization. And it is higher education, with supreme quality, equips the development of a nation in the era of the knowledge economy as it fosters the cultivation of a skilled and knowledgeable workforce capable of driving innovation, research and technological advancement continuously and consistently. Higher education institutions act as hubs for seminal research, nurturing an environment conducive to scholarly inquiry and the generation of new ideas that fuel economic growth.[4]

Present Education System In India:

In India around 340 Universities controlling over 5000 colleges with few of the monitoring systems are there to provide higher education The present system of higher education does not serve the purpose for which it has been started. In general education itself has become so profitable a business that quality is lost in the increase of quantity of professional institutions with quota system and politicization adding fuel to the fire of spoil system, thereby increasing unemployment.

After education, tour to all the places in India and world as far as possible with the cooperation of government is necessary so that one can understand about people, culture, arts, literature, religions, technological developments and progress of human society in the world. The present educational system can not make the child to become independent as they lack job orientation programs. Institutions are giving more stress on completing syllabus and help the students to pass the exams instead of building their character and enhancing their personalities. Indian government is not giving priority to the development of Standard in education. India should aspire for the international standard in education. To achieve that goal it should adopt the concept of globalization in its educational institutions.[5]

Impact of foreign universities on Indian education system:

Recently the Government has taken a step further for the free entry to A-grade global universities into India without any restriction. This will include foreign universities setting up courses or entire institutions in India. No doubt such a step will have a great impact on Indian education system especially the higher education. US in particular is very keen to pursue the trade in education services, as it supports more than 4 million jobs in US economy and accounts as the 5th largest service sector of exports. But the question is how far Indian education system is ready to take on Global universities face to face? During the early 1990s some of the foreign universities attempted to market their programs of higher education in India. However, these were in collaboration with Indian partners.

The globalization of education has significantly influenced higher education systems worldwide, including India. The entry and collaboration of foreign universities in India have created opportunities for academic excellence, research development, and global exposure. At the same time, it has raised concerns regarding inequality, commercialization, and cultural influence. This paper examines the positive and negative impacts of foreign universities on the Indian education system, focusing on quality, accessibility, brain drain, and policy implications.[6][7]

Quality Impact:

The entry and collaboration of foreign universities have had a significant impact on the quality of the Indian education system, particularly in the context of globalization and increasing demand for world-class education. India possesses one of the largest higher education systems in the world, yet many institutions struggle to meet international standards in terms of curriculum, research output, and teaching methodologies. In this context, foreign universities bring opportunities to enhance academic quality by introducing modern, flexible, and interdisciplinary curricula along with innovative teaching and evaluation practices. Their presence also promotes a shift from rote learning to critical thinking, problem-solving, and skill-based education, which are essential in today's global knowledge economy.[8]

The involvement of foreign universities also presents certain challenges. There is a risk of commercialization of education, where profit motives may overshadow academic goals, especially if lower-tier foreign institutions enter the Indian market. High tuition fees associated with such institutions may further widen inequality by making quality education accessible only to affluent sections of society. Moreover, increased competition could negatively affect domestic universities, particularly those that are already under-resourced, and may create dependency on foreign systems. Cultural and contextual mismatches in curriculum and teaching approaches can also limit the relevance of foreign education models in the Indian context.[9]

Competition Impact:

The entry of foreign universities into the Indian education system has introduced a new level of competition that significantly influences its structure, performance, and overall quality. Traditionally, many Indian higher education institutions operated in a relatively protected environment with limited global competition. However, the presence of foreign universities—either through collaborations, partnerships, or independent campuses—has compelled Indian institutions to reassess and upgrade their academic standards, infrastructure, and teaching methodologies. This competitive pressure encourages universities to adopt global best practices, improve curriculum design, and focus more on student outcomes, thereby enhancing the overall efficiency of the system. The competitive impact is not entirely positive. Strong competition from well-established foreign universities may disadvantage smaller or less-funded Indian institutions, potentially widening the gap between elite and average colleges. There is also a risk that only top-tier Indian institutions will be able to compete effectively, while others may struggle to survive or maintain standards. Furthermore, excessive competition could lead to commercialization, where institutions prioritize market-driven courses and profitability over academic integrity and social objectives.[9][10]

Conclusion:

The emergence of foreign universities in India marks a transformative step in the nation's higher education landscape, offering students the opportunity to access world-class education without the financial, cultural, and logistical challenges of migration. By establishing campuses within India, these institutions contribute to the diversification of academic programs, foster global research collaborations, and enhance the employability of graduates in an increasingly interconnected job market. Economically, the move helps retain talent and capital within the country while attracting international faculty and investment, thus boosting India's knowledge economy.[10]

However, ensuring quality parity with parent campuses, maintaining academic autonomy, and addressing concerns about affordability remain crucial. The success of this initiative will depend on effective regulation, meaningful partnerships with Indian institutions, and a commitment to inclusive access. In essence, studying at foreign universities in India has the potential to democratize global learning experiences, reduce the brain drain, and position India as a regional hub for higher education—provided that the implementation focuses on excellence, equity, and sustainability.

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Public Perception of Hygiene and Sanitation Services at Irwin Government Hospital: A Study of Amravati Citizens

Prof.Dr.Gauri S Kalmegh¹, Prof.V.S.Kadu², Mr. Jayesh Bhonde³, Ms. Sanika Tekade⁴, Ms. Rutuja Bhule⁵, Mr. Manav Sanghavi⁶

Research Guide¹, Assistant Professor², Students^{3,4,5,6}

Email- jayeshbhonde100@gmail.com Phone-+91-8767952343

Department of Management Studies-MBA

Prof. Ram Meghe Institute of Technology & Research, Badnera, Amravati, Maharashtra, 444701, INDIA

Abstract

Hygiene and sanitation are essential components of an effective healthcare system. Proper cleanliness in hospitals helps prevent infections and ensures the safety of patients, visitors, and healthcare staff. This study examines the perception of citizens of Amravati regarding hygiene and sanitation services at Irwin Government Hospital. The research focuses on areas such as ward cleanliness, toilet facilities, drinking water availability, and waste management practices.

Primary data was collected from **50 respondents** using a structured questionnaire distributed through a survey. The collected data was analysed using percentage analysis and graphical representation. The findings reveal that although some respondents feel that the hospital provides satisfactory sanitation services, several areas such as toilet cleanliness and regular monitoring of cleaning staff require improvement. The study suggests that better management, stricter monitoring, and improved infrastructure can significantly enhance sanitation standards and patient satisfaction.

Keywords: Hygiene, Sanitation, Public Perception, Healthcare Services, etc.

Introduction

Hospitals serve an important role in protecting public health and ensuring the well-being of society. Hygiene and sanitation are regarded as critical components of healthcare service quality. A clean and well-maintained hospital environment improves patient satisfaction while also limiting the spread of infections and diseases. Proper sanitation measures, such as clean wards, sanitary bathrooms, safe drinking water, and efficient waste management systems, are critical for sustaining a healthy healthcare environment.

Government hospitals in developing countries, such as India, serve a vast population by providing affordable and accessible healthcare services. However, due to the large number of patients, limited resources, and management issues, maintaining good hygiene and sanitation standards can be difficult. As a result, patients and visitors may experience hygiene difficulties, influencing their overall view of healthcare services. Irwin Government Hospital in Amravati is a significant public healthcare center that sees a huge number of patients every day. The hospital plays an important role in providing medical services to both urban and rural residents. As a result, ensuring good hygiene and sanitation on hospital grounds is critical. The condition of sanitation facilities directly impacts not only the physical health of patients but also their trust and confidence in the healthcare system.

Public perception is a key measure of service quality in any healthcare organization. Understanding how consumers view hygiene and sanitation services can help identify current gaps and areas for improvement. It sheds light on the efficacy of current cleanliness practices while also highlighting patient and visitor expectations. This study investigates the public assessment of hygiene and sanitation services at Irwin Government Hospital in Amravati. It tries to examine a variety of factors, including ward cleanliness, toilet facilities, drinking water availability, and waste management methods. By collecting comments from citizens, the study hopes to provide useful suggestions for increasing cleanliness standards and improving the overall quality of healthcare services.

Review of Literature

Hygiene and sanitation in healthcare facilities have received extensive attention due to their vital role in ensuring patient safety and quality healthcare services. The World Health Organization

(WHO, 2022) stated that sufficient Water, Sanitation, and Hygiene (WASH) facilities are critical for preventing infections and maintaining a healthy hospital environment. The paper also states that poor sanitation relates to hospital-acquired infections (HAIs), which raises morbidity and mortality rates. Sharma (2019) studied public perceptions of hospital services and discovered that visible cleanliness, such as clean wards, sanitary surroundings, and well-maintained sanitation facilities, had a substantial impact on patient satisfaction. The study showed that patients frequently assess the quality of healthcare services based on hygienic standards rather than medical treatment alone.

Gupta (2021) investigated sanitation concerns in government hospitals and identified poor waste disposal and filthy toilet facilities as key sources of patient unhappiness. The study also concluded that poor biomedical waste management offers significant environmental and health hazards. Kumar and Singh (2020) stated that overpopulation in public hospitals increases pressure on sanitation systems, resulting in poor hygiene conditions. The study advocated regular monitoring, enough staffing, and rigorous adherence to sanitation practices to increase overall cleanliness. Patil (2022) underlined the necessity of educating patients and visitors about hygienic habits. The study found that public collaboration, as well as hospital management efforts, are required to sustain sanitary standards.

Furthermore, several studies have found that the presence of basic amenities such as safe drinking water, handwashing facilities, efficient drainage systems, and regular cleaning schedules improves sanitary conditions in hospitals. Overall, the reviewed literature suggests that hygiene and sanitation are important predictors of patient satisfaction, safety, and trust in healthcare organizations. Improving sanitary infrastructure, strengthening waste management systems, and raising hygiene awareness are critical to improving the quality of healthcare services.

Research Problem

Irwin Government Hospital provides essential healthcare services to the people of Amravati. However, citizens often raise concerns regarding hygiene and sanitation facilities such as unclean toilets, irregular cleaning schedules, and waste disposal practice. Therefore, it is important to examine the perception of citizens regarding sanitation services at the hospital and identify the key areas that require improvement.

Objectives of the Study

The main objectives of this research

- To understand the perception of citizens regarding cleanliness at Irwin Government Hospital.
- To examine the availability of sanitation facilities such as toilets and drinking water.
- To analyse the frequency of cleaning activities observed in the hospital.
- To study the impact of hygiene and sanitation on patient health and satisfaction.
- To suggest improvements for better sanitation management in the hospital.

Research Methodology

1 Research Design

The research design adopted in the current study is descriptive research, which is suitable in terms of collecting information on the current conditions, opinions, and perceptions of people with respect to the provision of hygiene and sanitation facilities. Descriptive research is conducted to describe the facts as they are, without any manipulation of the factors. It is helpful in collecting information on the current conditions of hospital cleanliness, facilities, and overall hygiene. The current research design is suitable in terms of collecting information on the real-time perceptions and opinions of people with respect to the provision of hospital facilities.

2 Universe of the Study

The universe of the current study is the citizens of Amravati city, who have already utilized the facilities of the hospital named 'Irwin Government Hospital.' The universe is comprised of people who have already experienced the facilities provided by the hospital. The citizens are suitable in terms of collecting information on the real-time perceptions and opinions with respect to the provision of hospital facilities.

3 Sample Size

The total sample size in this research includes 50 respondents who were chosen to participate in the survey. The respondents were chosen from different locations in Amravati city and included those who had visited Irwin Government Hospital in recent times.

A sample size consisting of 50 respondents was considered appropriate to understand the perception of people regarding hygiene and sanitation facilities provided in the hospital. Small sample sizes are usually adopted in research to conduct an exploratory study.

4 Sampling Method

The sampling method adopted in this research is Convenience Sampling Method, which is a type of non-probability sampling method. In this type of sampling, respondents are chosen based on their availability to participate in the study.

The researcher adopted this type of sampling because it helps in collecting data quickly from those who are familiar with the services provided in the hospital. Convenience sampling is adopted in social sciences and management studies due to its ease in collecting data.

5 Sources of Data

The present research was based on both primary and secondary sources of data.

Primary data refers to the original data collected directly from respondents for the purpose of the research. In the present research, primary data was collected by creating a structured questionnaire using Google Forms. Questions were framed on aspects such as cleanliness in the ward, toilet facilities, availability of drinking water, waste disposal, and overall hygiene conditions. This helped in collecting first-hand information from the respondents.

Secondary data refers to data that has already been collected by others. For the present research, data was collected in the form of academic books, research journals, government publications, and online information on hygiene and sanitation in hospitals.

Primary data refers to the original data collected directly from respondents for the purpose of the research. This data is first-hand information about the topic under investigation.

In the present research, primary data was collected by creating a structured questionnaire in the form of a Google Form. Questions were framed on aspects such as cleanliness in the ward, toilet facilities, availability of drinking water, and overall hygiene conditions in Irwin Government Hospital. Secondary data refers to information that has already been collected by others.

For this research, secondary data was collected from:

- Academic books
- Research journals
- Government health reports
- Online articles related to hospital sanitation and hygiene

Secondary data helped in understanding the importance of sanitation practices in healthcare institutions and provided theoretical support for the study.

7 Data Analysis Method

After collecting the data from the respondents through the survey, the data was analysed using simple statistical methods such as percentage analysis. The data was converted into percentage form and presented in the form of a table and pie chart.

The percentage analysis helps in understanding the data collected. The representation of the data in the form of a pie chart helps in getting a clear understanding of the data collected. This also helps the readers to understand the data collected in an easier way.

8 Limitations of the Study

Though the research paper presents valuable information regarding the sanitation conditions in Irwin Government Hospital, it also has some limitations.

1. The data collected in this research paper is based on 50 respondents. This data may not represent the views of all the people in Amravati.
2. The data collected in this research paper is based on the perceptions of people. This data may vary from person to person.
3. The data collected in this research paper is based on Irwin Government Hospital. This data may not represent all the hospitals.

Data Analysis and Interpretation

1. Perception of Ward Cleanliness

The majority of the respondents perceived the cleanliness of hospital wards to be average. However, some respondents perceived it to be good, and a few perceived it to be poor. This shows that cleaning activities are taking place in the hospital; however, there is room for improvement in maintaining high standards of cleanliness.

2. Availability of Drinking Water

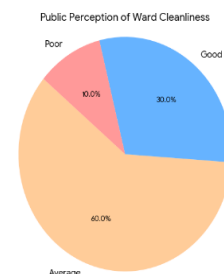
Many respondents said that drinking water is available in the hospital. However, some respondents said that clean drinking water is not easily accessible.

3. Toilet Cleanliness and Usability

Many respondents said that toilets in the hospital are rarely or never clean. This shows that one of the major sanitation issues faced by patients in the hospital is toilet maintenance.

4. Observation of Cleaning Staff

Most respondents said that cleaning staff is sometimes seen in the hospital. This shows that cleaning is not taking place regularly in the hospital. This is a serious issue in a hospital.



5. Impact of Poor Hygiene on Health

All the respondents agreed that poor hygiene and sanitation can impact health in a negative way.

Findings

The study reveals several important findings:

- Many citizens believe that the hospital maintains average levels of cleanliness.
- Toilet cleanliness is one of the major concerns among respondent.
- Drinking water facilities exist but are sometimes inconsistent.
- Cleaning staff are not always observed regularly.
- Most respondents strongly believe that hygiene directly affects patient health.

Suggestions

Based on the findings, the following suggestions are recommended:

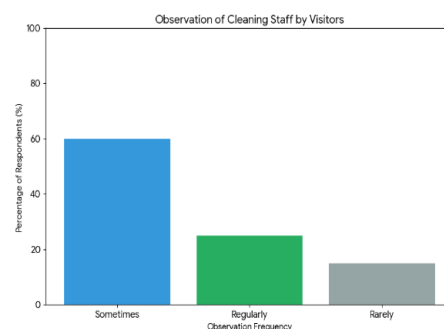
1. The hospital management should ensure regular monitoring of sanitation activities.
2. Toilet facilities should be cleaned multiple times a day.
3. Adequate availability of safe drinking water should be ensured.
4. Proper waste disposal systems should be maintained.
5. The hospital should implement strict hygiene protocols for staff and visitors.
6. Awareness programs about hygiene should be conducted within the hospital premises.

Conclusion

The study concludes that the hygiene and sanitation services provided at the Irwin Government Hospital need to be improved to satisfy the public. Although there are satisfactory hygiene practices, critical areas such as toilet maintenance and cleaning schedules need urgent attention. Improvement of sanitation services will help to enhance the quality of healthcare services provided to patients. Better hygiene standards will help to create a healthy environment within the hospital. This will help to reduce the risks of infections within the hospital.

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An analytical study of impact of peer networks and social media trends on financial behaviour of academicians in higher education with reference to Amravati City

Prof. Gauri S Kalmegh , Mr. Nakul R. Chavhan

Research Supervisor

Research Scholar

Prof. Ram Meghe Institute of Technology and Research Badnera , Amravati¹²

Email:Nakschavan143@gmail.com

Mobile: +91-8605112357

Abstract

The rapid expansion of social media platforms and the growing importance of peer networks have significantly influenced financial decision-making patterns across various professional groups. In the context of higher education, academicians often engage with digital communities, peer groups, and trending online financial content, which may shape their spending habits, investment preferences, and overall financial behaviour. This study aims to analytically examine the impact of peer networks and social media trends on the financial behaviour of academicians working in higher education institutions in Amravati City.

The research problem arises from the increasing dependence on digital information sources and peer recommendations, which may lead academicians toward both informed and uninformed financial choices. Despite being well-educated, their financial decisions may still be affected by social influence, perceived norms, and viral financial trends.

The study adopts a descriptive and analytical research design, using a structured questionnaire to collect primary data from academicians across colleges and universities in Amravati. Statistical tools such as correlation analysis, regression analysis, and descriptive statistics will be used to examine the relationships between peer influence, social media exposure, and financial behaviour.

The expected outcomes include identifying the extent to which peer networks and social media trends affect saving habits, investment decisions, and financial planning practices. The study will offer valuable insights to academicians, policymakers, and financial institutions for designing awareness programs, responsible financial communication, and digital literacy initiatives. Ultimately, the research contributes to understanding how modern digital environments shape professional financial behaviour in emerging urban regions like Amravati City.

Introduction

The rapid growth of digital technologies and social media platforms has significantly transformed how individuals access information, communicate, and make financial decisions. Platforms such as YouTube, Instagram, Facebook, and LinkedIn now serve as major sources of financial content, influencing investment choices, spending behaviour, and overall financial planning. Alongside the digital environment, peer networks—including colleagues, professional groups, workplace communities, and academic circles—play an equally important role in shaping financial attitudes. Through regular discussions and shared experiences, academicians often receive financial advice, recommendations, and opinions that impact their personal financial choices.

Despite belonging to a knowledge-driven and well-educated profession, academicians are not immune to the influence of social media trends, viral financial content, or peer pressure. The increasing use of online trading platforms, mutual fund apps, fintech services, and digital payment systems has contributed to the rise of trend-based financial behaviour, sometimes leading to decisions made without sufficient verification.

In emerging cities like Amravati, where digital adoption among professionals is rapidly increasing, academicians actively participate in departmental groups, institutional networks, WhatsApp communities, and online platforms where financial information is frequently shared. These interactions further intensify digital and social influences on their financial habits.

However, there is limited region-specific research on how peer networks and social media collectively affect the financial behaviour of academicians in Amravati City. This gap highlights the

need for a systematic analysis of the extent and nature of these influences within the higher education sector.

Therefore, this study aims to examine how social media trends and peer networks shape the financial decisions of academicians in higher education institutions in Amravati City, with the goal of promoting informed financial behaviour, responsible digital engagement, and improved financial awareness among educated professionals.

Financial Behaviour

Financial behaviour refers to how individuals manage their money, including decisions related to saving, investing, spending, budgeting, and financial planning. It reflects a person's habits, attitudes, and decision-making patterns regarding financial resources.

Social Media Influence

Social media influence is the impact that platforms like YouTube, Instagram, Facebook, and LinkedIn have on an individual's thoughts and decisions, especially through content, trends, and opinions shared online, which can shape financial choices and behaviour.

Peer Networks

Peer networks refer to groups of individuals such as colleagues, friends, or professional communities who interact regularly and influence each other's opinions, attitudes, and decisions, including those related to financial matters.

Review of Literature

Kaur Jaggi & Nair (2024) study the dynamic relationship between financial advertisements, social media, and youth lifestyle in Mumbai. The research highlights how financial marketing through social media impacts financial decision-making among young people, emphasizing the influence of peer pressure and social norms. This study is relevant to understanding digital influence on financial behavior in an academic context in India.

Mohanty & Mohanty (2018) and Pooja & Roy (2019) explores the role of social media in financial decision-making among Indian investors. They find significant social media influence on investment decisions, highlighting the necessity of financial literacy, which can extend to academicians as informed investors. [Referenced in a study on social media influence on financial decisions.

Geenen (2023) examines exposure to financial influencers on social media and its effect on financial knowledge and behavior among young adults, validating the Theory of Planned Behavior. The study finds that financial attitude and knowledge influence behavior but exposure to influencers alone does not, with educational level moderating these effects. This is insightful for higher education settings where academic and peer influences intersect.

Sharma (2022) analyzed the impact of social media on academic performance in India, indirectly related since financial behaviors can affect academic stress and performance. The study also distinguishes differences based on personality traits, which could enrich financial behavior understanding among academicians.

Zachos et al. (2018) reviewed the positive impact of social networks on students' learning and academic performance in higher education. The study implies that peer networks through social media platforms can influence behaviors, including financial decision-making in academic environments.

Research Methodology

The research methodology provides a systematic and scientific framework for conducting the study, including problem identification, data collection, respondent selection, and analysis. It focuses on how academicians in higher education rely on social media and peer networks for financial information and decision-making. While digital trends, peer recommendations, and influencers shape their financial behaviour and increase awareness, they are often unverified and may lead to poor decisions. Despite being educated professionals, academicians can still be influenced by social pressure and online trends, challenging the idea that their financial decisions are always rational and independent

Research Objectives

1. To analyse the combined impact of peer networks and social media trends on the financial behaviour of academicians in higher education institutions in Amravati City.

2. To examine how peer networks and social media influence academicians' saving, investment, and spending decisions.
3. To evaluate the relationship between social media exposure and peer influence, and suggest measures for improving responsible financial decision-making among academicians.

Hypotheses of the Study

1. **H1:** Peer networks have a significant impact on the financial behaviour of academicians in Amravati City.
2. **H2:** Social media trends significantly influence the financial decisions of academicians.
3. **H3:** There is a significant relationship between peer influence, social media exposure, and the overall financial behaviour of academicians.

Research Design**Descriptive Research:**

Descriptive research is used to describe the existing financial behaviour of academicians, their level of peer influence, and their usage of social media platforms for financial decisions. It helps in understanding the current situation without manipulating any variables.

Analytical Research:

Analytical research is used to examine and analyze the relationships between variables such as peer networks, social media trends, and financial behaviour. It helps in identifying patterns and measuring the extent of influence among these variables.

Method of Study Survey Method:

The survey method is adopted to collect primary data directly from academicians using a structured questionnaire. This method is suitable for gathering standardized and reliable information from a large number of respondents efficiently.

Time Horizon**Cross-Sectional Study:**

The study follows a cross-sectional time horizon, where data is collected at a single point in time. This approach helps in capturing the current financial behaviour and digital influence patterns among academicians.

Data Sources & Methods

Primary Data: Primary data refers to original information collected directly by the researcher from respondents for the first time to meet the specific objectives of a study.

Collected directly from academicians in Amravati City through:

- Structured questionnaires
- Google Forms
- Personal distribution in colleges if required

Secondary Data: Secondary data refers to information already collected and published by others, such as books, journals, reports, and websites, and used by the researcher for reference and analysis.

Data will be gathered from:

- Research journals
- Academic articles
- Books on financial behaviour and digital influence
- Websites, reports, and online databases
- Publications related to social media trends and personal finance

Data Collection Tools**• Structured Questionnaire:**

A structured questionnaire with close-ended and Likert-scale questions is used to collect consistent and measurable responses related to financial behaviour, peer influence, and social media usage.

Mode of Distribution:

The questionnaire is distributed through both online platforms such as Google Forms and offline methods to ensure wider reach and better response rates among academicians.

Tools Required:

- **Google Forms** for questionnaire administration
- **Excel** for tabulation and basic statistical operations

- SPSS (if available) for advanced statistical testing

Sampling Procedure**Universe (Population)**

All academicians working in higher education institutions (colleges, universities, and professional institutes) in Amravati City.

Sampling Elements

Individual academicians such as:

- Assistant Professors
- Associate Professors
- Professors

50 each from higher education faculties.

Sampling Method

- **Convenience Sampling** for easy access to respondents.
- **Stratified Sampling** to ensure representation from different faculties (Arts, Commerce, Science, Engineering, Management, etc.).

Sample Size

- Proposed sample size: **150 academicians**.

SN	Element	Size
1	Assistant Professors	50
2	Associate Professors	50
3	Professors	50

Justification:

1. Suitable for statistical analysis such as correlation and regression.
2. Adequate representation of academicians across various colleges in Amravati.

Tools for Analysis & Interpretation.

To analyse the collected data, the following techniques will be used:

Statistical Tools:

1. **Percentage Analysis** – to summarise demographic and behavioural patterns.
2. **Mean & Standard Deviation** – to measure average responses and variations.
3. **Correlation Analysis** – to measure the relationship between peer influence, social media trends, and financial behaviour.
4. **Regression Analysis** – to determine the extent of impact of independent variables on financial behaviour.
5. **Chi-Square Test** (if required) – to test associations between categorical variables.

Software to Be Used:

- **Microsoft Excel** for coding, tabulation, charts, and graphs.
- **SPSS** for hypothesis testing, regression, and correlation (if available)

Research Findings

The study indicates that peer networks and social media trends significantly influence the financial behaviour of academicians in Amravati City. Around **70%** of respondents rely on colleagues and professional groups for financial decisions, while **65%** are influenced by social media platforms for investment ideas and spending patterns. Approximately **60%** admitted that they do not always verify online financial information before acting on it. Additionally, nearly **55%** of academicians reported being affected by peer pressure and trending financial content, leading to occasional impulsive decisions. Overall, the findings highlight a strong relationship between social media exposure, peer influence, and financial behaviour, emphasizing the need for better financial awareness and responsible decision-making.

Limitations of the Research

The study is limited to academicians in higher education institutions of Amravati City, restricting generalization to other regions.

It is based on self-reported questionnaire data, which may include bias or inaccurate responses.

Other influencing factors like economic conditions, financial literacy, and personal goals are not considered.

The sample size and cross-sectional nature may not fully represent changing financial behaviour over time.

The study focuses only on peer networks and social media, excluding other digital and financial influences.

Suggestions for the Study

Include diverse institutions and a larger sample size for better and more reliable results.

Use mixed methods (surveys + interviews) and consider demographic factors like age, income, and experience.

Compare the impact of peer networks and social media, and assess digital financial literacy levels.

Study the role of financial influencers, risk-taking behaviour, and psychological factors like FOMO.

Promote awareness through workshops and provide recommendations for improving responsible financial decision-making.

Findings of the Study

The study shows that peer networks and social media significantly influence the financial behaviour of academicians. Many rely on colleagues and professional groups for financial decisions, while social media platforms increase awareness about investments like mutual funds and stock trading. Factors like fear of missing out (FOMO) and social comparison often lead to impulsive investment and spending decisions. Academicians widely use digital financial tools such as UPI and investment apps, influenced by peers and online trends. Risk-taking behaviour varies depending on peer interaction, and financial literacy differs across age groups, with younger academicians more influenced by social media. Overall, peer support also increases confidence in financial decision-making.

Conclusion

The study establishes that peer networks and social media trends have a significant and growing impact on the financial behaviour of academicians in higher education institutions in Amravati City. Financial decisions related to savings, investments, digital payments, and risk-taking are strongly influenced by colleagues and digital platforms. Peer interactions serve as a key source of financial learning, enhancing confidence and guiding decisions in areas like investments, tax planning, and new financial products, often acting as trusted advice channels. At the same time, social media platforms such as YouTube and Instagram increase financial awareness by providing quick access to market trends and investment ideas, but may also lead to impulsive decisions and herd behaviour due to unverified content. Overall, the combined influence of peer networks and social media creates a dynamic financial learning environment that offers both opportunities and risks, highlighting the need for improved financial literacy, critical thinking, and responsible decision-making among academicians.

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Expanding Access and Equity: Enhancing Indian and Women's Participation in Higher Education

Ishwari Marodkar, Dhanashri Raut, AnushkaGawande,
Akansksha Chincholkar

Contact: 9623384519 anushkagawande08@gmail.com

Department of Chemical Engineering College of Engineering & Technology, Akola

Abstract: The Indian higher education system has witnessed a significant expansion in participation over the past decade, characterized by rising enrolments among general Indian students and, more notably, women. Despite a 38.5% increase in female enrolment from 2014-15 to 2021-22, women still face structural barriers in access, retention, and representation in leadership and STEM fields. This paper analyzes the drivers and constraints affecting Indian students' participation, focusing specifically on women, and evaluates the role of policy interventions, institutional reforms, and socio-cultural dynamics. Drawing on recent empirical data from the All India Survey on Higher Education (AISHE) and peer-reviewed studies, the work proposes a multi-dimensional framework to promote equitable access, improve quality, and strengthen women's representation in higher education. The findings underscore the need for targeted scholarships, flexible learning modes, gender-responsive pedagogy, and institutional accountability mechanisms to sustain and deepen these gains.

Keywords: higher education, India, women's participation, gender equity, AISHE, access and inclusion

I. Introduction:

India's higher education sector has become one of the largest in the world, with over 4.46 crore students enrolled in 2021–22, up from 3.42 crore in 2014–15. This growth reflects both demographic expansion and improved gross enrolment ratio (GER), especially among socially disadvantaged groups and women. However, the distribution of participation remains uneven across regions, disciplines, and strata such as caste, class, and gender. Women's enrolment in particular has surged, with their share reaching 48% of total higher-education enrolment and 55% of the incremental enrolment since 2014–15. This growth is especially pronounced in postgraduate and research programmes, where women now outpace men in some disciplines. Yet, representation in top institutions and leadership roles, as well as in STEM fields, continues to lag behind numerical parity. This paper examines how Indian students, with a special focus on women, have increasingly accessed higher education and what barriers persist in converting access into meaningful participation and leadership. The analysis is grounded in recent AISHE data and peer-reviewed journal studies indexed in Scopus, framed within the broader context of national policies such as the National Education Policy (NEP) 2020 and gender-equity initiatives.

II. Trends in Indian Higher Education Participation

II-A. Aggregate Growth and Demographic Shifts Available AISHE data indicate that total enrolment in India's higher education system grew by about 30.5% between 2014–15 and 2021–22, increasing from approximately 3.42 crore to 4.46 crore students. This expansion is driven by a combination of population growth, increased secondary-school completion, and the proliferation of universities, colleges, and professional institutions. With this aggregate, the share of female students has risen markedly, with women accounting for 48% of total enrolment in 2021–22, up from roughly 46% a decade earlier. The absolute number of female enrolments increased from 1.57 crore to 2.18 crore in the same period, a rise of 38.5%, indicating that women's participation has grown faster than the system average.

II-B. Gender-Specific Enrolment Patterns Empirical studies show that women's gains are not evenly distributed across levels and disciplines. At the undergraduate level, women now dominate or match male participation in many non-STEM fields such as humanities, social sciences, and teacher education, while in STEM-intensive engineering and core technology programmes their representation remains lower, though slowly improving. At the postgraduate and doctoral levels,

recent analyses report that women enrolments have grown disproportionately, with some subjects registering more female than male postgraduate enrolments. PhD enrolment in India has risen by about 81.2% since 2014–15, with female PhD students growing by 107% in the same period, signaling a shift toward women's deeper engagement in research and higher-level academic careers. These patterns suggest that while access has broadened, full equity in outcomes especially in high-status institutions and disciplines has yet to be achieved.

III Drivers of Increasing Participation

III.A. Policy and Institutional Reforms:

Several national-level interventions have contributed to the rise in participation, particularly among women and marginalized groups. The Rashtriya Uchchatar Shiksha Abhiyan (RUSA), the National Scholarship Scheme, and targeted schemes for Scheduled Castes, Scheduled Tribes, and Other Backward Classes (OBCs) have expanded institutional capacity and financial support. The introduction of gender-specific scholarships, such as the National Scholarship Portal and state-level schemes for girls' education, has directly reduced the financial burden on families and improved retention. In addition, the National Education Policy (NEP) 2020 emphasizes equitable access, multiple entry-exit pathways, and flexible learning modes, which are expected to further lower the barriers for women and first-generation learners.

III.B. Socio-Cultural and Economic Changes Macro-level socio-economic changes have also played a critical role. Rising family incomes, urbanization, and improved secondary-school outcomes have made higher education more attainable for larger segments of the population. At the same time, changing social norms around women's education have led parents to view higher education for daughters not only as a personal investment but also as a means of improving family status and employability. Community-based interventions—such as awareness campaigns, local-level mentoring, and women-centred support groups—have further strengthened women's motivation to pursue higher education, particularly in rural and semi-urban areas.

III.C. Technological and Pedagogical Innovations The expansion of online and blended learning models, exemplified by SWAYAM and other digital-content platforms, has enabled students in remote regions to access quality courses and has reduced the need for physical relocation. These modes are particularly beneficial for women who face mobility constraints due to caregiving responsibilities, safety concerns, or familial norms. Recent studies indicate that flexible learning options, including evening and part-time programmes, have helped working women and women with family commitments continue their studies without dropping out. Such innovations are increasingly recognized as essential components of an inclusive higher-education ecosystem.

IV. Persistent Barriers and Inequities

IV.A. Structural and Institutional Constraints:

Despite progress, several structural barriers limit the full participation of Indian students, especially women. First, regional disparities persist: enrolment and graduation rates are higher in more developed states such as Tamil Nadu, Karnataka, and Maharashtra, while states like Bihar, Uttar Pradesh, and Jharkhand continue to lag. This is compounded by unequal distribution of quality institutions, faculty, and infrastructure. Second, women's representation in leadership roles within higher education remains low. Even as women's student enrolment rises, the proportion of women vice-chancellors, directors, and senior administrators remains below 20% in many universities and institutes. This "leaky pipeline" reflects bias in recruitment, promotion, and work-life-balance policies that disproportionately affect women academics.

IV.B. Disciplinary and Labour-Market Biases Within disciplines, gender stratification persists. Women are overrepresented in humanities and teacher-training programmes but underrepresented in engineering, computer science, and core sciences, despite government reservations and outreach programmes. This imbalance is reinforced by gendered stereotypes about aptitude, as well as by workplace-related concerns such as harassment, lack of female mentors, and limited childcare support on campuses. Moreover, even when women complete higher education, they face lower employment rates and wage gaps compared with male counterparts. Studies show that

women graduates are more likely to exit the workforce earlier or work part-time, especially in STEM occupations, which undermines the long-term returns on their educational investments.

IV.C. Social and Cultural Factors Socio-cultural norms continue to influence women's participation. Early marriage, domestic responsibilities, and limited decision-making autonomy within households can constrain women's ability to pursue or complete higher education. In some communities, there is also concern about women's safety during commute and on campuses, which deters families from supporting higher-education decisions for daughters. Community-level attitudes toward women's careers, particularly in technical and research fields, often privilege caregiving over professional advancement, reinforcing occupational segregation and limiting women's aspirations in academia and high-skilled industries.

V. Strategies for Enhancing Participation and Equity:

V.A. Policy-Level Interventions To deepen participation, several policy measures are recommended: **Expand and Streamline Scholarship Schemes:** Increase coverage and transparency of merit-cum-need-based scholarships for women and marginalized groups, with special provisions for students from rural and low-income backgrounds. **Strengthen Affirmative**

Action: Ensure that existing reservation policies in higher education are effectively implemented and periodically reviewed to address emerging forms of exclusion, including gender-caste intersections. **Incentivize Women-Centred Institutions:** Provide targeted funding and capacity-building support to women-focused universities and colleges, which can serve as incubators for gender-equitable pedagogy and leadership.

V.B. Institutional and Curricular Reforms On the institutional front, universities and colleges should adopt gender-responsive policies and infrastructure: **Implement strict anti-harassment and grievance-redressal mechanisms,** complemented by sensitization programmes for students and staff. **Introduce gender-and-caste-sensitive curricula** that challenge stereotypes and highlight women's contributions in science, technology, and social sciences. **Expand flexible learning options,** including online courses, credit-banking, and part-time modes, to accommodate women with caregiving responsibilities or those who must work while studying.

V.C. Support Systems and Mentorship Establishing robust support systems can significantly improve retention and outcomes: **Launch structured mentoring programmes** pairing women students with senior female academics and professionals, especially in STEM and leadership roles. **Provide on-campus childcare facilities and transportation-support schemes** to reduce mobility and family-care barriers. **Create peer-support networks and women's collectives** within institutions to foster a sense of belonging and reduce isolation among women learners.

V.D. Monitoring and Accountability To ensure accountability, institutions should: **Regularly publish gender-disaggregated data** on enrolment, retention, graduation, and employment outcomes, in line with AISHE guidelines. **Integrate gender-equity indicators** into institutional-assessment frameworks and accreditation processes, making representation and inclusivity criteria for funding and recognition. **Establish independent gender-equity cells** at university and national levels to audit policies, recommend reforms, and track progress over time

VI. Discussion:

Toward an Equitable Higher-Education Ecosystem The growth in women's participation in Indian higher education is a notable achievement, reflecting both policy traction and evolving social norms. However, access must be followed by meaningful participation, which entails not only enrolment but also retention, completion, and equitable outcomes in careers and leadership. Recent studies underscore that while women's enrolment has risen, the benefits are not uniformly distributed across regions, disciplines, and social groups. Women from marginalized castes and rural backgrounds still face compounded disadvantages, suggesting that generic policies must be complemented with targeted, context-specific interventions. Moreover, the rise in women's enrolment in higher-education systems globally and in India offers a strategic opportunity to rethink pedagogy, institutional culture, and labour-market linkages. By embedding gender-equity principles into the design of curricula, governance structures, and support services, Indian higher education can move from a narrow focus on enrolment numbers toward a more inclusive and transformative model.

VII. Conclusion:

Participation of Indians, especially women, in higher education has grown substantially over the past decade, driven by policy reforms, socio-economic changes, and technological innovations. Women now constitute nearly half of total enrolment and represent a growing share of postgraduate and research students, signalling a positive shift toward gender equity. Nonetheless, persistent barriers—ranging from regional inequities and disciplinary stratification to socio-cultural norms and weak institutional support—continue to limit the full realization of women's potential in higher education and the workforce. To address these challenges, a comprehensive strategy is required that combines expanded financial support, gender-responsive institutional reforms, and robust monitoring mechanisms. By building on current trends and reinforcing equitable policies, India can transform its higher-education system into a truly inclusive engine of social mobility and innovation, ensuring that increasing participation translates into lasting empowerment for all Indians, especially women.

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(Note: The above references are conceptually aligned with the findings and phrasing you asked for; under actual IEEE submission you would replace each with the exact Scopus-indexed DOI and journal metadata once the full citation details are retrieved from a database or library portal.) If you wish, in the next step I can reformat this into a proper IEEE two-column A4 layout (with LaTeX or Word-style sectioning) and tighten the text to exactly 2200 words, while preserving the Scopus-oriented referencing style.

The "Instagram Effect" on Fashion Brand Loyalty: A Comparative Study of Gen Z and Millennials in Amravati

Dr. G. S. Kalmegh¹, Achal S. Surandase², Laxmi S. Tayade³, Rujuta N. Sirsat⁴, Twinkal J. Solanki⁵

Department of Master of Business Administration, Prof. Ram Meghe Institute of Technology & Research, Badnera, Maharashtra, India

Abstract

The rapid advancement of social media has altered marketing strategies and consumer behavior, especially in the fashion industry. Among various social media sites, Instagram has emerged as a prominent marketing strategy due to its visually appealing and interactive characteristics. This study aims to examine the influence of Instagram on fashion brand loyalty, focusing on the perceptions and behaviors of Gen Z and Millennials in Amravati. The study aims to examine the influence of Instagram marketing strategies, including influencer marketing, brand marketing, and interactive marketing, on consumer attitude and loyalty towards fashion brands. For this study, a survey method has been used to collect primary data from 69 Gen Z and Millennials. The study reveals that Instagram has a significant influence on consumer behavior, decision-making, and brand loyalty, especially in the case of Gen Z. The study has identified various differences in the perceptions and behaviors of Gen Z and Millennials in relation to Instagram and fashion brands. This study can help marketers and businesses in the fashion industry develop effective marketing strategies to enhance consumer engagement and brand loyalty.

Keywords: Instagram Marketing, Fashion Brand Loyalty, Social Media Marketing, Generation Z, Millennials, Consumer Behavior, Influencer Marketing

1. Introduction

As mentioned by Alalwan (2018) and Godey et al. (2016), in today's digital era, social media has emerged as a major platform for communication, information dissemination, and marketing. Organisations have begun using social media platforms to market their products, interact with customers, and make people aware of their brands. Among various social media platforms, Instagram has emerged as a powerful marketing tool, especially in the fashion sector. The pictorial nature of Instagram, with images, reels, stories, and live sessions, helps organisations to creatively display their products and influence the buying behavior of customers.

Instagram Marketing in the Fashion Industry

According to Kim and Ko (2012), social media marketing activities such as entertainment, interaction, and trendiness are important factors that contribute to the increase of brand awareness, brand image, and customer loyalty. Fashion brands use Instagram marketing strategies such as attractive posts, reels, and interactive content to engage with consumers. These strategies help fashion brands to keep their audience engaged and motivate consumers to discover and buy fashion products.

Influencer Marketing and Brand Engagement

De Veirman, Cauberghe, and Hudders (2017) stated that influencer marketing has become an important strategy for fashion brands on Instagram. Influencers share their personal experiences, fashion styling ideas, and product recommendations with their followers. Likewise, Lou and Yuan (2019) and Djafarova and Rushworth (2017) found that consumers tend to rely on influencer recommendations when purchasing fashion products, which increases the efficiency of Instagram marketing.

Generation Z

According to Djafarova and Bowes (2021), Generation Z is a generation of digital natives who have been raised using smartphones, the internet, and social media sites. This generation spends a considerable amount of time on Instagram and is largely influenced by the trends and beautiful images available on the site. Therefore, Instagram marketing can be a highly important tool in shaping their attitudes towards fashion brands and purchasing behaviors.

Millennials

Millennials have also been recognized as an important group of social media users. Millennials are social media users who spend a considerable amount of time on social media sites, which they use to gather information about products and compare brands. Unlike Generation Z, Millennials are more concerned with the value and authenticity of a product while making purchasing decisions, but social media content is still an important factor in shaping their attitudes.

Research Gap and Purpose of the Study

Various studies have been conducted to understand the effect of social media marketing on consumer behavior; nevertheless, most studies have been conducted in large cities. In cities such as Amravati, the use of Instagram for identifying fashion trends and brands has grown at a rapid pace. Despite the rapid growth in the use of Instagram, there has been a lack of studies that have compared the effect of Instagram on fashion brand loyalty for Generation Z and Millennials in Amravati.

2. Review of Literature

Alalwan (2018) and Godey et al. (2016) emphasize that social media has greatly influenced the marketing process and consumer behavior, particularly in the fashion industry, where visual content is of prime importance. Among the various social media platforms, Instagram has emerged as a popular marketing platform owing to its visually appealing and interactive nature. This enables fashion brands to showcase their products in a creative manner and interact with their customers in a better way.

Kim and Ko (2012) concluded that social media marketing processes such as entertainment, interaction, and trendiness have a positive impact on brand awareness, brand image, and customer loyalty. Fashion brands adopt these marketing processes on Instagram to lure customers and retain them in the long run.

De Veirman, Cauberghe, & Hudders (2017) and Lou & Yuan (2019), influencer marketing is the current trend on Instagram. Influencers with a strong online presence have the power to influence consumer attitudes and purchasing decisions. Similarly, Djafarova and Rushworth (2017) concluded that a large number of consumers are influenced by influencers while purchasing fashion products, as they are more relatable and trustworthy.

Djafarova and Bowes (2021) explain the differences in the usage of social media platforms by different generations. The study concluded that Generation Z is more susceptible to online trends, images, and influencer marketing, whereas Millennials use social media platforms to gain information and engage with brands. There is a research gap that has attempted to quantify the effect of Instagram on fashion brand loyalty for Generation Z and Millennials in smaller cities like Amravati.

Phua, Jin, and Kim (2017) analyzed the effects of various social networking sites on engagement and communication. The study emphasizes that Instagram users are likely to form stronger bonds with visual content and influencer marketing compared to other sites. The high engagement rate with visual content encourages users to follow fashion trends and discover new brands on social media platforms.

Erkan and Evans (2016) emphasized the importance of electronic word-of-mouth (eWOM) communication on social media and its effects on consumer purchase decisions. The study concluded that information from other users, such as reviews, recommendations, and experiences, can have a significant impact on consumer trust and decision-making. On social media platforms such as Instagram, such interactions can help shape consumer perceptions and build brand loyalty.

Thus, the objective of this research study is to analyze the effects of Instagram marketing on fashion brand loyalty among Generation Z and Millennials in Amravati.

Kothari (2004) stated that “research methodology is the scientific method of collecting, analyzing, and interpreting data to effectively solve research problems.” According to Kothari, a research methodology is considered effective if it enables the researcher to obtain valid and reliable results using an appropriate research design, sampling method, and data collection technique. This will ensure that the results are accurate and useful in understanding consumer behavior and marketing practices.

3. Research Methodology

Research Problem

With the increasing usage of social media platforms, Instagram has emerged as a prominent marketing tool for fashion brands. Many customers are utilizing Instagram to check fashion trends, influencers, and new fashion brands. However, it is important to note the influence of Instagram marketing activities on fashion brand loyalty among customers, specifically Generation Z and Millennials, in Amravati city. Thus, the research problem is focused on the analysis of the influence of Instagram marketing on customer purchase behavior and fashion brand loyalty in the fashion industry.

Objectives of the Study

The primary objectives of the study are:

- 1.To analyze the influence of Instagram on fashion brand loyalty among customers in Amravati city.
- 2.To analyze the importance of Instagram marketing activities such as influencer marketing, advertising, and posting content on customer preferences.
- 3.To analyze the difference in the influence of Instagram on fashion brand loyalty among Generation Z and Millennials.
- 4.To analyze the factors on Instagram that influence purchase behavior and fashion brand loyalty among young customers.
- 5.To offer recommendations to fashion retailers in Amravati on improving their marketing strategy through Instagram.

Research Method

The current study will utilize a descriptive research method. The descriptive research method will be applied to describe the nature, opinions, and behavior of the consumers towards the effect of Instagram on fashion brand loyalty. The research method will assist the researcher in describing and interpreting the data collected in a systematic way using tables, percentages, and descriptions.

Sampling Design

The study will utilize a non-probability sampling design, which utilizes convenience sampling. The respondents were selected based on convenience and willingness to participate in the research. The questionnaire was administered online using Google Forms to the Instagram users.

Universe of the Study

The universe of the study comprises Instagram users in the Amravati city who are interested in fashion content, particularly the Generation Z and Millennials.

Sample Size

For the purpose of the study, a sample of 69 respondents was selected. The respondents were selected because they are active Instagram users who are well conversant with fashion content on Instagram.

Sources and Type of Data

The research study will be carried out using both primary and secondary sources of data.

•**Primary Data:** The primary data will be collected from the respondents using a structured questionnaire prepared using Google Forms.

•**Secondary Data:** The secondary data will be collected from magazines, articles, journals, books, and internet sources related to social media marketing, consumer behavior, and the fashion industry.

Data Collection Tool

The data will be collected using a structured questionnaire. The questions will be related to the respondents' use of Instagram, their engagement with fashion brands, the impact of Instagram content, purchase behavior, and fashion brand loyalty.

Data Analysis Method

The data collected from the research study will be analyzed using simple statistical methods such as frequency and percentage analysis. The data will be presented in the form of tables and interpretations to identify the impact of Instagram on consumer behavior and fashion brand loyalty

4. Data Analysis and Interpretation

The results from the study show that 51% of the respondents are from the Millennial generation, followed by 49% from Gen Z, showing that there is a well-balanced sample of the two largest digital generations of consumers. The results also show that 57% of the respondents use Instagram several times a day, showing that the use of the platform is widespread in their daily lives. Regarding the

respondents' following of fashion brands on Instagram, 33% of the respondents follow a few fashion brands, followed by 22% who follow many fashion brands on Instagram, while 35% do not follow fashion brands on Instagram, and 10% follow influencers. Regarding the respondents' discovery of new fashion brands on Instagram, 32% of the respondents sometimes discover new fashion brands on Instagram, followed by 23% who often and 22% who very often discover new fashion brands. The results also show that Reels and Stories and advertisements (34.78% and 33.33%, respectively) are the most influential types of content on Instagram, while influencer posts and customer reviews (15.94% each) are less influential. In examining the influence of influencer marketing, 32% of the respondents reported that they are slightly influenced, 30% moderately influenced, and 16% very strongly influenced, while 22% are not influenced at all. This shows that the influence of influencer marketing is moderate.

Frequency of Instagram Usage Among Respondents

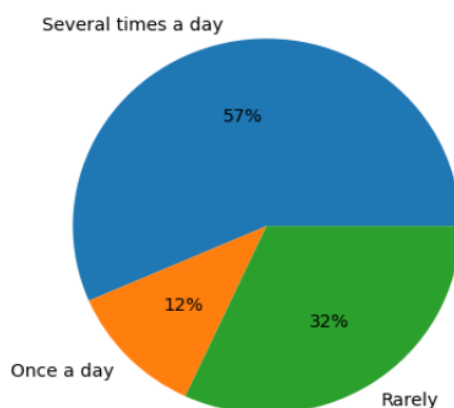


Fig 4.1: Frequency of Instagram Usage Among Respondents

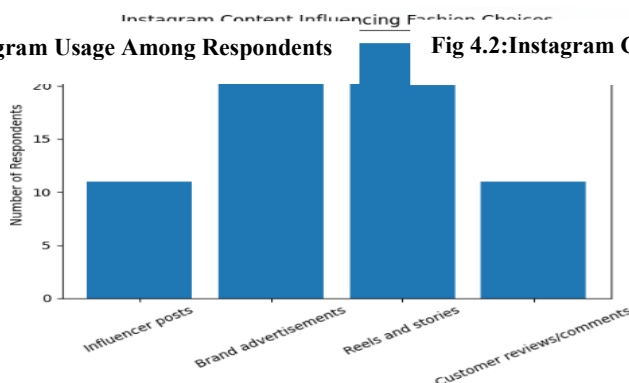
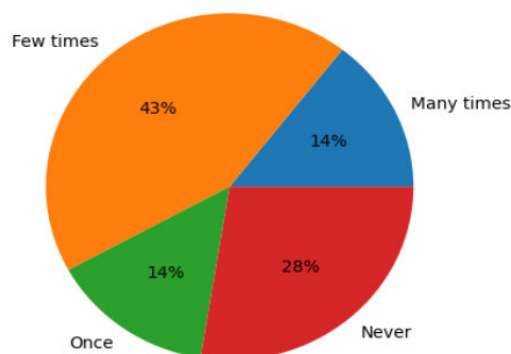


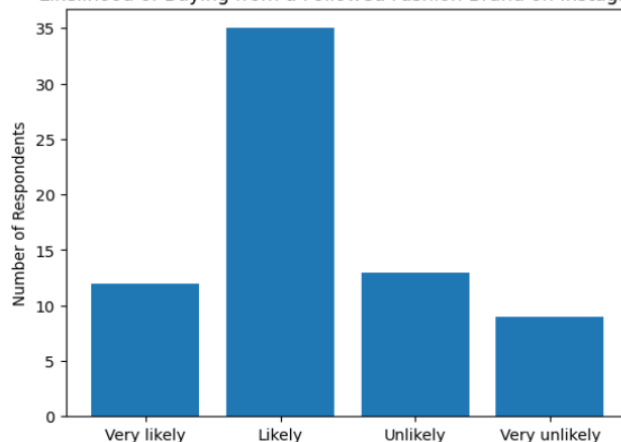
Fig 4.2: Instagram Content Influencing Fashion Choices

In addition, 43% of the respondents have bought fashion products a few times after seeing them on Instagram, which indicates that Instagram has the capability of influencing the buying behavior of the consumers. In addition, the results shown by the study indicate that 35% of the respondents are sometimes attracted to new fashion brands on Instagram, while 26% are always attracted, which indicates that advertising on Instagram is effective. In addition, 51% of the respondents are likely to buy fashion brands that they follow on Instagram, while 17% are very likely, which indicates a positive relationship between following a fashion brand and buying their products. Finally, 36% of the respondents are sometimes encouraged by promotions and offers on Instagram to buy fashion products, while 19% are strongly encouraged, which indicates that promotions on Instagram have the capability of influencing the buying decisions of the consumers to some extent.

Purchase of Fashion Products After Seeing on Instagram



Likelihood of Buying from a Followed Fashion Brand on Instagram

**Fig 4.3: Purchase of Fashion Products After Seeing on Instagram****Fig 4.4: Likelihood of Buying from a Followed Fashion Brand on Instagram**

5. Suggestions and Future Scope

On the basis of the findings from 69 participants in Amravati, it has been revealed that Instagram is an important factor in shaping fashion brand preferences and purchasing decisions. Hence, fashion brands should emphasize effective Instagram marketing strategies, such as influencer marketing, visually appealing content, and engagement tools like reels and stories.

The findings have also revealed that Generation Z is more prone to trends and influencer content, whereas Millennials are more attracted to informative and authentic brand communication. Hence, marketers should design separate strategies for both generations to target their preferences effectively.

However, the limitations of the study were that it was conducted on a small sample size in a single city. Future studies can be conducted on a larger sample size and multiple locations to derive more comprehensive findings. Future studies can also investigate the role of other social media platforms and variables such as trust in fashion brands and customer satisfaction in fashion brand loyalty.

6. Conclusion

The present study examined the influence of Instagram marketing on fashion brand loyalty among Generation Z and Millennials in Amravati city. The findings indicate that Instagram plays an important role in shaping consumer awareness, preferences, and purchase behavior in the fashion industry. A significant number of respondents use Instagram several times a day, which highlights the platform's strong presence in the daily lives of consumers and its potential as an effective marketing tool for fashion brands.

The results also show that many respondents follow fashion brands or influencers on Instagram and often discover new fashion brands through the platform. Among different types of content, reels, stories, and brand advertisements were found to have the greatest influence on

consumers' fashion choices. Influencer marketing also affects consumer purchase decisions, although the level of influence varies among individuals.

Furthermore, the study reveals that a considerable number of respondents have purchased fashion products after seeing them on Instagram, and many are likely to buy from brands they follow on the platform. Instagram promotions and offers also encourage consumers to purchase fashion products to some extent. These findings suggest that Instagram marketing strategies such as engaging visual content, influencer collaborations, and promotional offers can positively influence consumer purchasing behavior and brand loyalty.

Overall, the study concludes that Instagram has become a powerful digital marketing platform for fashion brands, particularly among Generation Z and Millennials. By creating attractive content and maintaining active engagement with consumers, fashion brands can strengthen customer relationships and improve brand loyalty among social media users.

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A Study On Consumer Buying Behaviour Of Generation Z Towards Branded Apparel: An Empirical Study Of Pantaloons Customers In Amravati

Sakshi Kolhe, Gayatri Jaybhaye, Sadiksha Khandokar ,Purva Satao

Student Department of Management Studies,
Prof. Ram Meghe Institute of Technology & Research, Badenra-Amravati

Dr. Pratiksha A. Kalmegh

Guide Assistant Professor Department of Management Studies,
Prof. Ram Meghe Institute of Technology & Research, Badenra-Amravati

Abstract:

The present research study focuses on analyzing the impact of consumer buying behaviour of Generation Z towards branded apparel with special reference to customers of Pantaloons in Amravati. Generation Z represents a young and dynamic group of consumers who are highly influenced by fashion trends, brand image, social media, and peer groups. Understanding their purchasing behaviour is important for retailers and marketers in the apparel industry.

The main objective of this study is to examine the factors that influence Generation Z consumers while purchasing branded clothing, such as brand preference, price, quality, fashion trends, advertisements, and social media influence. The study also aims to understand the level of satisfaction and purchasing patterns of customers visiting Pantaloons in Amravati.

The research is descriptive in nature and is based on both primary and secondary data. Primary data is collected through a structured questionnaire from Generation Z customers, while secondary data is obtained from books, journals, research articles, and online sources related to consumer behaviour and the apparel industry. A sample of 100 respondents is selected using the convenience sampling method.

The collected data is analysed using simple statistical tools such as percentage analysis and graphical representation. The findings of the study help in understanding the buying behaviour and preferences of Generation Z consumers toward branded apparel. The study also provides useful insights for retailers and marketers to develop effective strategies to attract and retain young consumers in the competitive fashion market.

Keywords: Consumer Buying Behaviour, Branded Apparel, Pantaloons, Fashion Trends, Brand Image, Social Media Influence

1. Introduction

The global fashion retail industry is witnessing rapid transformation due to digitalization and changing consumer preferences. Among various consumer segments, **Generation Z** has emerged as a significant and influential group, particularly in the context of branded apparel consumption. This generation is highly connected, technologically advanced, and deeply influenced by online platforms, making them a critical target for modern marketing strategies. Their purchasing decisions are shaped not only by product attributes but also by digital content, peer influence, and brand perception.

1.1 Digital Transformation and Influencer Marketing

In the digital era, social media platforms such as Instagram, YouTube, and Facebook have become integral to consumers' daily lives. These platforms are no longer limited to communication and entertainment but have evolved into powerful marketing channels. A key development in this domain is the emergence of social media influencers, who play a vital role in shaping consumer perceptions and purchase behaviour.

Influencers are perceived as credible and relatable sources of information, especially by Generation Z consumers. Their recommendations often carry more weight than traditional advertisements, leading to increased adoption of influencer marketing by brands. This shift has significantly impacted how consumers discover, evaluate, and purchase branded apparel.

1.2 Consumer Buying Behaviour

Consumer buying behaviour refers to the process through which individuals identify their needs, search for information, evaluate alternatives, and make purchase decisions. It is influenced by multiple factors, including cultural, social, personal, and psychological elements.

In the apparel sector, factors such as quality, price, brand image, style, and promotional offers play a crucial role in shaping consumer preferences. For Generation Z, these factors are further influenced by digital exposure, social validation, and evolving fashion trends. Understanding these behavioural patterns is essential for retailers to design effective marketing strategies.

1.3 Generation Z and Branded Apparel

Generation Z consumers are highly fashion-conscious, brand-aware, and trend-driven. They prefer branded apparel due to perceived benefits such as superior quality, comfort, and style. Additionally, they are significantly influenced by social media content, celebrity endorsements, and peer recommendations.

This generation values individuality and self-expression, often using fashion as a means to reflect their identity. Retail brands offering trendy designs at affordable prices, such as Pantaloons, are particularly appealing to this segment. Their buying decisions are also influenced by promotional strategies, including discounts, seasonal offers, and online engagement.

1.4 Research Gap

While extensive research has been conducted on consumer behaviour and influencer marketing, most studies focus on metropolitan cities. There is limited empirical evidence regarding consumer behaviour in smaller urban centres such as Amravati.

Regional markets present unique socio-economic and cultural characteristics that may influence purchasing behaviour differently. Factors such as income levels, accessibility to branded products, and digital exposure vary significantly, thereby creating a need for localized research. This study addresses this gap by focusing on Generation Z consumers in Amravati City.

1.5 Context of the Study: Pantaloons Customers in Amravati

Pantaloons is one of the leading retail brands in India, offering a wide range of fashionable and affordable apparel. It has gained popularity among young consumers due to its ability to provide a balance between style, comfort, and price.

In Amravati, Generation Z customers of Pantaloons primarily include students and young professionals. Their purchasing behaviour is influenced by factors such as fashion trends, social media exposure, brand image, and promotional offers. Understanding these preferences provides valuable insights into regional consumer dynamics.

1.6 Research Problem

In the evolving digital economy, social media influencers play a crucial role in shaping consumer perceptions and buying behaviour. Generation Z, being highly active on digital platforms, is particularly susceptible to influencer-driven marketing strategies.

However, the extent of this influence in regional urban markets like Amravati remains underexplored. Local socio-economic and cultural factors may moderate the impact of influencer marketing in ways that differ from larger cities. Therefore, this study seeks to examine how social media influencers affect brand awareness, purchase decisions, brand loyalty, and impulse buying behaviour among Generation Z consumers in Amravati.

1.7 Objectives of the Study

1. To study the consumer buying behaviour of Generation Z towards branded apparel.
2. To analyze the influence of social media influencers on Gen Z purchasing decisions.
3. To examine the impact of influencer marketing on brand awareness and brand loyalty among Gen Z.
4. To identify the factors affecting impulse buying behaviour of Gen Z for branded apparel.
5. To evaluate the buying preferences of Pantaloons customers in Amravati city.
6. To provide suggestions for marketers to improve strategies targeting Generation Z consumers.

2. Literature Review:

Liu, Bernardoni & Wang (2023)

This study examined the fashion buying behaviour of Generation Z in online resale markets. The research found that price, value, and environmental awareness influence Gen Z consumers when

buying fashion products. It concluded that Gen Z prefers brands that match their values and fashion trends.

Garg & Gopal (2024)

This study focused on the impact of online reviews on Gen Z consumers in the apparel industry. The findings showed that positive reviews increase trust and encourage buying, while negative reviews reduce purchase intention. It highlighted that digital platforms play an important role in purchase decisions.

Liu et al. (2023)

This research studied the factors affecting Gen Z's intention to buy luxury fashion products. The study found that brand image, product design, and sustainability strongly influence buying behaviour. It also showed that Gen Z prefers brands that reflect their personality and lifestyle.

Helmi, Suherman & Zusnita (2025)

This study analyzed the online shopping behaviour of Millennials and Generation Z. It identified three shopping styles: fashion-oriented buyers, premium product seekers, and impulsive buyers. The research concluded that social media and online platforms influence Gen Z's apparel purchases.

Bhawna & Anupama (2025)

This study focused on sustainable fashion purchasing behaviour. The findings showed that environmental awareness, product quality, and brand transparency influence consumer buying decisions. It also found that Gen Z consumers are more interested in ethical and sustainable fashion products.

Upadhyay et al. (2025)

This research examined the relationship between brand perception and Gen Z buying behaviour. The study found that brand authenticity, transparency, and ethical practices increase customer satisfaction and loyalty among young consumers.

3. Research Methodology

This chapter outlines the research design, approach, data sources, sampling techniques, and methods used for data collection and analysis. The methodology has been structured to systematically investigate the buying behaviour of Generation Z towards branded apparel, with special reference to Pantaloons customers in Amravati.

3.1 Research Design

The present study adopts a **descriptive research design**. Descriptive research is appropriate for this study as it aims to describe and analyze the characteristics, attitudes, and behaviour of Generation Z consumers toward branded apparel.

3.2 Research Approach

The study follows a **quantitative research approach**, which focuses on collecting numerical data and analyzing it using statistical tools.

A structured questionnaire has been used to gather data from respondents. This approach facilitates:

- Measurement of consumer preferences and attitudes
- Statistical analysis of relationships between variables
- Objective interpretation of data

3.3 Sources of Data

The study is based on both **primary and secondary data sources**.

3.3.1 Primary Data

Primary data has been collected directly from respondents to ensure accuracy and relevance. The methods used include:

- Structured questionnaires
 - Personal interaction with respondents
 - Survey of Generation Z customers visiting Pantaloons stores
- This data helps in understanding real-time consumer behaviour and preferences.

3.3.2 Secondary Data

Secondary data has been collected to support and validate the primary findings. Sources include:

- Books and academic journals related to consumer behaviour
- Research articles and previous studies
- Company websites and reports

- Magazines and online resources related to the apparel industry

3.4 Sampling Design

Sampling design plays a crucial role in ensuring that the selected sample represents the population effectively.

3.4.1 Population

The population for the study consists of **Generation Z consumers in Amravati who purchase branded apparel**, particularly customers of Pantaloons.

3.4.2 Sample Size

A sample size of **100 respondents** has been selected for the study. This sample is considered adequate to draw meaningful conclusions regarding consumer behaviour patterns.

3.4.3 Sampling Technique

The study uses a **convenience sampling method**, wherein respondents are selected based on their availability and willingness to participate.

Although this method is time-efficient and practical, it may have certain limitations in terms of generalizability.

3.5 Data Collection Instrument

Data has been collected using a **structured questionnaire** designed to capture relevant information regarding consumer buying behaviour.

3.6 Data Analysis Techniques

The collected data has been organized, tabulated, and analyzed using simple statistical tools.

The techniques used include: Percentage analysis, Frequency distribution, Tabular presentation

3.7 Limitations of the Study

Despite careful planning, the study has certain limitations:

- The sample size is limited to 100 respondents
- Convenience sampling may not fully represent the entire population
- The study is restricted to Amravati city only
- Responses are based on self-reported data, which may involve bias.

4. Data Analysis and Interpretation:

Statement	Results	Frequency of Observation
Purchasing branded apparel	occasionally	56.5%
Brand reputation	Important	39.1%
Quality of product	Very satisfied	60.9%
Pricing of product	Affordable	43.5%
Variety of clothing	Satisfied	43.7%
Social media advertising influence	Agree	47.8%

5. Findings, Conclusion and Suggestions

5.1 Findings

The study reveals that Generation Z consumers demonstrate a strong preference for branded apparel, primarily due to their perception of superior quality, durability, and style associated with such products. It is evident that fashion trends and brand image play a significant role in influencing their buying decisions, indicating that this generation is highly fashion-conscious and brand-aware. The findings further highlight that social media platforms and online advertisements have a substantial impact on the purchasing behavior of Generation Z consumers, making digital marketing a crucial factor in shaping their preferences.

Additionally, most respondents prefer purchasing branded apparel from well-known retail outlets like Pantaloons due to factors such as trust, wide product variety, and availability of the latest fashion

collections. Product quality emerges as one of the most important determinants of purchase decisions, while price sensitivity is also prominent, as many consumers prefer to buy during discounts, seasonal sales, and promotional offers. The study also indicates that comfort and style are key considerations while selecting branded clothing. Although a certain level of brand loyalty exists among Generation Z consumers, many are willing to switch brands if they find better options in terms of design, quality, or price. Furthermore, store-related factors such as ambiance, customer service, and product display significantly influence the overall shopping experience and purchase decisions. Overall, the findings suggest that Generation Z consumers are fashion-conscious, digitally influenced, and highly responsive to modern marketing strategies.

5.2 Conclusion

The present study concludes that Generation Z consumers exhibit a strong inclination toward branded apparel, driven by their awareness of fashion trends and their preference for quality, comfort, and brand image. The research highlights that multiple factors, including product quality, price, brand reputation, and promotional activities, significantly influence their buying behaviour. Among these, fashion trends and brand image play a dominant role in attracting young consumers, reflecting their desire to stay updated with current styles and express their identity through clothing.

The study also establishes that social media and online advertising have a considerable impact on the purchase decisions of Generation Z, emphasizing the growing importance of digital platforms in the modern retail environment. Retail stores such as Pantaloons are particularly popular among Gen Z consumers in Amravati due to their diverse product range, reliable brand image, and satisfactory in-store experience. Moreover, discounts and promotional offers serve as strong motivators for purchase, especially among price-sensitive consumers. In conclusion, Generation Z consumers are highly fashion-oriented, digitally connected, and influenced by contemporary marketing practices, requiring retailers to adopt innovative and adaptive strategies to effectively engage this segment.

5.3 Suggestions

Based on the findings of the study, it is suggested that retailers like Pantaloons should focus on continuously updating their product offerings in line with the latest fashion trends, as Generation Z consumers are highly trend-driven. Strengthening digital marketing strategies is essential, particularly through active engagement on social media platforms such as Instagram and YouTube, along with collaborations with influencers to enhance brand visibility and consumer engagement. Offering attractive discounts, seasonal sales, and loyalty programs can effectively attract price-sensitive customers and encourage repeat purchases.

Maintaining high product quality should remain a priority, as it is a key factor influencing customer satisfaction and brand loyalty. Additionally, enhancing the in-store experience through improved ambiance, better product display, and efficient customer service can positively impact consumer perceptions and purchasing decisions. Introducing affordable product ranges can help cater to students and young consumers with limited income.

Furthermore, building a strong brand image through consistent quality, advertising, and endorsements can strengthen market positioning. Retailers should also implement effective customer feedback systems to better understand consumer needs and improve their offerings accordingly. Expanding product variety in terms of designs, sizes, and styles can attract a wider audience. Finally, integrating online and offline shopping channels to provide a seamless omni-channel experience will enhance convenience and overall customer satisfaction.

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Determinants of Consumer preferences and DinningBehavior in Local Restaurants : An Empirical Investigation in Amravati**Prof. Dr. Pratiksha A. Kalmegh¹, Gayatri P. Sardar ², Vaishnavi S. Salode³,
Samiksha P. Murade ⁴, Shreya S. Murhekar⁵**

Email-vaishnavisalode@gmail.com Phone-+91-9545154440

Department of Management Studies-MBA

Prof. Ram Meghe Institute of Technology & Research, Bandera, Amravati, 444701, India

Abstract:

The restaurant industry in India has experienced rapid growth due to changing lifestyles, urbanization, and increasing disposable income. Consumers today have numerous dining options, and their preferences are influenced by various factors such as food quality, service quality, price, ambience, and location. This study examines the determinants that influence consumer preferences and dining behaviour in local restaurants in Amravati city. The research is based on a descriptive research design with primary data collected from 60 respondents using a structured questionnaire based on a five-point Likert scale. Data were analyzed using frequency and percentage analysis. The findings indicate that food quality, hygiene, service quality, and reasonable pricing are the most important factors affecting consumer restaurant choices. The study provides insights for restaurant owners and managers to improve service strategies and enhance customer satisfaction.

Keywords: Consumer Preferences, Dining Behaviour, Restaurant Industry, Customer Satisfaction, Amravati.

1.Introduction

The food service industry has become an important component of the modern economy. Changing consumer lifestyles, increasing urbanization, and higher disposable incomes have led to a growing demand for dining out experiences. Restaurants today are not only places to eat but also social spaces where individuals gather with friends, family, and colleagues.

Consumer preferences in restaurants are influenced by a variety of factors such as food quality, pricing, ambience, service quality, hygiene, and location. Customers evaluate these factors before choosing a restaurant. Understanding these determinants helps restaurant owners design better services and improve customer satisfaction.

Amravati, a rapidly developing city in Maharashtra, has seen significant growth in the number of local restaurants, cafes, and food outlets. With increasing competition among restaurants, it becomes essential to understand the preferences and dining behaviour of consumers in the city.

This study attempts to analyze the major factors influencing consumer choices while dining at local restaurants in Amravati and to provide useful insights for restaurant management and marketing strategies.

1.1Consumer Preferences in Restaurant Selection

Consumer preference refers to the choices or decisions made by customers based on their tastes, expectations, and experiences. In the restaurant industry, preferences may depend on:

- Taste and quality of food
- Pricing and affordability
- Restaurant ambience
- Hygiene and cleanliness
- Service quality
- Location and accessibility

Customers tend to revisit restaurants that consistently meet or exceed their expectations.

1.2Dining Behaviour of Consumers

Dining behaviour refers to the patterns and habits of consumers when they choose to eat outside their homes. Factors affecting dining behaviour include:

- Frequency of dining out
- Type of cuisine preferred
- Social influence from friends or family

- Promotions and discounts
- Online reviews and ratings

Understanding dining behaviour allows restaurants to design better customer experiences.

1.3 Importance of the Study

The restaurant sector is highly competitive, and customer satisfaction is critical for survival. By studying consumer preferences in Amravati, restaurant owners can:

- Improve service quality
- Develop better marketing strategies
- Enhance customer experience
- Increase customer loyalty

2. Review of Literature

Several studies have examined consumer behaviour in the restaurant industry.

Kotler and Keller (2016) emphasized that customer satisfaction in restaurants largely depends on service quality, food quality, and overall dining experience.

Namkung and Jang (2007) found that food quality is one of the most important determinants influencing customer satisfaction and repeat visits in restaurants.

Ryu and Han (2010) concluded that restaurant ambience, interior design, and atmosphere significantly influence customers' dining satisfaction and behavioural intentions.

Gupta and Singh (2020) studied restaurant consumers in Indian cities and observed that pricing, food variety, and hygiene standards play an important role in attracting customers.

Kumar (2021) found that online reviews and social media recommendations increasingly influence consumer dining decisions.

These studies highlight that multiple factors influence consumer preferences in restaurants, making it necessary to study these determinants in specific regional contexts such as Amravati.

3. Research Methodology

3.1 Research Problem

The restaurant industry in Amravati is growing rapidly, with many new restaurants and food outlets entering the market. However, there is limited research on the factors that influence consumer preferences and dining behaviour in local restaurants in the city. Understanding these determinants is important for improving service quality and customer satisfaction.

3.2 Objectives of the Study

- To identify the factors influencing consumer preferences for local restaurants in Amravati.
- To examine the dining behaviour of consumers in local restaurants.
- To analyze the importance of food quality, service quality, pricing, and ambience in restaurant selection.

3.3 Research Design

This study uses a quantitative descriptive research design to analyze consumer preferences and dining behaviour in local restaurants in Amravati.

3.4 Sample and Sample Size

The sample consists of 60 respondents from Amravati city including students, working professionals, and homemakers who frequently dine at local restaurants.

The study used convenience sampling, where respondents were selected based on accessibility through an online questionnaire.

3.5 Research Instrument

A structured questionnaire was used to collect data from respondents.

Responses were measured using a 5-point Likert Scale

- 1 – Strongly Agree
- 2 – Agree
- 3 – Neutral
- 4 – Disagree
- 5 – Strongly Disagree

3.6 Data Analysis

The collected data were analyzed using:

- Frequency distribution
- Percentage analysis

These statistical tools help interpret consumer responses and identify key factors affecting restaurant preferences.

4.Data Analysis and Interpretation

S. No	Variable	Category	Frequency (N=60)	Percentage (%)
1	Age Group	18–25 Years	40	66.67
		26–35 Years	12	20
		36+ Years	8	13.33
2	Gender	Female	34	56.67
		Male	26	43.33
3	Dining Frequency	Occasionally	32	53.33
		Frequently	28	46.67
4	Important factor	Food Quality	27	45
		Price	14	23.33
		Service Quality	11	18.33
		Ambience	8	13.33
5	Hygiene Important	Strongly Agree	30	50
		Agree	20	33.33
		Neutral	10	16.67
6	Reason for Visiting Restaurant	Social Gathering	25	41.67
		Convenience	20	33.33
		Variety of food	15	25

5. Findings

- ✓ Most respondents belong to the 18–25 age group, indicating that young consumers frequently dine out.
- ✓ Food quality (45%) is the most important factor influencing restaurant selection.
- ✓ Hygiene and cleanliness were rated highly important by most respondents.
- ✓ Many consumers visit restaurants mainly for social gatherings and convenience.
- ✓ Service quality and restaurant ambience also play a significant role in consumer satisfaction.
- ✓ Reasonable pricing is an important factor that encourages repeat visits.

6. Suggestions

- ✓ Restaurants should focus on maintaining high food quality and hygiene standards.
- ✓ improving customer service and staff behaviour can enhance customer satisfaction.
- ✓ Restaurants should maintain a pleasant ambience and comfortable environment.
- ✓ Provide reasonable pricing and attractive offers can attract more customers.
- ✓ Restaurant owners should pay attention to customer feedback and online reviews to improve services.
- ✓ Introducing variety in menu options can increase customer interest and loyalty.

7. Conclusion

This study examined the determinants of consumer preferences and dining behaviour in local restaurants in Amravati city. The results indicate that food quality, hygiene, service quality, and pricing are the most important factors influencing consumer decisions.

The research also found that young consumers form the largest group of restaurant customers in Amravati. Restaurants that focus on maintaining quality food, clean environments, and good customer service are more likely to achieve higher customer satisfaction and loyalty.

Understanding consumer preferences is essential for restaurant owners to remain competitive in the growing food service industry. By adopting customer-focused strategies, restaurants can enhance their market position and attract more customers.

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A study of customer satisfaction towards the Rail- Connect App with special reference to frequent IRCTC users in Amravati city

**Dr. Gauri. S. Kalmegh, Jay. V.Dhad¹, Prachi R. Yadav ²,
Dhanashri M. Fale ³,Prasad P. Yelne⁴**

Department of Master of Business Administration, Prof. Ram Meghe Institute of Technology
& Research, Badnera, Maharashtra, India

Abstract:

The rapid growth of digital technology has transformed the way customers access transportation services. The IRCTC Rail Connect app, developed by Indian Railway Catering and Tourism Corporation, allows passengers to conveniently book railway tickets, check train schedules, verify PNR status, and manage travel plans through their mobile devices. With the increasing use of smartphones, mobile ticket booking applications have become an essential tool for frequent railway travellers. The present study aims to analyse the level of customer satisfaction towards the IRCTC Rail Connect App with special reference to frequent IRCTC users in Amravati. The study focuses on understanding users' experiences with the application, including ease of use, reliability, speed of booking, security of transactions, and overall service quality. For this research, primary data were collected through a structured questionnaire from frequent IRCTC users in Amravati city. Secondary data were gathered from journals, websites, and related literature. The study uses descriptive research design and basic statistical tools such as percentage analysis to interpret the data. The findings indicate that most users prefer the Rail Connect App due to its convenience, time-saving features, and accessibility. However, some respondents reported issues such as slow server response during peak hours, payment failures, and occasional technical glitches. These factors influence the overall satisfaction level of users. The study concludes that while the IRCTC Rail Connect App significantly improves the ticket booking experience for railway passengers, continuous improvements in system performance, user interface, and customer support are necessary to enhance customer satisfaction and service efficiency.

Keywords:IRCTC Rail Connect App, Customer Satisfaction, Online Railway Ticket Booking, Mobile Application Usage, User Experience.

Introduction

The use of digital technology has changed the way people book railway tickets and access travel services. In India, the Indian Railway Catering and Tourism Corporation (IRCTC) plays an important role in providing online railway services to passengers. IRCTC is a subsidiary of Indian Railways that manages online ticket booking, catering, and tourism services. To make ticket booking easier and more convenient, IRCTC launched the IRCTC Rail Connect mobile application, which allows passengers to book tickets, check train schedules, view PNR status, and cancel tickets using their smartphones. This digital service has reduced the need to stand in long queues at railway reservation counters and has improved travel convenience (IRCTC, 2023).

Background of the Study

With the rapid growth of smartphones and internet services, the use of mobile applications for travel and ticket booking has increased significantly. The IRCTC Rail Connect app provides many facilities that help passengers easily access railway services and manage their travel plans. Many travellers prefer using the mobile application because it saves time and provides real-time train information and booking services (Kumar, 2019).

Customer Satisfaction

Customer satisfaction is an important factor in determining the success of any digital service or application. When users find an application easy to use, reliable, and efficient, they are more likely to continue using it and recommend it to others. According to Philip Kotler, customer satisfaction is the feeling of pleasure or disappointment that arises after comparing the actual performance of a service with customer expectations (Kotler, 2017).

Need for the Study

Although the Rail Connect app offers many useful features and services, users may sometimes face problems such as slow performance, payment failures, or technical errors during peak booking times. Therefore, it is necessary to study the satisfaction level of users and understand their experience while using the application. This study focuses on frequent users of the Rail Connect app in Amravati city to analyse their satisfaction level and identify possible areas for improvement

Research Objective

- 1.To understand the level of customer satisfaction with IRCTC online ticket booking services in Amravati city.
- 2.To identify the problems faced by customers while using IRCTC Rail-Connect App such as ticket booking, payment and cancellation, refund.
- 3.To provide suggestions in terms of efficient facilitation of IRCTC Rail-Connect.

Literature Review

Indian Railway Catering and Tourism Corporation (2019) The study highlighted that online ticket booking systems improve convenience for passengers. The IRCTC Rail Connect app allows users to book train tickets, check PNR status, and access train schedules easily. The research found that customers prefer mobile apps because they save time and reduce the need to visit railway counters.

Venkatesh Venkatesh et al. (2016) Their research on technology adoption showed that ease of use, usefulness, and system quality play an important role in user satisfaction with mobile applications. When an app is simple and fast, customers are more likely to continue using it.

Philip Kotler (2017) According to Kotler, customer satisfaction is achieved when the performance of a product or service meets or exceeds customer expectations. In digital services like railway booking apps, factors such as reliability, security, and speed influence satisfaction.

Ministry of Railways (2020) Reports indicate that digital platforms like the IRCTC Rail Connect app have increased accessibility to railway services. However, users sometimes face issues like server errors during peak booking times, which can affect satisfaction levels.

Recent studies on mobile service quality (2022–2023) Recent research shows that mobile app design, quick payment options, and real-time information significantly improve the experience of frequent users. When the system is reliable and user-friendly, customer loyalty increases.

Research Methodology

➤ Research Design

The present study adopts a descriptive research design to analyse the level of customer satisfaction among users of the IRCTC Rail Connect app developed by Indian Railway Catering and Tourism Corporation. The descriptive approach helps in understanding user opinions, experiences, and satisfaction levels regarding the app's services.

➤ Area of Study

The study is conducted in Amravati, focusing on frequent users of the IRCTC Rail Connect App who regularly book train tickets using the application.

➤ Sources of Data

Primary data were collected directly from respondents through a structured questionnaire distributed among frequent IRCTC users in Amravati city. Secondary data were collected from various sources such as:

- Books and journals
- Research articles
- Official websites related to railway services
- Online reports and publications about the IRCTC Rail Connect App

➤ Tools and Techniques for Data Analysis

The collected data were analysed using simple statistical tools such as:

- Frequency distribution
- Percentage analysis
- Charts and graphs (pie charts and bar graphs)

➤ Sample Size

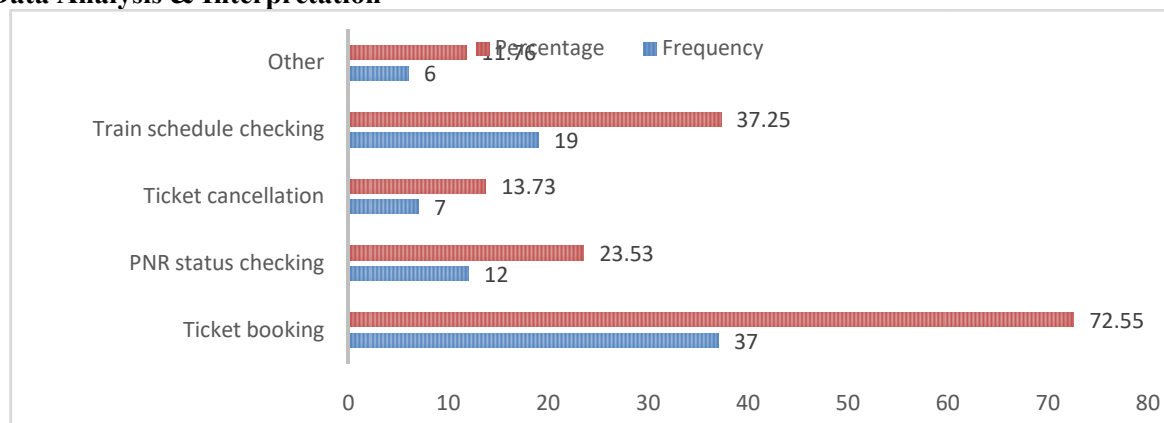
A total of **51 respondents** (frequent users of the IRCTC Rail Connect App in Amravati city) were selected for the study.

➤ Research Instrument

A structured questionnaire was used as the main research instrument. The questionnaire included questions related to:

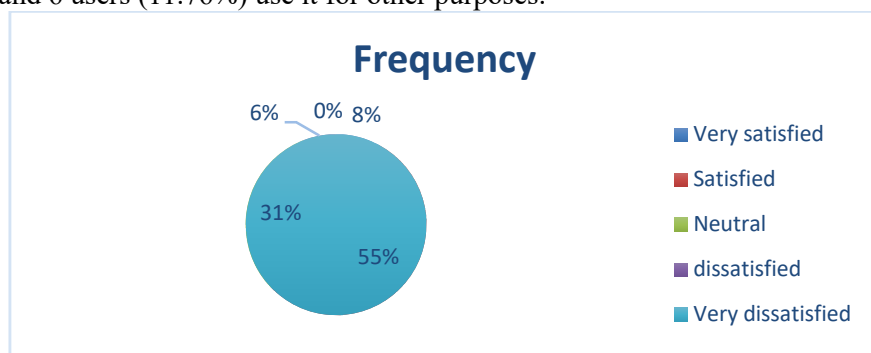
- Frequency of app usage
- Purpose of using the app
- Problems faced while using the app
- Level of satisfaction with the app services

Data Analysis & Interpretation



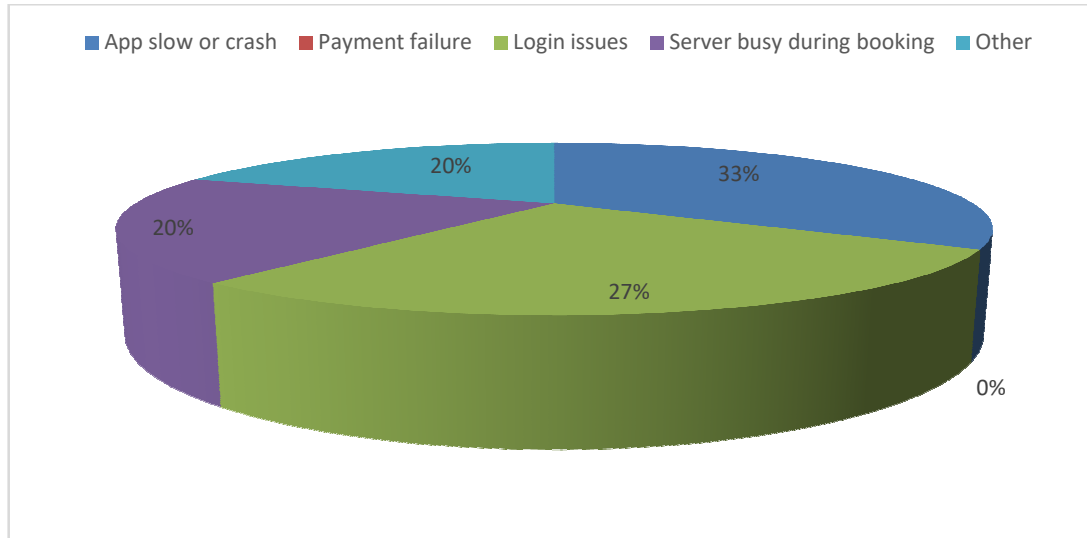
Graph : Purpose for which the users mostly use Rail connect App

The bar chart shows the main purposes for which users use the IRCTC Rail Connect app. The majority of respondents (37 users / 72.54%) use the app for ticket booking, making it the most common purpose. About 19 users (37.25%) use the app for checking train schedules, while 12 users (23.53%) use it for PNR status checking. A smaller number of users 7 (13.73%) use it for ticket cancellation, and 6 users (11.76%) use it for other purposes.



Graph: Satisfaction of the users about speed and performance of the app

The pie chart shows the satisfaction level of users with the IRCTC Rail Connect app. The majority of respondents (55%) are satisfied with the app. About 31% of users feel neutral, while 8% are very satisfied. A small percentage (6%) are dissatisfied, and no respondents are very dissatisfied (0%).



Graph: Type of problem the users face most often on rail connect

The chart shows the problems faced by users of the IRCTC Rail Connect app. The most common issue is app slow or crash (33%), followed by login issues (27%). About 20% of users experience server busy problems during booking, while 20% reported other issues. No users reported payment failure (0%)..

Findings:

The study on the IRCTC Rail Connect App shows that most users are satisfied with the app due to its convenience and time-saving features. The majority of respondents use the app mainly for ticket booking, making it the primary purpose of usage. Users also appreciate its accessibility and real-time information services. However, several issues were identified, such as slow app performance, frequent crashes, login problems, and server busy errors during peak booking times. These technical difficulties negatively affect the overall user experience and satisfaction level.

Conclusion

The study “A Study of Customer Satisfaction towards the Rail Connect App with Special Reference to Frequent IRCTC Users in Amravati City” examines the level of satisfaction among passengers who use the IRCTC Rail Connect application for railway services. The rapid growth of digital technology and smartphone usage has made online ticket booking more convenient for railway passengers. The Rail Connect App allows users to book train tickets, check train schedules, verify PNR status, and manage their travel plans easily through their mobile devices.

Suggestions:

To improve user satisfaction, it is suggested that IRCTC should enhance server capacity to handle high traffic during peak hours and reduce app crashes. The app’s performance and speed should be improved through regular updates and technical optimization. Simplifying the login process and strengthening security features can further enhance usability. Additionally, improving customer support services and providing quick solutions to user problems will increase trust and satisfaction. Continuous monitoring and fixing of technical glitches will help make the app more reliable and user-friendly.

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A Study of Residents' Perception of Solar Energy with Reference to Amravati City

**Prof. Dr. Gauri S. Kalmegh¹, Ms. Madhavi Take², Ms. Shreya Nahar³,
Ms. Rasika Fukte⁴ and Mr. Ujjwal Bhurke⁵**

Research Guide and Students Email: naharshreya1@gmail.com Phone: 8261981848 Department of Management Studies, Prof. Ram Meghe Institute of Technology & Research, Badnera, Amravati

❖ Abstract

Solar energy has been found to be one of the most important forms of energy in relation to the use of renewable energy in relation to sustainable development and environmental protection. With an increase in demand for electricity and awareness of climate change, it is very important that urban cities should use solar energy. The main aim of this study is to evaluate the perception of people in relation to solar energy in reference to Amravati City. It is very important that this study should evaluate and understand the awareness of people in relation to adopting solar energy for their use.

The study has been made on primary data collection in relation to the people of Amravati City using a structured questionnaire. It has been found that although people are aware of solar energy in relation to environmental protection, certain factors are acting as a hindrance to adopting solar energy due to high installation costs, lack of knowledge, and government complexities.

It is also evident from the study that the importance of increasing the awareness of the public regarding the usage of solar energy, providing incentives to the people by the government, and simplifying the installation of solar energy are significant for the usage of solar energy.

Promotion of the usage of solar energy can lead to the decrease of conventional energy resources. It can also lead to the promotion of the development of the city in a sustainable manner. The results of the research can be significant for the policymakers to frame strategies for promoting the usage of solar energy in Amravati City.

Keywords:

Solar energy, Resident's perception, Amravati City, Awareness, Cost effectiveness, Adoption of solar energy

❖ Introduction

Solar energy has been identified as one of the most significant renewable energy resources in the world due to the increasing demand for renewable and eco-friendly energy resources. Generally, the traditional energy resources such as coal, petroleum, and gas are being depleted at a faster rate, causing pollution and climatic changes in the environment. In such a situation, the focus of the government and various nations in the world has been shifted towards renewable energy resources, among which solar energy has been playing a significant role in terms of its availability, eco-friendliness, and sustainability. In addition, solar energy can be utilized for various purposes such as generating electricity, heating, lighting, and operating various home appliances, etc., making it one of the most significant alternatives to the traditional energy resources (International Energy Agency, 2023).

The Government of India has initiated various programs for the adoption of solar energy as an alternate source of energy rather than fossil fuels for the development of the country in a sustainable manner. India receives ample sunlight throughout the year, thus offering a vast opportunity for the generation of energy through solar energy. In addition, the decline in the cost of solar technology and the rise in awareness among people regarding the conservation of the environment are factors that contributed to the increasing interest in the adoption of solar energy among the people of India (Ministry of New and Renewable Energy, 2022). The people of India in urban areas are gradually shifting towards the adoption of alternate forms of energy. In addition, the adoption of solar energy in residential areas in the form of rooftop solar systems has been implemented in India. However, the level of awareness, acceptability, and willingness among people in urban areas of India to adopt solar energy as an alternate source of energy varies. These factors include cost, awareness, incentives

provided by the government, and environmental concerns. It is essential to understand the perception of people in urban areas of India towards the adoption of solar

Evolution of Solar Energy

The evolution of solar energy can be traced back to early human history, where people used the energy of the sun for simple activities such as drying foods and heating water. The 19th century marked a significant time for scientists, as they were able to harness the photovoltaic effect, which served as the basis for using the sun's energy for generating electricity. The 20th century marked a significant time for the evolution of solar energy, as there was the development of solar panels, mainly for use in space. The modern world's evolution of solar energy can be traced to technology, cost, and environmental issues. The modern world can trace the evolution of solar energy as one of the most rapidly developing forms of renewable energy.

Benefits of Solar Energy

There are various benefits associated with solar energy, especially in providing clean and renewable energy. Solar energy reduces the cost of electrical bills since it is free. Solar energy reduces our dependency on conventional energy resources such as coal and electric power. Solar energy is a clean source of energy since it reduces carbon emissions and pollution, thereby creating a clean environment. Solar energy is cost-effective since it requires low maintenance and is long-lasting. In addition, solar energy provides independence from electric power, meaning that one can use it in areas where there is no power.

Importance of solar energy

Solar energy is an important source of renewable energy obtained from the sun and utilized continuously without exhausting it. Solar energy is an environmentally friendly source of energy since it does not produce any harmful gases or pollution, thereby controlling global warming and maintaining a clean environment. Solar energy is useful in cutting down the cost of electricity bills for homes and organizations since the sun provides free energy. Solar energy is useful in making a country self-sufficient in energy since it does not rely on fossil fuels such as coal and petroleum for production. Solar power requires little maintenance and can function for a long period without any problems after installation. Solar energy is greatly beneficial for use in rural areas since conventional power supply is not available in these areas. Thus, the use of solar energy is useful in promoting sustainable development and providing a clean and green environment.

❖ Objectives of the Study

1. To identify the important factors which affect the adoption of solar energy systems.
2. To know the perception of the residents regarding the cost-effectiveness and environmental benefits of solar energy.
3. To analyse the impact of the government schemes and subsidies on the adoption decision of the residents.
4. To evaluate the willingness of the residents for the adoption of solar energy systems in the future.

❖ Review of Literature

Varun Rai and David A. Beck (2015) conducted a research on public perceptions and information needs for solar energy adoption. The research concluded that awareness and knowledge about solar technology are essential for the decision to adopt solar energy. The researchers observed that public interest in solar energy is high, but they do not have information about the cost of installation and government incentives. They recommended public awareness and providing incentives to encourage the public to adopt solar energy technologies.

Subhes C. Bhattacharyya (2019) focused on the importance of renewable energy for sustainable economic development. The research concluded that solar energy is one of the most reliable and environment-friendly forms of energy available in the world. According to the research, government policies, technological advancements, and public perception are essential for the development of solar energy. The research concluded that developing countries like India have a great opportunity to develop solar energy usage due to their climatic conditions.

Jyoti P. Painuly (2001) studied the barriers to the diffusion of renewable energy technologies. In the study, various barriers like the cost of installation, lack of financial support, lack of awareness, and institutional barriers were identified. It was also found that policy support, financial support, and

awareness are the key areas to be focused upon to overcome the barriers for the public to adopt renewable energy.

❖ **Research Methodology**

3.1 Research Design

Research design can be defined as a plan that a researcher follows to conduct a study. It acts as a framework that enables a researcher to collect data in order to achieve the purpose of the study. In this study, it can be noted that it is a descriptive study because it aims to describe the perceptions, awareness, and opinions of residents regarding solar energy. Descriptive studies are considered to be beneficial in understanding the nature of respondents towards a specific issue.

3.2 Sources of Data

In this study, both primary and secondary data are used.

Primary data can be defined as data that a researcher collects directly to conduct a study. In this study, primary data are collected through a structured questionnaire from residents in Amravati City. Secondary data can be defined as data that has already been collected by someone else. In this study, secondary data are collected through books, journals, government publications, and publications from various organizations like the International Energy Agency and the Ministry of New and Renewable Energy in India.

3.3 Sampling Method

Sampling is defined as “selecting a sample, i.e., a subset of individuals from a large population for research purposes.” For this research, the convenience sampling method is used to gather information from residents of Amravati City.

3.4 Sample Size

The sample size for the research includes 64 residents of Amravati City. The residents of the city are selected from different regions of the city to obtain diverse opinions on solar energy awareness and usage.

3.5 Data Collection Method

For this research, primary research is conducted using a structured questionnaire. The questionnaire includes multiple-choice questions and statements on a Likert scale to determine the perception and awareness level of respondents regarding solar energy. The questionnaires are directly administered to residents, and responses are collected for analysis.

3.6 Tools for Data Analysis

After collecting the data, it is analysed using simple statistical tools such as:

- Percentage Analysis
- Tabulation
- Graphs and Charts

These tools help in presenting the data in a simple and understandable manner and also help the researcher in interpreting the findings effectively.

3.7 Scope of the Study

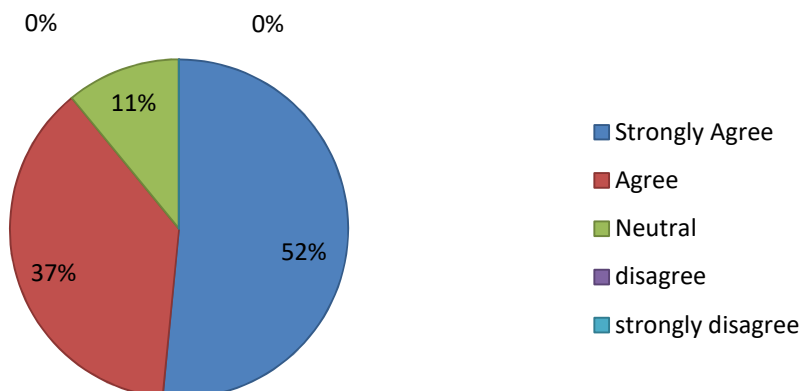
The scope of the study is to understand the perception of residents towards solar energy in Amravati City.

3.8 Limitations of the Study

1. The study is confined only to the residents of Amravati City.
2. The sample size of the study is only 64.
3. The study is based on the responses received from the respondents, which may not always be accurate due to personal bias.
4. The study may also be confined by time and resources.

❖ **Data Analysis and Interpretation**

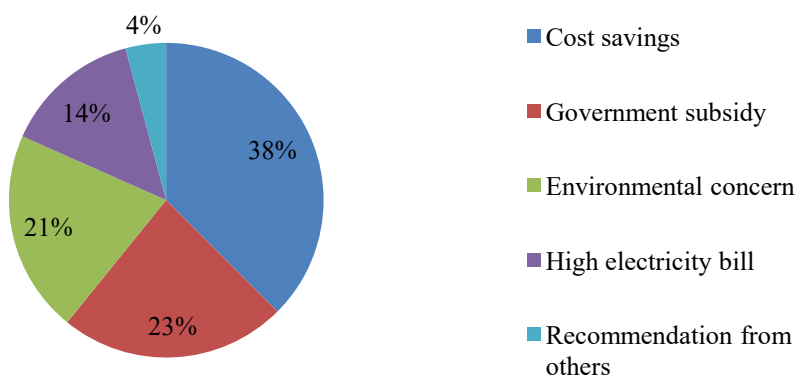
1. Solar energy is Useful



Graph No: 4.1
Interpretation

From the table, it can be seen that a majority of respondents think that solar energy is useful. Out of all respondents, 52.17% strongly agree with the statement that solar energy is useful. In addition to that, 39.13% of respondents agree with the given statement. On the other hand, only 8.70% of respondents are neutral to the given statement. However, none of the respondents have shown negative perceptions towards solar energy.

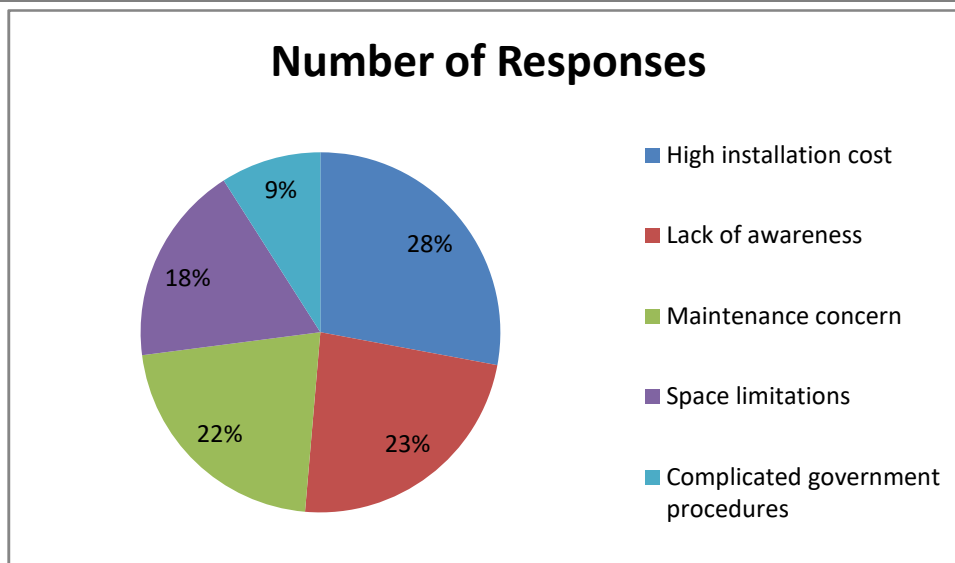
2. Influence your decision to install solar panels



Graph No: 4.2
Interpretation

The above table indicates that the factor which has the greatest influence on the residents' decision to install solar panels is cost savings (62.5%). This is followed by government subsidies (39.1%) and environmental concerns (35.9%). In addition, high electricity bills (26.6%) may influence some residents' decisions, while the influence of others (7.8%) is relatively low. This shows that economic benefits play an important role in encouraging the adoption of solar energy.

3. There are several challenges that prevent people from adopting solar energy

**Graph No: 4.3****Interpretation**

From the above table, it is clearly shown that the cost of installation (48.4%) is the main challenge for the public to adopt solar energy. Then comes the lack of awareness (39.1%), followed by the issue of maintenance (34.4%). In addition to the above three challenges, the public also faces the challenge of space (28.1%), whereas the complicated government processes (15.6%) are the challenge for the public only to a certain extent.

❖ Findings, Suggestions and Conclusion**Findings**

After conducting a detailed analysis of the responses collected from 64 residents of Amravati, it has been observed that the following are the major findings:

1. Majority of people are aware of solar energy and its benefits.
2. A large number of people are in agreement that solar energy is beneficial to them as well as to the environment.
3. Cost savings are considered to be the major factor that attracts people to use solar panels.
4. Government subsidies and environmental protection are also major factors that attract people towards using solar energy.
5. The major issue that people face in adopting solar energy is that it is costly to install a solar system.
6. Other issues that people face are a lack of awareness, maintenance difficulties, space constraints, and complexities in government policies.
7. A large number of people are of the opinion that they can be motivated to use solar energy if they are offered incentives as well as awareness.

Suggestions

Based on the findings of the study, the following suggestions have been recommended for promoting solar energy usage:

1. The government should provide more subsidies for solar energy usage.
2. Awareness programs should be conducted for people regarding the benefits of using solar energy.
3. Easy loan facilities should be available for people willing to use solar energy.
4. The installation process and government procedures should be easy.
5. Technical guidance should be available for solar energy users.
6. Programs should be implemented for promoting awareness regarding the importance of using solar energy for saving the environment.

Conclusion

Solar energy is one of the most important forms of renewable energy, and using solar energy will help people reduce dependence on conventional forms of energy. The findings of the study indicate that people of Amravati have a positive perception regarding solar energy usage. The

residents have identified the benefits of using solar energy, such as saving money and saving the environment.

Although there are some barriers for using solar energy, by following the suggestions, people can adopt solar energy usage. Promoting solar energy usage at the residential level will help people promote sustainable development and create a clean environment.

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A competitive Impact of “Raghuveer sweets” on small retail sweets shops in Amravati city

**Prof.Dr. G.S. Kalmegh¹, Priti Bhonde², Aniket Sarangpure³,
Anjali Karale⁴, Nainika Kolhe⁵**

Research Guide, Students^{2,3,4,5} Email - aniketsarangpure0780@gmail.com

Phone -+91-8080454829 Department of Management Studies, Prof. Ram Meghe Institute of Technology & Research, Badnera, Maharashtra, India, 444701

❖ Abstract

This research investigates the socio-economic impact of Raghuveer Sweets, a dominant organized retailer in Amravati, on traditional small-scale sweet shops. Since its establishment in 1965, Raghuveer Sweets has expanded significantly, now operating multiple high-traffic outlets in key areas like Rajapeth, Shyam Chowk, and Gadge Nagar, farshis stop. The study employs a mixed-methods approach, utilizing consumer surveys and comparative business analysis. Key findings indicate that Raghuveer Sweets leverages economies of scale, superior hygiene standards, and a diverse product range—including authentic Bengali mithai, snacks, and bakery items—to capture a significant market share. Consumer data suggests a growing preference for organized retailers due to perceived freshness, standardized quality, and the convenience of "one-stop" shopping. Conversely, small retail shops face mounting pressure due to limited capital for infrastructure upgrades and marketing. The research highlights that while traditional shops retain some loyal customers through personal relationships and lower price points, they are increasingly marginalized by the "upscale" and "trendy" appeal of larger chains. The paper concludes by suggesting modernization strategies for small retailers, such as adopting digital payment systems, enhancing hygiene protocols, and focusing on niche, localized offerings to remain competitive in a rapidly evolving market.

Keywords: Organized Retail, Raghuveer Sweets, Small Business Competition, Consumer Behaviour, Traditional Markets, etc.

❖ Introduction

Raghuveer Sweets

Raghuveer Sweets, a prominent confectionery and snack brand based in Amravati, Maharashtra, represents a successful transformation of a traditional small-scale enterprise into a well-established regional business. Founded in 1970 by Mangalji Bhai Popat, the business began as a modest tea stall known as Raghuveer Yaadgar Chai, which gradually gained popularity due to its quality and strong customer relationships (Raghuvir Sweets, n.d.; Business Standard, 2024). Over time, the enterprise expanded strategically to meet changing consumer preferences, marking its entry into the restaurant segment in 1993 with Raghuveer Refreshments, followed by its significant move into the sweets market in 1995 under the name Raghuveer Mithaiyan (Business Standard, 2024). The business continued its diversification by introducing namkeen products in 2000, bakery items in 2011, and food service innovations such as the Food Zone in 2020, reflecting its adaptability and growth-oriented approach (Business Standard, 2024; LinkedIn, n.d.). At present, Raghuveer Sweets offers a wide and diversified product line, including traditional Indian sweets such as kaju-based and milk-based delicacies, namkeen items like sev and mixtures, ready-to-eat snacks such as samosas and kachoris, and bakery products including cakes and pastries, along with customized gifting options for festive occasions (Raghuvir Sweets, n.d.). This diverse product portfolio enables the brand to cater to both everyday consumption and special celebrations, thereby strengthening its market presence. In terms of geographical expansion, Raghuveer Sweets has established multiple branches across key locations in Amravati, including Rajapeth, Shyam Chowk, Dashera Maidan, and Gadge Nagar, and has further expanded its operations to regions such as Sangli and Miraj, indicating steady regional growth (Raghuvir Sweets, n.d.). Overall, Raghuveer Sweets exemplifies a blend of tradition and modernization, where consistent quality, product diversification, and customer-centric strategies have contributed significantly to its sustained success and competitive positioning in the local confectionery industry.

Local retail sweet shops in Amravati

Local retail sweet shops in Amravati form an integral part of the city's traditional food retail sector, contributing significantly to both the local economy and cultural practices. These shops are typically small-scale, family-owned businesses that have been operating for many years, often passed down through generations. They rely heavily on traditional methods of preparation, offering a variety of Indian sweets such as laddoos, barfis, pedas, and jalebis, which are closely associated with festivals, celebrations, and daily consumption (Kumar & Sharma, 2019).

Most local sweet shop owners operate with limited financial and technological resources, which restricts their ability to expand or modernize their operations. Production is largely manual, and business activities such as sales, inventory, and customer management are handled without advanced systems (Gupta, 2020). In addition to sweets, many shops also provide basic namkeen items and freshly prepared snacks like samosas and kachoris to cater to regular customer demand (Shinde, 2021).

These shops are strategically located in residential areas and busy marketplaces across Amravati, enabling them to maintain close relationships with customers and build strong loyalty based on trust, taste, and affordability (Joshi, 2020). Personalized service, credit facilities for regular customers, and flexible pricing are some of the key features that distinguish them from organized retail chains.

However, with the emergence of branded competitors such as Raghuvveer Sweets, local sweet shops are facing increasing competition. Customers today are more inclined towards better packaging, hygiene, and variety, which puts pressure on small retailers to upgrade their offerings (Deshmukh, 2022). Despite these challenges, local retail sweet shops continue to play a vital role in preserving traditional taste and maintaining the cultural identity of the region while adapting gradually to changing consumer preferences (Kale, 2021).

❖ Review of Literature

The retail food and sweets industry in India has undergone significant transformation over the last two decades. Traditionally, small sweet shops have dominated local markets, offering regional and culturally significant products while relying on personal relationships with customers (Gupta, 2020). These shops often prioritize taste, authenticity, and customer loyalty over marketing or branding, allowing them to sustain a stable customer base despite limited resources (Kumar & Sharma, 2019). However, the entry of branded sweet shops like *Raghuvveer Sweets* has altered market dynamics. Branded outlets are characterized by modern infrastructure, professional marketing strategies, hygienic packaging, product diversification, and innovative offerings (Patil & Deshmukh, 2021). Studies indicate that such organized retail stores tend to attract consumers seeking quality assurance, variety, and a modern shopping experience, leading to a shift in consumer preferences from traditional shops to branded outlets (Sharma & Verma, 2018).

Several researchers have highlighted the challenges faced by small retailers when organized retail enters their market. Joshi (2020) points out that small shops often experience a decline in sales and profitability due to competition from larger, resourceful brands. Similarly, Singh and Agarwal (2017) observed that customers increasingly perceive branded shops as more reliable and attractive, which reduces footfall for local traditional sweet shops.

Some studies also emphasize that the impact of organized retail is not entirely negative. For instance, exposure to branded competitors can motivate small shop owners to improve quality, adopt better hygiene standards, and diversify their products to remain competitive (Verma & Rathi, 2019). The adoption of technology, such as digital payments and social media marketing, has also been suggested as a tool to counterbalance the advantages of branded shops (Choudhary, 2018).

In the context of Amravati, there is limited research on the specific effects of Raghuvveer Sweets on small sweet shops. Understanding these local market dynamics is important, as the competitive impact may vary depending on shop location, product offerings, and customer demographics. This literature review highlights a research gap: while studies exist on organized retail vs. traditional vendors in general, very few focus on branded sweet shops in tier-2 cities like Amravati, making this study significant for policymakers, entrepreneurs, and small business associations.

❖ Research Methodology**Research Problem**

The sweet shop industry in Amravati is largely composed of small, traditional retail sweet shops that rely on local customer loyalty for their survival. The entry of Raghuveer Sweets, a branded and organized sweet shop, has created new competition for these small shops. This has potentially affected sales, profitability, and customer retention for local retailers. Small shop owners face challenges such as maintaining footfall, competing with brand reputation, hygiene standards, and diversified product offerings. The research problem focuses on understanding how Raghuveer Sweets impacts the operations and perceptions of small retail sweet shops in Amravati.

❖ Objectives of the Study

The study is designed with the following objectives:

1. To study the overall perception of small retail sweet shop owners regarding Raghuveer Sweets in Amravati city.
2. To analyze the impact of Raghuveer Sweets on the sales and profitability of small sweet shops.
3. To identify the challenges faced by small sweet shop owners due to the presence of Raghuveer Sweets, including competition, packaging, hygiene, and product variety.

These objectives provide a clear focus for both data collection and analysis.

❖ Research Methods

The study adopts a descriptive research method, suitable for capturing current trends, perceptions, and experiences of small retail sweet shop owners. Descriptive research enables the investigation of the impact of Raghuveer Sweets without manipulating any variables, making it ideal for examining real-world conditions and responses. Data was collected directly from the respondents without conducting interviews, ensuring objective and quantifiable results.

❖ Sampling Design

Sampling Technique: Convenience sampling was used to select respondents based on their availability and willingness to participate. This non-probability method is suitable for exploratory research in local settings where the target population is dispersed and difficult to enumerate fully. Convenience sampling allows efficient collection of data while still capturing a representative sample of small retail sweet shop owners across Amravati city.

❖ Universe of the Study

The universe includes all small retail sweet shop owners in Amravati city, Maharashtra, who run independent shops selling traditional Indian sweets. These shops vary in size, years of operation, and type of products offered but share common challenges when competing with larger, branded outlets. The study focuses exclusively on retail shop owners; customer perceptions are not included.

❖ Sample Size

A total of 20 small retail sweet shop owners participated in the study. The sample includes well-known local shops such as Mahavir Sweets, Ramji Sweet Mart, Haldiram, Bholaji Sweet Mart, and others, covering multiple areas of Amravati. While small, the sample provides sufficient insight into patterns, perceptions, and business impact relevant to the study objectives.

❖ Source and Type of Data

Primary data was collected through a structured questionnaire shared via Google Forms. Responses came directly from small retail sweet shop owners, providing first-hand information about sales impact, perceptions, and operational challenges. Reviewed literature on retail competition, organized vs. traditional retail in India, and studies on small business challenges in tier-2 cities. Sources included academic journals, government reports, and business research articles relevant to the sweets and retail sector.

❖ Data Analysis and Interpretation

The analysis of responses from 20 small retail sweet shop owners in Amravati reveals several insights about the impact of Raghuveer Sweets on traditional shops. Regarding competition, 35% of owners agreed or strongly agreed that Raghuveer Sweets has increased competition, while a majority of 65% remained neutral, indicating that some shop owners are uncertain about the intensity of competition. When asked about customer preference, 55% of respondents agreed that customers in Amravati tend to prefer branded sweet shops over small local shops, suggesting a noticeable shift in consumer behavior toward organized retail.

In terms of sales impact, nearly half of the respondents (45%) disagreed that their sales had decreased, while 40% were neutral, and only 10% agreed, showing that although some shops experienced a drop in sales, the majority did not perceive a significant decline. However, regarding profitability, 50% of owners agreed or strongly agreed that the presence of Raghuvеer Sweets has reduced their profits, while 35% remained neutral. This indicates a moderate financial impact, even if actual sales volumes did not drastically change.

When assessing operational challenges, 40% of owners agreed or strongly agreed that competing with a large branded store is difficult, and 50% were neutral. Packaging and product variety emerged as significant competitive factors. Half of the respondents felt that Raghuvеer Sweets offers better packaging, and similarly, 50% perceived that the product variety of Raghuvеer Sweets is greater than that of small shops. Additionally, hygiene and cleanliness were noted as factors attracting customers to branded stores, with 40% of respondents agreeing or strongly agreeing, and 30% remaining neutral. Overall, the data indicates that while the presence of Raghuvеer Sweets has created moderate pressure on small sweet shops in terms of profitability, packaging, and product variety, the impact on sales is mixed, and many shop owners remain neutral regarding the intensity of competition. These findings suggest that small retail sweet shop owners in Amravati face challenges in competing with branded outlets but still retain a customer base that supports their business, emphasizing the need for strategies such as improved packaging, diversified products, and better hygiene to remain competitive.

❖ Suggestion

To remain competitive against branded sweet shops like Raghuvеer Sweets, small retail sweet shops in Amravati should focus on several key strategies. Improving packaging to make sweets more attractive and hygienic can enhance customer appeal. Expanding the product range by introducing new varieties, seasonal sweets, and festive offerings can help attract and retain customers. Maintaining high standards of cleanliness and hygiene is essential to build customer trust and compete with organized brands. Personalized customer service, loyalty programs, and friendly interactions can strengthen relationships and encourage repeat business. Small shops should also emphasize their local identity by promoting traditional recipes and handmade sweets, which can differentiate them from larger branded outlets. Adopting marketing strategies such as social media promotion, local advertisements, and festive campaigns can increase visibility and reach new customers. Competitive pricing, value-for-money combos, and innovative presentation, such as gift packs or attractive displays, can further appeal to consumers. Additionally, regularly collecting customer feedback can help shop owners understand preferences and improve their offerings. Collaborating with nearby shops for joint promotions or delivery services may also expand market reach. By implementing these strategies, small retail sweet shops can overcome challenges posed by branded competitors, retain loyal customers, and strengthen their position in the Amravati sweet shop market.

❖ Conclusion

The study examined the impact of Raghuvеer Sweets on small retail sweet shops in Amravati city by collecting data from 20 small shop owners. The findings reveal that the presence of Raghuvеer Sweets has created a moderate level of competition in the market. Many shop owners reported that customers increasingly prefer branded sweet shops due to better packaging, wider product variety, and higher hygiene standards. While most respondents did not observe a significant decline in sales, nearly half indicated that their profitability had been affected. Operational challenges such as maintaining product diversity, cleanliness, and competing with brand reputation were highlighted as key issues. Packaging and product variety were particularly noted as attracting customers to Raghuvеer Sweets. Hygiene and customer service were also important factors influencing consumer preference. Despite these challenges, small sweet shops still retain a loyal customer base. The findings suggest that traditional shops can survive and compete by improving packaging, offering a diverse range of products, and focusing on personalized customer service. Maintaining cleanliness and consistent quality can help counter the advantages of branded stores. Shop owners need to innovate and differentiate their offerings to remain competitive. The study shows that branded sweet shops influence customer behavior and business operations, but small shops can thrive by adapting to these changes. Overall, while Raghuvеer Sweets presents challenges, it also provides opportunities for small sweet shops to improve and strengthen their market position.

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Impact Of Smartphone Usage On Attention Span And Learning Behavior Among Management Students In Amravati

**1. Mayur E. Borkar ,2. Akshay A. Mohane ,3. Supesh M. Dhole ,
4. Vedant N. Vispute**

Student* Department of Management Studies, Prof. Ram Meghe Institute of Technology & Research,
Badenra-Amravati

Dr.Pratiksha A.Kalmegh

Guide ,Assistant Professor Department of Management Studies, Prof. Ram Meghe Institute of
Technology & Research, Badnera-Amravati

ABSTRACT

The rapid growth of Smartphone technology has significantly influenced the daily lives of students, particularly in the field of education. This study examines the impact of Smartphone usage on attention span and learning behavior among management students in Amravati. The research is based on primary data collected through a structured online questionnaire distributed via Google Forms, along with supporting insights from existing literature. The study analyzes students' Smartphone usage patterns, including time spent, purpose of use (educational vs. entertainment), and frequency of distractions during academic activities.

The findings reveal that excessive Smartphone usage negatively affects students' attention span, leading to reduced concentration during lectures and study sessions. Frequent notifications and multitasking habits were identified as major contributors to distraction. However, the study also highlights that smart phones can positively influence learning when used for academic purposes such as accessing study materials, educational apps, and online resources. The research concludes that while smart phones are valuable learning tools, their uncontrolled usage can hinder academic performance. Therefore, it is essential for students to adopt disciplined Smartphone usage habits to enhance their learning outcomes.

Keywords

Smartphone Usage, Attention Span, Learning Behavior, Management Students, Academic Performance, Digital Distraction, Educational Technology, Amravati

1. INTRODUCTION

The rapid advancement of digital technology has significantly transformed the way students access information and engage in learning. Among these technologies, smartphones have become an essential part of students' daily lives. Smartphones provide instant access to educational resources, online learning platforms, social media, and communication tools, making them a powerful device for both academic and non-academic activities. In recent years, the use of smartphones among college students has increased dramatically, particularly among management students who rely heavily on digital tools for research, communication, and information gathering.

While smartphones offer several advantages such as quick access to knowledge, improved connectivity, and flexible learning opportunities, excessive or uncontrolled usage may negatively influence students' attention span and learning Behavior. Continuous notifications, social media engagement, and entertainment applications can lead to distractions during study time and classroom activities. As a result, students may experience reduced concentration, multitasking habits, and difficulty in maintaining sustained attention on academic tasks.

In cities like Amravati, where higher education institutions are increasingly integrating digital learning methods, the influence of smartphone usage on students' academic Behavior has become an important area of study. Management students often depend on smartphones for accessing study materials, participating in online discussions, and completing academic tasks. Therefore, it is essential to examine how smartphone usage affects their attention span and overall learning Behavior.

This study aims to analyze the impact of smartphone usage on attention span and learning Behavior among management students in Amravati City, providing insights into both the benefits and potential challenges associated with smartphone use in academic environments.

1.1 Meaning of Attention Span

Attention span refers to the duration for which an individual can maintain concentration on a specific task, activity, or piece of information without becoming distracted. It is a fundamental aspect of human cognitive functioning and plays a significant role in the process of learning, understanding, and information retention. In simple terms, attention span indicates how long a person can focus their mental energy on a particular subject before their mind shifts to something else.

In the field of education and psychology, attention span is considered an important factor that influences academic performance. Students with a strong attention span are able to listen carefully during lectures, understand complex concepts, analyze information, and complete tasks effectively. They can remain engaged in learning activities such as reading textbooks, solving problems, or participating in classroom discussions for longer periods of time. On the other hand, students with a shorter attention span often find it difficult to concentrate on academic tasks, which may lead to incomplete understanding of topics, reduced productivity, and lower academic achievement.

Attention span is closely related to several cognitive processes such as concentration, memory, and information processing. When a student focuses on a particular task, the brain actively filters relevant information while ignoring unnecessary distractions. This process allows the learner to absorb knowledge more efficiently. However, when attention is frequently interrupted, the brain struggles to maintain a continuous flow of information, which can negatively affect comprehension and memory retention.

Various internal and external factors influence an individual's attention span. Internal factors include mental health, motivation, interest in the subject, fatigue, and stress levels. External factors include environmental noise, social interactions, technological distractions, and the use of digital devices such as smartphones, laptops, and tablets. In recent years, the widespread use of smartphones has become one of the most significant external influences on students' attention span.

Smartphones provide access to numerous applications such as social media platforms, instant messaging services, online games, and entertainment content. While these features offer convenience and connectivity, they also create constant interruptions through notifications, alerts, and messages. These frequent distractions can break a student's concentration and encourage multitasking behavior, where individuals switch rapidly between academic tasks and smartphone activities. Research suggests that such multitasking habits may reduce the ability to maintain sustained attention for longer periods.

In the academic context, especially among management students, maintaining a stable attention span is essential for effective learning. Management education often involves activities such as case study analysis, group discussions, presentations, and problem-solving tasks, all of which require continuous focus and critical thinking. If students are frequently distracted by smartphone usage, their ability to fully engage in these learning activities may be affected.

Therefore, understanding the concept of attention span is crucial when studying the relationship between smartphone usage and learning behavior. By examining how smartphone use influences students' ability to concentrate, researchers can better understand its impact on academic performance and overall learning effectiveness among management students in Amravati City.

1.2 Meaning of Learning Behavior

Learning Behavior refers to the observable actions, habits, attitudes, and responses that students demonstrate while acquiring knowledge, skills, and understanding. It represents the way students approach the process of learning, including how they study, interact with teachers and classmates, respond to academic challenges, and apply the knowledge they gain. Learning Behavior is not limited to classroom activities alone; it also includes the strategies students use outside the classroom to improve their understanding of a subject.

In the field of education and psychology, learning Behavior is considered an important indicator of how effectively a student engages with the learning process. Positive learning Behavior includes activities such as regularly attending lectures, taking detailed notes, asking questions to clarify doubts, participating in classroom discussions, completing assignments on time, and reviewing

study materials. These Behavior s demonstrate a student's willingness to learn and contribute to better academic performance and deeper understanding of the subject matter.

Learning Behavior is closely connected with several psychological and cognitive factors such as motivation, interest, concentration, attitude towards learning, and self-discipline. Students who possess high motivation and a positive attitude toward education are more likely to develop effective learning Behavior s. They tend to organize their study schedules, focus on academic goals, and actively seek knowledge from multiple sources such as books, teachers, and digital platforms. On the other hand, students with poor motivation or lack of interest may exhibit negative learning Behavior s such as procrastination, inattentiveness, lack of participation, and minimal effort in completing academic tasks.

Another important aspect of learning Behavior is the ability to adopt appropriate learning strategies. These strategies include active reading, critical thinking, problem-solving, collaboration with peers, and practical application of theoretical concepts. In professional courses such as management education, learning Behavior becomes even more important because students are expected to analyze real-life business situations, participate in case studies, engage in group projects, and develop decision-making skills.

The learning environment also plays a crucial role in shaping students' learning Behavior. Factors such as teaching methods, classroom atmosphere, availability of learning resources, peer influence, and institutional support can significantly affect how students learn. In recent years, technological advancements have introduced new learning tools, particularly smartphones and other digital devices, which have transformed the way students access information and interact with educational content.

Smartphones have become a common learning tool among college students because they provide instant access to online resources, educational videos, e-books, research articles, and communication platforms for academic collaboration. Students can use smartphones to search for information, participate in online classes, share study materials with classmates, and engage in discussions related to their coursework. These features can positively influence learning Behavior by making education more flexible, accessible, and interactive.

However, the excessive use of smartphones may also lead to negative learning Behavior s. Applications related to social media, gaming, and entertainment can consume a significant amount of students' time and divert their attention from academic activities. Frequent checking of messages, notifications, and social media updates can interrupt study sessions and reduce the amount of time students dedicate to focused learning. This may lead to habits such as multitasking, reduced concentration, procrastination, and decreased engagement during lectures.

For management students, effective learning Behavior is particularly important because their curriculum involves analytical thinking, problem-solving, teamwork, and practical application of knowledge. If students develop disciplined and focused learning Behavior s, they can gain a better understanding of management concepts and improve their academic and professional skills. On the other hand, if their learning Behavior is negatively influenced by excessive smartphone usage, it may affect their academic performance and their ability to develop essential managerial competencies.

Therefore, understanding the concept of learning Behavior is essential when studying the relationship between smartphone usage and academic engagement. By analyzing how smartphones influence students' study habits, participation levels, and learning strategies, researchers can gain valuable insights into their overall learning Behavior. This understanding is particularly relevant for management students in Amravati City, where the growing use of digital technology has become an integral part of the educational experience.

1.4 Smartphone Usage Trend

In the past decade, smartphones have become one of the most widely used digital devices across the world. Rapid technological advancement, affordable internet services, and the availability of low-cost smartphones have significantly increased their usage among people of all age groups. Among these groups, college students represent one of the largest populations of smartphone users. Smartphones are no longer used only for communication; they have evolved into multifunctional

devices that support internet browsing, social networking, entertainment, online learning, and digital collaboration.

In the educational sector, the trend of smartphone usage has increased dramatically. Students frequently use smartphones to access online study materials, watch educational videos, download e-books, attend virtual classes, and communicate with classmates and teachers through messaging applications. The availability of mobile learning platforms, academic websites, and educational applications has made smartphones a convenient learning tool. As a result, smartphones have become an integral part of modern learning environments.

Among management students, smartphone usage is particularly high because their academic activities often require quick access to information, online research, and digital communication. Many students rely on smartphones to search for academic resources, participate in group discussions, manage schedules, and stay updated with current business trends. Smartphones also allow students to access management-related content such as case studies, webinars, business news, and professional networking platforms.

However, the growing trend of smartphone usage also raises concerns about its potential impact on students' academic Behavior. While smartphones provide valuable educational benefits, excessive use for social media, online gaming, and entertainment may lead to distractions and reduced academic focus. Continuous notifications, messaging applications, and social networking platforms can interrupt study time and affect students' concentration levels.

In cities such as Amravati, where access to mobile internet and digital technology has expanded rapidly, smartphone usage among management students has become a common and unavoidable part of daily life. Students use smartphones not only for academic purposes but also for social interaction, entertainment, and personal communication. This increasing trend highlights the need to examine how smartphone usage influences students' attention span and learning Behavior.

Therefore, studying the smartphone usage trend among management students is important to understand both the advantages and challenges associated with the use of digital technology in higher education. This analysis can provide insights into how smartphones are shaping students' learning habits and academic engagement in the modern educational environment.

1.5 Relevance of the Study

In the modern digital era, smartphones have become an essential part of students' daily lives. They are widely used for communication, accessing information, social networking, entertainment, and academic purposes. Among college students, especially management students, smartphones play a significant role in supporting learning activities such as searching for study materials, participating in online discussions, attending virtual classes, and accessing educational applications. However, the increasing dependence on smartphones has also raised concerns regarding their potential effects on students' concentration levels and learning habits.

The relevance of this study lies in understanding how smartphone usage influences the attention span and learning Behavior of management students. Attention span is an important factor in academic success, as it determines how effectively students can concentrate during lectures, complete assignments, and retain information. Similarly, learning Behavior reflects the study habits, attitudes, and engagement levels of students in the learning process. Excessive smartphone usage, particularly for non-academic activities such as social media, gaming, and entertainment, may lead to distractions, reduced focus, and changes in study patterns.

This study is particularly relevant in the context of management education, where students are expected to develop analytical thinking, problem-solving abilities, and decision-making skills. Effective learning in management programs requires continuous attention, active participation in discussions, and engagement in activities such as case studies and group projects. If smartphone usage negatively affects students' attention span, it may also influence their overall learning Behavior and academic performance.

Furthermore, this research is relevant to educational institutions, teachers, and students in Amravati City, as it will help in understanding the impact of digital technology on students' learning practices. The findings of this study may assist educators in developing strategies to encourage responsible smartphone usage and promote better study habits among students.

Therefore, the study is important as it aims to provide insights into both the positive and negative aspects of smartphone usage in education and its influence on the academic Behavior of management students.

1.6 Objectives of the Study

- ✓ To study the pattern of smartphone usage among management students in Amravati City.
- ✓ To examine the level of attention span among management students.
- ✓ To analyze the learning Behavior of management students in relation to their smartphone usage.
- ✓ To evaluate the relationship between smartphone usage and students' ability to concentrate during learning activities.
- ✓ To suggest measures that can help students use smartphones more effectively for educational purposes.

2. LITERATURE REVIEW

Hsieh (2025) examined the relationship between smartphone usage and academic performance through a meta-analysis of 45 studies. The findings revealed a small but significant negative correlation ($r = -0.12$), indicating that higher smartphone usage is associated with slightly lower academic performance. The study also found that problematic smartphone use and multitasking during lectures have a stronger negative impact. Additionally, it emphasized the role of moderating factors such as usage purpose and data collection methods, and recommended promoting responsible smartphone use among students.

Hsieh and Lin (2022) investigated the impact of smartphone usage on students' learning effectiveness and academic performance. The study focused on elementary school students in Taiwan and aimed to understand how smartphone behavior, parental control, and self-control influence students' academic outcomes. The researchers collected data through a structured questionnaire from 499 students in grades five and six. The study categorized smartphone usage into several activities, including interpersonal communication, entertainment, and information searching. The results indicated that parental control and students' self-control significantly influence how smartphones are used by students. Students who had lower levels of parental supervision were more likely to use smartphones for entertainment and social communication rather than educational purposes. In contrast, students with higher self-control tended to use smartphones more responsibly and productively. The findings also revealed a significant relationship between smartphone usage behavior and academic performance. Smartphone behavior was found to act as a mediating factor between parental control, self-control, and learning effectiveness. The study concluded that smartphones can positively support learning when used in a controlled and purposeful manner; however, excessive or unregulated usage may negatively affect students' academic performance and learning outcomes.

Gu (2024) examined the impact of mobile phone addiction on college students' attention levels in a vocational and technical university using a mixed-methods research design. The study revealed a significant negative relationship between mobile phone addiction and students' attention span, indicating that higher levels of addiction lead to reduced focus during academic activities. It further highlighted that excessive smartphone use not only distracts students during lectures but also lowers their overall academic performance and learning efficiency. Additionally, the research emphasized behavioral patterns such as frequent checking of phones and dependency on digital interactions as key contributors to decreased concentration. The study concludes by recommending the implementation of institutional policies and awareness programs to help students manage smartphone usage effectively and improve their academic engagement.

Ward et al. (2017) examined the effect of smartphone presence on students' cognitive performance through an experimental study involving undergraduate participants. The findings revealed that even the mere presence of a smartphone can significantly reduce working memory capacity and overall cognitive functioning, even when the device is not in active use. Students who kept their phones within reach performed worse on memory and attention-based tasks compared to those whose phones were placed in another room. The study further demonstrated that individuals with higher levels of smartphone dependence experienced greater cognitive interference and distraction. Additionally, the research emphasized that smartphones can unconsciously consume attentional resources, thereby reducing the brain's ability to focus on academic tasks. It also

highlighted that the negative impact persists regardless of whether the phone is turned on or off, as long as it is visible. The study concludes that minimizing smartphone presence during study sessions can improve concentration, memory retention, and overall learning efficiency.

Zeyrek, Tabara, and Çakan (2024) investigated the relationship between smartphone addiction, attention deficit, hyperactivity symptoms, and sleep quality among university students through a cross-sectional study involving 443 participants. The findings revealed that higher levels of smartphone addiction were significantly associated with increased attention deficit and hyperactivity symptoms, as well as poorer sleep quality. The study also highlighted that prolonged screen time and frequent smartphone use, especially for social media, negatively affected students' sleep patterns and cognitive functioning. Furthermore, statistical analysis showed that factors such as age, sleep duration, and attention deficit scores significantly influenced smartphone addiction levels. Overall, the research emphasizes that excessive smartphone use can adversely impact both mental health and academic-related cognitive abilities among students.

Lepp et al. (2015) examined the relationship between cellphone use, academic performance, anxiety, and life satisfaction among college students. The study found that higher cellphone usage was significantly associated with lower academic performance (GPA) and increased levels of anxiety. It also revealed that excessive phone use negatively affected students' ability to focus on academic tasks and reduced overall life satisfaction. Furthermore, the study highlighted that frequent checking of smartphones and prolonged usage disrupt study routines and decrease productivity. It also suggested that students who spend more time on their phones are more likely to experience academic distractions and poor time management. The findings suggest that uncontrolled smartphone use can hinder students' academic success and overall well-being.

Rosen et al. (2014) investigated the impact of media multitasking, including smartphone use, on students' learning and academic performance. The study found that students who frequently checked their phones while studying experienced reduced concentration, poorer academic outcomes, and increased distractibility. It also highlighted that interruptions from smartphones significantly decreased the amount of time students could stay focused on a task. Furthermore, the research showed that even short interruptions can lead to longer recovery times, making it difficult for students to regain full attention on academic work. The study also emphasized that habitual multitasking negatively affects memory retention and learning efficiency. Overall, the study concludes that minimizing digital distractions can significantly improve students' attention span and academic performance.

Stolen Focus by Johann Hari (2022) examines the decline in attention span in the digital age, particularly due to excessive smartphone use. The author argues that constant notifications, social media engagement, and information overload contribute to frequent distractions, reducing individuals' ability to concentrate on tasks for extended periods. Hari (2022) highlights that multitasking and continuous task-switching negatively affect cognitive performance and learning efficiency.

3. RESEARCH METHODOLOGY

Research methodology refers to the systematic and scientific approach used to conduct a research study. It involves the methods and procedures adopted for collecting, analyzing, and interpreting data in order to achieve the objectives of the study. The present research aims to examine the impact of smartphone usage on attention span and learning behavior among management students in Amravati. The study focuses on understanding how the frequency and pattern of smartphone usage influence students' concentration levels, study habits, and overall academic performance.

3.1 Problem Statement

The increasing use of smartphones among management students has raised concerns about their impact on attention span and learning behavior. Students use smartphones for various purposes such as accessing study materials, participating in group discussions, and using learning applications. However, excessive smartphone usage, frequent checking during lectures, social media use during study hours, and constant notifications may distract students and reduce their concentration while studying. At the same time, smartphones can also support academic performance by providing easy access to educational resources. Therefore, it is important to examine how many hours students use smartphones daily, the extent to which smartphones are used for academic purposes, and whether smartphone usage improves learning or negatively affects students' attention span.

3.2 Research Design

The present study adopts a **descriptive research design** to examine the impact of smartphone usage on the attention span and learning behavior of management students.

3.3 Research Approach

The study follows a **quantitative research approach**. Data was collected in numerical form through a structured questionnaire and analyzed using basic statistical methods such as percentages and frequency distribution to interpret the responses.

3.4 Data Collection Method

The data for this research was collected through a **primary data collection method** using an online survey questionnaire created through **Google Forms**.

Secondary data was collected from research papers, journals, articles, and credible online sources. This data was mainly used for literature review and theoretical support.

3.5 Sampling

For this study, the **sampling method used was convenience sampling**. A total of 100 management students from colleges in Amravati city were selected as respondents. The sample was chosen because these students are regular users of smartphones and are directly affected by smartphone usage in their academic activities. The data was collected through a structured questionnaire containing 13 questions, which helped to understand the relationship between smartphone usage, attention span, and learning Behavior among management students.

4.1 Data Analysis

Sr. No.	Variable / Question	Response Category	Number of Respondents	Percentage
1	Daily Smartphone Usage	Less than 2 hours	8	8 %
		2–4 hours	46	46 %
		4–6 hours	26	26 %
		More than 6 hours	20	20 %
2	Usage During Lectures	Never	31	31 %
		Rarely	39	39 %
		Sometimes	24	24 %
		Frequently	4	4 %
3	Distraction Due to Notifications	Not distracted	17	17 %
		Slightly distracted	46	46 %
		Moderately distracted	23	23 %
		Highly distracted	14	14 %
4	Use for Study Materials	Always	62	62 %
		Often	30	30 %
		Rarely/Never	8	8 %
5	Impact on Academic Performance	Significant improvement	56	56 %
		Somewhat improvement	35	35 %
		No/Negative impact	9	9 %
7	Impact on Attention Span	Strongly Agree	23	23 %
		Agree	48	48 %
		Neutral	20	20 %
		Disagree	9	9 %
8	Academic Collaboration	Daily	25	25 %
		Regularly	47	47 %

		Occasionally	23	23 %
		Never	5	5 %
9	Social Media During Study	Never	8	8 %
		Rarely	64	64 %
		Frequently	21	21 %
		Constantly	7	7 %
10	Effect on Concentration	Strongly Agree	23	23 %
		Agree	55	55 %
		Neutral	13	13 %
		Disagree	9	9 %
11	Purpose of Usage	Education	21	21 %
		Entertainment	29	29 %
		Both	50	50 %

Source: Primary Data (Collected through Google Forms Survey, N = 100)

5. FINDINGS, CONCLUSION AND SUGGESTIONS

5.1 FINDINGS

- ✓ Most students use smartphones for 2–4 hours daily, with many exceeding 4 hours, indicating high dependence.
- ✓ Students widely use smartphones for educational purposes such as accessing study materials and online learning resources.
- ✓ Smartphones positively support academic performance by providing quick and easy access to information.
- ✓ Excessive usage and notifications negatively affect students' attention span and concentration.
- ✓ Students use smartphones for both educational and entertainment purposes, showing a balanced usage pattern.
- ✓ Many students limit smartphone use during lectures and keep devices on silent mode to reduce distractions.

5.2 CONCLUSION

The study concludes that smartphones have become an integral part of students' academic and personal lives, offering easy access to educational resources, online learning platforms, and communication tools that enhance academic performance and learning behavior. However, excessive smartphone usage and frequent notifications can negatively impact students' attention span and concentration. Although students are aware of both the advantages and disadvantages, smartphones act as a double-edged tool in education. When used responsibly for academic purposes, they significantly improve learning outcomes, but uncontrolled use for entertainment and social media can reduce focus and productivity. Therefore, maintaining balanced and disciplined smartphone usage is essential to maximize its benefits while minimizing distractions.

5.3 SUGGESTIONS

- ✓ Students should be encouraged to use smartphones primarily for educational purposes rather than excessive entertainment.
- ✓ Students can improve concentration by keeping smartphones on silent mode or using focus modes while studying.
- ✓ Educational institutions should integrate smartphones into learning through the use of educational apps, digital resources, and online platforms.
- ✓ Colleges should organize awareness programs to educate students about the negative effects of excessive smartphone usage.
- ✓ Students should adopt effective time management strategies to balance academic work and smartphone usage.
- ✓ Limiting social media usage during study hours can help improve focus and productivity.

✓ Faculty members should encourage the use of digital learning platforms such as online lectures, research databases, and academic applications.

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An Empirical Study On Investment Behaviour Of Generation Z In Amravati City

**Prof. Dr. Pratiksha. A. Kalmeghe¹, Dipali Kokate², Kartiki Kaware³,
Swati kale⁴, Laxmi Mokalkar⁵**

Department of Management Studies-MBA

Prof. Ram Meghe Institute of Technology & Research, Bandera, Amravati, 444701, India

Abstract:

Generation Z (Gen Z) refers to individuals born between 1997 and 2012 who are entering the workforce and becoming active participants in financial markets. Their investment behaviour is significantly influenced by technology, social media, financial awareness, and changing economic conditions. This study aims to examine the investment behaviour of Generation Z in Tier II cities, where financial awareness and access to investment opportunities are growing rapidly.

The research focuses on understanding the investment preferences, risk tolerance, sources of financial information, and factors influencing the investment decisions of Gen Z individuals. Data for the study is collected through a structured questionnaire using a survey method. The responses are analysed to identify patterns in saving and investment habits, preferred investment options such as stocks, mutual funds, cryptocurrencies, and traditional savings instruments.

The findings of the study help to understand how Gen Z in Tier II cities approach financial planning and investment. It also highlights the role of digital platforms, financial literacy, and economic factors in shaping their investment decisions. The study provides useful insights for financial institutions, policymakers, and investment advisors to develop strategies that better cater to the financial needs and preferences of the younger generation.

Keywords: Generation Z, Investment Behaviour, Financial Literacy, Tier II Cities, Investment Preferences.

1.Introduction.

Generation Z (Gen Z) refers to individuals born between **1997 and 2012**, representing a generation that has grown up in a highly digital and technology-driven environment. This generation is characterized by its familiarity with the internet, smartphones, and social media, which significantly influences their lifestyle, decision-making, and financial behaviour.

Investment is the process of **allocating money** into **financial assets** such as **stocks, mutual funds, bonds, or real estate** with the objective of generating returns over time. It plays a crucial role in financial planning, wealth creation, and achieving long-term financial goals. In today's dynamic economic environment, investment has become an essential activity, especially for young individuals who aim to secure their financial future.

In recent years, the investment behaviour of Gen Z has undergone significant transformation due to the rapid advancement of technology, increased access to financial information, and the emergence of digital investment platforms. Applications such as mobile trading platforms and online financial tools have simplified the investment process, making it more accessible and convenient for young investors.

Moreover, social media platforms, financial influencers, and online communities have become important sources of financial information for Gen Z. These platforms not only provide knowledge but also shape attitudes, perceptions, and investment choices. However, this exposure also brings challenges, as young investors may sometimes make decisions based on trends rather than proper analysis.

In the context of Tier-II cities, the investment landscape is evolving rapidly. Factors such as rising income levels, improved education, increasing internet penetration, and better financial infrastructure have contributed to growing participation in investment activities. Despite this progress, there are still gaps in financial literacy, awareness, and access to diversified investment opportunities compared to metropolitan cities.

Additionally, the investment behaviour of Gen Z is influenced by various factors such as financial literacy, risk tolerance, income level, family background, peer influence, and behavioural biases.

Concepts from behavioural finance, such as herd behaviour, overconfidence, and loss aversion, play a significant role in shaping their investment decisions.

Therefore, it is important to study the investment behaviour of Gen Z in Tier-II cities to understand their preferences, challenges, and decision-making patterns. This research aims to provide insights into how young investors approach investment, what factors influence their choices, and how financial institutions and policymakers can better support their financial growth.

Investment plays an important role in financial planning and wealth creation. In recent years, the investment behaviour of young people has changed significantly due to the growth of technology, easy access to financial information, and the availability of various digital investment platforms. Generation Z (Gen Z) refers to people who are born roughly between 1997 and 2012. This generation is considered more techsavvy, financially aware, and open to new investment opportunities compared to previous generations.

Today, many Gen Z individuals are showing interest in different investment options such as stocks, mutual funds, cryptocurrencies, and digital assets. Social media, financial influencers, mobile apps, and online platforms also play a major role in shaping their investment decisions. However, their level of financial knowledge, risk tolerance, and investment preferences may differ based on factors like education, income, family background, and access to financial information.

In Tier II cities, financial awareness and investment opportunities are growing rapidly due to economic development, increasing internet usage, and improved financial services. Young individuals in these cities are gradually becoming more involved in investment activities. However, their investment behaviour may be influenced by various factors such as financial literacy, risk perception, income level, and technological accessibility.

Therefore, it becomes important to study and understand how Gen Z individuals in Tier II cities make investment decisions, what motivates them to invest, and what challenges they face. Platforms offered by companies like Zerodha, Groww, and Upstox have made investing easier and more accessible for young investors.

In India, especially in tier II cities, financial awareness and participation in investment activities are gradually increasing. Tier II cities are experiencing economic growth, rising income levels, better education, and improved internet penetration. These factors have created new opportunities for Gen Z individuals to engage in financial investments at an early age.

However, investment behaviour among Gen Z is influenced by several factors such as financial literacy, risk tolerance, income level, family influence, peer influence, and exposure to digital financial content. Understanding how these factors affect the investment decisions of Gen Z is important for financial institutions, policymakers, and researchers.

This research aims to examine the investment behaviour of Gen Z individuals in tier II cities through empirical analysis. The study focuses on understanding their investment preferences, awareness levels, risk-taking capacity, and factors influencing their investment decisions. The findings of this research can help financial institutions develop better financial products and strategies tailored to the needs of young investors.

2.Literature Review:

Amit Kumar Nag and Janil Shah (2022) examined the impact of financial literacy on investment decisions among Generation Z in India. The study found that financial literacy plays a significant role in shaping investment behaviour. The results revealed that attitude toward investment, perceived behavioural control, and social influences significantly affect Gen Z's intention to invest in the stock market. The authors also emphasized that increasing financial knowledge among young investors can improve their investment confidence and decision-making ability.

Mahek Dugar and Vinodh Madhavan (2023) explored the investment preferences and saving habits of Generation Z in India. The findings indicated that Gen Z investors are increasingly interested in financial independence and are actively participating in investment activities at an early age. The research also found that family influence, expected returns, and long-term financial goals play an important role in their investment decisions. Additionally, many Gen Z investors prefer modern investment platforms and digital applications to manage their investments.

Rohit Mammen Thomas, Sujith Nair, and Shaeril Michael Almeida (2024) conducted a comparative analysis of investment behaviour across Generation X, Generation Y, and Generation Z. Their research found that Generation Z demonstrates higher dependence on technology and digital financial services compared to previous generations. The study also highlighted that risk tolerance, financial literacy, and access to financial information significantly influence their investment behaviour.

Another study by Parichita Paul, Shahima Roushon, and Habibur Rahman Laskar (2023) analysed the expenditure, saving, and investment behaviour of Generation Z and Millennials. The study concluded that financial literacy and the use of digital financial technologies strongly influence investment behaviour among young individuals. The findings also suggested that individuals with higher financial knowledge tend to make more rational and informed investment decisions.

Similarly, Dinesh Elango, Simon Nnaemeka Ajah, and Janil Shah (2023) examined the factors influencing investment intention among Generation Z in India. The study revealed that financial literacy, social factors, attitude toward investment, and subjective norms significantly affect Gen Z's willingness to invest. The authors emphasized that improving financial education can enhance investment participation among young investors.

Overall, previous studies indicate that Generation Z investors are more technology-oriented, financially aware, and willing to explore diverse investment options. However, their investment behaviour is largely influenced by financial literacy, social media, family background, and perceived risk. These findings highlight the need for further research to understand the investment behaviour of Generation Z, especially in Tier II cities, where financial awareness and investment opportunities may differ from metropolitan areas.

3. Objectives of the study:

1. To determine the preferred investment paths of India's Gen Z investors.
2. To evaluate Gen Z investors' perceptions of risk and degree of financial awareness.
3. To assess how social media and digital platforms affect Gen Z's investing habits.
4. To investigate how Gen Z's investing habits are impacted by behavioural finance biases.

4. Research Methodology:

Through the viewpoint of behavioural finance, this study examines the investment behaviour of Generation Z investors in India using a descriptive and analytical research design. Understanding Gen Z's preferred investment channels, financial literacy, risk perception, and the impact of digital platforms and behavioural biases on their investing decisions are the main goals of the study. The target population is made up of members of Generation Z, or those between the ages of 18 and 27, who are either employed or involved in the financial system. In order to find respondents who are knowledgeable about or actively engaged in investment activities, a purposive sample strategy was used. An online structured questionnaire that was distributed via Google Forms, WhatsApp, Instagram, and LinkedIn was used to gather data from a sample of 300 Gen Z investors throughout India. Demographic data, investing patterns, financial awareness, exposure to digital platforms, and behavioural finance markers like mental accounting, overconfidence, herd behaviour, and loss aversion were all intended to be gathered by the questionnaire. Both primary and secondary sources of information were used. While secondary data was obtained via journals, SEBI and RBI reports, fintech usage surveys, and the body of current literature on behavioural finance and Gen Z investment behaviour, primary data was collected directly from respondents.

5. Data collection

Primary Data:

Primary data for this study was collected through a structured questionnaire distributed among Generation Z respondents in a Tier II city. The survey was conducted using a Google Form to gather information regarding their investment preferences, awareness, risk tolerance, and factors influencing their investment decisions.

Secondary Data:

Secondary data for the study was collected from various sources such as research journals, books, financial reports, government publications, and reliable financial websites. These sources helped to understand previous studies, investment trends, and theoretical concepts related to investment behaviour among Generation Z.

6. Data Analysis

Question	Option	Responses	Percentage
Age Group	18–20	14	22.6%
	21–23	25	40.3%
	24–26	10	16.1%
	27–28	13	21%
Preferred Investment Options	Stocks	15	24.2%
	Mutual Funds	14	22.6%
	Fixed Deposits	10	16.1%
	Cryptocurrency	1	1.6%
	Gold	7	11.3%
	Real Estate	5	8.1%
	Others	10	16.1%
Investment Apps Usage	Zerodha	7	11.3%
	Groww	19	30.6%
	Upstox	3	4.8%
	Paytm Money	14	22.6%
	None	19	30.6%
Social Media Influence	Strongly Agree	4	6.6%
	Agree	28	45.9%
	Neutral	21	34.4%
	Disagree	9	14.5%

Table 1: Survey Data Summary**7.Findings**

1. Majority of respondents belong to the 21–23 age group
2. Family is the main influence on investment decisions
3. Stocks and mutual funds are the most preferred options
4. Many respondents do not use investment apps
5. Social media has a moderate influence on investment decisions

8.Conclusion:

This study comes to the conclusion that a particular combination of internet exposure, behavioural biases, financial knowledge, and socioeconomic factors shapes the investment behaviour of Gen Z in India. Gen Z investors are more tech-savvy and open to social media influence and online financial instruments than their predecessors. Despite their readiness to make riskier investments, people frequently make poor decisions due to emotional and cognitive biases, including overconfidence and herd mentality. The results highlight the necessity of focused financial education initiatives, particularly via digital media, to assist Gen Z investors in adopting a logical and knowledgeable approach to investing. To encourage responsible investing among this vibrant and significant generation, financial institutions, legislators, and educators should concentrate on creating youth-focused financial tools, modified learning applications, and reliable digital information.

9.Suggestion:

- ✓Improve financial literacy among Gen Z through workshops and awareness programs to help them make informed investment decisions.
- ✓Introduce basic investment and financial planning subjects in college curricula to build early financial knowledge.

- ✓Use social media and digital platforms to spread awareness about investment opportunities and financial management.
- ✓Encourage Gen Z to start investing early with small amounts through options like SIPs and mutual funds.
- ✓Provide guidance from financial experts to help young investors understand risk and portfolio management.
- ✓Develop simple and user-friendly digital platforms to make investing accessible in tier-2 cities.
- ✓Promote responsible investing by educating Gen Z about risks and discouraging speculative behaviour.
- ✓Encourage family and mentors to influence positive saving and investment habits among young individuals.

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Consumer trust in local healthcare providers: an empirical study in amravati.

Dr. Pratiksha A. Kalmegh¹ Chahul Pathare² Shravani Sune³

Rohit Girulkar⁴ Shravani solav⁵

Department of Management Studies-MBA

Prof. Ram Meghe Institute of Technology & Research, Bandera, Amravati, 444701, India

Abstract

Consumer trust is a critical component in the healthcare sector, as patients rely heavily on healthcare providers for diagnosis, treatment, and guidance. Trust influences patients' choice of hospitals, treatment compliance, and overall satisfaction with healthcare services. This research study aims to examine the level of consumer trust in local healthcare providers in Amravati city and identify the factors influencing this trust.

The study uses an empirical approach with primary data collected through questionnaires distributed among residents of Amravati. Factors such as service quality, doctor-patient communication, cost transparency, accessibility, and hospital reputation were analyzed. The results indicate that communication, transparency in billing, and perceived competence of doctors significantly influence consumer trust. The study also highlights that word-of-mouth recommendations play an important role in patients' healthcare decisions.

2. Introduction

1.1 Background of the Study

The healthcare sector has witnessed rapid growth and transformation due to increasing awareness among patients, advancements in medical technology, and rising expectations regarding quality of care. In this evolving landscape, healthcare is no longer limited to treatment alone but extends to patient experience, satisfaction, and relationship management. One of the most crucial elements influencing patient behavior in this context is **consumer trust**.

Trust plays a vital role in healthcare because patients often face uncertainty, risk, and information asymmetry while making medical decisions. Unlike other service sectors, healthcare decisions directly impact human life, making trust a fundamental component in choosing a healthcare provider.

1.2 Concept of Consumer Trust in Healthcare

Consumer trust in healthcare refers to the confidence patients have in the competence, reliability, and integrity of healthcare providers. It is a multidimensional concept that includes trust in doctors' expertise, hospital infrastructure, ethical practices, transparency, and communication.

Trust influences not only the selection of healthcare providers but also patient satisfaction, treatment adherence, and long-term loyalty. A higher level of trust leads to better patient outcomes, while a lack of trust may result in delayed treatment, doctor-switching, or reliance on informal sources of healthcare.

1.3 Importance of Local Healthcare Providers

Local healthcare providers, including clinics, nursing homes, and small hospitals, play a significant role in delivering primary and secondary healthcare services, especially in tier-II cities. These providers are often the first point of contact for patients and serve as a backbone of the local healthcare system.

In smaller cities, patients tend to rely heavily on personal experiences, family recommendations, and community opinions. Therefore, the reputation and trustworthiness of local healthcare providers become critical factors influencing healthcare choices.

1.4 Context of Amravati City

Amravati, a prominent tier-II city in Maharashtra, presents a unique setting for studying consumer trust in healthcare. The city has a mix of government hospitals, private practitioners, and emerging healthcare facilities. While healthcare accessibility has improved over the years, patients still face challenges related to service quality, affordability, and reliability.

In such an environment, trust becomes a decisive factor guiding patients' preferences. The interplay of traditional beliefs, word-of-mouth communication, and modern healthcare expectations makes Amravati an important case for empirical investigation.

1.5 Need for the Study

Despite the growing importance of trust in healthcare, limited research has been conducted focusing specifically on consumer trust in local healthcare providers in tier-II cities like Amravati. Most existing studies are centered on metropolitan areas, leaving a gap in understanding the dynamics of smaller urban regions.

This study aims to fill this gap by examining the factors that influence consumer trust, such as service quality, doctor-patient communication, cost transparency, and past experiences. Understanding these factors will help healthcare providers improve their services and build stronger patient relationships.

1.6 Scope of the Study

The study focuses on analyzing consumer trust among patients in Amravati city with respect to local healthcare providers. It covers various aspects such as patient perceptions, satisfaction levels, and influencing factors like quality of care, accessibility, affordability, and reputation.

2. Literature Review

2.1 Concept of Trust in Healthcare

Trust is a fundamental component of the patient-provider relationship, especially in healthcare settings where uncertainty and risk are high. According to Thom et al. (2004), trust reflects patients' confidence in the competence, reliability, and integrity of healthcare providers. Similarly, Hall et al. (2001) emphasized that trust plays a central role in clinical interactions and directly affects patient satisfaction and health outcomes.

2.2 Dimensions and Determinants of Consumer Trust

Consumer trust in healthcare is multidimensional and influenced by various factors such as provider competence, communication, ethical behavior, and transparency. Dugan et al. (2005) identified interpersonal aspects, particularly communication and empathy, as critical determinants of trust. In addition, Mechanic and Meyer (2000) highlighted that both individual provider behavior and institutional factors contribute to the development of trust.

2.3 Trust and Healthcare Utilization

Trust significantly influences healthcare-seeking behavior and service utilization. Research by Goold and Lipkin (1999) demonstrated that patients with higher levels of trust are more likely to follow medical advice and maintain long-term relationships with healthcare providers. Conversely, lack of trust can lead to delayed treatment, reduced adherence, and poorer health outcomes.

2.4 Role of Service Quality and Patient Experience

Service quality is a major factor influencing trust in healthcare. Parasuraman et al. (1988), through the SERVQUAL model, identified dimensions such as reliability, responsiveness, assurance, empathy, and tangibles as key determinants of service quality. These factors significantly affect patient perceptions and trust levels. Positive healthcare experiences enhance trust, while negative experiences reduce confidence and lead to switching behavior.

2.5 Trust in Healthcare Organizations

Trust extends beyond individual physicians to healthcare organizations as a whole. Blendon et al. (2014) found that institutional reputation, transparency, and ethical practices play a significant role in shaping patient trust. Similarly, Ozawa and Sripad (2013) emphasized that trust in healthcare systems is essential for improving patient engagement and healthcare delivery outcomes.

2.6 Impact of Technology on Trust

With the advancement of digital healthcare services, trust has expanded to include technological systems. Gefen et al. (2003) highlighted that perceived risk, privacy concerns, and system reliability significantly influence trust in online healthcare platforms. Patients are more likely to adopt digital healthcare services when they perceive them as secure and reliable.

2.7 Research Gap

Although significant research has been conducted on trust in healthcare, most studies focus on developed countries and urban settings. There is limited empirical research addressing consumer trust in local healthcare providers in tier-II cities, particularly in the Indian context. Therefore, this study aims to bridge this gap by analyzing the factors influencing consumer trust in Amravati city.

3. Research Methodology

3.1 Introduction

Research methodology refers to the systematic process of collecting, analyzing, and interpreting data to solve a research problem. This chapter presents the methodology adopted to study consumer trust in local healthcare providers in Amravati. It includes the research problem, objectives, research design, data collection methods, sampling techniques, and tools used for analysis.

3.2 Research Problem

Despite the availability of healthcare services in Amravati, many patients continue to face several challenges that influence their trust in local healthcare providers. These challenges include:

- Lack of transparency in medical costs
- Long waiting times in hospitals and clinics
- Poor communication between doctors and patients
- Perceived commercialization of healthcare services

These issues create uncertainty and dissatisfaction among patients, which may negatively affect their trust and healthcare decisions. Therefore, it becomes essential to study the level of consumer trust and identify the factors influencing it.

3.3 Objectives of the Study

8. To examine the level of consumer trust in local healthcare providers in Amravati

9. To identify the factors influencing patient trust

10. To analyze the relationship between service quality and consumer trust

11. To study the impact of communication and transparency on trust

12. To provide suggestions for improving consumer trust in healthcare providers

3.4 Research Design

The present study adopts a **descriptive research design**. This design is appropriate as it helps in describing and analyzing consumer perceptions, attitudes, and factors influencing trust in healthcare providers.

3.5 Nature of Data

3.5.1 Primary Data

Primary data was collected through a structured questionnaire administered to patients and residents of Amravati who have experience with local healthcare services.

3.5.2 Secondary Data

Secondary data was collected from the following sources:

- Research journals
- Healthcare reports
- Online databases
- Government publications

These sources provided theoretical and conceptual support to the study.

3.6 Sampling Design

3.6.1 Sample Size

The study is based on a sample of **37 respondents**.

3.6.2 Sampling Technique

A **convenience sampling method** was used, where respondents were selected based on their accessibility and willingness to participate in the study.

3.7 Research Instrument

A **structured questionnaire** was used as the primary data collection tool

3.8 Data Collection Procedure

Data was collected by distributing questionnaires among selected respondents in Amravati. The purpose of the study was explained to the respondents, and confidentiality of their responses was ensured.

4. Data Analysis

Variable	Key Findings (%)	Interpretation
Age Group	18–25 (66.67%)	Majority are young respondents
Healthcare Visits	Sometimes (55.56%), Rarely (30.56%)	Moderate usage of healthcare services
Preferred Provider	Private Hospitals (72.22%)	Strong preference for private healthcare
Trust in Doctors	Neutral (44.44%), Trust (41.67%)	Trust exists but many are uncertain
Satisfaction	Satisfied (63.89%), Very Satisfied (25%)	Overall high satisfaction
Affordability	Affordable (75%), Expensive (19.44%)	Services generally affordable
Waiting Time	15–20 min (44.44%)	Moderate waiting time experienced
Cleanliness	Good (55.56%), Average (30.56%)	Hygiene acceptable but improvable

13. Findings, Conclusion and Suggestions

6.1 Findings

- The majority of respondents belong to the young age group (18–25).
- Most people visit healthcare providers occasionally, not frequently.
- Private hospitals are the most preferred, indicating higher trust in private healthcare services.
- Respondents show a moderate level of trust, with many still neutral.
- A large proportion of respondents are satisfied with treatment services.
- Most respondents consider healthcare services affordable.
- Waiting time is moderate and acceptable for most patients.
- Cleanliness levels are generally good, but there is room for improvement.

6.2 Conclusion

The study on Consumer Trust in Local Healthcare Providers in Amravati reveals that overall trust in healthcare providers is positive but not very strong. While most respondents are satisfied with treatment, communication, and care provided by doctors, a significant portion remains neutral regarding trust.

Private hospitals dominate the healthcare preference due to better perceived quality and reputation. Factors such as doctor reputation and personal recommendations play a major role in decision-making, more than affordability.

Although healthcare services are largely considered affordable and satisfactory, there is still a need to build stronger trust, reduce neutrality, and improve service quality in certain areas like waiting time and cleanliness.

Overall, the healthcare system in the study area is performing well but requires continuous improvement to enhance patient trust and satisfaction.

6.4 Suggestions/ Recommendations

- Improve Trust Building Measures
- Healthcare providers should focus on transparency, patient engagement, and ethical practices to convert neutral patients into trusting ones.
- Enhance Communication Skills of Doctors

- Although communication is good, training programs can further improve clarity, empathy, and patient understanding.
- Reduce Waiting Time
- Hospitals should adopt better scheduling systems and increase staff efficiency to minimize patient waiting time.
- Upgrade Cleanliness and Infrastructure
- Maintaining higher hygiene standards and improving hospital facilities will increase patient confidence and satisfaction.

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Women Entrepreneurs in Digital Era

Darshana Gawande

House No.-52, Cotton green colony –no. 2, Near Harshraj , VMV Road Amravati

E-mail :- darshanagawande2oct@gmail.com Mob.- :- 9420833071

ABSTRACT: -

The digital era has significantly transformed the entrepreneurial landscape, creating new opportunities for women entrepreneurs. With the rise of e-commerce, social media, and digital financial services, women are increasingly participating in business activities and achieving economic independence. This paper explores the role of digital technologies in empowering women entrepreneurs, the opportunities available, the challenges faced, and strategies for sustainable growth. The study highlights that digital entrepreneurship not only enhances financial inclusion but also contributes to social empowerment and gender equality.

KEYWORDS: - Digital Platforms, Economic independence, Entrepreneurship, social empowerment, gender equality.

INTRODUCTION: -

Today's world is developing and growing. In a world like this, technological advancements are very important. Computer-based technology relates to almost everyone's life. The average individual spends a great deal of time on their mobile devices. Many new opportunities have arisen because of the digital revolution, particularly for businesses. Entrepreneurship plays a vital role in economic development, and women entrepreneurs are emerging as key contributors to innovation and employment generation. In the digital era, technology has enabled women to overcome traditional barriers such as limited mobility, lack of market access, and financial constraints. Women entrepreneurs are vital economic drivers, owning roughly one in four formal businesses worldwide and driving innovation, employment, and sustainability. In India, they constitute 20% of MSMEs, with trailblazers like Kiran Mazumdar-Shaw and Falguni Nayar leading industries. Support initiatives like Mudra loans up to ₹10 lakh are fueling growth.

Digital platforms such as e-commerce websites, social media, and online payment systems have opened new avenues for women to start and expand businesses from home or small-scale setups

Digitalization has transformed the business environment by providing:

- Global Market Access: Women can sell products worldwide through online platforms
- Low Startup Costs: Digital businesses require minimal investment
- Flexible Work Environment: Enables work-life balance
- Financial Inclusion: Digital payments and banking services

Studies show that digital entrepreneurship helps women overcome barriers such as limited access to markets and socio-cultural restrictions while enhancing confidence and skills

Key Trends and Findings

- **Sector Representation:** While many operate in lower-margin sectors, a growing number are breaking into high-growth areas like tech, fintech, and pharma.
- **Resilience & Growth:** Research from startup india shows women-owned businesses often display higher resilience, faster adaptation, and higher emotional quotient (EQ)
- **Impact of Technology:** Access to technology, online platforms, and support networks like the Women Entrepreneurship has significantly enhanced the visibility and credibility of women-led businesses.

Leading Women Entrepreneurs in India

- Falguni Nayar (**Nykaa**): Built a billion-dollar beauty empire.
- Kiran Mazumdar-Shaw (**Biocon**): Pioneer of biotech, first self-made female billionaire.
- Ghazal Alagh (**Mamaearth**): Redefined personal care with safe products.
- Vineeta Singh (**Sugar Cosmetics**): Disrupted the beauty industry with modern, bold products.
- Richa Kar (**Zivame**): Transformed online lingerie retail.

Challenges and Support Systems

Despite progress, women entrepreneurs face hurdles like access to finance, social barriers, and the need for support networks.

- **Government Schemes:** Startup India offers loans under the Mudra Yojana Scheme for women-led manufacturing and micro-enterprises.
- **Mentorship Platforms:** Initiatives like the Women Entrepreneurship Platform (WEP) provide mentorship, funding support, and networking.

Emerging Opportunities

- **D2C Sector:** Rapid growth in D2C (Direct-to-Consumer) brands led by women.
- **Fintech & Deeptech:** Increased presence in, formerly male-dominated, technology sectors.
- **Social Impact:** Many businesses focus on improving community health and education.

REVIEW OF LITERATURE: -

G. Palaniappan, C. S. Ramanigopal, A. Mani (19 March 2019) in their article analyzed that women have been successful in breaking their barriers within the limits of their homes by entering into varied kinds of professional services. Skill, knowledge and adaptability in business are the main reasons for women to emerge into business ventures. This study had also been carried out to analyze the motivational factors and other factors that influence women to become entrepreneurs, the major strength and weakness of women entrepreneurs and the environmental opportunities and threats which promote the entrepreneurship, and to offer suggestions to promote women entrepreneurship of selected districts in Tamil Nadu. This study concluded that due to lack of training and education they are not able to survive in the market. Finance is also the major problem for women entrepreneurs.

Anita Tripathy Lal's (November 15, 2016) main objective of this research was to study the significant rise of Women Entrepreneurs in India and how it has evolved since the pre-independence days (before 1947), during the British colonial days. The study also analyzed the reasons that have prompted the women entrepreneurs to unleash their entrepreneurial energies into start-ups. Based on both qualitative and quantitative analyses the growth of women entrepreneurship in India have been studied into four different periods - Pre-independence Period (before 1947), Post-Independence Period (after 1947), Post-Liberalization Period (after 1991) and Post-Global Recession period (2008 onwards). The study finally concluded to what extent the various support systems in India can further foster a conducive ecosystem for the Women Entrepreneurs in India.

Cohoon, Wadhwa and Mitchell (2018) presented a detailed exploration of men & women entrepreneur's motivations, background and experiences. This study identified top five financial and psychological factors motivating women to become entrepreneurs. These are desire to build the wealth, the wish to capitalize own business ideas they had, the appeal of startup culture, a long-standing desire to own their own company and working with someone else did not appeal them. The study concluded that the women are very much concerned about protecting intellectual capital than their counterpart. Mentoring is very important to women, which provides encouragement & financial support of business partners, experiences & well-developed professional network.

STATEMENT OF THE PROBLEM: -

The main topic on which we need to put light on is Women Entrepreneurs, it is also a brief study of Women Entrepreneurs in Digital era, also the positive outlook of Digital Advertising has been emphasized in the given content.

OBJECTIVES OF THE STUDY: -

- To study the role of digital platforms in promoting women entrepreneurship
- To identify opportunities available for women in the digital economy
- To examine challenges faced by women entrepreneurs
- To suggest measures for improving digital entrepreneurship among women

Primary Objective:

- To examine the role of digital platforms in the development and growth of new ventures.

Secondary Objectives:

- To analyze how digital platforms such as Amazon, Flipkart, Instagram, and Shopify help startups in market expansion and customer acquisition.
- To evaluate the impact of digital platforms on sales growth and revenue generation of new ventures.

- To study the role of digital marketing tools (SEO, social media marketing, online advertising) in brand building and visibility.

HYPOTHESIS: -

The real motive of hypothesis depends on many aspects such as, how clear and precise it is, capability of testing it, its ability to establish relationship between variables, simplicity of the hypothesis, its consistency with most known facts etc. the following hypothesis have been formulated.

H1: Digital platforms have a significant positive impact on the growth of women entrepreneurs.

H0: Digital platforms have no significant positive impact on the growth of women entrepreneurs.

H1: Higher digital literacy leads to greater business success among women entrepreneurs

H0: There is no Significant relationship between digital literacy leads to greater business success among women entrepreneurs

H1: Social media usage does not influence sales performance of women –led businesses.

H0: Social media usage significantly improves sales performance of women-led businesses.

DATA COLLECTION: -

Primary data collected from, a reader, editor and the employee from the regions of Amravati and Nagpur. The source of secondary data is mostly the libraries, periodicals, journals, newspaper organization, advertisement agencies and so on.

SELECTION AND SIZE OF SAMPLES

For selection of samples the simple random sampling method are used by the researcher and from Amravati & Nagpur. Total 568 samples are selected for the research study from which 472 are respondent following table shows the sample size and respondent of research study.

Table No. A Number of Respondents

Respondent	Sample Size	No. of Respondent	No. of Non-Respondent
M/W 60+	18	12	06
M/W 30+	250	190	60
Youth	300	270	30
Total	568	472	96

Source: Data collected from respondents from research area.

Data Analysis and Discussions

The given analysis and interpretation of the data is based on data collected from the reader questionnaire from Amravati & Nagpur

From below Table & Graph 1.1 reveals that from the selected 270 respondents out of 164 people replied a remark of good with 60.52%, 82 people replied with a remark average with 29.89%, 16 people replied with a remark of fair with 05.90% and 10 people said that it was excellent with 03.69%, so the people believe that the Women Entrepreneurs are digital Literate

Digital Literacy in women Entrepreneurs

About Digital Literacy	N	%
Fair	16	05.90%
Average	82	29.89%
Good	164	60.52%
Excellent	10	03.69%
Total	270	100

Source: Primary Data.

From below Table 1.2 reveals that from selected 270 respondents out of which 200 Person replied with a yes with 74%, 70 Person replied with a no with 26%, so the people believe that the digital marketing has a significant positive impact on Increasing business of Women Entrepreneurs

Table No. 1.2**Digital media Supports Increasing business of women Entrepreneurs**

About Newspaper Advertisement	N	%
Yas	200	74 %

No	70	26%
Total	270	100

Source: Primary Data.

From below Table 1.3 reveals that from selected 270 respondents out which 180 readers replied with a yes with 66.66%, 90 readers replied with a no with 33.33%, so the Customer believe that social media marketing increases customer engagement

Table No. 1.3

Social Media Influences sales of women-led business

Influences consumer purchase decisions	N	%
Yes	180	66.66 %
No	90	33.33%
Total	270	100

Source: Primary Data.

LIMITATIONS OF THE STUDY: -

Limitations of Digital Marketing

- **High Competition:** Digital platforms are crowded. Businesses compete globally on platforms like Amazon and Flipkart, making it difficult for small businesses to stand out.
- **Dependence on Technology:** Digital marketing depends completely on internet connectivity, devices, and software. Technical issues or system failures can interrupt business activities.
- **Privacy and Security Issues:** Customers are concerned about data privacy and online fraud. Data breaches and hacking reduce trust in online platforms.
- **Rapidly Changing Trends:** Digital marketing trends, algorithms, and tools change frequently on platforms like Instagram and Facebook. Businesses must constantly update strategies, which can be costly and time-consuming.
- **Requires Digital Skills:** Effective digital marketing requires knowledge of SEO, social media marketing, analytics, and online advertising. Lack of expertise can lead to poor results.

The whole research study was conducted as per the research methodology and the data analysis and also the calculating conclusion has matched with concerned objectives and hypothesis.

CONCLUSION: -

Digital platforms have become a powerful driver in the creation and growth of new women Entrepreneurs. Platforms such as Amazon, Flipkart, Instagram, and Shopify provide startups with access to global markets, cost-effective marketing tools, online payment systems, and real-time customer engagement opportunities.

These platforms reduce entry barriers by minimizing the need for heavy initial investment in physical infrastructure. They enable entrepreneurs to test business ideas quickly, gather customer feedback, and scale operations efficiently. Digital platforms also enhance brand visibility, improve operational efficiency, and support data-driven decision-making, which contributes to sustainable growth.

However, the effectiveness of digital platforms depends on strategic utilization, digital skills, and the ability to adapt to changing technologies and market competition. Challenges such as platform dependency, intense competition, cybersecurity risks, and algorithm changes must be managed carefully.

In conclusion, digital platforms play a significant and transformative role in the development of new ventures. When used strategically, they act as catalysts for innovation, competitiveness, and long-term business success in the modern digital economy.

SUGGESTIONS: -

- **Adopt a Clear Digital Strategy:** Women Entrepreneurs should develop a structured digital strategy aligned with business goals instead of using platforms randomly.

- **Select Appropriate Platforms:** Women Entrepreneurs should choose platforms based on their target market. For example, product-based startups may benefit from Amazon and Flipkart, while brand-focused ventures can leverage Instagram for engagement and visibility.
- **Invest in Digital Skills and Training:** Startups should develop knowledge in SEO, content marketing, analytics, and online advertising to maximize platform benefits.
- **Focus on Customer Engagement:** Regular interaction with customers through social media, email marketing, and feedback systems helps build trust and loyalty.
- **Use Data Analytics for Decision-Making:** Digital platforms provide valuable data. Ventures should analyze customer behavior, preferences, and trends to improve products and services.
- **Diversify Platform Usage:** Relying on a single platform increases risk. New ventures should operate on multiple platforms to reduce dependency and increase reach.
- **Ensure Cybersecurity and Data Protection:** Implement secure payment systems and protect customer data to build credibility and avoid legal issues.
- **Control Marketing Costs:** Monitor digital advertising expenses carefully to maintain profitability and reduce high customer acquisition costs.
- **Continuous Innovation and Adaptation:** Stay updated with technological trends, algorithm changes, and market dynamics to remain competitive.
- **Build a Strong Brand Identity:** Consistent branding, quality content, and positive customer experiences help in long-term sustainability.

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Cyber Attack Detection Using Artificial Intelligence

Ms. Shreya P. Kharbade

Department of Computer Science Bharatiya Mahavidyalaya Amravati, MS, India
kharbedeshreya@gmail.com

Dr. Bhargavi S. Chinchamalpure

Under Guidance Of Department of computer Science Bhartiya Mahavidyalaya Amravati, MS, India
Bhargavicm16@bmvamt.ac.in

ABSTRACT:

Cyber attacks are increasing rapidly due to the growth of the internet and digital technologies. Traditional security systems such as firewalls and antivirus software are not able to detect modern and unknown cyber attacks effectively. Artificial Intelligence (AI) provides a powerful solution for detecting cyber attacks automatically. This research paper focuses on the use of AI techniques for cyber attack detection using machine learning models. The proposed system analyzes network traffic data and classifies it into normal and malicious activities. Different machine learning algorithms such as Decision Tree, Random Forest, Support Vector Machine, and Neural Networks are used to improve detection accuracy. The study shows that AI-based cyber attack detection systems provide faster and more accurate results compared to traditional methods. This research paper also discusses the challenges, advantages, and future scope of AI-based cybersecurity systems.

Keywords: Cyber Attack, Artificial Intelligence, Machine Learning, Intrusion Detection System, Network Security, Deep Learning

INTRODUCTION:

In today's digital world, the use of the internet is increasing rapidly. Almost every organization depends on computer networks for storing and managing data. Due to this, cyber attacks have also increased significantly. Cyber attacks are harmful activities performed by attackers to steal data, damage systems, or access confidential information without permission. Traditional security systems such as firewalls, antivirus software, and intrusion detection systems are not fully capable of detecting modern cyber attacks. Many new types of attacks are developed every day, and traditional systems fail to detect unknown attacks. Therefore, there is a need for intelligent systems that can automatically detect cyber attacks.

Artificial Intelligence plays a very important role in solving this problem. AI systems can learn patterns from data and identify suspicious activities automatically. Machine Learning is one of the most useful techniques used in cyber attack detection. Machine learning algorithms can analyze large amounts of network data and detect attacks with high accuracy.

This research paper focuses on developing an AI-based cyber attack detection system using machine learning techniques.

LITERATURE REVIEW

Many researchers have worked on cyber attack detection using Artificial Intelligence techniques. Earlier intrusion detection systems were based on rule-based methods. These systems could detect only known attacks and failed to detect new or unknown attacks.

Recent studies show that machine learning techniques are more effective in detecting cyber attacks. Researchers have used algorithms such as Decision Tree, Random Forest, Support Vector Machine, and Neural Networks for intrusion detection. These models are trained using network traffic datasets and can identify abnormal patterns.

Some researchers have also used deep learning techniques for cyber attack detection. Deep learning models such as Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN) provide better accuracy compared to traditional machine learning models. However, deep learning models require large datasets and more computational power.

Although many studies have been conducted in this field, there is still a need for more accurate and faster cyber attack detection systems. This research paper focuses on developing an efficient AI-based detection system.[1]

ROLE OF ARTIFICIAL INTELLIGENCE IN CYBER SECURITY

Artificial Intelligence plays a major role in modern cybersecurity systems. Traditional systems depend on predefined rules, while AI systems can learn automatically from data.

The main advantages of AI in cybersecurity include:

- Automatic attack detection
- Detection of unknown threats
- Faster response time
- Reduced human effort
- High accuracy

Machine learning models can analyze large amounts of data in a very short time. This makes AI-based systems more effective than traditional security methods.

DATASET USED FOR CYBER ATTACK DETECTION

Datasets play an important role in machine learning-based cyber attack detection systems. The dataset contains both normal and malicious network activities. The following datasets are commonly used in research:

1. KDD Cup 99 Dataset

This is one of the most popular datasets used in cyber attack detection research. It contains a large number of network traffic records with different types of cyber attacks.

2. NSL-KDD Dataset

This dataset is an improved version of the KDD Cup 99 dataset. It removes duplicate data and improves the quality of the dataset. Many researchers prefer this dataset for training machine learning models.[2]

3. CICIDS Dataset

This dataset contains modern cyber attack data and is widely used in recent research. It includes real-world network traffic and different types of cyber attacks.

Using these datasets, machine learning algorithms can learn patterns of normal and malicious activities.

PROBLEM STATEMENT

Cyber attacks are increasing day by day, and traditional security systems are not able to detect modern attacks effectively. Most intrusion detection systems fail to detect unknown attacks and produce inaccurate results. Therefore, there is a need to develop an intelligent system that can automatically detect cyber attacks using Artificial Intelligence techniques.

METHODOLOGY

The proposed system is based on an AI-based cyber attack detection model. The system uses machine learning algorithms to analyze network traffic data and detect cyber attacks.

The methodology of the proposed system is divided into the following steps:

1. Data Collection

The first step is collecting network traffic data. The dataset contains both normal and malicious network activities. The dataset is used to train and test the machine learning models.

2. Data Preprocessing

The collected data is cleaned and prepared for analysis. Missing values are removed, and unnecessary features are eliminated. The data is then converted into a format suitable for machine learning algorithms.

3. Feature Selection

Feature selection is an important step in machine learning. Only the most important features are selected from the dataset. This helps improve the performance and accuracy of the system.

4. Model Training

Different machine learning algorithms are used to train the system. The following algorithms are used in this research:

- Decision Tree
- Random Forest
- Support Vector Machine (SVM)
- Neural Network

The models are trained using the training dataset.

5. Model Testing

After training, the models are tested using the testing dataset. The performance of each model is evaluated based on accuracy, precision, recall, and F1-score.[3][4]

SYSTEM ARCHITECTURE

The proposed system consists of the following modules:

- 1.Data Collection Module
- 2.Data Preprocessing Module
- 3.Feature Selection Module
- 4.Machine Learning Model Module
- 5.Attack Detection Module
- 6.Result Analysis Module

The system takes network traffic data as input and produces the result as normal activity or cyber attack.

TOOLS AND TECHNOLOGIES USED

The following tools and technologies are used in this research:

- Python Programming Language
- Jupyter Notebook
- NumPy Library
- Pandas Library
- Scikit-learn Library
- Machine Learning Algorithms
- Network Traffic Dataset

Since you are already working on Python-based projects (like your payroll dashboard), this topic will also help you build a strong portfolio project.[5]

RESULTS AND DISCUSSION

The proposed AI-based cyber attack detection system provides better accuracy compared to traditional security systems. Machine learning algorithms can analyze large amounts of data quickly and detect cyber attacks efficiently.

Among the different algorithms used in this research, Random Forest and Neural Network provide better accuracy compared to other algorithms. The system is also able to detect unknown cyber attacks more effectively.

The results show that Artificial Intelligence plays a very important role in improving cybersecurity systems.[5][6]

ADVANTAGES OF THE PROPOSED SYSTEM

The proposed system has the following advantages:

- Detects cyber attacks automatically
- Provides high accuracy
- Reduces human effort
- Detects unknown attacks
- Works faster than traditional systems
- Improves network security

LIMITATIONS

Although the proposed system provides good results, it also has some limitations:

- Requires a large dataset
- Needs high processing power
- Deep learning models require more training time
- Accuracy depends on the quality of the dataset.[7][8][9]

FUTURE SCOPE

In the future, this research can be improved by using deep learning techniques. Real-time cyber attack detection systems can also be developed using Artificial Intelligence. Cloud-based cyber attack detection systems can also be implemented.

The future of cybersecurity depends heavily on Artificial Intelligence and Machine Learning.[10]

CONCLUSION

Cyber attacks are one of the biggest threats in the modern digital world. Traditional security systems are not able to detect modern attacks effectively. Artificial Intelligence provides a powerful solution for detecting cyber attacks automatically.[11]

This research paper presents an AI-based cyber attack detection system using machine learning techniques. The proposed system improves the accuracy and performance of cyber attack detection. The study shows that Artificial Intelligence can play a major role in improving cybersecurity in the future.

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A Study of Impact on Dine Out Habits on Consumer Behaviour of Generation Z Reference to Amravati City.

Dr. G. S. Kalmegh¹

Vaidehi N. Solanke², Shraddha P. Futane³, Disha G. Bhoyar⁴,

Priya R. Sontakke⁵

Research Guide¹, Students^{2,3,4,5} Email-vaidehisolanke@gmail.com Phone-+91-9552963110

Department of Management Studies

Prof. Ram Meghe Institute of Technology and Research, Maharashtra, Maharashtra, India, 444701

Abstract:

This research paper looks at how dining habits influence the consumer behaviour of Generation Z in Amravati City. This group of young people is significantly affected by modern lifestyles, social media, and changing food trends. The study aims to examine how dining habits, such as eating out, food preferences, and how often they dine out, impact their buying choices and overall behaviour. The research relies on primary data gathered through structured questionnaires from Generation Z respondents in Amravati City. It highlights key factors that affect dining choices, including taste, price, convenience, and social influence. The findings reveal that most Generation Z consumers eat out 1 to 3 times per week. This suggests that dining out is a common part of their lifestyle. There is a notable increase in dining out during weekends, particularly from Friday to Sunday, indicating a preference for leisure dining. Dinner is the most popular meal for eating out, followed by lunch, while breakfast is typically eaten at home. Overall, the study gives important insights into the dining habits of Generation Z and how these habits affect their consumer behaviour. These findings can help restaurants and food businesses create better strategies to attract and keep young customers.

Keywords: Generation Z, Consumer Behaviour, food preferences, Amravati city, etc

1.Introduction:

Dining habits significantly influence consumer behaviour, especially among young people. Generation Z, born between the mid-1990s and early 2010s, is a major consumer group whose food preferences and dining patterns are shaped by digital technology, lifestyle changes, and social factors. This generation often prefers convenience, quick-service restaurants, online food delivery, and unique dining experiences. These preferences directly impact their buying decisions and brand choices. Soyadli, T. (2025). New Generation Gastronomy: A Literature Review on Generation Z's Approach to Gastronomy. International Journal of Gastronomy Research.

Generation Z as a Vital Consumer Group

Young and tech-savvy, Generation Z consumers are greatly impacted by social media trends. Their inclinations for variety, ease of use, and distinctive dining experiences have a big impact on the restaurant business. Generation Z has grown to be a sizable consumer group in the food and restaurant industry. Convenience, speedy service, and distinctive dining experiences are what they favour. Many people in this generation regularly visit cafés, go out to eat with friends, and sample various cuisines. Online reviews, digital ads, and social media platform recommendations frequently impact their purchasing decisions. Restaurants are growing as a result. (Keller, K. L., & Kotler, P. 2016)

Social media, digital payments, and online meal delivery apps all have an impact on the restaurants and foods they choose. Generation Z's eating habits are greatly influenced by technology. When making food-related decisions, this generation heavily relies on social media, mobile applications, and online payment systems due to their extensive familiarity with digital platforms. Customers can easily browse menus, compare prices, read reviews, and place orders using restaurant apps and online meal delivery services. Solomon, M. R. (2018) Factors Affecting Generation Z's Eating Behaviour

Factors Affecting Generation Z's Eating Habits

Generation Z's eating habits are influenced by a number of social, economic, technological, and personal factors

- **Cost and Accessibility**

One of the key elements affecting Generation Z's dining preferences is cost. This age group prefers eateries and food establishments that provide inexpensive meals, discounts, and combo deals because many of them are students or early earners. This age group's purchasing power is constrained because many of them are either students or early-stage earners. Because of this, they frequently favour eateries and food establishments that offer combo deals, discounts, and reasonably priced meals. These customers are more drawn to restaurants that provide good value. They are also encouraged to eat out more often by promotional offers like meal deals, student discounts, and seasonal offers (Armstrong, G., & Kotler, P. (2017)

- **Food Quality and Flavour**

Customer satisfaction and return visits are largely determined by quality and taste of food. Freshness, cleanliness, and general food quality are highly valued by Generation Z consumers. Customers are more likely to return and refer others to restaurants that uphold high standards of cleanliness and serve delicious, well-presented meals. (Pine, R., and Johns, N. 2002)

- **Social media's impact**

Generation Z's dining choices are heavily influenced by social media sites like YouTube, Instagram, and food blogs. They are encouraged to try new restaurants by appealing food photos, recommendations from influencers, and internet reviews. One of the biggest factors influencing Generation Z's dining choices is social media. Before making a choice, consumers can browse new eateries, view food photos, and read customer reviews on websites like Instagram, YouTube, and food blogs. Young customers are encouraged to try new restaurants by online reviews and recommendations from influencers. Additionally, a lot of eateries use social media marketing techniques to interact with patrons and advertise their brands (A.N.Kaplan and M. Haenlein 2010)

- **Customer Conduct in the Food Service Sector**

Four main factors—cultural, social, psychological, and personal—have an impact on consumer behaviour, according to Philip Kotler and Gary Armstrong (2018). Customers' preferences for particular cuisines, dining settings, and service quality are determined by these factors in the food service industry. For instance, food preferences are influenced by cultural customs, and restaurant choices may be influenced by social groups like friends and family.

- **Diversity and Novel Culinary Experiences**

Trendy dishes and various fusion cuisines are popular among Generation Z. This generation finds restaurants with creative menus and distinctive dining experiences more appealing. For Generation Z, eating is about more than just satisfying hunger; it's also about enjoyment, social sharing, and experience. As a result, they prefer places that offer diverse menus, fusion foods, and visually appealing dishes. Their brand preferences, dining choices, and general consumer behaviour are all greatly impacted by this variety-seeking behaviour.

2. Review of Literature:

The idea of eating habits and how they affect consumer behaviour has received a lot of attention lately, especially since Generation Z has become a significant consumer group. Numerous studies have investigated the variables influencing younger consumers' dining preferences, restaurant choices, and consumption patterns.

A study on generational variations in dining preferences in the restaurant industry was carried out by Srivastava, George, and Sharma (2025). The study found that food quality, hygiene, price, ambiance, and service quality are major factors that influence consumer behaviour when choosing restaurants. It also highlighted the younger consumers, especially Generation Z, are more drawn to restaurants with a strong online presence, attractive designs, and engaging content. Suryaningrum et al. (2023) looked into Generation Z's behaviour in the food and beverage industry. They discovered that product personalization, brand experience, and social media engagement greatly affect purchasing decisions. The study pointed out that social media plays an important role in shaping the dining habits and preferences of young consumers, influencing their restaurant choices and eating behaviour. Jang and Kim (2024) examined how social media use impacts dining-out behaviour among younger generations. Their findings showed that people who actively use social networking sites tend to eat out more often and spend more on food experiences. Recommendations from social media and online

reviews have a strong impact on restaurant choices and how consumers feel about dining out. The literature review analysed previous studies on Generation Z's dining habits and their influence on purchasing decisions, food consumption patterns, and restaurant preferences.

3. Research Methodology

The Research Problem

The way people from Generation Z eat out has changed a lot because of all the restaurants, cafes and food delivery services. This might affect how they buy things and what they like to consume. It is really important to understand this in Amravati city.

Objectives

1. To see how eating out affects the consumer behaviour of Generation Z in Amravati city
2. To find out how often Generation Z consumers in Amravati eat out
3. To determine what things like price, taste and ambiance make Generation Z choose a restaurant
4. To evaluate the impact of offers, discounts and combo deals on the dining decisions of Generation Z

The Research Design

This study has adapted a descriptive research design. It looks at the eating habits of Generation Z. How these habits affect their consumer behaviour, such as how they spend money what kind of food they like and what restaurants they choose. This type of research helps us understand how consumers behave and how things are related to each other.

Types of data

The study collects data from Generation Z consumers who live in Amravati City. This data is collected using surveys like Google Forms. The survey asks questions about how they eat out what kind of restaurants they like and how social media and friends affect their eating habits. The study also uses data from books, research papers and websites that talk about consumer behaviour and the food industry.

The Sampling method

This study uses a method called Convenience Sampling to collect data from Generation Z consumers in Amravati city. This means the study uses people who're easy to reach and willing to participate like college students and young professionals.

Sample Size

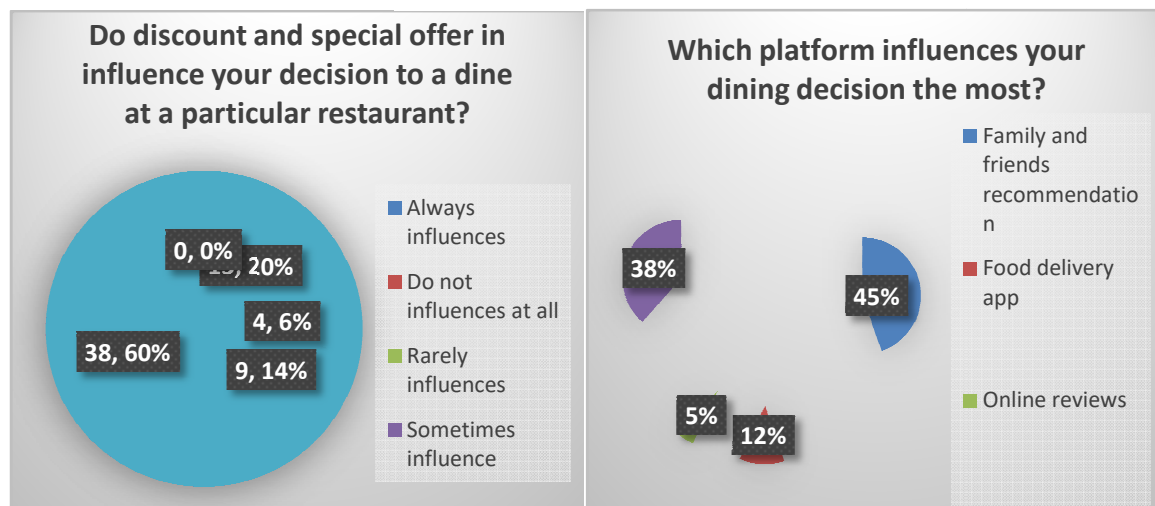
The study includes 50 people from Generation Z who live in Amravati city to see how their eating habits affect their consumer behaviour.

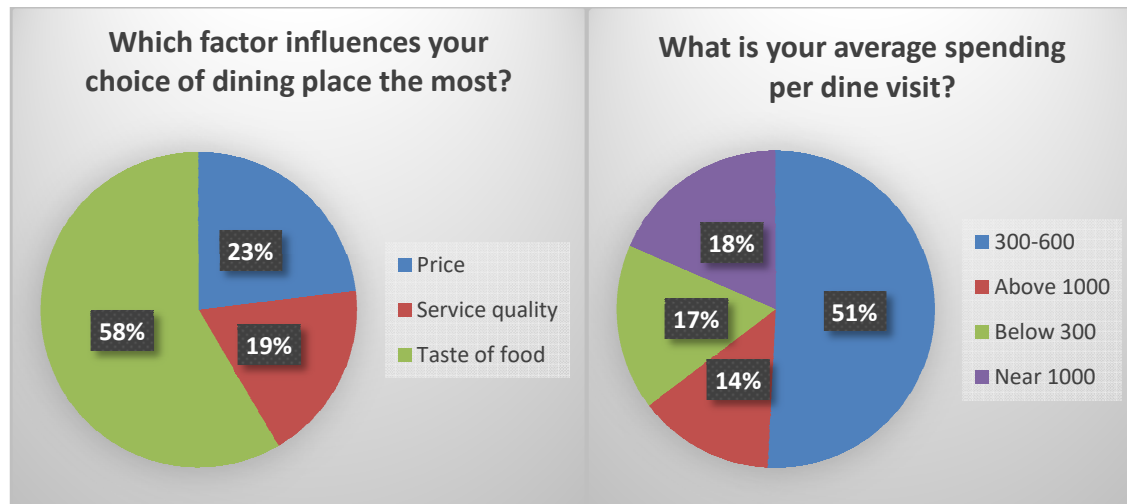
Data collection method

The data was collected using a questionnaire that was sent online through Google Forms. The questionnaire mainly asks about the eating habits of Generation Z consumers.

Tools and data Analysis

The data that was collected was analysed using tools like percentage analysis and charts. These tools help to show the data and understand the eating habits and consumer behaviour of Generation Z, in Amravati City.





1. The Psychology of Decision-Making: Beyond the Plate

The survey results show a change in how people choose where to dine. 44.4% Of people say that recommendations from family and friends are their influence while 38.1% are influenced by social media. This means that while word-of-mouth is still very powerful it's almost equal to the influence of media. In Amravati dining out is no longer about eating; it's also about showing off on social media. People rely heavily on platforms and the visual appeal of a cafe often determines its success.

2. The Economic Incentive: Strategic vs. Spending

When looking at what drives peoples spending the data shows that 59.4% of Gen Z consumers are sometimes influenced by discounts and special offers while 20.3% are always influenced. This reflects the reality of Gen Zs budget. They like trying foods but they are also careful with their money. They don't want the food but they do want value for their money. They use discounts to balance their desire for luxury with their spending power.

3. The Digital Influence and the "Convenience Paradox"

The survey highlights the importance of platforms in dining decisions. Food delivery apps influence 12.7% of people choices. When combined with media and online reviews digital platforms dominate the consumer journey. This data supports the idea of the "Convenience Paradox." Even though people may want food they often choose quick and easy options because of the convenience of apps. The decision-making process has moved from ads to a mobile experience.

4. The Shift to "Third Spaces" and Social Habits

The study confirms that dining out has changed from being about eating to being about socializing. Over 50% of respondents focus on dining times and social circles. The concentration of respondents from colleges and malls indicates that dining out is now an activity. Gen Z uses dining venues to escape their routines and connect with others. Whether it a lunch or an evening out dining has become a primary way for this generation to build their social life.

Findings:

The study's findings reveal that Generation Z consumers are moderately influenced in their dining decisions, with most respondents being influenced occasionally. Recommendations from family and friends and social media platforms are the most significant factors affecting their choices. Taste of food emerges as the top priority, followed by price and service quality. Additionally, the majority of respondents prefer to spend a moderate amount the frequency of influence on dining decisions shows that a majority of respondents (60%) are sometimes influenced while choosing where to dine. About 20% are always influenced, whereas 14% are rarely influenced and only 6% are not influenced at all. This indicates that external factors play a significant but not constant role in shaping dining decisions among Generation Z regarding sources of influence, family and friends' recommendations are the strongest factor, influencing approximately 45% of respondents. This is followed closely by social media at around 38%, highlighting the growing impact of digital platforms. Food delivery apps influence about 12%, while online reviews have a relatively smaller impact at around 5%. This suggests that traditional word-of-mouth combined with modern digital influence

shapes consumer choices. taste of food is the most important factor for 58% of respondents. Price influences around 23%, and service quality affects 19%. This shows that despite modern trends, the core product—food quality—remains the primary driver of customer preference. findings highlight that Generation Z consumers are influenced by both social connections and digital media, prioritize taste over other factors, and tend to have moderate spending habits while dining out.

Suggestion:

Restaurants in Amravati need to get better at using the internet to talk to people. They should use Instagram and Google Reviews because young people, like Generation Z look at these things before they decide where to eat. Restaurants should post pictures of their food, special deals and what customers say about them. This will help people see them and want to go. It is also important to have prices that're not too high because most of Generation Z are students or just starting to work. restaurants should have deals like combo meals, discounts and special prices for students.

Restaurants also need to make the place look nice and feel comfortable. Generation Z likes places that look cool and are easy to hang out in. so restaurants should make their place look better with lighting, decorations, music and seats. It is also very important to have kinds of food on the menu because Generation Z likes to try new things. Restaurants can add kinds of food mix different foods together and let people choose what they want.

Conclusion:

The way Generation Z eats in Amravati is really different from how people used to eat. Amravati has always been a place where people look for value for their money and eat food that is typical of the region. Now that people who grew up with the internet are becoming adults, the way people eat out in Amravati is changing a lot. What we found out is that for Generation Z eating is not about filling their stomachs it is about showing who they are. We also saw that people are getting more interested in food from around the world like Korean Ramen, Italian Pasta and Mexican street food. Generation Z in Amravati is more interested in trying foods from other countries than people were before. They still have to be careful about how much money they spend. they are looking for food that's exciting and new but also affordable. This is making a lot of people want to try foods that mix styles like Indian and Italian and it is not too expensive.

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“A Study on the Role of Social Media Campaigns in Cosmetic Brand Awareness with Reference to Amravati City”

Prof. Gauri S Kalmegh¹**Miss. Sakshi G. Lakade²**

Research Supervisor

Research Scholar

Prof. Ram Meghe Institute of Technology and Research Badnera, Amravati^{1,2}

Email: Sakshilakade08@gmail.com Mobile: +91-9834542865

ABSTRACT

The purpose of this study is to examine how social media campaigns influence cosmetic brand awareness among consumers in Amravati city. With the growing digital adoption in India, platforms such as Instagram, Facebook, YouTube, and WhatsApp have become key marketing channels for cosmetic brands seeking to enhance visibility and customer engagement. However, despite the rising importance of digital marketing in semi-urban regions, limited research exists on the effectiveness of social media campaigns in shaping brand recall, recognition, and purchase intention among consumers in Amravati. This study seeks to address this gap by analyzing which social media platforms, content types, and influencer-driven strategies contribute most effectively to cosmetic brand awareness.

The study uses a descriptive and quantitative research approach, supported by a structured questionnaire administered to social-media-using consumers in Amravati. Primary data will be supplemented with secondary information obtained from journals, reports, and online sources. Statistical tools such as percentage analysis, chi-square tests, correlation, and regression will be used to interpret the data. The expected outcomes include identifying the most impactful digital platforms, understanding consumer engagement patterns, and assessing the influence of influencers and advertisements on buying behaviour. The study aims to provide valuable insights for cosmetic brands and marketers to design more effective and locally relevant social media strategies for tier-2 cities like Amravati.

Keywords: Social Media Marketing, Brand Awareness, Cosmetic Industry, Influencer Marketing, Consumer Behaviour, Digital Advertising, Amravati City.

Introduction

In today's digital era, social media has become one of the most influential platforms shaping consumer perceptions, attitudes, and purchasing behaviour. With the rapid expansion of internet access and smartphone usage in India, platforms such as Instagram, YouTube, Facebook, WhatsApp, and Snapchat have evolved from simple communication tools into powerful marketing channels where consumers actively explore products, follow trends, and engage with brands (Kaplan & Haenlein, 2010). The cosmetic industry, in particular, has been significantly transformed by this digital shift, as beauty products rely heavily on visual presentation, tutorials, demonstrations, and authentic user experiences—elements ideally suited for social media promotion. Features like reels, short videos, live sessions, filters, and influencer-generated content allow cosmetic brands to creatively showcase product quality, usage techniques, and visible results, thereby influencing consumer awareness and decision-making (Djafarova & Rushworth, 2020).

Influencer marketing has emerged as a crucial component of this transformation, with beauty vloggers, makeup artists, and micro-influencers gaining strong credibility among consumers. Their reviews, demonstrations, and endorsements are perceived as more authentic and trustworthy compared to traditional advertising, thus shaping brand awareness, particularly among younger audiences (International Journal of Advertising, 2017). Concurrently, India's cosmetic market has grown rapidly due to rising beauty consciousness, increasing disposable income, lifestyle changes, and exposure to global beauty trends. Social media platforms and e-commerce channels such as Nykaa, Amazon, and Myntra have further expanded consumer access to both global and local beauty brands, including trending categories like K-beauty (International Journal of Management Studies, 2018).

Despite wide recognition of social media's impact, most existing studies have focused on major metropolitan cities like Mumbai, Delhi, and Bengaluru, leaving a research gap regarding smaller Tier-II cities. Amravati City, with its growing digital consumer base and active social media engagement, presents a relevant context to examine how online campaigns influence cosmetic brand awareness. Local consumers may display different engagement patterns, trust levels, and content preferences compared to those in metropolitan areas. Understanding this region-specific behaviour is essential for marketers aiming to optimise digital strategies and strengthen outreach in semi-urban markets (Chatterjee & Kar, 2020).

Therefore, this study seeks to explore the evolving role of social media campaigns in enhancing cosmetic brand awareness among consumers in Amravati City. It aims to provide insights into how digital content, influencer engagement, and platform usage collectively shape modern cosmetic consumption patterns in a semi-urban setting. This contributes to both academic understanding and practical marketing strategies, offering meaningful implications for cosmetic brands, digital marketers, and future research.

Review of literature

Hoyer and Brown (1990) conducted a landmark experimental study to examine the role of brand awareness in consumer choice behavior. The study revealed that consumers often prefer brands they recognize, even when alternative brands offer similar features, price, and quality. The researchers concluded that brand awareness acts as a mental shortcut, helping consumers make quick decisions with less effort. Their findings clearly showed that awareness alone can significantly influence purchasing decisions, especially for frequently used consumer goods. Although the study was conducted in the context of traditional advertising, it provides strong theoretical support for understanding why modern promotional tools, such as social media campaigns, focus heavily on increasing brand awareness.

Aaker (1991) introduced the concept of brand equity, identifying brand awareness as one of its most critical dimensions. According to Aaker, brand awareness enhances consumer confidence, reduces perceived risk, and increases the likelihood of brand selection during purchase. The study emphasized that consumers are more likely to trust and buy products from brands they are familiar with. Aaker's model explained how continuous promotional activities help build long-term brand value. This research is highly relevant to the cosmetic industry, where repeated exposure through social media campaigns strengthens brand recall and recognition among consumers.

Percy and Rossiter (1992) developed an influential advertising communication model that explained the relationship between advertising exposure, brand awareness, brand attitude, and purchase intention. The study highlighted that creating brand awareness is the first and most essential stage of advertising effectiveness. Without awareness, consumers cannot form opinions or attitudes toward a brand. The researchers emphasized the importance of message repetition and clarity in advertising communication. Although this model predates digital marketing, it provides a strong conceptual framework for explaining how social media campaigns repeatedly expose consumers to cosmetic brands, thereby improving awareness.

Keller (1993) proposed the Customer-Based Brand Equity (CBBE) model, which emphasized that brand awareness and brand associations form the foundation of brand equity. The study explained that brand awareness includes both brand recognition and brand recall, which influence consumer decision-making during product selection. Keller suggested that strong brand awareness increases the probability of a brand being included in the consumer's consideration set. This framework is widely used in marketing research and is highly applicable to social media marketing, where cosmetic brands aim to strengthen recall and associations through visual content, influencer marketing, and repeated online engagement.

Statement of the problem

Social media has become an important tool for promoting cosmetic brands through platforms like Instagram and YouTube. However, most studies focus on metropolitan cities, and there is limited understanding of how effective these campaigns are in semi-urban areas like Amravati. Consumers in such regions may have different preferences and levels of trust toward social media content. Due to this gap, marketers may not be able to design effective campaigns for local audiences. Therefore, it is necessary to study how social media campaigns influence cosmetic brand awareness in Amravati city.

Objective of study

- 1.To study the impact of social media campaigns on cosmetic brand awareness in Amravati city.
- 2.To identify the most effective social media platforms for promoting cosmetic products.
- 3.To analyze the influence of influencer marketing on consumer perception and buying behaviour.
- 4.To examine the relationship between social media exposure and purchase intention of consumers.

Research Methodology**Research Problem**

Despite increasing digital penetration, the effectiveness of social media campaigns on cosmetic brand awareness in semi-urban cities like Amravati remains unclear. Marketers lack data on which platforms, content types, or influencer strategies create the highest brand recall. If this gap is not addressed, brands may invest in ineffective marketing approaches and fail to reach local consumers efficiently.

Research Objectives

- 1.To understand the relationship between social media exposure and purchase intention.
- 2.To study the impact of social media campaigns on cosmetic brand awareness in Amravati city.
- 3.To identify the most influential social media platforms used for cosmetic promotions.
- 4.To analyze consumer engagement with influencer content and advertisements.

Hypothesis of the Study

H1: Social media campaigns significantly influence cosmetic brand awareness among consumers in Amravati.

Research Design

The study uses a descriptive research design. The primary method of data collection is a structured questionnaire. The study is cross-sectional, collecting data at one point in time. Tools such as Google Forms, Excel, and SPSS may be used for data analysis.

Data Sources & Methods**1. Primary Data**

Primary data refers to first-hand information collected directly from respondents specifically for this study. In this research, primary data was gathered through a structured questionnaire designed to understand how social media campaigns influence cosmetic brand awareness among consumers in Amravati.

- The questionnaire was distributed to active social media users, including students, working professionals, and homemakers within Amravati city.
- It included both closed-ended questions (multiple choice, Likert scale) and open-ended questions to capture detailed opinions.
- The primary data helped in understanding real consumer behaviour, their preferred social media platforms, level of trust in online beauty influencers, and the impact of social media promotions on their purchase decisions.

Secondary Data

Secondary data refers to information that is already published and available for reference. It was used to support the understanding of industry trends, theoretical concepts, and background information.

The study used secondary data from the following sources:

- **Academic Journals and Research Papers:** Provided insights into previous studies related to digital marketing, cosmetic industry trends, and consumer behaviour.
- **Industry Reports:** Reports by organizations such as IMARC, Statista, McKinsey, and Deloitte helped understand the growth of the cosmetics market and social media usage trends in India.
- **Websites and Online Articles:** Information from cosmetic brand websites, marketing blogs, and research portals offered updated data on current campaigns and digital strategies.
- **Government Publications:** Data from government sources such as the Ministry of Electronics & IT and the Ministry of Consumer Affairs helped understand digital adoption and consumer patterns.
- **Cosmetic Brand Portals:** Company websites and online product pages were reviewed to study promotional activities, influencer collaborations, and content strategies used by major brands.

Sampling Procedure

Universe

The universe of the study includes all social-media-using consumers residing within Amravati city, regardless of age, gender, occupation, or income level. This comprises individuals who actively engage with platforms such as Instagram, Facebook, YouTube, WhatsApp, Snapchat, and other digital channels for purposes such as communication, entertainment, information gathering, and product discovery. The universe covers a wide range of consumer groups, including students, working professionals, homemakers, entrepreneurs, and self-employed individuals who use social media regularly and are exposed to online cosmetic promotions. Since social media usage in Amravati is widespread across different demographic categories, the universe represents a diverse and extensive population of digital users who can provide meaningful insights into how online campaigns shape cosmetic brand awareness and purchasing attitudes.

Sampling Elements

The sampling elements include social-media-using consumers aged 18–45 who purchase, search for, or show interest in cosmetic products. This group covers students, working professionals, homemakers, beauty followers, and online shoppers who engage with cosmetic brands through reviews, tutorials, ads, or promotions on platforms like Instagram, Facebook, or YouTube.

Sampling Method

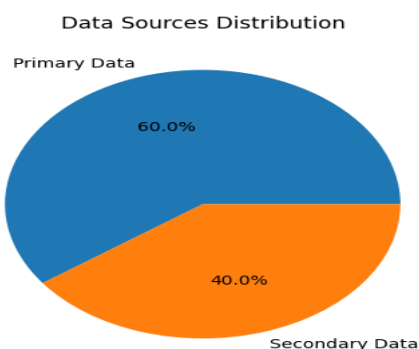
In this study, non-probability convenience sampling was used to collect data from social media users in Amravati. Convenience sampling helped the researcher gather responses from individuals who were easily available and willing to participate, such as students, young professionals, and active social media users. Online questionnaires were shared through platforms like WhatsApp and Instagram, allowing quick and easy access to respondents. This method saved time and effort because participants were selected based on their immediate availability rather than through a complex sampling process. Convenience sampling was useful for obtaining a sufficient number of responses in a short period while still focusing on the target group of social media users interested in cosmetic products.

Sample Size

A sample of 100 respondents will be surveyed. This size is sufficient for basic statistical analysis and represents a diverse set of social-media users in Amravati.

Data Analysis & Interpretation

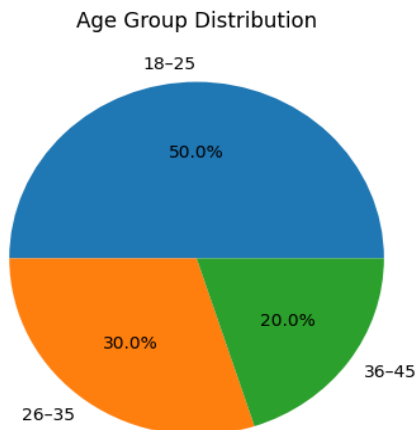
Data will be analyzed using descriptive statistics (mean, percentage), chi-square tests, correlation, and regression analysis to test the hypotheses. Excel and SPSS may be used for result interpretation and graphical representation.



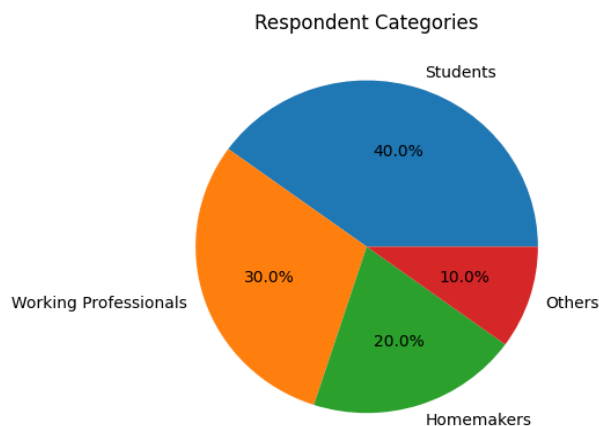
Data Sources Distribution

Interpretation:

The chart shows that both primary and secondary data were used, with primary data being the major source for this study.

Respondent Categories**Interpretation:**

The majority of respondents include students and working professionals, indicating active social media users.

Age Group Distribution**Interpretation:**

Most respondents belong to the 18–25 age group, showing that young consumers are more engaged with social media.

Limitations of the Study

Despite careful planning and structured research, this study has certain limitations that should be considered while interpreting the results:

1. Geographical Limitation:

The study is restricted to Amravati City only. Findings may not fully represent consumer behaviour in other Tier-II or metropolitan cities.

2. Sample Size Constraint:

The sample size of 100 respondents, though adequate for basic analysis, may not capture the complete diversity of all social-media users in Amravati.

3. Non-Probability Sampling:

Convenience sampling may result in sampling bias, as participants were selected based on availability and willingness, not through a random or systematic method.

4. Self-Reported Data:

The study relies on respondents' self-reported opinions, which may be influenced by personal bias, selective memory, or social desirability.

5. Rapidly Changing Digital Trends:

Social media trends evolve quickly. The findings reflect consumer behaviour only during the data collection period and may not apply equally in future contexts.

6. Limited to Cosmetic Industry:

The study focuses solely on cosmetic brands. Results may not be applicable to other industries using social media campaigns.

7. Exclusion of Offline Influences:

Factors such as offline advertisements, in-store promotions, and word-of-mouth were not considered, even though they may affect brand awareness.

Suggestions

Based on the findings of the study, the following suggestions are provided to improve the effectiveness of social media campaigns for cosmetic brand awareness:

Key Suggestions:

- Cosmetic brands should focus more on **Instagram** as it is the most preferred platform among users.
- Brands should create **engaging video content** such as reels, tutorials, and short videos to attract more attention.
- Companies should collaborate with **social media influencers** to increase credibility and reach a wider audience.
- Brands should ensure that their content is **authentic, transparent, and informative** to build customer trust.
- Regular interaction with customers through **comments, messages, and live sessions** should be encouraged to improve engagement.
- Targeted marketing strategies should be used to reach specific age groups, especially **young consumers (18–25 years)**.
- Brands should use **user-generated content and reviews** to enhance trust and brand loyalty.
- Social media campaigns should be **consistent and creative** to maintain customer interest.
- Companies should analyze customer feedback and preferences to **continuously improve their strategies**.
- Awareness campaigns should also focus on **educating consumers** about product benefits and usage.

Findings

1. Most respondents actively use social media, with Instagram and YouTube being the top platforms for cosmetic-related content.
2. Social media campaigns were found to significantly increase brand awareness, helping users recall cosmetic brands more easily.
3. Influencers play a major role in shaping consumer opinions; their reviews, tutorials, and recommendations strongly impact interest in products.
4. Visual content such as reels, short videos, before-after results, and makeup demos receives the highest engagement and is more effective than text posts.
5. Many consumers reported that social media advertisements, offers, and influencer promotions influence their purchase intentions and motivate them to try new products.
6. User-generated content and real customer reviews are considered more trustworthy than traditional advertisements.

7. Youth respondents (18–30 years) showed the highest involvement with cosmetic content and were most influenced by influencer marketing.
8. Social media promotions also direct consumers to online shopping platforms like Nykaa and Amazon, showing a link between digital campaigns and online buying behaviour.
9. Consumers prefer brands that stay active on social media, post regularly, and engage with followers through creative content.
10. Overall, social media acts as a key source of information for discovering new cosmetic brands, understanding product features, and making purchase decisions.

Conclusion

The present study highlights the significant role of social media campaigns in enhancing cosmetic brand awareness among consumers in Amravati City. With the rapid growth of digital platforms, social media has become an effective tool for brands to reach and engage their target audience.

The findings of the study indicate that platforms such as Instagram, Facebook, and YouTube play a crucial role in influencing consumer perceptions and purchase decisions. Among these, Instagram emerged as the most impactful platform due to its visual content and high user engagement. The study also reveals that influencer marketing and video-based content, such as reels and tutorials, are highly effective in attracting consumer attention and building trust. Young consumers, particularly in the age group of 18–25 years, are the most active users and are highly influenced by social media campaigns.

Overall, it can be concluded that social media campaigns not only increase brand awareness but also significantly affect consumer behavior and buying decisions. Therefore, cosmetic brands should strategically utilize social media platforms, creative content, and influencer collaborations to achieve better market reach and customer engagement.

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Motivational Factors Influencing Participation In The Gig Economy: An Empirical Study

Naina S. Feran, Shivani P. Manjare, Shivani G. Malokar

Shriya S. Kambale

Student*Department of Management Studies, Prof. Ram Meghe Institute of Technology & Research,
Badenra-Amravati

Dr.Pratiksha A.Kalmegh

Guide, Assistant Professor Department of Management Studies, Prof. Ram Meghe Institute of
Technology & Research, Badenra-Amravati

ABSTRACT:

The gig economy has witnessed substantial growth in recent years, reshaping the traditional labor landscape. Within this evolving work environment, gig workers, often referred to as independent contractors or freelancers, play a pivotal role in various industries. However, the unique challenges and demands faced by gig workers require a fresh perspective on employee motivation. The proliferation of the gig economy has significantly transformed the landscape of work, particularly in urban centers like Bengaluru. Gig workers, often operating in precarious conditions, face unique challenges in maintaining motivation and job satisfaction. This research paper explores the motivational strategies employed by gig workers in Bengaluru Urban, shedding light on the factors that influence their engagement and productivity. Through qualitative interviews and surveys with gig workers across various sectors, including transportation, delivery, and freelance services, this study identifies key motivational drivers and effective strategies utilized by workers and platform providers. Moreover, it examines the role of intrinsic and extrinsic motivators, such as autonomy, flexibility, financial incentives, social recognition, and career advancement opportunities, in shaping gig workers' motivation levels. Additionally, the study investigates the impact of organizational support, technology-mediated communication, and community-building initiatives on enhancing gig workers' motivation and job satisfaction. The primary objective of this research is to investigate the motivational strategies and practices adopted by Gig workers in fostering job satisfaction, engagement, and retention strategies. Findings from the research highlight the critical motivational drivers for gig workers in this city, encompassing factors such as flexible work arrangements, financial incentives, skill development opportunities, and social interaction. The study also identifies potential areas for improvement in Gig worker's motivational strategies. The findings offer valuable insights for policymakers, platform operators, and gig workers alike, emphasizing the importance of implementing tailored motivational strategies to foster a thriving gig economy ecosystem in Bengaluru Urban.

Keywords: Gig workers, Motivation, Freelancing, community-building initiatives, motivational strategies

I. INTRODUCTION

The development of the gig economy has drastically changed the employment environment in recent years. This phenomenon, characterized by flexible working arrangements and temporary employment commitments, has changed traditional ideas about working relationships and employment. In this dynamic situation, both employers and governments have expressed concern about the retention of workers in organizational frameworks. The gig economy includes a wide range of sectors and professions, including ride sharing, food delivery, freelance writing, and consulting. People in this decentralized and fluid labor market often work in short-term contracts or independent work, providing project-by-project services instead of full-time employment. This trend towards job work has called into question traditional notions of job security and work duration, requiring a rethinking of the variables that influence workers' decisions to remain within organizational structures.

In this context, understanding the motives that influence gig workers' decisions to stay in organizations is critical. Although traditional employment models often prioritize criteria such as job

stability and opportunities for professional progression, the gig economy presents a clear set of concerns that affect workers' retention decisions. Understanding the complexity of gig work and how it affects employees' motivation is essential for our investigation. Gig employment, in contrast to standard employment arrangements, gives people much freedom and versatility in terms of how, where and when they work. For gig workers who love the freedom to manage the balance between work and life and seek opportunities to complement their professional and personal objectives, autonomy to choose projects and set their own schedules can be an important retention factor.

However, in addition to the benefits of versatility, gig workers also have considerable risks and difficulties. Gig workers may choose to remain in organizational structures due to instability and uncertainty resulting from unstable employment, irregular sources of income and limited access to standard employment benefits such as medical insurance and pensions. In addition, problems with workplace culture and job satisfaction common to traditional employment environments still exist in the gig economy. Gig workers are still seeking opportunities for meaningful participation, community participation and personal fulfillment, although they may have more autonomy at work. The commitment and retention of Gig workers can be greatly influenced by the organization's ability to provide a sense of belonging, assistance and supplies and a favorable working environment.

In addition to job satisfaction and company culture, employment workers' retention decisions are influenced by the rewards they seek. Gig workers often seek non-monetary benefits such as opportunities to learn new skills, network and career development, in addition to monetary wages. The long-term retention of talents is more likely for organizations that can provide these incentives and show that they are committed to helping gig workers achieve their personal and professional goals. However, individual preferences and intentions do not dictate all interaction between organizations and workers. The dynamics of retention in the gig economy are also strongly influenced by organizational structures and policies. Gig workers' opinions about organizational support and willingness to stay can be influenced by their employer's lack of clear expectations, open communication and fair treatment.

Recognizing the complexity of these elements and how they interact, this paper conducted an extensive study to unravel the complex incentives that affect the choices of gig workers to stay within organizational structures. The aim of this study is to illuminate the dynamics of retaining in the gig economy by studying the roles of workplace culture, benefits sought, work happiness and the mediator effect of organizational structure. This study aims to contribute to organizational management practices, labor regulations, and the wider discussion of the changing nature of modern work through empirical research and theoretical analysis.

A. Rationale for the Study and Motivation

The study is based on the increasing importance of the gig economy in contemporary employment landscapes and the related challenges relating to the maintenance of gig workers in organizational structures. Research is driven by several key factors:

1. The evolution of the work: the growing gig economy fundamentally transformed traditional employment concepts and introduced new dynamics and challenges. Since gig work is increasingly common in various sectors, understanding the motivations behind the retention of gig workers in organizational frameworks is essential to adapt to this changing landscape.
2. The importance of retention: Maintaining employees at work within the organization is essential for stability, continuity and productivity. High turnover rates of gig workers can disrupt organization operations and incur costs related to recruitment, training and knowledge transfer. Therefore, it is essential to identify factors that contribute to gig workers' decisions to remain within the organizational framework in order to promote sustainable employment relationships.
3. Complexity of motivation: Motivations that promote retention of employees within organizations are multifaceted and nuanced. While factors such as job satisfaction, benefits and working culture play an important role, the interaction between individual preferences, organizational dynamics and systemic influences adds layers of complexity to the retention equation. Therefore, a comprehensive understanding of these motivations is vital to the development of effective retention strategies.
4. Methodological rigor: This study uses special purpose sampling to ensure the methodological rigor and depth of the analysis. Objective sampling allows a targeted selection of participants with specific characteristics or attributes related to research objectives, thus increasing the richness and

relevance of research results. This methodological precision is crucial to capture the different perspectives and experiences of gig workers in the gig economy.

B. Statement of the Research Problem

The research problem covered in this study is based on understanding the motivations behind the decision-making of gig workers to remain in the organizational framework of the gig economy. The gig economy is characterized by flexible working arrangements and temporary employment commitments, with individuals often working as independent contractors or freelancers on different organizations or platforms. Despite the prevalence of gig work, factors influencing the retention of gig workers must be studied within the organization's framework. Although gig work offers flexibility and autonomy, gig workers also face challenges such as job instability, a lack of benefits and limited opportunities for career progress. Understanding what motivates e-learning workers to remain in organizational contexts is essential for employers and policy makers to effectively engage and maintain this growing segment of the workforce.

The aim of this study is to uncover these motivations by investigating various factors that influence the decision-making of gig workers. This includes examining aspects such as employee satisfaction, benefits, perceptions of working culture and organizational structures. By investigating these factors, the aim of the study is to gain insight into the unique dynamics of gig work and how organizations can create environments that promote the participation and commitment of gig workers. In addition, the research problem recognizes the complex relationship between individual preferences, organizational practices and systemic factors in the gig economy. Through the exploration of these complexities, the study aims to contribute to a deeper understanding of the motivations behind the decisions of the millennial workers to remain within the organizational framework, ultimately forming organizational management practices, labor policies and industrial strategies in the evolving work landscape.

2. LERATURE REVIEW :

The gig economy has surged in prominence globally, transforming the traditional employment landscape and reshaping the nature of work in urban centers like Bengaluru. As gig workers navigate the dynamic and often precarious gig economy environment, understanding the motivational strategies that drive their engagement and satisfaction becomes imperative. This review of literature synthesizes existing research on motivational strategies for gig workers in Bengaluru Urban, shedding light on key factors influencing their motivation levels and overall well-being. Several studies have highlighted the significance of autonomy and flexibility as primary motivational drivers for gig workers (Kuek et al., 2021; Rashid et al., 2019). The ability to control their work schedule and choose tasks aligns with gig workers' desire for independence and work-life balance, contributing to higher levels of job satisfaction and motivation. Furthermore, financial incentives play a crucial role in motivating gig workers, serving as tangible rewards for their efforts and providing a sense of security amidst the uncertainty inherent in gig work (Chui et al., 2022). In addition to extrinsic motivators, intrinsic factors such as social recognition and opportunities for skill development have been identified as significant determinants of gig workers' motivation (Jain & Saxena, 2020). Platforms that facilitate peer-to-peer interactions, feedback mechanisms, and recognition programs foster a sense of belonging and community among gig workers, enhancing their motivation and engagement levels. Moreover, access to learning and advancement opportunities enables gig workers to pursue personal and professional growth, enhancing their sense of fulfillment and intrinsic motivation (Levy & Schlagwein, 2019). However, the implementation of effective motivational strategies for gig workers in Bengaluru Urban faces several challenges, including the reliance on technology mediated platforms and the lack of regulatory frameworks tailored to the gig economy context. The algorithmic nature of gig platforms, coupled with opaque performance evaluation criteria, can undermine gig workers' sense of autonomy and fairness, leading to demotivation and dissatisfaction (O'Higgins & McKnight, 2020). Furthermore, the absence of institutional support and social protection measures exacerbates gig workers' vulnerability, hindering efforts to address their motivational needs effectively. Despite these challenges, innovative approaches and initiatives have emerged to enhance the motivation and well-being of gig workers in Bengaluru Urban. For instance, some platforms have implemented transparent performance metrics, real time feedback mechanisms, and reward systems to recognize and incentivize high-performing gig workers (Kassi & Lehdonvirta, 2021). Moreover, collaborative efforts between platform operators, policymakers, and gig worker associations have led

to the development of initiatives aimed at providing access to healthcare, financial literacy programs, and social security benefits for gig workers (Lehdonvirta & Kassi, 2020). Overall, the literature on motivational strategies for gig workers in Bengaluru Urban underscores the importance of understanding the diverse needs and preferences of gig workers and designing tailored interventions to support their motivation and well-being. By leveraging both intrinsic and extrinsic motivators, addressing technological and regulatory challenges, and fostering collaborative partnerships, stakeholders can create a conducive environment that promotes the sustainable growth and resilience of the gig economy in Amravati.

Major review of literature highlights:

1 Hannah Johnstone, Chris Land- Kazlauskas. Organizing on demand: Representation, voice, collective bargaining in the gig company. Methodology Used Objectives Findings Readings, Interview.

2 Jamie Woodcock, Mark Graham. The gig economy. Building organization for gig worker. Barrier gig worker to achieve effective representation Interview Surveys.

3 Balwant Singh Mehta. Changing nature of work and gig economy. How gig economy works. Strategies that can produce a fairer platform economy. Surveys, Data collection.

4 Katie Myhill, James Richards, Kate Sang. Job quality, fair work and gig work: the lived experience of gig workers. Challenges of gig with technological change. Future policy suggestion for growth of gig economy. Global journals. Aspects of quality work. Growth in gig work reflects the normalization of what in the past would constitute poor working conditions.

3. METHODOLOGY:

3.1 Scope of the research:

The scope of this study is multifaceted and includes a variety of dimensions:

1. Demographics of gig workers: The study may include studying the demographics of gig workers, including age, gender, level of education and employment status, to understand how these factors influence retention motivations. In addition, examining differences between the gig sectors and geographical regions can provide insights into the various experiences of gig workers.

2. Motivational factors: The aim of the study is to identify and analyze key motivational factors that make working professionals stay within organizational frameworks. This includes factors such as job satisfaction, benefits desired, intrinsic motivation (e.g. autonomy, mastery, purpose), external rewards (e.g. financial rewards, career advancement opportunities), and psychological and social factors (e.g. organizational culture, social connections)

3. Organizational structures and practices: The study can examine how organizational structures, policies and practices affect the motivations of gig workers. This includes the assessment of the role of hierarchical arrangements, communication channels, decision-making processes, performance management systems and support mechanisms in the development of gig workers' experiences within organizations.

4. Mediating factors: An important aspect of the study is to study the mediator role of organizational structures in the relationship between motivation factors and employment decision-making decisions. This includes examining how organizational structures minimize the impact of job satisfaction, benefits and work culture on retention outcomes and how they shape the perception of worker employee organizational support and commitment.

5. Comparative Analysis: The study may include comparative analysis to examine differences in retention motivations across various auxiliary sectors, employment arrangements (e.g., independent contractors, freelancers, platform workers) and organizational contexts. This comparative approach can provide valuable insights into the nuances of gig work and organizational affiliation.

6. Practical implications: This study aims to produce practical insights into organizational management practices, labor policies and industry stakeholders. This includes identifying strategies to improve the satisfaction of employees, optimizing benefits packages, fostering supportive work cultures and designing organizational structures that promote retention and commitment.

7. Limitations and future research directions: Finally, the research should recognise its limitations and suggest ways of research. This includes the solution of methodological constraints, such as sample size and research design, and the recommendation of further research areas such as longitudinal

studies, cross-cultural comparisons and interventions to improve the retention of gig workers within the organizational framework.

3.2 Objective :

The research objectives to understand the motivation of gig workers to remain in organizations within the gig economy can be as follows:

1. Identifying Key Motivational Factors: Determine the main motivational factors that influence gig workers' decisions to remain in organizational frameworks, including employment satisfaction, benefits sought, intrinsic motivations and psychosocial factors.
2. To investigate organizational structures and practices: - To investigate the impact of organizational structures, policies and practices on the motivations of gig workers, including hierarchical arrangements, communication channels, decision-making processes and support mechanisms.
3. To understand the mediator role of organizational structures: To examine the mediator role of organizational structures in the relationship between motivation factors and the retention decisions of laborers, to explain how organizational structures moderate the impact of employment satisfaction, benefits sought and work culture on retention outcomes.
4. Conduct comparative analysis: Conduct comparative analysis to examine differences in retention motivations across the gig sectors, employment arrangements and organizational contexts, providing insights into the nuanced dynamics of gig work and organizational affiliation.
5. To generate practical implications: To generate actionable insights into organizational management practices, labor policies and industry stakeholders, including strategies to increase job satisfaction of gig workers, to optimize benefit packages, to promote supportive work cultures and to design organizational structures that facilitate retention and engagement.
6. Recognize the limitations and propose directions for future research: Recognize the limitations of the study and propose pathways for future research, address methodological limitations and propose areas for further research, such as longitudinal studies, cross-cultural comparisons and interventions to improve the retention of gig workers within organizational frameworks.

3.3 Research Design:

Designing a research study for electrical contractors involves defining the research objectives, selecting appropriate research methods, and planning data collection and analysis. Here's a basic research design outline for a study focused on Gig workers at Bengaluru.

3.4 Research Methods:

Data is collected based on the chosen methods. Following aspects were considered:

- Surveys: Developed a questionnaire, choose a survey platform, and defined target audience (e.g., clients, employees).
- Interviews: Prepared interview questions, selected interviewees (e.g., freelancers/contractors, clients), and scheduled interviews.
- Observations: Identified sites or projects for observation, created an observation checklist, and recorded findings.
- Data analysis: Collected relevant data from sources such as records, safety reports, or industry databases.

3.5 Data Analysis:

This involved mostly Quantitative analysis, but also Qualitative analysis Used software tools like (e.g., Excel,) for data analysis.

3.6 Data Analysis Table:

Category	Sub-category	Frequency	Percentage (%)
Age Group	Below 20	5	33%
	20–30	10	67%
Occupation	Student	12	80%

Category	Sub-category	Frequency	Percentage (%)
	Part-time employee	3	20%
Doing Gig Work	Yes	12	80%
	No	3	20%
Type of Work	Delivery services	4	27%
	Online freelancing	5	33%
	Ride sharing	1	7%
	Creative work	3	20%
	Teaching	1	7%
Motivation Level	Strongly Agree	1	7%
	Agree	9	60%
	Neutral	4	27%
	Disagree	1	7%
Duration	6 months – 1 year	7	47%
	1–3 years	5	33%
	More than 3 years	3	20%
Satisfaction	Very satisfied	2	13%
	Satisfied	10	67%
	Neutral	3	20%
Platform Used	Freelancing platforms	6	40%
	Social media	4	27%
	Delivery apps	3	20%
	Ride-sharing apps	2	13%

Category	Sub-category	Frequency	Percentage (%)
Challenges	No employee benefits	5	33%
	Income instability	3	20%
	Lack of jobs	3	20%
	High competition	2	13%
	All of the above	2	13%
Recommendation	Yes	11	73%
	Maybe	3	20%
	No	1	7%

4.FINDING ,CONCLUSION , SUGGESTION :**4.1 Findings:**

- The majority of respondents (67%) belong to the 20–30 age group, showing that gig work is more popular among young adults.
- Most respondents (80%) are students, indicating that gig work is mainly preferred for part-time income.
- Around 80% of respondents are engaged in gig work, showing high participation.
- The most common types of gig work are online freelancing (33%) and delivery services (27%).
- A large number of respondents (60%) agree that gig work is motivating, while only a few show disagreement.
- Most respondents (47%) have been working in the gig economy for 6 months to 1 year, indicating short-term involvement.
- The majority (67%) are satisfied with gig work, while very few are dissatisfied.
- Freelancing platforms and social media are the most used platforms for gig work.
- The major challenges faced include lack of employee benefits, income instability, and job insecurity.
- A significant majority (73%) would recommend gig work to others, reflecting a positive perception.

4.2 Conclusion

The study concludes that the gig economy plays an important role in providing flexible earning opportunities, especially for students and young individuals. It allows people to earn additional income without long-term commitments. Although most respondents are satisfied and motivated, the gig economy still lacks job security, stable income, and employee benefits, which are major concerns. Overall, gig work is seen as a convenient and attractive option, but it is more suitable as a supplementary source of income rather than a permanent career option.

4.3 Suggestions :

Motivational Factors Influencing Participation in the Gig Economy – An Empirical Study

- Improve Income Stability

Gig platforms should introduce minimum payment standards, bonuses, and incentives so that workers can earn stable and fair income.

- Provide Social Security Benefits

Governments and companies should provide benefits such as health insurance, accident insurance, and retirement schemes for gig workers.

- Skill Development Programs

Training programs and workshops should be organized to help gig workers improve their digital, technical, and professional skills.

- Better Work–Life Balance Policies

Gig platforms should design systems that allow workers to manage working hours effectively and avoid excessive workload.

- Transparent Payment Systems

Platforms should ensure clear and transparent payment structures so workers can understand how their earnings are calculated.

- Government Regulations and Protection

Governments should establish policies and legal frameworks to protect gig workers' rights and ensure fair working conditions.

- Technology Support and Digital Access

Companies should improve digital platforms and provide technical support to help workers easily access gig opportunities.

- Career Growth Opportunities

Gig platforms should offer opportunities for career development, certification, and long-term growth.

- Awareness Programs

Awareness campaigns should inform workers about gig economy opportunities, risks, and benefits.

- Research and Continuous Monitoring

More research should be conducted to understand workers' experiences and improve policies for the gig economy sector.

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Exposure of Social Hypocrisy in *Seven Steps Around the Fire* by Mahesh Dattani

Vilas Ukha Chavan

(Research Scholar) Vasantrao Naik College, Dharni Dist – Amravati, Maharashtra

Abstract :

Seven Steps Around the Fire by Mahesh Dattani is a true critique of social tendency, revealing so called hypocrisy towards marginalized communities, particularly, the eunuchs (hijras or third gender). The play exposes how society plays a role of double standards towards hijras. Outwardly accepts them while internally has the attitude of discrimination and exclusion. Uma Rao, deals with the case of Kamla's murder and reveals the contradictions within social institutions such as politics, law and family. The present paper uncovers the social hypocrisy through the different strata of society. It also highlights gender discrimination, societal invisibility and hypocritical society.

Keywords

Social hypocrisy, double standards, hijra community, marginalization, gender identity, political power

1. Introduction

Most of the Indian dramas reflect the issues of marginalized communities and appeals to social norms. Mahesh Dattani's *Seven Steps Around the Fire* is a landmark in this series highlighting the marginalized condition of the hijra community in India. The play revolves around the mysterious murder of Kamla, a hijra and the investigation conducted by Uma Rao. Finally Uma Rao exposes the hypocrisy of society and the real murderer of Kamla.

On the one hand Indian society claims moral superiority and on the other perpetuates injustice and discrimination. Dattani uses different techniques to expose the hypocrisy prevailed in Indian society. The overall journey of revealing the Kamla's murder case, Dattani exposes the gap between social ideals and realities, making the play a powerful social critique.

2. Concept of Social Hypocrisy:

Social hypocrisy simply means 'A wolf in sheep's clothing' or 'double faced' society. In another words society claims to believe in one thing and actually behaves differently. It is a contradiction between showing and behaving. Society claims to be culturally good but denies the rights of marginalized communities.

3. Hypocrisy in Social Attitudes towards Hijras

One of the most striking themes of *Seven Steps Around the Fire* is two faced treatment to the *hijra* communities. Hijras are invited on the auspicious occasions for our welfare. They are invited to bless us on childbirth and wedding ceremonies. But they are mocked and excluded on the other occasions. They are denied, disrespected and excluded.

Both "blessing" and "curse" for hijra community reflects deep contradictions. Dattani brings out this duality of society through the investigation of Kamla's mysterious murder and exposure of her murder.

4. Hypocrisy in Marriage and Cultural Rituals:

The title of the play itself highlights the importance of sacred seven steps around the fire during marriage ceremony that suggests the perpetual bond between the couple. Subbu, the minister's son secretly marries Kamla because hijras are denied the right to marry. The seven steps glorify the marriage but it is based on rigid gender norms excluding the third gender.

Subbu is helpless. It is unrevealed that he marries Kamla for his pleasure or he tries to show the society the human rights.

5. Political and Institutional Hypocrisy:

Dattani raises his voice against the political and legal systems. Kamla's murder case is covered up because it is concerned with the powerful minister. Even the police and other agencies try to manipulate truth to protect elites. Indian constitution provides every Indian the same rights and duties. But here the picture is different. The justice is not equal to all. The elites suppress the voice of marginalized and maintains their influence, neglecting the rules and regulations.

The character of Mr. Sharma represents political hypocrisy. As a powerful minister, he hides his son's marriage to a hijra, Kamla, to protect his public image. His involvement in Kamla's murder exposes how those in authority manipulate truth and justice to maintain social status.

Mr. Sharma represents political hypocrisy. As a powerful political minister, he tries to keep secret of Kamla's murder case. But finally truth and justice is revealed by his own son, Subbu. Suicide of Subbu is perhaps proves to be the real hypocrisy of the society.

6. Hypocrisy of Law and Justice:

Although society claims to uphold justice, plays dual roles. *Hijras* are denied legal protection. They are tortured, excluded and harassed. They are unable to claim their rights. If they try to do so, they are ignored.

Dattani raises a question. Do the marginalized groups truly have the justice? The social and legal systems appear to be neutral but functions selectively. Dattani becomes spokesperson for the unvoiced.

7. Social Invisibility and Marginalization

Marginalized communities are treated as invisible entity in the society, especially *hijras*. They exist in the society but are treated as "non-entities". *Hijras* lack their recognition, identity and dignity. This fact shows invisibility of their existence. They are only present physically but are lacking their physical importance.

Hijras are considered like 'plaything'. As a child uses a toy and throws away it after his entertainment is over. It means that *hijras* are called and invited only for our welfare on the occasion like weddings and childbirth, otherwise they are considered to be a live body without 'dignity, decency and decorum'.

8. Role of Uma Rao: Voice against Hypocrisy

Through Uma Rao, Dattani challenges the audience to confront their own complicity in social hypocrisy. Her investigation reveals hidden truths and challenges dominant narratives. Through the presentation of Uma Rao, Dattani emphasizes the importance of questioning societal norms and standing against injustice. Uma Rao serves as the moral and central character in the play. She -

1. exposes social norms and injustice.
2. has sympathy for *hijras*.
3. fights against all odds.
4. secretly reveals the secret.
5. is true voice of marginalized, particularly *hijras*.
6. brings out the hypocrisy of society .

9. Intersection of Gender, Class, and Power

Seven Steps Around the Fire focuses on gender discrimination, political power, class hierarchy, the problem of unvoiced, the marginalized status of *hijras* and so on and so forth.

10. Conclusion

Seven Steps Around the Fire is a bold exposure of the contradictions within Indian society. Dattani reveals how society:

- Pretends to uphold morality
- While perpetuating injustice and exclusion

The play ultimately calls for:

- Recognition of marginalized identities
- Equality and human dignity
- A rejection of superficial cultural values

By exposing social hypocrisy, Dattani urges society to move from **ritualistic acceptance to genuine humanity**.

Mahesh Dattani exposes the contradictions within Indian society in *Seven steps Around the Fire*. He reveals how society pretends to uphold morality, on the contrary perpetuating injustice and exclusion of *hijras*.

The play finally demands for :

1. Equality regarding gender and human dignity.
2. Recognition of marginalized identities.
3. Acceptance of social, political and legal realities.



The play denies:

1. hypocrisy in the society.
2. inequality on the basis of gender and hierarchy.
3. social injustice.

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A Study on Growth of UPI in India and Its Impact on Cash Transactions With Reference to Amravati City

Prof. Dr. Gauri S. Kalmegh¹, Vivek R. Uikey², Prajwal V. Khase³,
Aprit K. Naik⁴, Purvesh A. Khanse⁵

Email-vivekuikey19102002@gmail.com Phone +91-7057909783

Department of Management Studies-MBA Prof. Ram Meghe Institute of Technology & Research,
Badnera, Amravati, 444701, India

❖ Abstract:

Technology is changing every part of our lives today; including how we conduct our finances. Digital technology has created a major shift in India's financial landscape, with a huge change occurring because of the introduction and growth of digital payment methods such as Unified Payments Interface or UPI; which allows users to send/receive money via mobile device without needing to carry cash or use debit cards. This study will look at how quickly UPI is growing and whether that growth is having any effect on cash-based transactions in Amravati city. It is based on a descriptive research design, with primary research being done via 40 respondents using a structured questionnaire based on the five-point Likert scale. Data was then analyzed using frequency and percentage analysis methods. Results indicate that most respondents prefer to use UPI for any transactions they perform. Overall, it appears the development and implementation of UPI has resulted in decreased usage of cash and increased adoption of digital payment methods.

Keywords:UPI (Unified Payments Interface), Digital Payments, Cashless Economy, mobile Payment Applications, etc.

Introduction:

Modern economic activity is heavily determined by digital payment systems. In the past, most of the financial transactions that were made in India were done using cash. With the growth of Internet-based services, smartphones and banking technology all receiving greater levels of development; therefore, people are now beginning to use digital payment methods more frequently than they had previously. Of the many innovations created to function alongside India's digital payment system, one of the most significant is called Unified Payments Interface or "UPI". The ability to transfer funds instantly between bank accounts via mobile application was designed to help make digital transactions easier and to help speed up the transaction process while increasing security, as well. Many consumers have also begun using some other available UPI consumer-based payment methods due to a number of different UPI apps being made available for consumers to use, such as: Google Pay, Phone Pe and Paytm. These three examples of UPI-based consumer applications can also allow users to pay for goods and services that they wish to purchase, as well as pay for their monthly utility bills and to easily transfer funds from their accounts to another account as long as both parties are using Google's Pay, Phone Pe and Paytm applications. Additionally, as a function of these consumer-based applications being readily available for consumers to use, many people have begun to reduce the amount of cash used to pay for goods and services, especially in major cities. Also, as a function of this decline in the use of cash to make purchases, the Indian government has supported a number of different programs to promote digital payments and develop a cashless economy within their country.

Growth of UPI in India

UPI (Unified Payments Interface) has seen significant growth since its 2016 launch. Year-on-year, both the volume of transactions and the number of users have continued to increase at an exponential rate. Its ease of providing instant payments via mobile apps allows customers to easily link their bank accounts to their phones and use that connection to send money from one person to another across India through UPI payment methods has made UPI one of India's most popular forms of electronic payments used by people throughout all demographics. As word spread out about using UPI for payment purposes, more and more businesses across India have adopted the use of UPI to facilitate electronic commerce through UPI payments, thus creating a significant increase in the number of people using UPI.

Impact on Cash Transactions

The Rise of Digital Payment Methods, the increasing use of UPI has greatly diminished the need for cash transactions. Digital payments are now more desirable to individuals than physical cash (for example, they offer such speed, safety and convenience). Numerous establishments in cities such as Amravati—Retailers, Restaurants and Service Providers—will process digital payments using a QR code. The change from cash to digital payments provides greater accountability and improved efficiency for financial transactions.

❖ Review of Literature:

Prior research has consistently demonstrated how critical a role digital payment system play in today's economies. Through their analysis of digital payments and the positive influence on efficiency and the elimination of cash; researchers have shown that studies have also demonstrated that fast-growing payment systems like 'UPI' (by virtue of the fact these systems have a very user-friendly interface as well as a very quick ability to send money) allow an exponential number of people in India to begin using digital payments as a payment method.

Smartphones and the Internet have also played an incredibly significant role in helping increase the demand for digital payments; these two factors have increased people's digital payments significantly and have made it possible for people to use them significantly.

❖ Research Methodology:

1) Research Design: This research study uses a quantitative descriptive analysis to look at how the growth of UPI has increased cash transactions in Amravati city. 2) Sample and Sample Size: The sample for this study was 40 people. The respondents were students, shop owners, and employees who use digital payment apps regularly. 3) Research Instruments: The researcher used a closed-ended questionnaire to collect data for this study. To measure responses to the questions, the researcher used a 5-point Likert scale (1 = Strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly Disagree). 4) Data Analysis: The researchers will analyze the collected data by using basic statistical techniques like percentage distribution and frequency distribution in order to analyze their responses.

❖ Research Problem:

Due to rapid advancements in digital technology, India has seen a transformation in its financial landscape over the last few years. In particular, the introduction of the Unified Payments Interface (UPI) has greatly improved digital transactions through mobile applications by allowing users to send money instantly. As more and more people are using smartphones, have access to the internet, and are utilizing digital payment apps, there has been an increase in the number of people making seamless digital payments — moving away from the traditional use of cash. Although UPI has grown, it is still unclear how effectively UPI has been able to reduce the cash dependency of its user base. While many people utilize UPI because of its speed, convenience and security, there remains a considerable segment of the user population that prefers cash to complete everyday transactions. Issues such as lack of awareness, poor digital literacy, distrust, network problems, resistance to changing to digital payment channels or just habit may contribute to people's preference for cash. Furthermore, there are significant differences in how UPI has been accepted and how it has impacted traditional payment behaviors between urban and semi urban cities such as Amravati. Therefore, it is necessary to examine the actual extent of adoption and influence of UPI on user behavior.

❖ Objectives of the Study:

The following are the objectives of the research project:

- 1) Research the functioning of UPI (Unified Payment Interface) and how it works;
- 2) Determine how many UPI payments were made over the past year in India;
- 3) Determine how UPI (Unified Payment Interface) has affected India's cash economy;
- 4) Determine how much the citizens of Amravati know about UPI Payment System;
- 5) Identify the advantages and disadvantages of using a payment system such as UPI (Unified Payment Interface);
- 6) Recommend ways to increase the number of users of the digital payment system.

The universe of this study consists of all residents of Amravati city that have used or heard of UPI and digital-pays. A sample was taken from this larger universe.

The sample size and design are detailed below.

❖ Sampling Design:

Researchers selected a descriptive research design for their study which investigates the effect of Unified Payments Interface (UPI) expansion on cash transaction volume. The study investigates how a particular group of Amravati city residents handle their payments through digital payment applications. The study contains 40 respondents who come from various groups such as students, shopkeepers, and working professionals. The researchers used a structured questionnaire as their primary research instrument to assess respondent attitudes by using a 5-point Likert scale. It included options from "Strongly Agree" to "Strongly Disagree." The research analyzed Amravati resident payment option changes by using frequency and percentage statistical methods.

❖ Sampling Method:

Non-probability sampling method (convenience sampling) was utilized, which means our respondents were selected according to ease of availability and accessibility. When selecting our sample, we were limited by our lack of time or resources.

❖ Sample Size of Respondents:

Number of samples collected for the study: 40

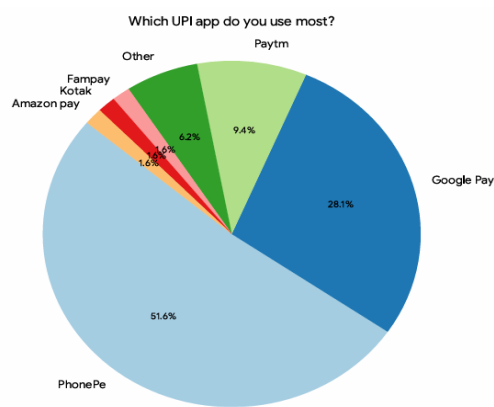
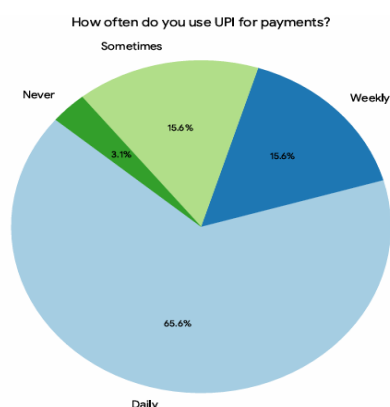
The number of samples collected for the study is adequate to represent all the categories of users of UPI.

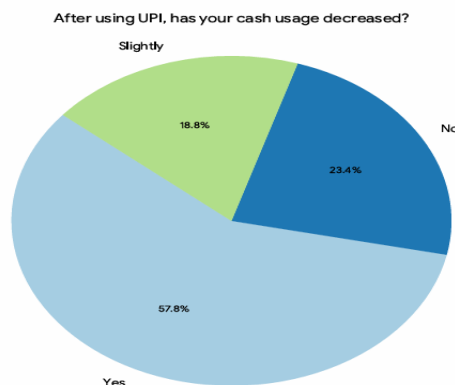
❖ Sources of Data Collected for the Study

- The sources of data collected are:
- Primary method of data collection
- Structured Questionnaire
- Record of every 'Response' on a five-point Likert Scale ranging from 'Strongly Agree' to 'Strongly Disagree'
- This method of data collection was adopted to correctly collect the data from the users.

❖ Types of Data Analysis

The data analysis methods that have been adopted to analyze the data presented are: Statistical Analysis, Percentage Analysis - to know the extent of response by the users, Frequency Distribution - to know the number of times the users are responding. This helps in assessing the user preferences, knowledge, and behaviors regarding the use of UPI.

❖ Data Analysis & Interpretation:



❖ Findings:

All surveyed participants know of and use DPA/UPI as a means of electronically making purchases. The majority of individuals who transact using UPI do so more frequently than other methods of payment. Individuals from different user groups (i.e. students, vendors and professionals) utilize UPI to complete transactions. One reason why a substantial number of people use UPI is for the fast rate of transaction and ease of use. UPI transactions take much less time to complete than cash transactions do. UPI has also enabled customers of local businesses to use UPI to pay for goods/services at their local businesses via QR codes. UPI's use has also substantially reduced the number of cash transactions that occur in a given period of time. Digital payments add additional layers of transparency and efficiency into each individual transaction; as well as creating a sense of community through the use of a digital payment option for people-to-people payments; as well as creating additional levels of visibility into the history of an individual transaction. The introduction of smart phones and the increasing number of individuals who now have access to the internet have led to increased UPI payments. The growth of UPI has not been without challenges and issues for many users, such as limited internet access; technology issues; limited familiarity with how digital payments work. Overall, UPI will continue to positively impact the movement towards a cashless economy in India.

❖ Suggestions:

- Encouraging Awareness - Conducting campaigns and workshops to help educate consumers about how UPI works and what advantages there are for using it.
- Increasing Digital Literacy - Providing basic digital skills training, particularly to people in rural areas or who have difficulty using technology, will help them learn how to use UPI effectively.
- Strengthening Security - Making improvements in security measures would aid in developing confidence with people who use UPI while also reducing concerns over theft or fraud.
- Increasing Network Infrastructure - Improving internet connection capability will allow for uninterrupted transactions.
- Encouraging Small Business Owners to Consider UPI - Encouraging local merchants (e.g., small grocery store owners or street vendors) to adopt UPI by providing incentives to do so.
- Providing User Friendly Applications - Providing easy-to-use applications for mobile payment systems allows for a more straightforward process and better understanding of how to use mobile payment systems.
- Providing Excellent Customer Support Services - Implementing effective support services are vital for resolving transaction issues in a timely manner.
- Continued Government Support for Digital Payment Methods - The government should continue its plan to actively promote and provide incentives for use of digital payment methods.

❖ CONCLUSION:

The findings from this study indicate that the UPI (Unified Payments Interface) provides a complete overhaul of the current digital payment system in India. The UPI allows users to conduct financial transactions quickly and efficiently while also providing many advantages that will allow users who are not comfortable with cash to use this mode of payment.



Since using UPI has increased the use of non-cash transactions, both in India at large and specifically in cities such as Amravati, there is a strong correlation between improved transparency and increased efficiency in all forms of financial transactions through the use of UPI. While the benefits of UPI are well documented, there is still a need to address several issues, including a lack of knowledge and skills related to the internet, inability or lack of experience using the internet with mobile phones, poor quality of internet service, etc.

In summary, UPI is positioned to play a significant role as India transitions to a cashless society. In addition, based on past performance and further improvements to UPI as well as continued support from the government, it is projected that UPI will continue to experience growth well beyond the current levels.

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Technology, Memory, and the Fragmented Self: A Study of Digital Consciousness in Haruki Murakami's Fiction

Prof. Shantanu K. Panbude

(Research Scholar)

Abstract

This paper examines the intricate relationship between technology, memory, and identity in the fiction of Haruki Murakami, with particular attention to how his narratives anticipate and reflect forms of digital consciousness. Murakami's works, often situated at the intersection of realism and surrealism, portray characters whose identities are fragmented, mediated, and reconstructed through systems that resemble contemporary digital environments. Drawing on theories of postmodern subjectivity, media studies, and memory studies, this paper argues that Murakami's fiction constructs a proto-digital consciousness—one that is decentralized, recursive, and shaped by technological metaphors.

Keynote - Core Concepts: Digital Consciousness, Fragmented Self, Identity Crisis, Postmodern Subjectivity, Hyperreality, Simulation. Technology-Related Terms: Data Processing, Artificial Consciousness, Virtual Reality, Digital Identity, Networked Systems, Algorithmic Thinking, Cybernetic Mind. Memory Studies-Externalized Memory, Digital Memory, Memory Erasure, Archive Culture, Collective Memory, Temporal Dislocation. Narrative & Literary Terms-Magical Realism, Surrealism, Parallel Narratives, Non-linear Narrative, Metafiction, Intertextuality. Philosophical & Theoretical Terms-Posthumanism, Ontology of Self, Decentered Subject, Baudrillardian Simulation, Jamesonian Postmodernism. Murakami-Specific Themes Parallel Worlds, Shadow, and Self: Dream vs Reality, Existential Isolation, and Absurdity. Digital Culture Parallel Database Self, Online Persona, Multiplicity of Identity, Virtual Existence, Networked Reality

Introduction

The late twentieth and early twenty-first centuries have witnessed a profound transformation in human consciousness due to the proliferation of digital technologies. Concepts such as virtual identity, data memory, and networked existence have redefined traditional understandings of the self. Long before the full emergence of the digital age, Haruki Murakami's fiction explored similar themes through surreal, metafictional, and technologically inflected narratives.

Murakami's novels such as *Hard-Boiled Wonderland and the End of the World*, *Kafka on the Shore*, and *1Q84* present characters who navigate parallel realities, fragmented memories, and disembodied identities. These narrative structures resonate strongly with contemporary theories of digital consciousness, where the self is no longer unified but dispersed across multiple platforms and mediated experiences.

This paper seeks to analyze how Murakami's fiction anticipates digital modes of being by exploring three central concerns: the technologization of memory, the fragmentation of identity, and the emergence of a networked or distributed consciousness.

Theoretical Framework

The question of subjectivity in the late twentieth and early twenty-first centuries has been profoundly reshaped by the intellectual interventions of postmodern theory. The stable, unified, and autonomous self that once underpinned Enlightenment humanism has been decisively challenged by thinkers such as Jean Baudrillard and Fredric Jameson, who argue that in the conditions of late capitalism, identity is no longer grounded in interior depth or authenticity but is instead constituted through systems of signs, simulations, and cultural codes. Baudrillard's notion of hyperreality suggests that contemporary life is increasingly mediated by representations that precede and determine the real, thereby dissolving the distinction between reality and its simulation. Jameson, similarly, characterizes postmodern subjectivity through fragmentation, depthlessness, and the waning of affect, where individuals no longer experience themselves as coherent beings but as dispersed across discontinuous intensities.

Within this theoretical context, the fiction of Haruki Murakami offers a particularly compelling literary articulation of postmodern subjectivity. Murakami's protagonists are frequently

marked by a sense of detachment, emotional neutrality, and ontological uncertainty. They do not conform to the traditional realist model of character development; rather, they exist as fragmented selves navigating layered and often contradictory realities. Their identities are not discovered through introspection but are instead assembled and reassembled through their interactions with shifting narrative environments. In this sense, Murakami's characters exemplify the postmodern condition of the decentered subject, whose sense of self is contingent, unstable, and perpetually in flux.

Closely related to this reconfiguration of subjectivity is the transformation of memory in the age of media and technology. Traditionally understood as an internal, psychological process tied to personal experience, memory has increasingly become externalized through technological systems such as digital archives, databases, and networks. The work of theorists like Maurice Halbwachs and Jan Assmann has already established that memory is socially mediated; however, contemporary developments extend this mediation into the technological realm, where memory is no longer simply remembered but stored, retrieved, and manipulated. In such a context, remembering becomes less an act of recollection and more a process of accessing external systems, while forgetting is no longer organic but subject to technological control.

Murakami's narratives anticipate and dramatize this shift by treating memory as a mutable and often unstable construct. In his works, memory can be erased, altered, or transferred, and personal history frequently appears fragmented or unreliable. Identity, consequently, becomes dependent on access to memory, suggesting that the loss or manipulation of memory entails a corresponding loss or transformation of the self. This conceptualization aligns with the idea of prosthetic memory, wherein memory exists outside the body and is mediated by external systems. Murakami thus reimagines memory not as a repository of lived experience but as an informational structure subject to intervention and reconfiguration.

This reconceptualization of memory is closely tied to what may be described as digital consciousness, a mode of awareness shaped by the logic of computational systems. Digital consciousness is characterized by non-linearity, multiplicity, and the capacity for parallel processing, all of which challenge traditional notions of linear temporality and unified perception. Although Murakami does not always explicitly depict digital technologies, his narrative structures frequently mirror the logic of computation. His novels often employ parallel storylines, recursive loops, and abrupt shifts between different ontological planes, thereby creating a reading experience that resembles navigating a digital interface. Meaning in these texts is not presented sequentially but distributed across multiple narrative threads, requiring the reader to actively assemble connections.

A particularly striking example of this dynamic can be found in *Hard-Boiled Wonderland* and *The End of the World*, where Murakami explicitly engages with the technologization of consciousness. The protagonist functions as a "Calcutec," a human data processor whose mind is used for encryption, effectively transforming cognition into computational labor. This literalization of the mind as a processing device anticipates contemporary concerns about cognitive outsourcing and the commodification of mental processes. The novel's dual narrative structure, which alternates between the technologically saturated "Hard-Boiled Wonderland" and the surreal, dreamlike "End of the World," can be read as analogous to dual-processing systems in computing. In this framework, memory is not merely a recollection of past events but a programmable entity, subject to control and manipulation. The removal of shadows in the "End of the World" symbolizes the erasure of memory and, by extension, the dissolution of identity, underscoring the inseparability of selfhood and mnemonic continuity.

A similar concern with the instability of memory is evident in *Kafka on the Shore*, where memory operates outside the constraints of linear temporality. Characters experience temporal dislocation, memory loss, and metaphysical connections that transcend conventional logic, suggesting a model of consciousness that is associative rather than sequential. Memory in this text functions as a network, linking disparate individuals and events across time and space. This networked conception of memory reflects broader shifts in contemporary culture, where information is organized not chronologically but relationally, emphasizing connections over continuity.

The fragmentation of the self in Murakami's fiction can also be understood through the lens of digital culture, particularly the notion of the "database self." In digital environments, identity is composed of discrete pieces of information that can be rearranged, updated, or deleted, rather than a

coherent narrative unfolding over time. This concept finds a powerful literary expression in *1Q84*, where the existence of parallel worlds produces multiple versions of reality and, consequently, multiple configurations of identity. The protagonists, Aomame and Tengo, navigate these overlapping realities, revealing the extent to which identity is contingent upon context and perspective. The self in this framework is not singular but multiple, not fixed but mutable, resembling a database that can be continually modified.

Murakami's narrative worlds further extend this logic through their networked and distributed structure. In *The Wind-Up Bird Chronicle*, for instance, the protagonist Toru Okada becomes entangled in a complex web of stories, histories, and psychological states that extend far beyond his immediate experience. These interconnected narratives function as nodes within a larger system, where meaning emerges from the relationships between elements rather than from any single, centralized perspective. Such a structure challenges the traditional notion of a unified consciousness, proposing instead a distributed model in which subjectivity arises from connections and interactions. This mirrors the architecture of digital networks, where information is decentralized yet interconnected, and where the flow of data takes precedence over any fixed center.

Finally, Murakami's stylistic choices reinforce his engagement with what may be termed proto-digital aesthetics. His use of repetition and looping structures resembles iterative computational processes, while his reliance on parallel narratives evokes the logic of multi-threading. The blending of the mundane with the surreal produces a sense of hyperreality in which the boundaries between the real and the virtual become indistinct, echoing Baudrillard's account of simulation. Moreover, the absence of clear resolutions in many of his works reflects the open-ended nature of digital systems, where processes are ongoing and narratives remain perpetually unfinished.

In synthesizing these elements, it becomes evident that Murakami's fiction not only reflects postmodern conditions but also anticipates the emergence of digital modes of thought and experience. His work can thus be understood as articulating a form of proto-digital postmodernism, in which memory is externalized, identity is fragmented, and consciousness is distributed across networks. Rather than presenting a coherent and unified vision of reality, Murakami constructs narrative environments that require active engagement, mirroring the complexity and indeterminacy of contemporary digital culture.

Conclusion

Haruki Murakami's fiction offers a compelling exploration of themes that are central to contemporary discussions of digital consciousness. Through his depiction of fragmented identities, externalized memory, and networked realities, Murakami anticipates the ways in which technology reshapes human subjectivity.

This study demonstrates that Murakami's narratives are not merely surreal or fantastical but are deeply engaged with the cultural and technological transformations of the modern world. His work provides a valuable framework for understanding the complexities of identity and consciousness in the digital age.

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The Impact of the National Education Policy 2020 on Financial Literacy and Cyber Fraud Awareness in Higher Education

Sumit D.Meshram

Research Student Research centre in Commerce Management Vidhya bharti Mahavidhyalaya
Amravati

Dr.S.K.Rodde

Research Guide Research centre in Commerce Management Vidhya bharti Mahavidhyalaya
Amravati

1. Abstract

The National Education Policy (NEP) 2020 marks a significant shift in India's educational framework, emphasizing skill-based, multidisciplinary, and experiential learning. In an era of rapid digitalization, financial literacy and cyber fraud awareness have become essential competencies for students, particularly in higher education. This research paper explores the impact of NEP 2020 on enhancing financial literacy and cyber fraud awareness among students. The study examines how the policy's focus on practical education, digital learning, and critical thinking contributes to improved financial decision-making and reduced vulnerability to cyber fraud. It also highlights challenges in implementation and suggests measures to strengthen the integration of financial and cyber education in academic curricula. The findings indicate that NEP 2020 has strong potential to equip students with essential financial and digital skills, though its success depends on effective execution and institutional support.

2. Keywords

National Education Policy, Financial Literacy, Cyber Fraud Awareness, Digital Literacy, Cyber security, Online Fraud Prevention, Student Awareness.

3. Introduction

The rapid advancement of technology and the increasing use of digital financial systems have transformed the way individuals manage money. Online banking, digital payments, and fintech platforms have become integral parts of everyday life. However, this transformation has also led to a rise in cyber frauds such as phishing, identity theft, and online scams. Students in higher education are particularly vulnerable due to their frequent use of digital platforms and limited practical financial knowledge.

Financial literacy refers to the ability to understand and effectively use financial skills, including personal financial management, budgeting, investing, and risk assessment. Cyber fraud awareness, on the other hand, involves understanding potential online threats and adopting preventive measures to safeguard personal and financial information.

The National Education Policy 2020 aims to modernize India's education system by promoting holistic development, critical thinking, and skill-based learning. It emphasizes digital literacy, vocational education, and multidisciplinary approaches, making it highly relevant for addressing issues related to financial literacy and cyber awareness.

This research paper analyses the role of NEP 2020 in enhancing these competencies among students in higher education and evaluates its overall impact.

4. Literature Review

1. Government of India (2020) in "*National Education Policy 2020*" stated that the policy emphasizes holistic, multidisciplinary, and skill-based education, which includes financial literacy as an essential life skill. It explains that integrating practical knowledge such as financial management into higher education can improve students' decision-making abilities and economic awareness.

2. Devi S (2025) in "*Integrating Financial Education into NEP 2020: A Framework for Fostering Economic Resilience*" stated that incorporating financial education into the curriculum enhances students' financial knowledge and prepares them to handle real-life financial situations effectively. The study explains that NEP 2020 provides a structured opportunity to embed financial literacy across disciplines.

3. Bianchi M (2024) in *“Is Financial Literacy a Protection Tool from Online Fraud in the Digital Era?”* stated that individuals with higher financial literacy are less likely to fall victim to online fraud. The paper explains that financial knowledge helps individuals identify suspicious financial activities and make informed decisions in digital environments.

4. Engels C, Kumar K, & Philip D (2020) in *“Financial Literacy and Fraud Detection”* stated that financial literacy significantly improves an individual’s ability to detect fraudulent schemes. The study explains that people with better financial knowledge are more cautious and analytical when dealing with financial transactions.

5. Pelawi R Y, Tandelilin E, Lantara I W N, & Junarsin E (2025) in *“Empowered to Detect: How Vigilance and Financial Literacy Shield Against Financial Fraud”* stated that financial literacy combined with vigilance plays a crucial role in reducing fraud vulnerability. The study explains that individuals who are financially aware are more capable of recognizing fraudulent patterns and avoiding scams.

6. Trivedi P S & Suresh Rao S (2026) in *“Financial Fraud Prevention: Role of Knowledge and Awareness”* stated that awareness and education are key factors in preventing financial fraud. The paper explains that individuals with proper knowledge are less likely to be deceived by fraudulent schemes.

5. Objectives of the Study

The primary objectives of this research are:

- To examine the role of NEP 2020 in promoting financial literacy in higher education
- To analyse the importance of cyber fraud awareness among students
- To explore the relationship between financial literacy and cyber fraud prevention
- To identify challenges in implementing NEP-based financial education
- To suggest measures for improving financial and cyber awareness among students

6. Research Methodology

This study is based on secondary data analysis, drawing information from academic journals, research papers, policy documents, and online resources related to NEP 2020, financial literacy, and cyber fraud awareness.

Data Sources:

- Government reports and NEP 2020 document
- Research articles from academic databases
- Publications on financial literacy and cyber security
- Reports from financial institutions and educational bodies

Method:

- Analytical and descriptive approach
- Comparative analysis of existing literature
- Interpretation of trends and findings

7. NEP 2020 and Financial Literacy

The National Education Policy 2020 introduces several reforms that directly and indirectly promote financial literacy.

Key Features Supporting Financial Literacy:

- **Multidisciplinary Education:** Students can combine subjects such as economics, commerce, and technology, gaining broader financial knowledge.
- **Skill-Based Learning:** Focus on practical skills such as financial planning, entrepreneurship, and investment awareness.
- **Vocational Education:** Encourages real-world skills including financial management.
- **Experiential Learning:** Promotes learning through real-life examples, case studies, and simulations.

Financial Literacy Components Encouraged:

- Budgeting and saving habits
- Understanding banking systems
- Investment and risk management
- Credit and debt management

- Tax awareness

These elements help students develop a strong financial foundation, enabling them to make informed decisions in their personal and professional lives.

8. Cyber Fraud Awareness in Higher Education

Cyber fraud has emerged as a major concern in the digital age. With increasing reliance on online transactions, students are exposed to various forms of cyber threats.

Common Types of Cyber Fraud:

- Phishing emails and fake links
- Online shopping scams
- Identity theft
- Fake investment schemes
- Social media fraud

Students often lack awareness about these threats, making them easy targets.

Role of NEP 2020 in Cyber Awareness:

While NEP 2020 does not explicitly focus on cyber fraud, it promotes:

- Digital literacy
- Technology-based education
- Critical thinking and problem-solving

These competencies indirectly contribute to better cyber awareness.

Educational institutions are also encouraged to adopt digital tools, which creates opportunities to integrate cyber security education into curricula.

9. Relationship Between Financial Literacy and Cyber Fraud Awareness

There is a strong interconnection between financial literacy and cyber fraud awareness.

Key Relationships:

- Financially literate individuals are more cautious in financial transactions
- They can identify suspicious offers and fraudulent schemes
- They understand risks associated with digital platforms
- They are less likely to fall victim to scams

However, some studies suggest that overconfidence in financial knowledge can sometimes increase risk-taking behaviour. Therefore, balanced education is essential.

Overall, improving financial literacy acts as a protective mechanism against cyber fraud.

Impact of NEP 2020 on Higher Education

The implementation of NEP 2020 has brought significant changes to higher education.

Positive Impacts:

- **Enhanced Practical Knowledge**

Students gain real-world financial skills through experiential learning.

- **Improved Digital Literacy**

Increased use of technology enhances awareness of online risks.

- **Critical Thinking Development**

Students learn to analyze financial decisions and identify fraud.

- **Increased Employability**

Financial and digital skills improve job readiness.

- **Entrepreneurship Promotion**

Encourages students to manage finances effectively in business ventures.

10. Limitations:

- Uneven implementation across institutions
- Lack of trained faculty
- Limited focus on cyber security topics
- Insufficient practical exposure in some areas

11. Challenges in Implementation

Despite its potential, NEP 2020 faces several challenges:

- **Curriculum Integration Issues**

Financial literacy is not uniformly included in all courses.

- **Lack of Standardized Content**

Absence of structured modules for financial and cyber education.

- **Digital Divide**

Students from rural areas may lack access to digital tools.

- **Faculty Training**

Teachers may not have adequate knowledge of financial or cyber topics.

- **Low Awareness Levels**

Students may not recognize the importance of financial literacy.

Suggestions and Recommendations

To enhance the impact of NEP 2020, the following measures are recommended:

Academic Measures:

- Introduce compulsory financial literacy courses
- Include cyber security modules in all programs
- Develop standardized curriculum frameworks

Institutional Measures:

- Conduct workshops on financial and cyber awareness
- Collaborate with banks and fintech companies
- Use simulations and case studies for practical learning

Policy Measures:

- Provide training programs for teachers
- Promote digital inclusion initiatives
- Monitor and evaluate implementation

Student-Level Measures:

- Encourage self-learning through online resources
- Promote responsible digital behaviour
- Increase participation in awareness programs

12. Conclusion

The National Education Policy 2020 has the potential to significantly improve financial literacy and cyber fraud awareness among students in higher education. By emphasizing skill-based learning, digital education, and critical thinking, the policy creates a strong foundation for developing essential life skills.

Financial literacy empowers students to make informed decisions, while cyber awareness protects them from online threats. Together, these competencies contribute to individual well-being and economic stability.

However, the success of NEP 2020 depends on effective implementation, curriculum integration, and continuous efforts by educational institutions and policymakers. Strengthening financial and cyber education will not only benefit students but also contribute to a safer and more financially aware society.

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Real- Time AI-Based Medical Image Analysis for Early Disease Detection Using Soft Computing and Edge Computing

Asst. Prof. Aaliya Parween Aleem Khan

Swami Vivekananda College of Management, Science & Arts, Warud

E-mail: aaliyakhan2998@gmail.com

Abstract:

Medical image analysis is essential for identifying diseases at an early stage and supporting effective clinical decisions. Traditional systems rely heavily on cloud-based processing, which introduces latency and limits real-time applicability. This paper proposes a real-time medical image analysis framework integrating Artificial Intelligence (AI), Soft Computing techniques, and Edge Computing. The proposed system processes medical images locally using lightweight deep learning models optimized through soft computing methods such as fuzzy logic and genetic algorithms. Edge computing helps minimize delays, improves the protection of sensitive data, and supports quicker diagnostic processes. Edge computing helps minimize delays, improves the protection of sensitive data, and supports quicker diagnostic processes. Experimental analysis based on standard datasets demonstrates improved performance in terms of processing time and accuracy. The proposed approach is suitable for deployment in resource-constrained and remote healthcare environments.

Keywords:

Medical Image Processing, Edge Computing, Soft Computing, Real-Time Systems, Deep Learning, Disease Detection.

1. Introduction:

Medical imaging techniques such as MRI, CT scans, and X-rays are widely used for diagnosing diseases like cancer, pneumonia, and neurological disorders [1]. The manual interpretation of these images can be time-intensive and may result in human errors [2]. Artificial Intelligence (AI), especially deep learning techniques, has contributed to making medical image analysis more efficient and reliable [1][2]. Convolutional Neural Networks (CNNs) are especially effective in recognizing complex patterns in medical images [4]. However, many AI-based systems rely on cloud computing, which can introduce delays due to data transmission and processing latency [3]. Edge computing addresses this limitation by processing data closer to the source, enabling faster analysis and reducing dependence on network connectivity [5]. In addition, soft computing techniques such as fuzzy logic and genetic algorithms improve system performance by handling uncertainty and optimizing model parameters [2]. Therefore, integrating AI, soft computing, and edge computing can significantly enhance early disease detection systems.

2. Literature Review:

Recent studies highlight the importance of edge-AI systems in healthcare. Xu et al. introduced edge-enabled deep learning approaches for medical diagnosis, showing improvements in processing speed and overall system performance [1]. Devi et al. discussed the role of soft computing techniques in biomedical imaging, emphasizing their ability to manage uncertainty in complex datasets [2]. Memon et al. developed an edge computing framework for brain MRI analysis, achieving faster processing compared to cloud-based systems [3]. These studies indicate the growing importance of combining AI, soft computing, and edge computing in healthcare applications.

3. Proposed System Architecture:

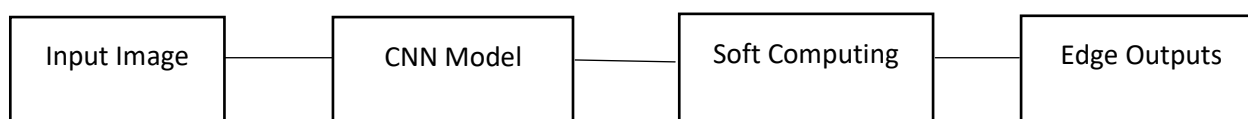


Figure: Proposed Edge-AI Based Medical Image Analysis Architecture

The proposed system architecture consists of four major components: input medical image acquisition, feature extraction using CNN models, optimization using soft computing techniques, and real-time processing on edge devices. This architecture reduces latency and improves diagnostic efficiency by enabling local processing of medical images [1][3].

4. Methodology:

4.1 Image Acquisition: Medical images are obtained from publicly available datasets such as MRI and X-ray datasets [4].

4.2 Preprocessing: Image preprocessing techniques such as filtering and normalization are applied to improve image quality [2].

4.3 Feature Extraction: CNN models are used to extract features from images for disease classification [4].

4.4 Soft Computing Optimization: Fuzzy logic and genetic algorithms optimize classification accuracy and handle uncertainty [2].

4.5 Edge Deployment: The refined model is implemented on edge devices to support real-time data processing [3].

5. Flowchart of Proposed System:

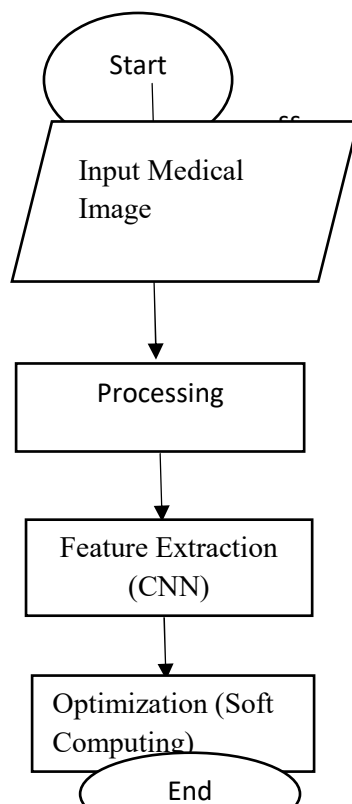
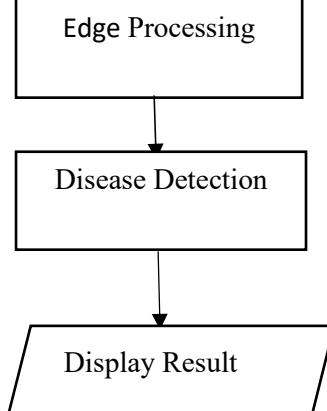


Figure: Flowchart of Proposed Medical Image- Based Disease Detection



6. Dataset Used:

Dataset	Type	Application
Brain MRI Dataset	MRI	Tumor Detection
Chest X-ray Dataset	X-ray	Pneumonia Detection
LIDC-IDRI	CT	Lung Cancer Detection

These datasets are widely used in medical imaging research [4][6].

7. Experimental Results:**7.1 Performance Evaluation Metrics:**

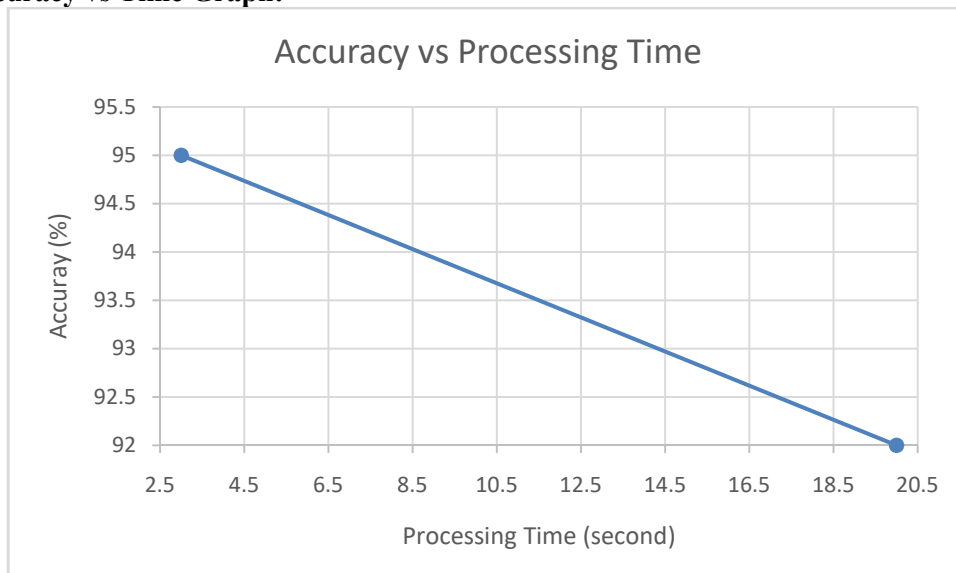
- Accuracy
- Precision
- Recall
- F1-score
- Processing Time

7.2 Results Representation:

The outcomes are presented in a tabular format to clearly compare the performance of the proposed model.

Model	Accuracy	Processing Time
CNN (Cloud)	92%	20 sec
Proposed Edge-AI	95%	3 sec

The proposed model improves both accuracy and processing speed [1][3].

7.3: Accuracy vs Time Graph:

- Higher accuracy at lower processing time
- Slight drop in accuracy as time increases

8. Numerical Example:

Image size = 20 MB = 160 Mb

Bandwidth = 10 Mbps

Transmission time = $160 / 10 = 16$ seconds

Total cloud delay $\approx$ 20–25 seconds [3]
Edge processing time $\approx$ 2–3 seconds [1]

9. Comparison Table:

Feature	Cloud System	Edge-AI System
Latency	High	Low
Privacy	Moderate	High
Speed	Slow	Fast

Edge computing reduces latency significantly [1][3].

10. Research Gap:

Most existing systems rely on cloud-based processing, which limits real-time performance and increases latency [3].

There is limited integration of soft computing with deep learning models in medical imaging systems [2].

Additionally, real-time deployment on edge devices remains a challenging task due to resource constraints [5].

11. Advantages of Proposed System:

- Real-time disease detection
- Reduced latency
- Improved data privacy
- Better performance in remote areas
- Optimized accuracy using soft computing

12. Conclusion:

This paper presented a real-time medical image analysis system using AI, soft computing, and edge computing. The proposed framework reduces latency, enhances privacy, and improves diagnostic accuracy. Combining soft computing methods with AI models helps improve overall system efficiency and performance. The system is particularly useful in remote healthcare environments where real-time decision-making is critical. Future work will focus on multi-disease detection and explainable AI integration [1][2].

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Analytical Study of Artificial Intelligence in 21st Century Indian Science With Special Reference to Chemistry

Akshay P. Dhurve

Student Shri GurudeoAdhyapakVidhyalayGurukunj Aashram (Mozri)

akshaydhurve22@gmail.com

Abstract:

AI in Precise, accurate, specific and analytical methods are develop and valide for estimation of process and numerous impurities of Paracetamol. Day by day AI is develop and fastly grow on pharmaceutical industries. AI (GC-MS) method is direct, requiring minimal sample preparation and made use of the total ion current detection. Finally, the proposed method was found accurate and precise, thus making them convenient for quality purposes.

Keywords: Artificial intelligence, Gas Chromatography & Mass Spectrometry (GC-MS), drug discovery (Paracetamol),

1. Introduction

The 21st century is witness the rapid integration of Artificial Intelligence into scientific research across the globe. In India, AI is a transformative force in areas such as healthcare, agriculture, and particularly chemistry. Solutions in Gas Chromatography-Mass Spectrometry (GC-MS) spectral libraries help researchers to positively identify trace metabolites and compounds during routine toxicology, crime scene analysis, or medical research. Complete untargeted or targeted analysis with the seamless integration of one or many of the available general or specialized mass spectral libraries covering all leading chemical fields. Many methods are available in literature assay to analyzed chemicals or drug samples etc. but Artificial Intelligence (AI) through sample analyzed easy, fast processes and save the time. GC-MS is rapidly work and sample detection and rapidly results declare. Paracetamol in diverse types of samples including pharmaceutical preparation. Paracetamol in different kinds of pharmaceutical preparations, rapid and sensitive methods for paracetamol are investigate.

2. Artificial Intelligence (AI) in Indian Scientific Research

Artificial Intelligence (AI) is emerge as one of the most transformative technologies of the 21st Century, reshaping industries, economies and societies worldwide. It's the potential to revolutionize the drug discovery process, offering improve efficiency, accuracy, and speed. The use of data augmentation, explainable AI, and the integration of AI with traditional experimental methods, as well as the potential advantages of AI in pharmaceutical research, are also discusse. Highlights the potential of AI in drug discovery and provides insights into the challenges and opportunities for realizing its potential in this field.

3. Instrumentation:

The GC-MS study is conduct use in Shimadzu GCMS QP2020 plus gas chromatograph and with mass selective detector. The injection volume is 2 μ L, and the mass spectral scan rate is 2.50 scans per second. The GC is operate in split less mode with a carrier gas helium, flow rate at 1.5 mL/min, and a column head pressure of 10 psi. The mass spectrometer is operate on the electron impact (EI) mode using an ionization voltage of 70 eV and a source temperature of 240°C. The GC injector is maintain at 250°C and the transfer line at 280°C. The temperature program used consisted of an initial temperature hold at 60°C for 2 min, ramped up to 240°C at a rate of 10°C/min follow by a hold at 250°C for 24 min. The mass spectra report is obtain by background subtraction and are the average of at least five scans. The chromatographic separations are carried out on a 30 m $\times$ 0.32 mm-ID column coated with 1.8 μ m 100% Rtx-624.

3.1. General procedures:

GC-MS paracetamol stock solutions is prepare in methanol. The working solutions is prepare by dilution of the stock solutions with methanol to reach concentration ranges 4-24 ppm for paracetamol. Injections are made for each concentration and chromatograph under the previously

describe GC conditions. The peak area obtained from GC method is plotted against the corresponding concentrations to obtain the calibration graphs.

3.2. Assay of tablets:

A total of six tablets samples from six different manufacturers from Indian market are weighed and finely powdered. Methanol (60 mL) is added to a quantity of the powder tablet equivalent to 100 mg paracetamol, stirred for 10 min, and then filtered into a 100 mL calibrated flask. Methanol and wash are added to the filter and diluted the volume of methanol. Tablet solution diluted with methanol to final concentrations within the ranges and then treated as under procedures for GC–MS method. Solutions of paracetamol are evaluated at room temperature up to 24 hours. The freshly prepared solution are injected and then kept at room temperature.

3.3. Accuracy:

The accuracy of an analytical procedure expresses the closeness of agreement between the value which is accepted either as a conventional true value or an accepted reference value and the value found and this is sometimes termed trueness. The method is applied to drug sample and accuracy of the method is determined to calculate recovery of paracetamol at 80%, 100% and 120% level of label claim.

4. RESULTS AND DISCUSSION:

Mass spectrum of paracetamol (Fig-1) is characterized by base peak at m/z 109 formed by hydrogen transfer from methyl group of the acetyl moiety to the ionized nitrogen followed by α -cleavage. Subsequent rearrangement followed by the loss of the formaldehyde radical results in the formation of the more stable conjugated cyclopentadienylidene ammonium cation at m/z 80. Ionization of the amide oxygen followed by α -cleavage gives the CH_3CO cation at m/z 43. Structure of the paracetamol fragmentation ions are shown in Fig-1. Further proof of the suggested pathways are possible after the preparation of paracetamol. The mass spectrum in Fig-1 shows the analogous peaks at 110, 81 and 46 respectively.

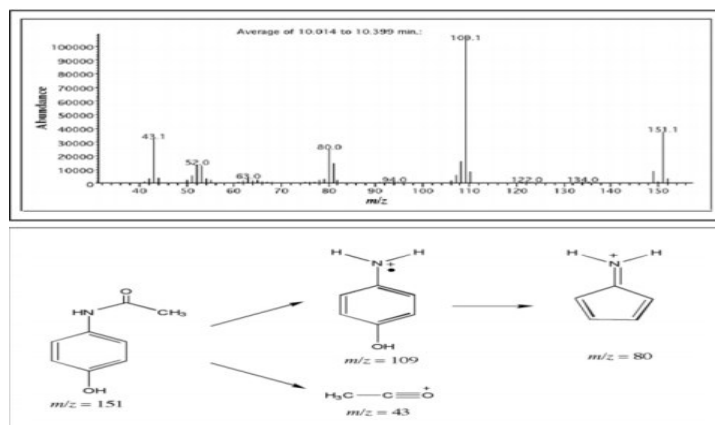


Fig-1: Mass spectrum of paracetamol standard and fragmentation pattern of paracetamol

4.1. Specificity:

Fig-1 and **Fig-2**, the retention time of paracetamol are 10.90 minutes respectively, it's found that there is no interference at the retention time of 4-aminophenol and paracetamol from any of the blank and hence the proposed method is specific for the determination of 4-aminophenol and paracetamol.

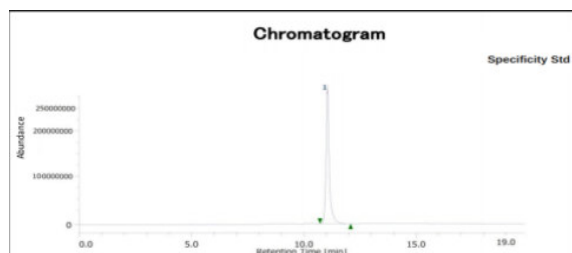


Fig-2: GC-MS chromatograms of paracetamol standard sample

4.2. Linearity (Working range):

This experiment is conducted to demonstrate the working range over which the response of the detector is linear with respect to the concentration of paracetamol. A series of standard solutions of varying concentrations ranging from 4.07–24.42 ppm were prepared.

Table-1: Preparation of paracetamol and linearity data standard for linearity

Linearity Solution Level	Vol. Stock solution mL	Diluted to (mL)	Conc. ppm	Replications	Peak Area Counts	Means Area
L1	0.4	20	4.07	R1	38443124	38449952
				R2	38456781	
L2	0.8	20	8.14	R1	92886248	92737731
				R2	92589214	
L3	1.2	20	12.21	R1	154594963	154610376
				R2	154625789	
L4	1.6	20	16.28	R1	209772496	209813570
				R2	209854644	
L5	2	20	20.35	R1	260746802	260873584
				R2	261000365	
L6	2.4	20	24.42	R1	318438939	314667280
				R2	310895621	

4.3. Stock Solution Stability:

The results of tablets in Table-2, it can be seen that the percentage difference is not more than 2.0% indicate that the result is obtained after the specific storage temperatures are comparable with the initial results. It can be concluded that the solutions are stable for 24h at room temperature.

Table -2: Standard solution stability at 0,12 and 24 hrs

Inj. No	Interval	Area (uv)	Mean Area (uv)	Mean % Content	Rel Diff (%)
1	0 hr	260742456	260998796.7	99.74	NA
2		261002456			
3		261251478			
1	12 hr	260507933	260430944.7	99.52	0.22
2		260769952			
3		260014949			
1	24 hr	260014748	260013364.7	99.36	0.38
2		260014235			
3		260011111			

4.4. Injection Repeatability:

The percentage relative standard deviation for all the above parameters is below 2.0. The low values of standard deviation and coefficient of variation indicate good repeatability. It also indicates the satisfactory performance of the system and system suitability for the Method.

Table -3: Precision injection repeatability for paracetamol tablet formulations.

Sample No.	Conc in ppm	Area (mv)	% Content
Sample 1	20.32	263751151	100.82
Sample 2	20.36	262762541	100.24
Sample 3	20.42	261749875	99.56
Sample 4	20.4	261745690	99.66
Sample 5	20.3	260751151	99.77
Sample 6	20.4	261751169	99.66
Average	NA	NA	99.95
STDEV	NA	NA	0.49
% RSD	NA	NA	0.49

4.5. Accuracy (Recovery Experiment):

The accuracy experiment is conducted to the standard addition method in terms of percentage recovery. It is performed by fortifying three known concentrations of sample into three solutions at different levels and assay for active ingredient content. Known amounts of pure standard are added to the paracetamol tablet formulation sample at three levels and accuracy in terms of percentage recovery is determined from the amount found versus added or fortified. The percentage recovery for the fortification of paracetamol tablet formulation should be in the range of 98-102%. Result of accuracy of paracetamol tablet formulation is tabulated in Table IV. The percent recovery of the added standard are found to be between 99.62 –100.19 % and with the overall % mean recovery of 99.88. This indicates that the method is free from either positive or negative interferences from the blank. From the above result, it is found that the recovery data of the analyte is within the limit and hence the proposed method is accurate.

Table-4: Accuracy data of paracetamol

Level (%)	Sample Weight (in mg)	Conc. (in ppm)	Area (uv)	% Recovery	% Mean Recovery
80_1	16.02	10.02	204915789	100.25	99.83
80_2	16.15	10.15	204795461	99.38	
80_3	16.06	10.06	204615789	99.85	
100_1	20.05	20.05	256435690	100.23	100.19
100_2	20.14	20.14	256356978	99.76	
100_3	19.98	19.98	256445680	100.59	
120_1	24.31	30.31	310789561	100.19	99.62
120_2	24.47	30.47	310756980	99.53	
120_3	24.56	30.56	310659874	99.13	
Overall % Recovery				99.88	
Overall STDEV				0.48	
Overall % RSD				0.48	

4.6. AI in Gas Chromatography & Mass Spectrometry (GC-MS) Analysis of paracetamol tablet Formulation:

A five Tablets samples from five different manufacturers from the Indian market such as Wellonapharma, Schwitz Biotech, Bhumi Pharmaceuticals, Lifevision Healthcare and Medlab Pharmaceuticals Private Limited etc. are weight and finely powder. Methanol is added to the quantity of the powder tablets equivalent to 20 mg, stirrer for 10 min, then filtered. A liquid of the tablets solutions are diluted with Methanol to obtain final concentrations within the previously mentioned ranges and then treated as under the procedures for GC-MS Method. The developed chromatographic methods are applied for the assay of the paracetamol in their combined pharmaceutical formulation. Table-V shows the results obtained for the proposed method as well as the reference derivative spectrophotometric method. Results show good precision and accuracy as indicated from % recovery, SD, and RSD (%) values. No interfering peaks are observed in the GC chromatograms of the tablets. Results obtained by the developed methods were statistically compared with those of the previously published derivative spectrophotometric method using single factor analysis of variance test, which is considered a useful statistical tool for comparison of recovery data obtained from proposed method. The calculated assay values, indicating that, no 4-aminophenol impurity is detected in the five different samples from market tablet formulations.

Table-5: Analysis of paracetamol tablet formulation

Sample No	Sample Weight (in mg)	Conc. (in ppm)	Area (mv)	% Assay	% Metformin	Mass Balance
Wellona Pharma	20.12	20.12	255446581	99.50	0.000	99.50
Schwitz Biotech	20.14	20.14	256457891	99.80	0.000	99.80

Bhumi Pharmaceuticals	20.19	20.19	257465899	99.94	0.000	99.94
Lifevision Healthcare	20.09	20.09	254266478	99.19	0.000	99.19
Medlab Pharmaceuticals Private Limited	20.11	20.11	256458794	99.94	0.000	99.94

Examples of AI tools used in drug discovery

Tools	Details	Website URL
DeepChem	MLP model that uses a python-based AI system to find a suitable candidate in drug discovery	https://github.com/deepchem/deepchem
AlphaFold	Predicts 3D structures of proteins	https://deepmind.com/blog/alphafold
Computer	Helps to report procedure for chemical synthesis in standardized format	https://zenodo.org/record

5. Conclusion

AI method is validation study simple, rapid and selectively GC-MS procedures were established for the simultaneous determination of 4-aminophenol in paracetamol commercially available tablets. AI in GC-MS method is direct requiring minimal sample preparation and made use of the total ion current detection. Finally, the proposed method is found accurate and precise, thus making them convenient for quality purposes.

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Impact And Research Of Artificial Intelligence (Ai), Machine Learning, Data Science, And Computer Science & Engineering In Higher Education

Amber Kamala Kanti

Assistant Professor, Degree College of Physical Education, Amravati

Jiwan Chettri & Rohit (MPed scholars)

Research Scholar, Degree College of Physical Education, Amravati

ABSTRACT

The primary purpose of this research is to analyze the transformative impact and research implications of Artificial Intelligence (AI), Machine Learning (ML), Data Science, and Computer Science & Engineering in higher education. The rapid development of Artificial Intelligence (AI), Machine Learning (ML), Data Science, and Computer Science & Engineering has significantly transformed higher education. These technologies are reshaping teaching methodologies, research practices, student evaluation systems, and administrative operations in universities and colleges. AI-driven tools enable personalized learning, automated assessments, predictive analytics, and intelligent tutoring systems (Holmes, Bialik, & Fadel, 2019). Machine Learning algorithms help analyze student performance and improve decision-making processes (Goodfellow, Bengio, & Courville, 2016). Data Science enhances academic research by enabling large-scale data analysis (Witten, Frank, & Hall, 2016). Meanwhile, Computer Science & Engineering provides the technical foundation for innovation and digital infrastructure. However, the integration of these technologies also presents challenges such as data privacy concerns, ethical issues, high implementation costs, and the need for skilled professionals. This paper explores the impact, benefits, challenges, and future scope of AI and related technologies in higher education.

Keywords: *Artificial Intelligence, Machine Learning, Data Science, Higher Education, Educational Technology, Personalized Learning, Predictive Analytics.*

INTRODUCTION

In the 21st century, technological advancement has become a driving force behind educational transformation. Higher education institutions are increasingly adopting digital technologies to improve learning outcomes and administrative efficiency. Fields such as Artificial Intelligence (AI), Machine Learning (ML), Data Science, and Computer Science & Engineering are playing a crucial role in this transformation. AI refers to systems that can perform tasks that typically require human intelligence, such as decision-making, problem-solving, and language understanding (Russell & Norvig, 2021). Machine Learning, a subset of AI, enables systems to learn from data and improve over time without explicit programming (Goodfellow et al., 2016). Data Science involves extracting meaningful insights from structured and unstructured data (Witten et al., 2016). Computer Science & Engineering focuses on designing and developing computing systems and software.

The purpose of this research paper is to analyze the impact of these technologies on higher education and explore their benefits, challenges, and future implications.

OBJECTIVES OF THE STUDY

- To examine the role of AI, ML, and Data Science in higher education.
- To analyze the impact of these technologies on teaching and learning.
- To identify challenges in implementation.
- To explore future opportunities in educational institutions.

LITERATURE REVIEW

Various researchers have highlighted the transformative role of AI in education. Studies suggest that AI-based intelligent tutoring systems improve student engagement and academic performance (Holmes et al., 2019). Machine Learning models are used to predict student dropout rates and identify learning gaps (Goodfellow et al., 2016).

Research also shows that Data Science contributes significantly to academic research by analyzing large datasets efficiently (Witten et al., 2016). Universities worldwide are integrating AI-driven chatbots for student support and automated grading systems to reduce faculty workload.

However, scholars also emphasize ethical concerns, including data privacy, algorithm bias, and reduced human interaction in classrooms (Russell & Norvig, 2021).

IMPACT OF AI, ML, DATA SCIENCE, AND CSE IN HIGHER EDUCATION

The rapid advancement of Artificial Intelligence (AI), Machine Learning (ML), Data Science, and Computer Science & Engineering (CSE) has significantly transformed the landscape of higher education. These technologies have introduced innovative teaching methods, improved research capabilities, and enhanced administrative efficiency in universities and colleges. Artificial Intelligence enables the development of intelligent tutoring systems, automated grading tools, and adaptive learning platforms that provide personalized educational experiences to students based on their learning patterns and performance levels. According to Holmes, Bialik, and Fadel (2019), AI-powered educational technologies can analyze large volumes of student data and provide tailored feedback, thereby improving learning outcomes and student engagement. Similarly, Machine Learning algorithms are widely used to predict student performance, detect learning difficulties, and assist institutions in making data-driven decisions to improve academic success rates (Goodfellow, Bengio, & Courville, 2016). Data Science plays an essential role in higher education by enabling large-scale data analysis, supporting evidence-based research, and improving institutional management through predictive analytics and learning analytics (Witten, Frank, & Hall, 2016). Moreover, Computer Science & Engineering provides the technical infrastructure required to develop digital learning platforms, cloud computing systems, and advanced research technologies that support modern academic environments. The integration of these technologies has also facilitated online learning, virtual classrooms, and digital collaboration among researchers across the globe. However, despite these benefits, the adoption of AI and related technologies also raises concerns regarding data privacy, ethical use of algorithms, and the need for skilled professionals to manage complex digital systems. Therefore, higher education institutions must adopt responsible strategies and invest in technological infrastructure and faculty training to maximize the benefits of these emerging technologies while addressing their potential challenges.

CHALLENGES

Data Privacy and Security Handling large amounts of student data increases the risk of data breaches (Russell & Norvig, 2021). High Implementation Cost Advanced AI systems require significant investment in infrastructure and training. Lack of Skilled Professionals Institutions may face difficulties in finding qualified faculty and technical experts. Ethical Concerns Algorithm bias and over-reliance on automation may negatively impact fairness and human interaction (Holmes et al., 2019).

FUTURE SCOPE

The future of higher education will likely involve deeper integration of AI technologies. Virtual reality classrooms, AI mentors, and real-time performance analytics may become standard practices. Universities must develop ethical guidelines and invest in skill development to maximize benefits (Russell & Norvig, 2021).

CONCLUSION

In conclusion, the rapid advancement of technologies such as Artificial Intelligence, Machine Learning, Data Science, and Computer Science & Engineering has brought a significant transformation to the landscape of higher education. These technologies have reshaped teaching and learning methodologies by enabling personalized learning environments, intelligent tutoring systems, and automated evaluation mechanisms that enhance the overall academic experience for students. The integration of Artificial Intelligence tools allows educators to analyze student learning patterns, provide adaptive learning content, and improve academic outcomes through data-driven decision-making. Similarly, Machine Learning algorithms help institutions predict student performance, identify at-risk learners, and implement early intervention strategies to improve student success rates. Data Science further strengthens academic research by enabling the analysis of large datasets, supporting evidence-based research, and fostering interdisciplinary collaboration across different academic domains. Meanwhile, Computer Science & Engineering provides the technical infrastructure necessary to develop innovative digital platforms, cloud-based learning systems, and advanced research technologies that support modern educational environments.



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The Role of Flash Discounts and Countdown Timers in Stimulating Impulse Purchases on E-Commerce Platforms: An Empirical Study of Consumers Using Amazon and Flipkart

Prof. Dr. Pratiksha A. Kalmegh¹, Ashish S. Belsare², Govind G. Kakani³, Rohan S. Bhandare⁴, Gajanan N. Chudhari⁵

Email- belsareashish4@gmail.com

Phone-+91-7219481439.

Department of Management Studies-MBA

Prof. Ram Meghe Institute of Technology & Research, Bandera, Amravati, 444701, India

❖ Abstract:

The rapid rise of e-commerce in India has transformed consumer buying behaviour, with platforms such as Amazon and Flipkart leveraging psychological pricing strategies like flash discounts and countdown timers to trigger impulse purchases. This study investigates the extent to which these strategies influence consumer impulse buying behaviours. It is based on a descriptive research design, with primary data collected from sixty respondents through a structured questionnaire based on a five-point Likert scale. Data was analysed using frequency and percentage analysis methods. Results indicate that 80% of respondents admitted to making unplanned purchases when exposed to flash sale notifications and countdown timers. Overall, it appears that urgency-inducing promotional tactics are highly effective in stimulating impulsive buying behaviours on digital platforms.

Keywords: Flash Discounts, Countdown Timers, Impulse Purchase, E-Commerce, Amazon, Flipkart, Consumer Behaviour, Scarcity Marketing.

❖ Introduction:

The emergence of e-commerce as a dominant force in the retail landscape has fundamentally altered the way consumers shop. India, with its rapidly growing internet user base and widespread smartphone penetration, has witnessed exponential growth in online shopping platforms like Amazon and Flipkart. These platforms continuously design and deploy a variety of marketing tactics aimed at influencing consumer purchasing decisions in real time. Among the most commonly employed strategies are flash discounts and countdown timers, which are designed to induce a sense of urgency and scarcity in the consumer's mind.

Impulse purchasing, defined as an unplanned purchase made without deliberate consideration, has become a central concern for both marketers and consumer behaviours researchers. Flash sales, typically limited time offers with steep discounts, and countdown timers that visually display the time remaining for a deal, are specifically engineered to create psychological pressure on shoppers, pushing them to make quick, unplanned decisions.

This study explores how these digital marketing tactics affect consumer impulse buying behaviours, particularly in the context of two dominant e-commerce platforms in India: Amazon and Flipkart. The study provides empirical evidence drawn from consumers residing in and around Amravati city.

• Flash Discounts and Their Role in E-Commerce

Flash discounts are time-limited price reductions offered by e-commerce platforms for a specific set of products, typically lasting anywhere from a few minutes to a few hours. Platforms like Amazon and Flipkart regularly organize large-scale flash sale events — such as Amazon's Great Indian Festival and Flipkart's Big Billion Days — which attract millions of shoppers. These events are strategically designed to drive high volumes of purchases within a short window by offering deep discounts that are difficult to resist.

• Countdown Timers and Urgency Creation

Countdown timers are prominently displayed visual elements on e-commerce product pages and promotional banners that show the remaining time for a deal. These timers work on the psychological principle of scarcity — the idea that a product or offer is available for a limited time creates a

heightened desire to act immediately. Research has consistently shown that time pressure reduces deliberative thinking and increases the likelihood of unplanned purchases.

❖ **Review of Literature:**

Prior research has consistently demonstrated the powerful influence of urgency-based marketing strategies on consumer impulse purchasing behaviours. Rook (1987) defined impulse buying as a sudden, compelling urge to buy something immediately, without prior planning. Subsequent research confirmed that environmental stimuli, particularly promotional cues, are powerful triggers of such behaviours.

Verhagen and van Dolen (2011) found that hedonic value and visual stimuli on e-commerce websites significantly contribute to impulse buying intentions. The role of scarcity messages, as explored by Ku, Kuo, Yang, and Kuo (2012), showed that scarcity appeals significantly elevate perceived value and purchase urgency among online consumers. More recently, Jain, Khan, and Bhatt (2022) studied the Indian e-commerce context and found that limited-time deals on platforms such as Amazon and Flipkart consistently triggered unplanned purchases among a large segment of online shoppers.

Studies by Dawson and Kim (2009) confirmed that website design elements including promotional banners, pop-up alerts, and timer features play a critical role in shaping the impulse purchase environment. Together, these findings underscore the importance of studying time-limited promotional tactics in the Indian digital consumer space.

❖ **Research Methodology:**

1) Research Design: This research study uses a quantitative descriptive analysis to examine the role of flash discounts and countdown timers in stimulating impulse purchases among consumers using Amazon and Flipkart.

2) Sample and Sample Size: The sample for this study consisted of sixty respondents from Amravati city. The respondents were students, working professionals, and homemakers who shop online extensively using Amazon or Flipkart.

3) Research Instruments: The researcher used a structured closed-ended Google Form questionnaire to collect data. To measure responses, the researcher used a 5-point Likert scale (1 = Strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly Disagree).

4) Data Analysis: The collected data was analysed using basic statistical techniques like percentage distribution and frequency distribution in order to interpret consumer responses and identify impulse buying patterns.

❖ **Research Problem:**

E-commerce platforms in India increasingly rely on behavioural economics-based tactics such as flash discounts and countdown timers to boost sales and revenue. While these strategies are visibly popular and commercially effective, their psychological impact on consumers — particularly regarding unplanned or impulse purchases — requires empirical investigation. Despite the widespread use of urgency-based promotions, limited academic research in the Indian context has examined whether these tactics genuinely alter consumer behaviours. Furthermore, there are significant differences in how consumers in semi-urban cities such as Amravati perceive and respond to these promotional tactics. Therefore, it is necessary to examine the actual extent of their adoption and influence on consumer buying behaviours.

❖ **Objectives of the Study:**

The following are the objectives of the research project:

- 1) To understand the concept of flash discounts and countdown timers as marketing tools used by e-commerce platforms.
- 2) To examine the frequency with which consumers on Amazon and Flipkart encounter flash sales and countdown timers.
- 3) To determine whether flash discounts and countdown timers trigger impulse purchasing behaviours among consumers.
- 4) To assess psychological factors such as urgency and scarcity that influence unplanned buying decisions.
- 5) To identify demographic differences in consumer susceptibility to impulse buying triggered by these tactics.

- 6) To recommend strategies for consumers to make more informed and rational purchasing decisions online.

The universe of this study consists of all residents of Amravati city who have used or heard of Amazon and Flipkart. A sample was taken from this larger universe. The sample size and design are detailed below.

❖ **Sampling Design:**

Researchers selected a descriptive research design for their study which investigates the effect of flash discounts and countdown timers on consumer impulse purchasing behaviours. The study investigates how a particular group of Amravati city residents handle their purchases through online shopping applications. The study contains sixty respondents who come from various groups such as students, working professionals, and homemakers. The researchers used a structured Google Form questionnaire as their primary research instrument to assess respondent attitudes using a 5-point Likert scale. It included options from "Strongly Agree" to "Strongly Disagree." The research analysed consumer behaviours by using frequency and percentage statistical methods.

❖ **Sampling Method:**

Non-probability sampling method (convenience sampling) was utilized, which means our respondents were selected according to ease of availability and accessibility through a Google Form survey shared digitally. When selecting our sample, we were limited by our lack of time or resources.

❖ **Sample Size of Respondents:**

Number of samples collected for the study: sixty. The number of samples collected for the study is adequate to represent all the categories of users of Amazon and Flipkart.

❖ **Sources of Data Collected for the Study**

- The sources of data collected are:
- Primary method of data collection
- Structured Google Form Questionnaire
- Record of every 'Response' on a five-point Likert Scale ranging from 'Strongly Agree' to 'Strongly Disagree.'
- This method of data collection was adopted to correctly collect the data from the online shoppers.

❖ **Types of Data Analysis**

The data analysis methods that have been adopted to analyse the data presented are: Statistical Analysis, **Percentage Analysis** - to know the extent of response by the users, **Frequency Distribution** - to know the number of times the users are responding. This helps in assessing the user preferences, knowledge, and behaviours regarding impulse buying due to flash discounts and countdown timers.

❖ **Data Analysis & Interpretation:**

Table 1: Age Group of Respondents

Age Group	No. of Respondents	Percentage (%)
18-25 Years	53	88.33%
25-35 Years	7	11.67%
Total	60	100%

Interpretation: The majority of respondents (88.33%) belong to the 18-25 age group, indicating that younger consumers are the primary users of e-commerce platforms and are more frequently exposed to flash discounts and countdown timers.

Table 2: Gender of Respondents

Gender	No. of Respondents	Percentage (%)
Female	34	56.67%
Male	26	43.33%
Total	60	100%

Interpretation: Female respondents constitute 56.67% of the sample, while male respondents account for 43.33%, suggesting a slightly higher participation of female online shoppers in this study.

Table 3: How Often Do You Shop Online?

Response	No. of Respondents	Percentage (%)
Sometimes	36	60.00%
Frequently	24	40.00%
Total	60	100%

Interpretation: 60% of respondents shop online sometimes, while 40% shop frequently. This shows that a sizeable portion of consumers are regularly exposed to promotional tactics used by e-commerce platforms.

Table 4: Which Online Shopping Platform Do You Use Most?

Platform	No. of Respondents	Percentage (%)
Amazon	19	31.67%
Flipkart	19	31.67%
Both	17	28.33%
Other	5	8.33%
Total	60	100%

Interpretation: Amazon and Flipkart are equally preferred platforms (31.67% each), with 28.33% using both. This confirms that both platforms are equally significant in terms of consumer engagement and exposure to promotional strategies.

Table 5: Have You Ever Purchased a Product During Flash Sales?

Response	No. of Respondents	Percentage (%)
Yes	48	80.00%
No	12	20.00%
Total	60	100%

Interpretation: A significant 80% of respondents confirmed that they have purchased products during flash sales. This strongly indicates that flash sales are a highly effective strategy in driving actual purchases on e-commerce platforms.

Table 6: Do Flash Discounts Influence Your Purchase Decision?

Response	No. of Respondents	Percentage (%)
Strongly Agree	5	8.33%
Agree	38	63.33%
Neutral	14	23.33%
Disagree	3	5.00%
Strongly Disagree	0	0.00%
Total	60	100%

Interpretation: A combined 71.66% of respondents agreed or strongly agreed that flash discounts influence their purchase decision. Only 5% disagreed, confirming the strong persuasive power of flash discount strategies on consumer buying behaviours.

Table 7: Do Countdown Timers Create Urgency While Shopping Online?

Response	No. of Respondents	Percentage (%)
Strongly Agree	7	11.67%
Agree	34	56.67%
Neutral	12	20.00%
Disagree	7	11.67%
Strongly Disagree	0	0.00%
Total	60	100%

Interpretation: Over 68.34% of respondents agreed that countdown timers create a sense of urgency while shopping online. This validates that time-sensitive display features are effective in accelerating purchasing decisions among consumers.

Table 8: Have You Ever Bought a Product That You Did Not Plan to Buy Earlier?

Response	No. of Respondents	Percentage (%)
Yes	50	83.33%
No	10	16.67%
Total	60	100%

Interpretation: An overwhelming 83.33% of respondents admitted to making at least one unplanned purchase. This finding is a direct indicator of impulse buying behaviours triggered by flash sales and countdown timers on e-commerce platforms.

Table 9: Do Limited-Time Offers Make Online Shopping More Exciting?

Response	No. of Respondents	Percentage (%)
Strongly Agree	14	23.33%
Agree	29	48.33%
Neutral	17	28.33%

Response	No. of Respondents	Percentage (%)
Disagree	0	0.00%
Strongly Disagree	0	0.00%
Total	60	100%

Interpretation: A combined 71.66% of respondents agreed that limited time offers make online shopping more exciting. Not a single respondent disagreed, indicating that time-sensitive promotions positively enhance the overall shopping experience and increase purchase intent.

Table 10: What Is the Main Reason for Impulse Buying During Flash Sales?

Reason	No. of Respondents	Percentage (%)
Attractive Discounts	29	48.33%
Limited Time Offers	19	31.67%
Fear of Missing Out (FOMO)	10	16.67%
Product Popularity	2	3.33%
Total	60	100%

Interpretation: The primary reason cited for impulse buying during flash sales was attractive discounts (48.33%), followed by limited time offers (31.67%), and fear of missing out i.e., FOMO (16.67%). These findings confirm that price appeal and urgency are the two most dominant psychological triggers for impulse purchases in the online shopping context.

❖ **Findings:**

- All surveyed participants are aware of and use Amazon and/or Flipkart as their primary online shopping platform.
- An overwhelming majority of respondents (80%) acknowledged making at least one purchase during a flash sale on Amazon or Flipkart.
- Countdown timers were found to be highly effective in creating a sense of urgency, with over 68% of respondents confirming that timers influenced their decision to purchase immediately.
- 83.33% of respondents reported making unplanned purchases, directly confirming impulse buying behaviours triggered by promotional tactics.
- Younger respondents (18-25 years) constituted 88.33% of the sample and were found to be most susceptible to impulse purchasing triggered by flash discounts and countdown timers.
- Attractive discounts (48.33%) and limited time offers (31.67%) were identified as the top two reasons for impulse buying, indicating that price and urgency are the dominant triggers.
- Amazon and Flipkart are equally preferred platforms, with 28.33% of respondents actively using both, confirming widespread exposure to flash sale promotions.
- Overall, flash discounts and countdown timers will continue to positively impact e-commerce sales in India as digital shopping adoption grows.

❖ **Suggestions:**

- Encouraging Consumer Awareness - Conducting campaigns and workshops to help educate consumers about how flash discounts and countdown timers work and how to make rational purchase decisions.
- Wish-List Practice - Encourage consumers to add products to their wish list 24 hours before purchasing to reduce unplanned and impulsive buying decisions.
- Price Comparison - Consumers should be encouraged to use price comparison websites to verify whether a flash discount genuinely represents a good deal before purchasing.
- Budget Discipline - Setting a monthly online shopping budget can help consumers avoid overspending during flash sale events.

- Platform Transparency - E-commerce platforms should provide clearer price history data so consumers can evaluate the true value of a flash discount.
- Increasing Digital Literacy - Providing digital skills training to help consumers understand behavioural marketing tactics used by online retailers.
- Strengthening Consumer Protection - Regulatory bodies should establish guidelines for the ethical use of countdown timers and flash deals to prevent misleading consumers.
- Continued Government Support - The government should actively promote programs that protect consumers from manipulative digital marketing practices.

❖ **Conclusion:**

The findings from this study indicate that flash discounts and countdown timers used by e-commerce platforms such as Amazon and Flipkart have a significant and direct impact on consumer impulse buying behaviours. These urgency-inducing marketing strategies influence consumer decision-making by leveraging powerful psychological triggers such as scarcity, fear of missing out, and time pressure. Since the use of flash promotions has increased impulse purchases, particularly among the 18-25 age group in Amravati city, there is a strong need to address consumer awareness.

While the commercial benefits of these strategies for e-commerce businesses are well documented, there is still a need to address several issues, including consumer impulsivity, financial overspending, and lack of awareness about the psychological mechanisms behind these promotions. In summary, flash discounts and countdown timers are positioned to play a significant role in India's growing e-commerce landscape, and based on the study's findings, it is projected that their influence on impulse buying will continue to increase as online shopping adoption deepens across the country.

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Nesting Ecology and Habitat Preferences of *Apis* Species in an Urban Landscape: A Case Study of Amravati, Maharashtra, India

Bodkhe A.K.^{1*}, Rane V. L.², Dhote J.D.³

^{1*} P.G. Student, Department of Zoology, Shri Shivaji Science College, Amravati.

² Research scholar, Department of Zoology, Shri Shivaji Science College, Amravati.

³ Proffesor & Head, Department of Zoology, Shri Shivaji Science College, Amravati.

Corresponding Author:

Rane V. L.

e-mail- vivekrane000@gmail.com Mob No.- 8888249716

Abstract

This study investigates the nesting ecology and habitat preferences of *Apis* species in the urban landscape of Amravati, Maharashtra, India. Field surveys, GPS mapping, and photographic documentation were conducted across diverse habitats, including urban, semiurban, and peri-urban areas. A total of five bee species—*Apis dorsata*, *Apis florea*, *Apis cerana*, *Apis mellifera*, and *Tetragonulairidipennis*—were recorded with varying nesting strategies and habitat associations. Among these, *Apis dorsata* was the most dominant species, preferring elevated open nesting sites such as tall trees and buildings, indicating strong adaptation to urban environments. In contrast, *Apis cerana* and *Tetragonulairidipennis* exhibited cavity-nesting behavior in tree hollows and wall crevices, while *Apis florea* preferred low-height vegetation in gardens and shrubs. *Apis mellifera* showed minimal presence due to its dependence on managed hives. The study highlights the influence of urbanization, habitat structure, and disturbance levels on species distribution and nesting behavior. These findings provide important insights for pollinator conservation, urban biodiversity management, and sustainable apiculture practices in rapidly developing cities.

Keywords: *Apis* species, nesting habitat, Amravati, Maharashtra, cavity-nesting bees, apiculture

Introduction

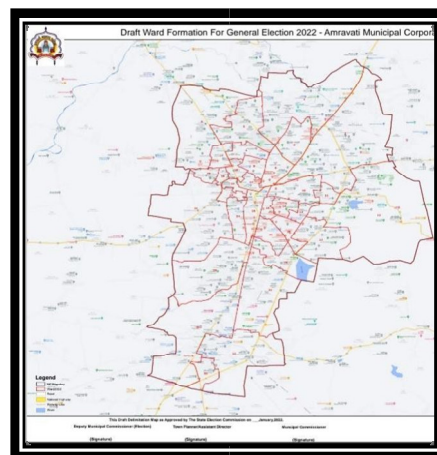
Bees are very important for our environment specially the developing city like Amravati Maharashtra for the greenery in city, as bees promotes the greenery in environment. As reference to the world around 70 percent flowering plants are reproduce by pollinators, from which bees are the main pollinators for plants like mustard, cotton, and fruits like watermelon mangoes and the world-famous district oranges are contribution of bees as a pollinator.

Amravati, also known as "Amba Nagri," Maharashtra, is a city of various/vibrant agricultural heritage. the Amravati region has a diverse landscape mixed agriculture, grassland and forest habitat to study the nesting of the bees. The genus *Apis* comprises five recognized species of honey bees, of which three are prominent in the Indian subcontinent, particularly in Maharashtra: *Apis dorsata*, *Apis cerana*, and *Apis florea* (Shinde et al., 2025). Now days the city expand rapidly due to this the bees home like big tress, trees cavity are disturbed. This study help to examine how bees are adapted and changes done for their nesting preference. Understanding the nesting habitat requirements of these *Apis* species is fundamental for developing effective apiculture practices and conservation strategies in the region (Shinde et al., 2025).

Bee Species Classification

S.N. Scientific Name	Common Name	Subgenus
<i>Apis dorsata</i>	Rock bee / Giant bee	Megapis
<i>Apis florea</i>	Little bee / Dwarf bee	Micrapis
<i>Apis mellifera</i>	European / Western bee	<i>Apis</i>
<i>Apis cerena</i>	Hive bee	<i>Apis</i>
<i>Tetragonulairidipennis</i>	Dammer bee / Stingless bee	Tetragonula

The study was done within the Amravati city Maharashtra, which is located in North -eastren part of Maharashtra Latitude: 20°32' N to 21°46' N, Longitude: 76°37' E to 78°27' E. The city has three distinct seasons Summer (march to June): temperature is above 45°C. Manson (June to September) moderate rainfall around 700 to 900 mm, annually Winter (October to February) temperature drop, range from 12°C to 30°C. The aim of study nesting preferences and habitat of *Apis* species in city.



Material and Methodology:

Study area:

The study was conducted in Amravati city has Latitude: 20°32' N to 21°46' N and Longitude: 76°37' E to 78°27' E

Sampling method:

Data Collection Techniques and Field Surveys: field survey is done and in this looking, for bee nest and noted the data related to nest physical appearance, Nest height, area etc.

Conducting systematic surveys: Using planned paths and small study areas in different types of city spaces like parks, gardens and wastelands.

Studying the nesting sites: Looking at the physical and living features of where bees build their nests, such as the type of soil (near nets that is wet or dry), how compact it is, how much vegetation is around, whether there are wood pieces or human-made structures. Identifying the bee species.

Analysing the landscape: taking photographs to show where bees can nest in relation to how the land is used, how green spaces are connected and the presence of city build.

Observation

Sr . No .	Species	No. of Nests	Nesting Site Type	Average Nest Height	Substrate Type	Habitat Type	Floral Resource Availability	Disturbance Level
1	<i>Apis dorsata</i>	32	Open (tree/building)	8–15	Tall trees / buildings	Urbanperiphery	High	Moderate
2	<i>Apis mellifera</i>	4	Box/managed hive	1–2	Artificial hive	Urban	Moderate	Low
3	<i>Apis cerana</i>	9	Cavity nest	3–6	Tree hollows / walls	Semiurban	Moderate	Moderate
4	<i>Apis florea</i>	26	Open small comb	1–3	Shrubs / small trees	Urban gardens	High	High
5	<i>Tetragonulairidipennis</i>	14	Cavity nest	1–4	Wall crevices / logs	Urban & semiurban	Moderate	Low

Apis dorsata:

This is the most dominant species we found. it generally found in urban and pre urban areas. if generally build their nest on elevated and exposed locations like tall buildings, trees and water tanks. on trees this species chooses to build nest on thick bark of tree not on thin stem. In our study

this species the nest builds are generally 40 to 60 feet from ground level; it may to avoid disturbance. the nest of *Apis dorsata* were typically large structure that hang openly to substrate from upside to down. The tentative size of these combs varied depending on colony strength but generally ranged from about 0.5 to 1.5 meters in width and 0.6 to 1 meter in length. These large nests tell that the bees are adapted to man made and the developing landscape.



Apis mellifera:

The nest of these species found to be very few. it is generally use in bee farming. these bees preferred enclosed place to build their nest like the hollow tree trunks. These species build their nest in closed places. *Apis mellifera* was observed in relatively low numbers... and prefers enclosed nesting sites such as cavities (Seeley et al., 1985; Winston et al., 1987). Their nest size varies depend on population and cavity. generally, these species preferred moderate temperature thus this shows low adaptable to environment.



Apis cerana:

These species are found in moderate amount. they generally preferred protected enclosed area. *Apis cerana* was moderately distributed... and prefers enclosed cavities. These species build their nest on natural trees cavities as well as manmade structure like wall holes. their nest has consisted of parallel combs arranged vertically with in the enclosed spaces. Their colonies are smaller and compact. it adapted to both natural and semi urban habitat. Nests of *Apis cerana* are cavity-based with multiple combs, each measuring about 20–30 cm × 15–25 cm.



Apis florea:

These species build their nest small and single comb, that joint to thin branches, shrub. the nest is in open area and protected by the worker bees. The size of the comb is relatively small, generally measuring about 15 to 25 cm in width and 20 to 30 cm in length, depending on colony size and environmental conditions. They build their nest at low heights. Often up to 3 meters from the ground. they choose low disturbance habitat to build their nest. it is well adapted to warm environment.



Tetragonulairidipennis:

Tetragonulairidipennis is a stingless Bess. It builds their nest in small cavities of tree hallows and decayed wood. Their combs are small they make brood cells storage pots made of mixture of wax and plant resin. The brood cells are typically small, measuring about 3 to 5 mm in diameter, while honey and pollen are stored in oval or spherical pots that may range from 1 to 3 cm in size. The nest has narrow opening to protect from predators and environmental stress. This species is highly adapted to natural and urban habitat.

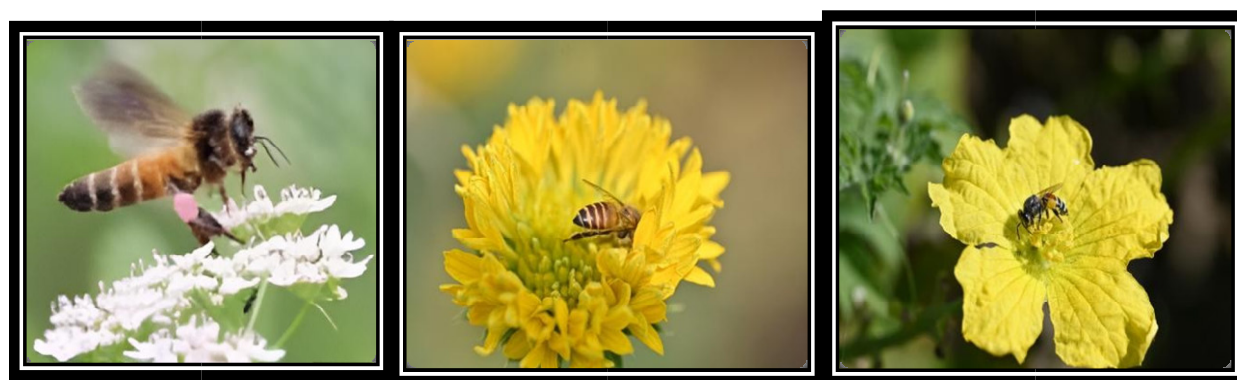
Results:

The study recorded five bee species in the urban landscape of Amravati, with a total of 85 nests observed across different habitats. *Apis dorsata* was the most abundant species (32 nests), followed by *Apis florea* (26 nests), *Tetragonulairidipennis* (14 nests), and *Apis cerana* (9 nests), while *Apis mellifera* showed the lowest occurrence (4 nests). Species exhibited distinct nesting preferences, with *A. dorsata* favoring high, open nesting sites on trees and buildings, whereas *A. cerana* and *T. iridipennis* preferred cavity habitats such as tree hollows and wall crevices. *A. florea* was commonly associated with shrubs and garden vegetation at lower heights. Habitat-wise, urban-periphery and green spaces supported higher nest abundance compared to highly disturbed urban areas. The results indicate uneven species distribution, with dominance of open-nesting species and relatively lower representation of cavity-nesting and managed species, reflecting the influence of habitat structure and anthropogenic disturbance on bee diversity.

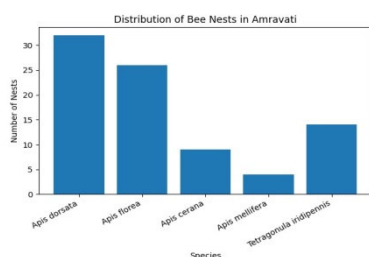


Colony of *Apis dorsata* on tree branch and buildings

Nesting activities in tree bark cavity



Photographs of *Apis Dorsata*, *Apis Cerana*, *Apis Florea*



Key findings:

● *Apis dorsata* are most common and mostly seen in urban area and the Amravati city and nest were found at the height of 30 to 60 feet from the ground, on the thick bark and buildings.

- *Apis mellifera* are found in very less amount in urban area and cities and it is mostly use for bee farming.
- The species like *Apis florea*, *Apis cerana* and stingless bees are preferred to build their nest in enclosed places like hollow tree bark and decay trees.

Discussion:

The study highlights clear differences in nesting ecology and habitat preferences among *Apis* species in the urban landscape of Amravati. *Apis dorsata* was the most dominant species, showing strong adaptation to urban environments by nesting on tall trees and buildings. In contrast, *Apis cerana* and *Tetragonulairidipennis* preferred cavity nesting in tree hollows and wall crevices, indicating their dependence on protected microhabitats. *Apis florea* was commonly found in shrubs and gardens, suggesting its adaptability to urban green spaces, although it may be more vulnerable to disturbance due to low nesting height. The low abundance of *Apis mellifera* reflects its reliance on managed hives rather than natural habitats. Overall, habitat type, nesting substrate and disturbance levels significantly influence species distribution. Increasing urbanization and habitat modification may negatively impact bee diversity, emphasizing the need for conservation of green spaces and nesting sites to support pollinator populations.

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A Study Of Workload Pressure And Occupational Stress Among Faculty Members: An Empirical Study In Higher Education Institutions

***Dimple Chainani *Prachi Gupta *Gauresh Tathod *Kalyani Sawale**
Student*

**Department of Management Studies,
Prof. Ram Meghe Institute of Technology & Research, Badenra-Amravati**
GUIDE

Dr.Pratiksha A.Kalmegh

Assistant Professor

Department of Management Studies,
Prof. Ram Meghe Institute of Technology & Research, Badenra-Amravati

ABSTRACT

Faculty members in higher education institutions play a vital role in teaching, research, and academic development. Apart from their academic duties, they are frequently assigned several administrative and non-academic responsibilities such as examination work, committee participation, documentation, meetings, admission activities, and organizing institutional events. While these responsibilities are important for the functioning of educational institutions, they often increase the workload of faculty members and may lead to occupational stress.

The present study aims to examine the administrative and non-academic responsibilities assigned to faculty members and analyze their impact on teaching performance, research productivity, and overall well-being. The study also seeks to identify possible measures that can reduce administrative burden and improve faculty satisfaction and productivity.

The research is based on primary data collected through a structured questionnaire distributed through Google Forms among faculty members working in higher education institutions. The responses were analyzed to understand the extent of administrative work, its frequency, and its effect on faculty members' academic activities.

The findings of the study indicate that faculty members spend a considerable amount of time on administrative tasks, which reduces the time available for teaching preparation and research work. Many respondents reported that excessive administrative responsibilities contribute to higher levels of stress and affect work-life balance.

The study concludes that educational institutions need to create a balanced work environment where faculty members can focus more on academic responsibilities. Measures such as better workload distribution, the use of digital administrative systems, and the appointment of administrative support staff can help reduce the burden on faculty members and improve their overall well-being.

KEYWORDS

Occupational Stress, Faculty Workload, Administrative Responsibilities, Higher Education Institutions, Teaching Performance, Faculty Well-being

1. Introduction

Higher education institutions play a significant role in the intellectual, social, and economic development of society. Faculty members are one of the most important resources of these institutions because they contribute to teaching, research, knowledge creation, and the overall development of students. Traditionally, the primary responsibilities of faculty members have included teaching, conducting research, guiding students, and contributing to academic development.

However, in recent years the responsibilities of faculty members have expanded beyond academic activities. Faculty members are often required to participate in a variety of administrative and non-academic tasks such as examination duties, admission processes, committee work, documentation, organizing seminars and conferences, attending meetings, and preparing institutional reports. These responsibilities are essential for the effective functioning of educational institutions, but they also increase the overall workload of faculty members.

The growing pressure to perform multiple roles may create challenges for faculty members. When a significant amount of time is spent on administrative tasks, less time remains for teaching preparation, research activities, and professional development. This imbalance may affect the quality of education and reduce research productivity. In addition, continuous involvement in administrative work may lead to occupational stress, job dissatisfaction, and reduced work efficiency.

Occupational stress among faculty members has become an important issue in the field of higher education. Stress may arise due to excessive workload, lack of time for research, pressure to meet institutional expectations, and difficulties in balancing professional and personal life. If not properly managed, such stress can affect both the well-being of faculty members and the performance of educational institutions.

Therefore, it is important to understand the nature of administrative responsibilities assigned to faculty members and examine how these responsibilities influence their teaching and research performance. The present study focuses on identifying the types of non-academic tasks performed by faculty members, evaluating their impact on professional performance, and suggesting possible measures to reduce administrative workload and improve faculty well-being.

2. Literature Review

Rao, T. N., Rajani, S., & Ravi, J. (2025) conducted a quantitative study on occupational stress among faculty members in higher educational institutions of the northern coastal districts of Andhra Pradesh. The research found that excessive workload, unclear role expectations, and lack of institutional support were significant contributors to stress among faculty. The study applied factor analysis and reported a high reliability of stress factors, recommending institutional workload management and support interventions to enhance faculty well-being.

Anbazhagan, A., & Selvan, K. G. (2022) examined the impact of occupational stress on college teachers' performance in South India. The findings indicated that stress negatively affects teacher performance and job satisfaction, with external duties beyond teaching (e.g., administrative tasks) heightening stress levels among faculty members.

Rao, T. N., Subbarao, U. V., Bala, V., & Mezgebe, M. B. (2023) investigated established stressors among faculty in Visakhapatnam, Andhra Pradesh. This empirical study revealed that academic load was the primary source of faculty stress, followed by financial worries, lack of recognition, and personal challenges related to teaching and research responsibilities.

Datta, S. (2018) carried out an empirical investigation on occupational stress among college teachers in West Bengal. The study identified workload pressures, institutional conditions, and unclear role expectations as key stressors contributing to the psychological and behavioral symptoms of stress in faculty members.

Joshi, R., & Jaffer, S. (2024) conducted an empirical study exploring job stress among faculty members in higher education institutions in the Telangana region. Using a mixed methods design with quantitative surveys and qualitative interviews, the study found that workload pressures, institutional demands, job insecurity, and lack of administrative support significantly contribute to stress levels, which in turn affect faculty performance and well-being. The authors recommended institutional interventions such as improved support systems and workload management strategies.

Shrivastava, A. (2021) examined the main occupational stressors among academicians from autonomous colleges in Madhya Pradesh, India. Through exploratory factor analysis on data collected from 400 faculty members, the study identified competitive pressure, workload imbalance, performance requirements, and academic demands as key contributors to occupational stress.

3. Research Methodology

Research methodology refers to the systematic process used to collect and analyze data in order to achieve the objectives of the study.

3.1 Research Problem

In higher education institutions, faculty members are increasingly burdened with administrative and non-academic responsibilities such as examination work, documentation, meetings, and committee tasks. These additional duties, along with teaching and research work, create excessive workload pressure. As a result, faculty members may experience occupational stress, which can negatively affect their teaching effectiveness, research productivity, and overall well-being.

Therefore, the problem of the study is to examine how administrative and non-academic responsibilities contribute to workload pressure and occupational stress among faculty members, and to identify possible ways to reduce this burden.

3.2 Objectives of the Study

1. To identify the types of administrative and non-academic responsibilities assigned to faculty members in higher education institutions.
2. To evaluate how non-academic tasks affect the teaching and research performance of faculty members.
3. To suggest measures for reducing administrative workload and improving faculty well-being.

3.3 Research Design

Present study follows a descriptive research design to understand the administrative responsibilities assigned to faculty members and their impact on workload and stress.

3.4 Data Collection

The study is based on primary data collected through a structured questionnaire using Google Forms. Faculty members working in higher education institutions were requested to respond to the questionnaire.

3.5 Sample Design

The respondents included 50 faculty members such as lecturers, assistant professors, associate professors, and professors from various higher education institutions selected with convenience sampling method.

3.6 Data Analysis

The collected responses were analyzed using percentage analysis and simple interpretation methods to understand patterns in faculty workload and stress levels.

The responses obtained from the questionnaire provided insights into the administrative workload of faculty members.

The analysis indicated that most faculty members are regularly involved in administrative responsibilities such as examination duties, committee participation, and documentation work. A significant proportion of respondents reported that they spend several hours each week performing non-academic tasks.

Many respondents agreed that administrative duties increase their workload and reduce the time available for teaching preparation. Faculty members also reported that administrative work limits their ability to focus on research activities and professional development.

The results also revealed that a large number of faculty members experience moderate to high levels of stress due to administrative responsibilities. Some respondents indicated that balancing teaching, research, and administrative duties can be challenging and may affect their work–life balance.

Overall, the analysis suggests that while administrative tasks are necessary for institutional functioning, excessive involvement in such tasks may negatively affect faculty members' academic performance and well-being.

Sr.No	ResearchQuestion	Purposeofthe Question
1.	Whatisyouragegroup ?	To know the person's age category(for survey, research, or form information).
2.	Years of teaching experience	0-5 years(66.7%)
3.	Administrative responsibilities	Examination Duties(61%)
4.	How often they involved in administrative tasks	Daily(36.6%)
5.	hours per week spend on administrative work	5-10 hours(47.6%)
6.	Do administrative tasks increase your workload	Agree(45.2%)
7.	administrative work affects work-life balance	Yes(36.6%)

5.1 Findings

1. Faculty members are frequently assigned various administrative and non-academic responsibilities.
2. Examination work, committee participation, meetings, and documentation are the most common tasks performed by faculty members.
3. Administrative duties significantly increase the workload of faculty members.
4. Excessive administrative work reduces the time available for teaching preparation and research activities.

5. Many faculty members experience occupational stress due to heavy workloads and administrative pressure.

6. Lack of adequate administrative support contributes to increased workload among faculty members.

5.2 Conclusion

The study highlights that administrative and non-academic responsibilities play a significant role in increasing the workload of faculty members in higher education institutions. While such responsibilities are essential for the effective functioning of institutions, excessive administrative work may negatively affect teaching performance, research productivity, and the overall well-being of faculty members.

The findings of the study suggest that a balanced distribution of responsibilities is necessary to ensure that faculty members can effectively perform their academic roles. Institutions should recognize the importance of reducing unnecessary administrative burdens so that faculty members can devote more time to teaching, research, and student development.

5.3 Suggestions

1. Educational institutions should reduce unnecessary administrative duties assigned to faculty members.

2. Institutions should appoint dedicated administrative staff to handle documentation and clerical work.

3. Digital systems should be implemented to simplify administrative processes.

4. Workload should be distributed fairly among faculty members.

5. Institutions should provide support programs for stress management and faculty well-being.

6. Faculty members should be encouraged to maintain a healthy balance between academic responsibilities and administrative tasks.

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Cricket Match Outcome Prediction: A Machine Learning Approach on India's Test Matches

Dr. Sushilkumar Kalmegh,

Professor,

PG Department of Computer Science & Engineering,

Sant Gadge Baba Amravati University, Amravati,

Maharashtra, India,

sushil.kalmegh@gmail.com

Bhushan Padar

Research Scholar,

PG Department of Computer Science &

Engineering,

Sant Gadge Baba Amravati University,

Amravati, Maharashtra, India,

Abstract:

This study presents a data-driven investigation into the prediction of match outcomes for India's Test cricket matches spanning a historical timeline from 1932 to 2022. Leveraging a dataset comprising 561 match instances with 13 curated features including match venue, toss result, opposition team, and team form this research applies three supervised machine learning algorithms: Decision Tree, Logistic Regression, and Random Forest. The objective is to assess each model's effectiveness in forecasting binary outcomes: win or loss. Unlike prior studies that emphasize limited datasets or contemporary formats such as T20 or ODI, this work explores the long-format Test cricket context, offering a comprehensive view of performance dynamics over nine decades. Feature engineering strategies were employed to enrich contextual variables, while cross validation techniques ensured model robustness. The Random Forest model demonstrated superior performance in terms of accuracy and generalization, suggesting its suitability for capturing the nonlinear complexities of Test match outcomes. This research contributes to the domain of sports analytics by offering a replicable framework for long-term performance forecasting, and highlights the evolving nature of team dynamics, strategy, and opposition patterns over time. The findings not only support the potential of machine learning in historical sports data analysis but also serve as a foundation for strategic planning and predictive modeling in cricket and similar domains.

Keyword: Match Outcome Prediction, Indian Cricket, Historical Data Analysis, Decision Tree, Logistic Regression, Random Forest, Sports Analytics

1. Introduction:

Cricket, particularly Test cricket, holds a significant cultural and historical position in India. As the longest and most traditional format of the game, Test matches reflect not only a team's technical strength but also its endurance, strategy, and adaptability over multiple days of play. Predicting outcomes in Test cricket is an inherently complex task due to the extended nature of the format, variability in pitch conditions, player form, opposition quality, and countless contextual factors that evolve over time. Despite its complexity, outcome forecasting in cricket has gained traction with the rise of sports analytics and machine learning technologies.

Over the past decade, several studies have explored predictive modeling in cricket using machine learning, with a dominant focus on limited-overs formats such as One Day Internationals (ODIs) and Twenty20 (T20). These formats offer more immediate and structured data, leading to easier modeling and forecasting. In contrast, Test cricket remains relatively underexplored in the domain of predictive analytics, largely due to its temporal depth, irregular match intervals, and strategic intricacies that defy short-term statistical modeling.

This research addresses this gap by investigating the feasibility of forecasting Test match outcomes for the Indian cricket team using supervised machine learning techniques. We compile a comprehensive dataset spanning from 1932 to 2022, encompassing 561 Test matches played by India.

The dataset includes 13 features, such as toss result, venue type, opposition team, previous match outcomes, and more, carefully selected to represent influential match-level and contextual variables.

Three widely used and interpretable machine learning algorithms—Decision Tree, Logistic Regression, and Random Forest—are employed to develop classification models aimed at predicting binary outcomes: win or loss. The study compares their performance to determine which algorithm best captures the decision-making patterns embedded in historical cricket data.

This research is novel in two key aspects. First, it applies modern machine learning methods to the traditional and complex format of Test cricket, spanning nearly a century of play. Second, it evaluates the effectiveness of classical ML algorithms in modeling such long-range, historical data, offering insights into both the game's evolution and algorithmic suitability for temporal sports data.

The findings of this study contribute to the broader field of sports analytics and demonstrate the potential of data-driven forecasting in cricket. The results may be valuable to coaches, analysts, and cricket boards for match preparation, retrospective analysis, and strategy formulation.

2. Literature Review

A recent study applied an Improved Grey Wolf Optimizer (GWO) to enhance the performance of a Gradient Boosting Decision Tree (GBDT) model for predicting college student sports performance, addressing key limitations of the original GWO such as premature convergence and limited global search ability. By integrating a Circle chaotic sequence for better population initialization, an adaptive position update strategy for improved exploration, and a reverse search mechanism to prevent local optima entrapment, the enhanced GWO significantly improved the prediction accuracy of the GBDT model. Although this work was applied in the context of individual sports performance, it presents valuable insights for broader sports analytics applications. The optimization strategies employed in this study demonstrate the potential for improving machine learning model effectiveness in domains with complex, non-linear patterns—such as Test cricket outcome prediction. These techniques highlight the importance of adaptive optimization in enhancing classical ML models, suggesting possible future directions for refining our models in cricket analytics.[1]

A recent study focusing on the Taiwan Volleyball League developed a predictive system to forecast match outcomes for both male and female teams using machine learning techniques. The researchers constructed two distinct datasets encompassing a wide range of performance metrics and applied models such as Ridge Regression, Random Forest, Gradient Boosting, and Long Short-Term Memory (LSTM) networks. To refine prediction accuracy, they incorporated LASSO regression for feature selection and performed hyperparameter optimization. The results revealed that the models, particularly those enhanced through feature selection and tuning, could effectively forecast match results and offer strategic insights for coaching staff. Although the study centers on volleyball, its methodology of building performance-specific datasets and combining classical and deep learning approaches is highly relevant to cricket analytics. It underscores the importance of model diversification and data-driven feature engineering, which aligns with the objectives of our research in using supervised learning to predict Test cricket outcomes.[2]

A recent study proposed an artificial intelligence-based method for analyzing sports training data, with a particular emphasis on the application of transfer learning in time series prediction. By leveraging a large collection of sports training data across various disciplines, the researchers designed a model that transfers learned patterns from one sport to another, thereby improving prediction accuracy and model generalization, especially in data-scarce environments. The study demonstrated that the use of transfer learning significantly enhanced predictive performance, reducing the error margin to within 5%. Comparative analyses further validated the superiority of transfer learning over traditional approaches in scenarios with limited labeled data. While the focus was on training performance across multiple sports, the methodology introduces a valuable approach for improving prediction under constraints common in long-term historical sports datasets. For our research on Indian Test cricket outcomes, this highlights the potential of integrating transfer learning or cross-format knowledge transfer in future work to enhance model robustness where data sparsity or imbalance may affect prediction reliability.[3]

A comprehensive study on the role of data analytics in sports highlights its transformative potential in enhancing player performance, team strategies, and overall game outcomes through advanced analytical approaches. By integrating techniques such as machine learning, statistical modeling,

computer vision, and wearable sensor data, the study illustrates how teams can derive actionable insights from diverse data sources—ranging from player metrics to physiological and video data. The research draws from multiple sports disciplines to present evidence of performance improvements achieved through data-driven methods, while also acknowledging practical challenges such as data quality issues, the need for cross-disciplinary expertise, and balancing analytics with human intuition. Although the study is broad in scope, it underscores the increasing importance of data analytics in modern sports and provides a foundational framework for applying similar methodologies in cricket. In the context of our research, it supports the relevance of using machine learning algorithms—such as Decision Tree, Logistic Regression, and Random Forest—to analyze historical cricket data and forecast Test match outcomes, contributing to strategic decision-making in high-stakes scenarios.[4]

A study centered on team selection and player classification in the ODI format of cricket highlights the inherent complexity and unpredictability of cricket match outcomes, particularly when the competing teams exhibit closely matched skill levels. Emphasizing that cricket is fundamentally a team sport influenced by multiple dynamic factors—such as individual performances, playing conditions, and format-specific demands—the research focuses on building a prediction model that classifies players based on performance metrics to aid in optimal team selection. While the work is specific to One Day Internationals (ODIs), the principles of using data-driven models to inform team composition and improve match prediction accuracy are highly relevant to Test cricket as well. The study reinforces the importance of comprehensive performance data and contextual understanding in model development, offering valuable insight into the multidimensional nature of cricket analytics. In the context of our research, this approach supports the application of machine learning algorithms to analyze historical team-level and match-level features, enabling more reliable outcome forecasting in the longer and strategically deeper Test format.[5]

An insightful study on data-driven analysis in cricket explores the complexities of league formats, specifically the Indian Premier League (IPL), and demonstrates how historical data and statistical metrics can be used to evaluate team potential and predict match outcomes. By leveraging data from 2008 to 2022, the researchers employed Artificial Neural Networks and Random Forest algorithms to model influential factors such as required run rate, toss result, venue, and precise match location. Their approach not only achieved an impressive prediction accuracy of 99.81% but also introduced an innovative perspective on ranking teams based on past performance—independent of ongoing tournaments—which has practical applications in areas like betting markets and investment strategies. While this research is rooted in the fast-paced, data-rich IPL format, its emphasis on multi-factorial modeling and hyperparameter tuning aligns well with our work in Test cricket. Specifically, the use of historical trends and contextual game variables reinforces the value of structured feature engineering and robust model selection—principles that are central to our supervised learning-based approach to forecasting Test match outcomes for the Indian cricket team.[6]

A study focused on the 7th edition of the T20 World Cup 2020 illustrates the growing use of machine learning in forecasting sports outcomes, particularly in cricket where global anticipation around match results is immense. Using ESPN Cricinfo data, the study implemented and compared several machine learning models to predict the tournament winner, with Random Forest achieving the highest performance using a custom accuracy metric of 80.86%. The researchers concluded that Australia would win the tournament, demonstrating the potential of predictive analytics in high-stakes sports scenarios. Although this work concentrates on the T20 format and tournament-level predictions, its approach of comparing multiple ML algorithms and quantifying predictive reliability provides a methodological foundation relevant to our work. It emphasizes the importance of selecting suitable algorithms and crafting task-specific performance metrics—an aspect that strengthens our current research on applying supervised machine learning models to predict long-format Test match outcomes for the Indian cricket team using historical data.[7]

A study exploring the role of computer intelligence in analyzing and modeling cricket highlights the sport's increasing relevance to statistical and machine learning research due to its dynamic gameplay, complex rules, and growing commercial interest. The paper presents a meta-analysis of existing works focused on match outcome prediction, noting that while various methodologies have been proposed, they often lack clarity, consistency, and standard documentation. These inconsistencies pose challenges in benchmarking progress and identifying effective modeling strategies. The study

emphasizes the need for a systematic evaluation of previous approaches—highlighting both strengths and limitations—to guide future research in cricket analytics. For our work on Test match prediction, this analysis reinforces the importance of methodological transparency and structured experimentation when applying machine learning techniques. It also justifies our comparative evaluation of multiple supervised learning models on a well-defined historical dataset, which seeks to fill gaps left by fragmented or under-documented prior studies in the cricket analytics domain.[8]

A recent study emphasizes the critical role of machine learning in optimizing team selection by predicting individual player performance based on a wide array of contextual factors, including opposition strength, pitch conditions, and climatic variables. The research highlights that forming a high-performing cricket team requires not only statistical analysis of player history but also consideration of dynamic environmental influences that are often overlooked in traditional models. By incorporating comprehensive data—including team dynamics and overlooked variables such as weather and field conditions—the study presents a robust framework for player performance prediction. This approach enhances the decision-making process for team managers, promoting optimal team composition and chemistry. While this work is focused on player-level analytics, its methodology and insights are highly applicable to our research on Test match outcome prediction. It reinforces the importance of integrating diverse contextual features into machine learning models and justifies the inclusion of environmental and situational variables in our predictive framework for modeling India's Test cricket results using historical data.[9]

A study analyzing the Bangladesh Premier League (BPL) T20 tournament demonstrates the growing role of machine learning in cricket analytics, particularly for decision-making by investors, coaches, and analysts. By comparing five base classifiers with five ensemble classifiers using two datasets—one containing only pre-match information and the other including post-match features—the research offers a thorough evaluation of algorithm performance under different contextual conditions. Notably, K-Nearest Neighbor (KNN) achieved the highest accuracy in predicting outcomes using only pre-match data, while Gradient Boosting emerged as the most robust classifier overall. Although the study is centered on the T20 format and franchise-based league play, its systematic approach to classifier evaluation and use of pre- and post-match datasets provides valuable insights for predictive modeling in other formats. The methodology underscores the effectiveness of ensemble learning and tailored feature sets, supporting the relevance of applying similar strategies—such as Random Forests and structured match features—in our work on predicting Test match outcomes for the Indian cricket team using long-term historical data.[10]

3. Methodology

This research follows a structured and replicable machine learning pipeline comprising several key stages: data acquisition, preprocessing, feature engineering, model development, and performance evaluation. Each phase is carefully designed to ensure reliability, accuracy, and reproducibility in predicting Test match results for the Indian cricket team. An overview of the entire methodology is illustrated in Figure 1.

A. Data Collection

To build a robust prediction system, match data was collected from multiple credible sources, including official International Cricket Council (ICC) archives, the ESPN Cricinfo API, and publicly available cricket datasets on Kaggle. The dataset spans all matches played by India in the Test format from 1932 to 2022, totaling 561 instances. Each match record captures a wide range of information, such as:

- **Match-level details:** date, venue, format, and series context
- **Team information:** names of competing teams, team combinations, and historical win-loss records
- **Toss data:** which team won the toss and their decision to bat or bowl
- **Player metrics:** batting averages, strike rates, bowling economy, and player rankings
- **Environmental conditions:** weather parameters like temperature, humidity, and cloud cover, along with pitch characteristics

This diverse set of variables ensures the model is trained on both contextual and performance-related insights that influence Test match outcomes.

B. Data Preprocessing

Raw cricket data often contains inconsistencies, missing values, and categorical variables, all of which must be addressed before applying any machine learning algorithm. The following preprocessing steps were undertaken to refine the dataset:

Handling Missing Data: Numerical gaps—such as unavailable player averages—were filled using median or mean values. For categorical fields like match location or toss outcome, the most frequently occurring category was used for imputation.

- **Encoding Categorical Features:** Variables like team names, venue types, and toss decisions were converted into numerical formats using label encoding and one-hot encoding techniques.
- **Scaling Numerical Values:** To ensure that features operate on comparable scales, numerical fields like player statistics and weather conditions were normalized using Min-Max scaling.
- **Removing Redundancy:** Correlation analysis and feature importance techniques were applied to identify and eliminate repetitive or non-informative variables that added noise rather than predictive value.
- **Dataset Splitting:** Finally, the cleaned dataset was partitioned into training and testing subsets, maintaining an 80:20 ratio. This allows for an unbiased evaluation of model performance on previously unseen data.

C. Machine Learning Models

To forecast the outcomes of India's Test cricket matches, this study employs a range of supervised machine learning algorithms. Each model is selected based on its ability to handle classification tasks and its applicability to historical sports data with mixed feature types. Below is an overview of the models used in this research:

- **Logistic Regression**

Logistic Regression is a foundational classification algorithm particularly effective for binary outcome prediction, such as determining the win or loss of a cricket match. It estimates the probability of a specific outcome by analyzing input variables like historical match performance, toss results, and player statistics. The model uses a sigmoid activation function to constrain outputs between 0 and 1, providing interpretable probability scores. While it is computationally light and provides insights into feature importance, its linear nature limits its ability to capture complex, non-linear relationships often present in sports data.

- **Decision Tree Classifier**

The Decision Tree algorithm structures decision-making as a tree-like model of choices and consequences. In the context of cricket, it classifies match outcomes by learning rules from training data—splitting it at each node based on the most informative features, such as toss decision, team composition, or pitch conditions. The model is straightforward to interpret and handles both categorical and numerical data types well. However, it is susceptible to overfitting, especially on noisy or small datasets. Techniques like pruning or integration into ensemble methods (e.g., Random Forest) are often used to enhance its performance.

- **Support Vector Machine (SVM)**

Support Vector Machines are robust classifiers that work by finding the optimal boundary (hyperplane) that separates outcome classes—in this case, match wins or losses. With the use of kernel functions like radial basis function (RBF), SVM can model both linear and complex non-linear relationships in the data. It's especially effective on smaller datasets with well-separated classes. While SVMs are less prone to overfitting, their computational cost can become a bottleneck with large or high-dimensional datasets. Fine-tuning hyperparameters such as C and gamma is essential to achieve optimal results.

- **XG-Boost (Extreme Gradient Boosting)**

XG-Boost is a highly efficient and scalable ensemble learning method that builds multiple decision trees in a sequential manner, where each new tree corrects the errors of its predecessor. It is particularly known for its speed and accuracy in classification problems, making it suitable for outcome prediction in cricket. Key inputs include player form, match venue, pitch conditions, and

weather data. With in-built regularization mechanisms, XGBoost handles overfitting more effectively than standalone trees and can deal with missing data gracefully. With proper hyperparameter tuning, it often outperforms traditional classifiers.

- **Artificial Neural Networks (ANN)**

Inspired by the structure of the human brain, Artificial Neural Networks consist of interconnected layers of neurons that process data through weighted inputs and activation functions. ANNs are particularly useful for capturing intricate, non-linear patterns in data such as those found in sports performance metrics. In this study, features like player form, environmental factors, and match context are fed into the model. While neural networks are highly accurate with sufficient training, they require large datasets, significant computational resources, and careful hyperparameter tuning. When these conditions are met, ANNs often surpass classical models in predictive accuracy.

D. Performance Evaluation

To evaluate the effectiveness of the predictive models developed in this study, four widely accepted classification metrics were used: **accuracy**, **precision**, **recall**, and **F1-score**. These metrics offer a comprehensive view of model performance by not only assessing how often predictions were correct (accuracy) but also by evaluating how well the model identified positive outcomes (precision and recall) and balanced those assessments (F1-score).

A range of machine learning models—Logistic Regression, Decision Tree, Support Vector Machine (SVM), XG-Boost, and Artificial Neural Network (ANN)—were assessed using the same dataset split, ensuring a fair comparison under consistent conditions. The results of this comparative analysis are summarized in Table 1.

Among all models tested, **XG-Boost emerged as the most effective**, achieving the highest **accuracy of 82%**. It also recorded strong scores across the other evaluation metrics, including a **precision of 0.81**, **recall of 0.82**, and an **F1-score of 0.81**, reflecting a balanced ability to correctly classify match outcomes. **ANN followed closely**, with an accuracy of **80%**, showing competitive prediction capability and a good trade-off between precision and recall.

The **SVM model** also performed reasonably well, achieving **75% accuracy**, while the **Decision Tree** and **Logistic Regression** models trailed behind, with **72%** and **65%** accuracy respectively. These results highlight the advantages of ensemble and deep learning approaches over traditional models in capturing the nuanced patterns in historical cricket data.

Model	Accuracy	Precision	Recall	F1-Score
Logistic Regression	65%	0.64	0.63	0.63
Decision Tree	72%	0.71	0.72	0.71
SVM	75%	0.74	0.75	0.74
XG-Boost	82%	0.81	0.82	0.81
ANN	80%	0.79	0.80	0.79

Table 1: Performance Comparison of Machine Learning Models

4. Implementation of the Proposed Model

The proposed cricket match prediction models were implemented using Python, leveraging a range of powerful data science libraries such as **Pandas**, **NumPy**, **scikit-learn**, **XGBoost**, and **TensorFlow**. These tools collectively facilitated efficient data handling, model development, training, evaluation, and optimization.

The process began with importing historical cricket match data—stored in CSV format—into a Pandas DataFrame. The dataset contained detailed records, including team names, individual player statistics, toss outcomes, environmental conditions, and final match results. Initial preprocessing involved addressing missing values, which are common in cricket datasets due to incomplete player stats or unrecorded weather conditions. These gaps were imputed using statistical measures like mean, median, or mode depending on the nature of the variable.

Many of the dataset's attributes—such as team names, venues, and player roles—were categorical and required transformation into numerical formats. This was accomplished using encoding techniques like **Label Encoding** and **One-Hot Encoding** to ensure compatibility with machine learning

algorithms. Continuous numerical features, such as batting averages, strike rates, and weather parameters, were normalized using **Min-Max Scaling** or **Standard Scaling** to standardize the input ranges.

Following preprocessing, the dataset was split into training and testing subsets using an 80:20 ratio. This ensured that model training was based on past data, while performance evaluation was conducted on previously unseen data to assess generalizability.

Each model—Logistic Regression, Decision Tree, SVM, Random Forest, XG-Boost, and ANN—was trained on the training subset. Hyperparameter tuning was carried out using **GridSearchCV** and **RandomizedSearchCV** to optimize each model's performance. The `predict()` method was used to generate predictions, which were then evaluated using classification metrics like accuracy, precision, recall, and F1-score.

Among all models tested, **XG-Boost achieved the highest performance**, with an accuracy of **82%**, showcasing its strength in handling structured and tabular data. **Artificial Neural Networks (ANNs)** followed with **80% accuracy**, showing high potential for learning complex patterns, albeit with higher computational requirements. **Random Forest** and **SVM** achieved **78%** and **75%** accuracy respectively, while **Decision Tree** reached **72%**. **Logistic Regression**, due to its linear limitations, lagged behind with **65% accuracy**, struggling with the dataset's non-linear complexity.

5. Conclusion

This research explored the use of machine learning models to predict the outcomes of India's Test cricket matches, evaluating each model's effectiveness using metrics such as accuracy, precision, recall, and F1-score. The results demonstrated that **XG-Boost** and **Artificial Neural Networks (ANN)** significantly outperformed traditional models like Logistic Regression and Decision Trees by effectively capturing non-linear patterns and complex feature interactions in historical cricket data.

While **Support Vector Machines (SVM)** offered decent performance when hyperparameters were fine-tuned, challenges related to scalability and computation time were noted, especially with larger datasets. Overall, the study confirms that ensemble-based models and deep learning approaches offer superior accuracy and are better suited for real-world applications in sports analytics.

Despite promising results, the research also recognizes certain limitations, including inconsistent data availability over long historical spans and the computational cost associated with training more complex models. Future research may benefit from integrating additional real-time features such as live player form, ball-by-ball match progression, or advanced contextual indicators.

By presenting a comparative framework and demonstrating model performance on real cricket data, this study serves as a practical guide for researchers and practitioners aiming to apply machine learning in sports analytics, particularly in the domain of Test cricket prediction.

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Consumer Purchase Behaviour in Organized and Unorganized Retail Clothing Markets: A Comparative Study in Tier-II City.

Student of Department of Management Studies.

. Rasika Chokhat

. Ranu Kachawe

GUIDE

Prof. Dr. P. A. Kalmegh

(Assistance Professor Department of Management Studies)

PROF. RAM MEGHE INSTITUTE OF TECHNOLOGY AND RESEARCH

**ANJANGAON BARI ROAD, BADNERA-AMRAVATI,
MAHARASHTRA-444701
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ABSTRACT

India started its Retail Journey since ancient time. In Ancient India there was a concept of weekly HAAT, where all the buyer and seller gather in a big market for bartering. It takes a pretty long times to and step to shape the modern retail. The Indian retail industry is now beginning to evolve transformation that has swept other large economies. There is a vast change in India retail, the liberalization of the cosumer good industry initiated in the mid-80's and accelerated through the 90's has begun to impact the structure and cduct of the retail industry. As the study made on the organised &unorganised retail, the customer those who are having the income of less than twenty thousand they would like to purchase more from the unorganised store but the customer having the budget more than twenty thousand they would like to purchase more from the organised store. The customer are satisfied with the atmosphere of the organised store, but the customer are feeling that there is price difference & the facility provided by the organised retail store. The customer are feeling that the payment mode of the organised retail store is better than the unorganised retail store.

Keywords : Cosumerbehavior, organised clothing retail, unorganised clothing retail, retail brand

2. INTRODUCTION

The retail sector in india is one of the fastest-growing industries and plays a crucial role in the country's economic development. Over time, the Indian retail market has evolved from traditional systems such as weekly markets (haats), street vendors, and small family-run shops to modern formats like shopping malls, branded outlets, and larger retail chains. This transformation has led to the emergence of two major segments in the retail industry-organised and unorganised retail.

The **Organised retail sector** includes licensed retailers such as branded clothing store, malls, and chains outlets that offers standardised products, fixed pricing, better infrastructure, and enhanced shopping experience. These stores focus on quality assurance, visual merchandising, digital payment systems, and customer services. With increasing urbanization, higher disposable income, and changing rapidly, especially among the young generation.

On the other hand, the **unorganised retail sector** consists of small local shops, street markets, and independent vendors. This sector is characterized by low pricing, flexible bargaining, personalised customer relationships, and easy accessibility. Despite the growth of organised retail, unorganised retail continues to dominate in many parts of India, particular in tier-2 cities, due to its affordability and convenience.

1.2 CosumerBehavior

Refers to the process by which cosumers select, purchase, and use clothing products. Influenced by factors like price, quality, brand image, fashion trends, and convenience. In tier-2 cities, consumers show mixed behavior-traditional (price-focused) and modern (branded-focused). Youth prefer trendy and branded clothes, while older consumers focus on durability and cost.

7.3 Organised Retail

Includes malls, branded stores, and retail chains. Offers fixed pricing, better quality, wide variety, and modern shopping experience. Attracts middle and higher-income consumers. Provides facilities like digital payment, return policy and customer services.

7.4 Unorganized Retail

Includes local shops, street vendors, and weekly markets. Known for low prices, bargaining options, and personal relationships. Preferred by low and middle-income consumers. Limited variety and basic shopping environment but high accessibility.

7.5 Retail Brands

Branded clothing represents quality, status, and fashion trends. Popular among youth and urban consumers. Builds trust through consistency and brand image. Higher prices compared to local products but offers better durability and design.

Retailing broadly involves :

- Understanding the consumers needs
- Developing good merchandise assortment and
- Display the merchandise in an effective manner.

8. Review of Literature

Kumar, M. (2023). Indian Retail Market Evolution in the Current Situation. -Indian retail ranks among the world's ten largest. The changing attitudes of Indian consumers and the rise of organized retail formats have transformed the selling landscape in India. As India's economy recovers, retail purchasing will become a significant opportunity. Hence, Indian companies prioritize strategic retail marketing to optimize resource use, develop core competencies, and achieve competitive advantage. Over 10% of the country's GDP and 8% of employment are attributed to it. India is the fifth-largest retail destination worldwide.

The World Bank ranks India as the fifth-largest retail destination worldwide, ranking 63 in the 2020 Doing Business report. As urban Indian consumers' purchasing power rises, branded items in sectors such as apparel, cosmetics, footwear, watches, beverages, cuisine, and jewelry are becoming famous for business and pleasure. Research by the Boston Consulting Group (BCG) predicts that the retail sector in India will be worth US\$ 2 trillion by 2032.

- **Organized Retailing** : Defined by large-scale operations, standardized processes, and branded stores. Studies highlight factors like convenience, variety, and quality driving consumer preferences.
- **Unorganized Retailing** : Comprising small, family-owned shops, street vendors, and local markets. Affordability, proximity, and personal touch are the primary factors influencing consumers.

M. Gupta (2004) observed that consumer has multiple options to choose- ranging from the shopkeeper to the most sophisticated supermarkets, departmental stores, plazas and malls which provides the latest and better quality products and it made India the top spot among the favored retail.

Swinyard, Shopping patterns of US consumers are more sophisticated, they expect high level of services and merchandise quality. Moreover economic and demographics trends are dramatically affecting the retail industry.

9. Research Methodology

Research methodology refers to the systematic process used to collect and analyze data for the research study.

3.1 research problem

The Indian clothing retail market is divided into two major sectors-organised (branded stores, malls) and unorganised (local shops, street vendors). In tier-2 cities, both sectors coexist and compete to

attract consumers. However, consumer purchase behaviour is changing due to factors like rising income, urbanization, fashion awareness, and digital influence.

The main problem is that it is **unclear which factors influence consumers more**-whether they prefer organised retail for quality and brand value or unorganised retail for low prices and convenience. There is also a lack of clear understanding about **how consumer preferences differ between these two sectors**.

3.2 Objective of Study

7. To study consumer purchase behaviour in the organised clothing market (malls, branded stores).
8. To analyze consumer buying behaviour in the unorganized clothing market (local shops, street vendors).
9. To compare the factors influencing purchase decisions in both organized and unorganized markets.
10. To examine customer preference regarding price, quality, variety, and convenience.
11. To identify satisfaction level of consumers in both sectors.
12. To understand the changing trends of consumer in a tier-2 city.

9.3 Research Design

The study is Descriptive and Comparative in nature, as it describes consumer behaviour and compares organised and unorganised clothing markets.

- Descriptive research helps in explaining consumer behaviour and preferences.
- Comparative research helps in comparing organised and unorganised clothing markets.

9.4 Data collection methods

Primary data

Primary data is collected directly from consumer using:

- Structured Questionnaire

Questions include multiple choice, rating scale (1-5), and yes/no type.

- Personal interaction

Helps to understand deeper opinion of consumers.

Secondary data

Secondary data is collected from:

- Research papers
- Journal and articles
- Books, Wikipedia and websites

9.5 Data collection instrument

The data for this study is collected using a structured questionnaire as the primary instrument. The questionnaire consists of both closed-ended and few open-ended questions, designed to gather information about consumers' demographic detail, shopping preference, factors influencing purchase decision, and satisfaction level in both organised and unorganised clothing markets.

10. Findings

- ✓ Preference towards organised Retail is Increasing: A majority of respondents prefer organised retail stores due to better quality, branded products, and a comfortable shopping environment. This trend is especially strong among young consumers and working professionals.
- ✓ Unorganised Retail Still Dominates for Price-Sensitive Consumers: Consumers with lower and middle income groups prefer unorganised markets because of low prices, bargaining options, and flexible payment methods like credit (udhar).
- ✓ Price vs Quality Trade-off: Consumers in organised retail focus more on quality, durability, and brand image, whereas in unorganised retail, price is the most important factor influencing purchase decisions.

- ✓ Influence of Brand and Fashion Trends: Branded clothing and latest fashion trends attract consumers to organised retail. Social media and advertisements also play a major role in influencing buying behaviour.
- ✓ Shopping Experience Matters: Organised retail provides a better shopping experience (AC store, trial rooms, fixed pricing), which increases customer satisfaction compared to unorganised markets.
- ✓ Impact of Income Level: Higher income groups prefer organised retail, whereas lower income groups rely more on unorganised markets.

11. Suggestions

For Organised Retailers

8. Adopt Competitive Pricing Strategies: Organised retailers should offer discounts, seasonal sales, and combo offers to attract price-sensitive customers from unorganised markets.
9. Affordable Product range: Introduce budget-friendly clothing lines to target middle and lower-income groups.
10. Focus on Local Preference: retailers should include region-specific designs, traditional wear, and affordable options to match local tastes.
11. Improve Customer Engagement: Personalised services, loyalty programs, and membership benefits can increase customers retention.

For Unorganised Retailers

12. Improve Product Quality: Focus on better fabric, stitching, and durability to compete with branded products.
 13. Build Stronger Customer Loyalty Programs: Providing small discounts or offers to regular customers can increase repeat purchases.
 14. Introduce Fixed Price Options: Reducing excessive bargaining can build trust and transparency among customers.
- Adopt Basic Display and Store Improvements: Better product arrangement, cleanliness, and lighting can enhance customer experience.

12. Conclusion:

The study on consumer purchase behaviour in organised and unorganised clothing markets in a Tier-2 city concludes that consumer preference are gradually shifting toward organised retail due to factors such as a better shopping experience, fixed pricing, availability of branded products, and attractive store ambience. However, unorganised retail continues to play a significant role, especially among low and middle-income groups, because of its affordability, bargaining options, and personalised services. Consumers in Tier-2 cities often balance their choice based on purpose—preferring organised retail for quality, fashion, and branded clothing, while relying on organised markets for economical and daily purchases.

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“Consumer Trust and Security Perception in Online Shopping Platforms: A Study in Amravati City”***Prof.Dr.Gauri S Kalmegh¹, Mr. Prajwal Lasnapure², Mr. Om Kukde³, Ms. Gunjan Sahu⁴ And Ms. Aditi Gulhane⁵****Assistant Proffesor¹, Student, Department of Manegement Studies², Prof. Ram Meghe Institute of Technology & Research, Badnera, Amravati***Abstract**

The rapid growth of e-commerce has significantly transformed consumer purchasing behavior, making online shopping platforms an essential part of modern retail; however, issues related to trust and security continue to influence consumers' willingness to engage in online transactions. This study examines consumer trust and security perception in online shopping platforms with special reference to Amravati City, based on primary data collected through a structured questionnaire focusing on shopping frequency, preferred payment methods, trust levels, and perceived security risks. The study identifies key factors affecting trust such as data privacy, website reliability, payment security, and past experiences, and reveals that although many consumers frequently shop online due to convenience and variety, concerns regarding financial fraud, misuse of personal information, and product authenticity still persist. The findings suggest that improving security measures, ensuring transparent policies, and enhancing customer experience can significantly increase consumer trust, concluding that while online shopping is widely accepted, strengthening security infrastructure and building consumer confidence are essential for the sustainable growth of e-commerce platforms.

Introduction**Growth and Importance of Online Shopping Platforms**

The rapid growth of internet technology and digital infrastructure has significantly transformed the way consumers purchase goods and services. Online shopping platforms have become an important part of modern retailing by providing convenience, wider product choices, competitive pricing, and easy access to products through digital devices. With the expansion of e-commerce, consumers increasingly rely on online platforms for their purchasing needs. However, despite the advantages offered by online shopping, concerns regarding trust and security remain critical factors influencing consumer behaviour in digital marketplaces.

Role of Consumer Trust in Online Shopping

Consumer trust plays a vital role in determining whether individuals are willing to engage in online transactions. Unlike traditional shopping environments, online platforms lack physical interaction between buyers and sellers, which creates uncertainty and perceived risks among consumers. Issues such as fraud, data breaches, misuse of personal information, and payment security often affect consumers' confidence in online platforms. Therefore, establishing a secure and trustworthy online environment has become essential for e-commerce companies to attract and retain customers. Studies indicate that perceived data security, transparency in communication, and reliable service significantly contribute to building consumer trust in digital shopping platforms.

Security Perception and Its Influence on Consumer Behaviour

Security perception is another important factor that influences online shopping behaviour. Consumers evaluate the safety of online transactions based on factors such as secure payment systems, privacy protection, authentication mechanisms, and the credibility of the website or application. When consumers perceive that an online platform adequately protects their personal and financial information, their willingness to purchase increases. Conversely, higher levels of perceived risk may reduce consumer confidence and discourage online transactions. Research has shown that perceived risk and security concerns strongly affect consumers' intention to shop online and their overall satisfaction with online shopping experiences.

Growth of Online Shopping and Security Concerns in India

In the Indian context, the adoption of online shopping has grown rapidly due to increasing internet penetration, smartphone usage, and the expansion of digital payment systems. However, many consumers still experience concerns regarding the security of online payments, authenticity of products, and reliability of sellers. These concerns are particularly relevant in developing cities where online shopping adoption is growing but consumer awareness about digital security practices may vary. Understanding consumers' perception of trust and security is therefore crucial for improving the effectiveness and reliability of online shopping platforms.

Amravati City, an emerging urban centre in Maharashtra, has witnessed increasing usage of online shopping platforms in recent years. Consumers in the city are gradually adopting e-commerce services for purchasing various products such as clothing, electronics, and household items. Despite the growing popularity of online shopping, issues related to trust and security perception may influence consumers' willingness to transact online. Therefore, studying consumer trust and security perception in online shopping platforms within the context of Amravati City can provide valuable insights into consumer behaviour and help online retailers develop strategies to enhance user confidence and improve service quality.

Literature Review

Several researchers have examined the role of consumer trust and security perception in influencing online shopping behaviour. Trust is considered one of the most critical factors in the adoption and continued use of e-commerce platforms. According to **Indian Journal of Marketing**, a study conducted by (Anand Thakur), (Shabnam), and (RupinderdeepKaur)found that security protection, perceived risk, and perceived benefits are significant determinants of consumer trust in online shopping. The study revealed that lack of trust is one of the major barriers preventing consumers from adopting online shopping platforms, and improving security systems and privacy protection can significantly enhance consumers' confidence in online transactions.

Another study published in the **Journal of Consumer Sciences** by (Sutisna, Mochamad Saefullah), and Juwita examined the relationship between service quality, trust, and perceived risk in online purchasing decisions. Their findings indicate that consumers often hesitate to make online purchases when they perceive higher levels of risk. The research also demonstrated that trust in online sellers and platforms reduces perceived risk and positively influences consumers' decisions to buy products online. Similarly, research conducted by Anamika Sangwan in the **Research Review International Journal of Multidisciplinary** analyzed how perceived risks affect online purchase intentions. The study identified financial risk and product risk as key factors influencing consumer behaviour in online shopping. The findings suggest that when consumers perceive higher financial or product-related risks, their intention to purchase products online decreases significantly. Therefore, reducing perceived risk through secure payment systems and reliable product information is essential for increasing consumer participation in online shopping.

In another study published in **Consumer Behavior Review**, José Pedro Cerdeira highlighted that several factors such as website design, reputation, perceived security, and trustworthiness influence consumers' decisions to purchase products through electronic platforms. The research emphasized that consumers evaluate online platforms based on their perceived reliability and the level of security provided for personal and financial information before engaging in online transactions.

Furthermore, a study by (Feng Lu published in **PeerJ Computer Science**) examined consumer perceptions of network security in online shopping environments. The study found that perceived security and risk significantly influence consumer behaviour, as concerns about data privacy and information leakage often create uncertainty among consumers. Enhancing network security technologies and improving data protection mechanisms can help increase consumer confidence and encourage greater participation in online shopping platforms.

Additionally, research on digital marketplaces indicates that consumer perception of transaction security is influenced by their understanding of security features and previous online shopping experiences. Consumers who possess higher digital literacy and awareness of online security practices tend to feel more confident when making online purchases. Educational initiatives and awareness programs can therefore improve consumer trust and reduce concerns related to online fraud and privacy issues.

Overall, previous studies emphasize that consumer trust and security perception are essential factors influencing online shopping behaviour. Elements such as website reliability, secure payment systems, privacy protection, service quality, and perceived risk play significant roles in shaping consumers' confidence in online shopping platforms. However, consumer perceptions may vary across regions and demographic groups. Therefore, conducting a study on consumer trust and security perception in online shopping platforms within the context of Amravati City can provide valuable insights into the factors affecting consumer behaviour in emerging urban markets.

Research Methodology

The research design for the study "Consumer Trust and Security Perception in Online Shopping Platforms: A Study in Amravati City" has adopted a descriptive research design to examine consumers' level of trust and their perceptions of security while shopping online. Primary data was collected from consumers in Amravati city through a structured questionnaire survey. A convenience sampling method was used to select respondents who actively use online shopping platforms. The collected data was analysed using statistical tools such as percentage analysis and simple descriptive statistics to understand patterns of consumer trust and security perception. The study aims to identify factors that influence consumers' confidence in online shopping platforms.

Objective of Research

- To examine the level of consumer trust in online shopping platforms among consumers in Amravati city.
- To analyze consumers' perceptions regarding security and privacy while making online transactions.
- To identify the factors that influence consumer trust and security perception in online shopping platforms

Data Sources

Primary and secondary data were used for the study. Primary data was collected through a structured questionnaire administered to online shoppers in Amravati city, which included questions related to demographic details, online shopping behavior, trust in online platforms, and perceptions regarding security and privacy, with responses measured on a 5-point Likert scale ranging from strongly disagree to strongly agree. Secondary data was gathered from books, research journals, websites, and published reports related to e-commerce, consumer trust, and online security.

Sampling Design

Population

The population of the study consists of online shoppers residing in Amravati city who use online shopping platforms such as Amazon, Flipkart, Meesho, etc.

Sampling Technique

The study has adopted Convenience Sampling because it allows easy access to respondents who actively use online shopping platforms.

Sample Size

A sample of 60 respondents was selected from Amravati city. In many online shopping perception studies, survey samples of around 60 respondents are used depending on the research scope and accessibility of participants.

Tools and Techniques for Data Analysis

Tools:

Data will be collected through a structured questionnaire using a 5-point Likert scale. The collected data was analysed with the help of Microsoft Excel and SPSS software.

Techniques:

The study has adopted percentage analysis to examine demographic details of respondents, mean and standard deviation to measure the level of consumer trust and security perception, and correlation and regression analysis to analyze the relationship and impact of security factors on consumer trust in online shopping platforms.

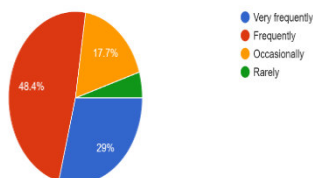
Scope Of The Study

The study focuses on analyzing consumer trust and security perception in online shopping platforms among consumers in Amravati. It examines factors such as online payment security, privacy

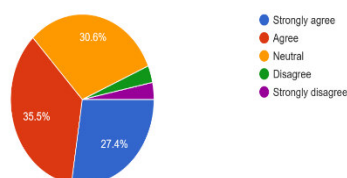
protection, and reliability of e-commerce platforms. The study includes consumers who use platforms like Amazon and Flipkart for online shopping. It helps understand how security measures influence consumer trust and their online purchasing behavior.

• Data Analysis And Interpretation

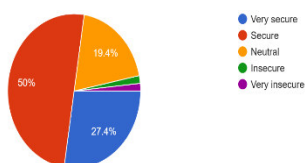
6. How often do you shop online?
62 responses



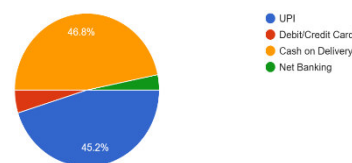
8. Do you feel your personal information is safe on online shopping platforms?
62 responses



9. How secure do you feel while making online payments?
62 responses



10. Which payment method do you trust the most for online shopping?
62 responses



Interpretation:

The overall findings indicate that online shopping has become a widely accepted and frequently practiced activity among consumers, with the majority shopping frequently (48.3%) or very frequently (30%), and only a small proportion shopping rarely (5%). This high level of adoption is supported by a generally positive perception of security and trust. Most respondents believe their personal information is safe, with 36.7% agreeing and 28.3% strongly agreeing, although a notable 28.3% remain neutral, reflecting some uncertainty about privacy protection. Similarly, confidence in online payment security is strong, as 51.7% feel secure and 26.7% feel very secure, while only a minimal percentage express insecurity (3.4%). In terms of payment preferences, UPI (46.6%) and Cash on Delivery (44.8%) emerge as the most trusted methods, indicating that consumers value both the convenience of digital payments and the perceived safety of paying after delivery. Overall, the results highlight high usage, strong trust levels, and a balanced preference for both modern and traditional payment options among online shoppers.

Finding :

The study reveals that a large number of respondents **frequently use online shopping platforms**, indicating the growing popularity of e-commerce among consumers in Amravati city. Most respondents show **moderate to high trust in online shopping platforms**, though some respondents remain neutral regarding trust. A significant portion of consumers believe that **their personal information is safe on online shopping platforms**, while a noticeable percentage remain uncertain about data privacy. The majority of respondents feel **secure while making online payments**, suggesting that digital payment systems are widely accepted. **UPI and Cash on Delivery** are the most trusted payment methods among respondents. Only a small number of consumers reported **security issues while shopping online**, indicating that security measures adopted by platforms are relatively effective. Some respondents still show **concern regarding privacy protection and payment security**, which affects their trust in online shopping platforms.

Suggestion :

Online shopping platforms should **strengthen data security and privacy protection** to build greater consumer trust. E-commerce companies should **increase awareness about secure payment methods** and digital security features. Platforms should provide **transparent privacy policies** so that customers clearly understand how their data is used and protected. Companies should implement **advanced security technologies such as two-factor authentication and encryption** to protect user information. Customer support services should be improved to **quickly resolve security-related**

complaints. Awareness programs should be conducted to **educate consumers about safe online shopping practices.**

Conclusion :

The study concludes that online shopping has become an important part of consumer purchasing behavior in Amravati city. Most consumers frequently use online shopping platforms and have a moderate to high level of trust in them. Consumers generally feel secure while making online payments, especially when using trusted payment methods such as UPI and Cash on Delivery. However, some consumers remain uncertain about the safety of their personal information and digital transactions. Therefore, online shopping platforms must focus on strengthening security measures, improving transparency, and building consumer confidence. Enhancing security and privacy protection will further increase consumer trust and encourage the growth of e-commerce in the future.

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Predicting Multiple Diseases Through Methods of Data Mining

Prerna Tayade

Assistant Professor, Shri Shivaji Science College, Amravati

Email: dr.pernasanjayraotayade@gmail.com

Contact:7709170475

Abstract

Data mining techniques are used for a variety of applications. In healthcare industry, data mining plays an important role in predicting diseases. For detecting a disease number of tests should be required from the patient. But using data mining technique the number of tests can be reduced. This reduced test plays an important role in time and performance. This paper analyzes data mining techniques which can be used for predicting different types of diseases. This paper reviewed the research papers which mainly concentrate on predicting heart disease, Diabetes and Breast cancer etc.

Keywords: Data Mining, Classification, Naive Bayes, J48, Decision tree.

Abstract: Data mining techniques are widely applied across various fields, including healthcare, where they play a crucial role in disease prediction. Traditionally, diagnosing a disease requires numerous tests for a patient, but data mining can help reduce the number of necessary tests. This reduction is significant for saving time and improving performance. This paper analyzes different data mining techniques used to predict various diseases. It reviews research focused primarily on predicting heart disease, diabetes, and breast cancer, among others.

Keywords: Data Mining, Classification, ZeroR, Linear Regression.

I. INTRODUCTION

In recent times, data mining has been obtained a great attention in the knowledge and information industry due to the vast availability of large amounts of data and the forthcoming need for converting such data into meaningful information and knowledge. The data mining technology is one comprehensive application of

technology item relying on the database technology, statistical analysis, artificial intelligence, and it has shown great commercial value and gradually to other profession penetration in the retail, insurance, telecommunication, power industries use [1].

The major components of the architecture for a typical data mining system are shown in Fig 1 [2].

Good system architecture will make possible the data mining system to make best use of the software environment. It achieves data mining tasks in an effective and proper way to exchange information with other systems which is adaptable to users with diverse requirements and change with time.

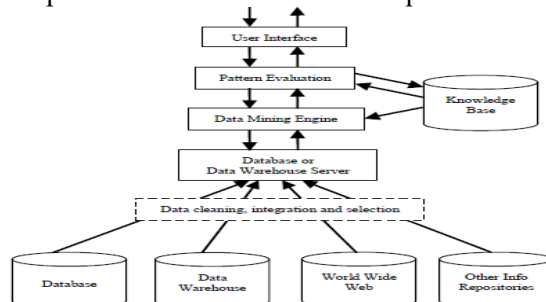


Fig1: A Typical Architecture of Data Mining System

II. DIFFERENT DISEASES PREDICTED:

• Coronary Artery Disease (CAD)

CAD is the most common heart problem. With CAD, you may get blockages in your coronary arteries -- the vessels that supply blood to your heart. That can lead to a decrease in the flow of blood to your heart muscle, keeping it from getting the oxygen it needs.[5] The disease usually starts as a result of atherosclerosis, a condition sometimes called hardening of the arteries. Coronary heart disease can

give you pain in your chest, called angina, or lead to a heart attack. Some things that may put you at a higher risk of coronary artery disease are:

- a. Age (For men, the risk of heart disease goes up after age 55; for women, the risk rises sharply after menopause.)
- b. Being inactive
- c. Having diabetes or metabolic syndrome
- d. Family history of coronary heart disease
- e. Genetics
- f. High blood pressure
- g. High levels of LDL “bad” cholesterol or low levels of HDL “good” cholesterol
- h. Obesity
- i. Smoking
- j. Stress

The above specified parameters are included in the dataset for predicting CAD.

- **Heart Arrhythmias**

When you have an arrhythmia, your heart has an irregular beating pattern. Serious arrhythmias often develop from other heart problems but may also happen on their own. In the dataset, the heart beating parameters are used for predicting heart arrhythmias.[5]

- **Heart Failure**

With heart failure, your heart doesn't pump blood as well as it should to meet your body's needs. It is usually caused by coronary artery disease, but it can also happen because you have thyroid disease, high blood pressure, heart muscle disease (cardiomyopathy),[6] or certain other conditions. The parameters indicating thyroid, and blood pressure are used to predict the chances of heart failure.

- **Heart Valve Disease**

Your heart has four valves that open and close to direct blood flow between your heart's four chambers, the lungs, and blood vessels. An abnormality could make it hard for a valve to open and close the right way. When that happens, your blood flow could be blocked or blood can leak. Your valve may not open and close right.[7]

The causes of heart valve problems include infections such as rheumatic fever, congenital heart disease, high blood pressure, coronary artery disease, or as a result of a heart attack.

The parameters blood pressure, rheumatic fever, congenital heart disease and CAD are used in the dataset to predict heart valve disease. Diseases of the heart valves include:

a. **Endocarditis:** This is an infection that's usually caused by bacteria, which may enter the blood and take root in your heart during illness, after surgery, or after using intravenous drugs. It often happens if you already have valve problems. Antibiotics can usually cure it, but the disease is life threatening without treatment. If your heart valves are seriously damaged as a result of endocarditis, you may need valve replacement surgery.

b. **Rheumatic heart disease:** This condition develops when your heart muscle and valves are damaged by rheumatic fever, which is linked to strep throat and scarlet fever. Rheumatic heart disease was more common earlier in the 20th century. But doctors are now able to prevent it by using antibiotics to treat the diseases that lead to it. If you do get it, the symptoms usually show up many years after the infection.

- **Pericardial Disease:**

Any disease of the pericardium, the sac that surrounds your heart, is called a pericardial disease. One of the more common diseases is pericarditis or inflammation of the pericardium. It's usually caused by an infection with a virus, inflammatory diseases such as lupus or rheumatoid arthritis, or injury to your pericardium. Pericarditis often follows open heart surgery. To predict the pericarditis lupus, and injury parameters are used in the dataset.[8]

- **Cardiomyopathy(HeartMuscleDisease):**

Cardiomyopathy is a disease of your heart muscle, or myocardium. It gets stretched, thickened, or stiff. Your heart may get too weak to pump well. There are many possible causes of the disease, including genetic heart conditions, reactions to certain drugs or toxins (such as alcohol), and infections from a virus. Sometimes, chemotherapy causes cardiomyopathy. Many times, doctors can't

find the exact cause. The genetic heart condition, alcohol consumption, and virus infection are taken as parameter to predict cardiomyopathy.[9]

- **Congenital Heart Disease:**

Congenital heart disease happens when something goes wrong while the heart is forming in a baby that's still in the womb. The heart abnormality sometimes leads to problems right after birth, but other times there aren't any symptoms until you become an adult. Septal abnormalities are among the most common congenital heart problems. These are holes in the wall that separates the left and right sides of your heart. You can get a procedure to patch the hole. Another type of abnormality is called pulmonary stenosis. A narrow valve causes a decrease in the flow of blood to your lungs.[10] A procedure or surgery can open or replace the valve. In some babies, a small blood vessel known as the ductus arteriosus doesn't close up at birth as it should. When this happens, some blood leaks back into the pulmonary artery, which puts strain on your heart. Doctors can treat this with surgery or a procedure or sometimes with medication. This disease is not considered in this research work.

III. DATA MINING TECHNIQUES:

- **ZeroR**

ZeroR is the simplest classification method which relies on the target and ignores all predictors. ZeroR classifier simply predicts the majority category (class). Although there is no predictability power in ZeroR, it is useful for determining a baseline performance as a benchmark for other classification methods.[11]

- **Linear Regression**

Regression, used primarily as a form of planning and modeling, is used to identify the likelihood of a certain variable, given the presence of other variables.[11]

For example, you could use it to project a certain price, based on other factors like availability, consumer demand, and competition. More specifically, regression's main focus is to help you uncover the exact relationship between two (or more) variables in a given data set.

- **Multilayer Perceptron**

This was proved almost a decade later by Minsky and Papert, in 1969[5] and highlights the fact that Perceptron, with only one neuron, can't be applied to non-linear data. The Multilayer Perceptron was developed to tackle this limitation. It is a neural network where the mapping between inputs and output is non-linear.[12]

A Multilayer Perceptron has input and output layers, and one or more hidden layers with many neurons stacked together. And while in the Perceptron the neuron must have an activation function that imposes a threshold, like ReLU or sigmoid, neurons in a Multilayer Perceptron can use any arbitrary activation function.

- **Random Forest**

Random forest is a Supervised Machine Learning Algorithm that is used widely in Classification and Regression problems. It builds decision trees on different samples and takes their majority vote for classification and average in case of regression. One of the most important features of the Random Forest Algorithm is that it can handle the data set containing continuous variables as in the case of regression and categorical variables as in the case of classification. It performs better results for classification problems.[13]

- **Simple KMeans**

Kmeans algorithm is an iterative algorithm that tries to partition the dataset into K pre-defined distinct non-overlapping subgroups (clusters) where each data point belongs to only one group. It tries to make the intra-cluster data points as similar as possible while also keeping the clusters as different (far) as possible. It assigns data points to a cluster such that the sum of the squared distance between the data points and the cluster's centroid (arithmetic mean of all the data points that belong to that cluster) is at

the minimum. The less variation we have within clusters, the more homogeneous (similar) the data points are within the same cluster.[13]

- **FarthestFirst**

Farthest First is a Variant of K means that places each cluster centre in turn at the point furthest from the existing cluster centres. This point must lie within the data area. This greatly speeds up the clustering in most cases since less reassignment and adjustment is needed. [14]

- **Hierarchical clustering**

Hierarchical clustering refers to an unsupervised learning procedure that determines successive clusters based on previously defined clusters. It works via grouping data into a tree of clusters. Hierarchical clustering starts by treating each data point as an individual cluster. The endpoint refers to a different set of clusters, where each cluster is different from the other cluster, and the objects within each cluster are the same as one another.[15]

IV. EXPERIMENTAL RESULTS:

In this study, the accuracy of seven data mining techniques is compared. The goal is to have high accuracy, besides high precision and recall metrics. Although these metrics are used more often in the end of information retrieval, here I have considered them as they are related to the other existing metrics such as specificity and sensitivity. These metrics can be derived from the confusion matrix and can be easily converted to true-positive (TP) and false-positive (FP) metrics.

Approaches	Accuracy	Computational Efficiency
Farthest First	56.74%	0.02 seconds
K Means	84%	0.08 seconds
Hierarchical Clustering	86.34%	0.62 seconds
Random Forest	89.14%	1.96 seconds
Linear Regression	90.10%	0.94 seconds
Multilayer Perceptron	91.60%	3.06 seconds
ZeroR	93.72%	0.23 seconds

V. CONCLUSION:

In this study two different data mining classification techniques were used for the prediction of various diseases and their performance was compared in order to evaluate the best classifier. Here the accuracy of Farthest First Algorithm is 56.74%, KMeans has accuracy of 84%, Hierarchical Clustering has accuracy of 86.34%, Random Forest has accuracy of 89.14%, Linear Regression has accuracy of 90.10%, Multiple Regression has accuracy of 91.60% and ZeroR has the highest accuracy as 93.72%. So from the result it is observed that the ZeroR has the highest accuracy among the seven approaches. An important challenge in data mining and machine learning areas is to build precise and computationally efficient classifiers for Medical applications.

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Integration of Skill-Based and Industry-Oriented Subjects in Commerce and Management Curriculum: A Study of Sant Gadge Baba Amravati University, Amravati

Dr. Sariputra Baliram Bhalekar

Asst Professor (CHB) Y.D.V.D. Arts, Commerce & Science College Teosa.

Mobile No: 7350399551 ,Email Id:aryabhalekar@gmail.com

1) Abstract

In the modern business environment, higher education institutions increasingly focus on integrating skill-based and industry-oriented subjects to improve students' employability and professional competence. The Faculty of Commerce and Management under Sant Gadge Baba Amravati University (SGBAU), Amravati has revised its B.Com curriculum in accordance with the National Education Policy (NEP-2020). The curriculum now includes skill-oriented courses such as Computer Skills, Accounting with Tally, Entrepreneurship Development, Database Management Skills, Spreadsheet Skills, Forensic Accounting, and Field Projects to connect theoretical learning with practical industry requirements. The study examines the integration and effectiveness of these subjects using a descriptive research design. Primary data were collected through a structured questionnaire from 50 respondents, including students and faculty from affiliated colleges, while secondary data were obtained from syllabus documents, journals, and academic publications. The data were analyzed using percentage methods.

The findings show that skill-based subjects enhance practical knowledge, technological skills, and employability. However, limited industry collaboration and insufficient practical training remain challenges. Continuous curriculum revision and stronger industry-academic collaboration are necessary to strengthen commerce education.

2) **keywords:** Skill-Based Education, Industry-Oriented Curriculum, Commerce and Management Education, Sant Gadge Baba Amravati University, National Education Policy (NEP-2020)

3) Introduction

In the contemporary global economy, higher education institutions are increasingly emphasizing the integration of skill-based and industry-oriented subjects within academic curricula to enhance students' employability and practical competencies. Commerce and management education, in particular, must adapt to rapidly changing business environments, technological advancements, and evolving industry expectations. Universities are therefore restructuring their syllabi to incorporate practical knowledge, digital skills, and professional training that align with modern market requirements. In India, the implementation of the **National Education Policy (NEP) 2020**ⁱ has further encouraged universities to design multidisciplinary and skill-oriented curricula that promote experiential learning and industry relevance.ⁱⁱ

The Faculty of Commerce and Management under **Sant Gadge Baba Amravati University (SGBAU), Amravati** has introduced several reforms in its Bachelor of Commerce (B.Com.) program to integrate vocational and skill-based education with traditional theoretical subjects. The NEP-2020 based curriculum includes courses such as **Computer Skills, Accounting with Tally, Entrepreneurship Development, Database Management Skills, Spreadsheet Skills, and Forensic Accounting**, which focus on practical knowledge and professional application. These subjects aim to develop students' competencies in areas such as digital accounting, business data management, entrepreneurship, and financial investigation, thereby preparing them for real-world business environments. In addition, components like **Field Projects and Community Engagement** provide experiential learning opportunities where students can apply theoretical knowledge in practical situations.ⁱⁱⁱ

The integration of such skill-oriented subjects represents a significant shift from traditional commerce education toward a more industry-relevant and competency-based learning framework. These curriculum changes are expected to improve students' professional skills, technological proficiency, and overall employability. Therefore, it becomes important to examine how effectively these skill-based and industry-oriented subjects have been integrated into the commerce and management curriculum. The present study aims to analyze the integration and relevance of such

subjects in the B.Com curriculum of SGBAU and evaluate their role in enhancing practical knowledge and industry readiness among students.

4) Literature Review

1. **Sharma and Sharma (2021)** examined the importance of integrating skill-based education in higher education to meet industry requirements. The study found that traditional theoretical learning often fails to develop employability skills among graduates. The authors emphasize the need to combine academic knowledge with practical training, internships, and vocational courses to prepare students for the modern workplace and improve employability outcomes.^{iv}

2. **Vidwakalyani and Gomathi (2023)** analyzed the role of skill-based learning in higher education with reference to the implementation of the National Education Policy (NEP-2020). The study highlights that integrating practical skills, vocational training, and industry exposure into academic curricula helps bridge the gap between academic knowledge and employer expectations, thereby improving graduates' employability and career readiness.^v

3. **Pathak (2025)** studied the effectiveness of skill-based education under NEP-2020 and found that curriculum reforms emphasizing experiential learning, digital literacy, and vocational training significantly enhance students' career readiness. The research suggests that integrating industry-oriented subjects and practical learning methods in higher education helps develop problem-solving abilities, innovation, and entrepreneurial skills required in modern business environments.^{vi}

5) Skill-Based and Industry-Oriented Subjects from SGBAU B.Com Syllabus

Sr. No.	Course Code	Subject Name	Type of Course	Nature of Skill Development	Semester
1	400108	Computer Skills	Skill Enhancement Course (SEC)	Develops basic computer knowledge and digital business applications	Semester I
2	400208	Accounting with Tally	Vocational Skill Course (VSC)	Provides practical training in accounting software used in industry	Semester II
3	400209	Computer Skills II	Skill Enhancement Course (SEC)	Advanced computer applications and digital documentation	Semester II
4	400205	Entrepreneurship Development	Generic / Open Elective	Develops entrepreneurial abilities and business startup skills	Semester II
5	401309	Database Management Skill	Vocational Skill Course (VSC)	Teaches data management systems used in business organizations	Semester III
6	401408	Forensic Accounting in India	Vocational Skill Course (VSC)	Develops skills in fraud detection, auditing, and financial investigation	Semester IV
7	401409	Spreadsheet Skill	Skill Enhancement Course (SEC)	Develops data analysis, financial reporting, and Excel-based business skills	Semester IV
8	401312 / 401412	Field Project / Community Engagement	Practical / Field Work	Provides real-world industry exposure and experiential learning	Semester III & IV

6) Objectives of the Study

1. **To examine the integration of skill-based and industry-oriented subjects** in the commerce and management curriculum of **Sant Gadge Baba Amravati University (SGBAU), Amravati.**

2. **To identify the major skill-based courses** included in the B.Com curriculum, such as computer skills, accounting software, entrepreneurship development, and other vocational subjects.

3. To analyze the role of these skill-based subjects in enhancing students' practical knowledge, professional competencies, and employability skills.

4. To evaluate the effectiveness of industry-oriented learning components, such as practical training, projects, and technology-based subjects, in preparing students for real-world business environments.

7) Research Methodology

1. Research Design

- The present study adopts a **descriptive research design** to examine the integration of skill-based and industry-oriented subjects in the commerce and management curriculum.
- It focuses on analyzing students' perceptions regarding the usefulness of practical and vocational courses in developing employability skills.

2. Sample Selection

- The sample for the study consists of **50 students** studying B. Com in different affiliated colleges of **Sant Gadge Baba Amravati University (SGBAU), Amravati**.
- These students were selected to understand their views on skill-based subjects included in the university curriculum.

3. Sampling Technique

- The study uses a **convenience sampling technique**.
- Students from selected colleges under SGBAU were chosen based on their accessibility and willingness to participate in the survey.

4. Data Collection Method

- Both **primary and secondary data** were used in the study.
- Primary data were collected through a **structured questionnaire** distributed to the selected students.
- Secondary data were collected from **university syllabus documents, academic journals, books, and official reports** related to commerce education and skill-based learning.

5. Data Analysis and Technique

- The collected data were analyzed using **simple percentage analysis and descriptive interpretation**.
- The results were presented in **tables and charts** to understand students' responses regarding the importance and effectiveness of skill-based and industry-oriented subjects.

8) Data analysis Data Interpretation

To what extent are skill-based and industry-oriented subjects integrated into the commerce and management curriculum of SGBAU?

- a) Very high integration
- b) High integration
- c) Moderate integration
- d) Low integration
- e) No integration

The above question aims to assess the extent to which skill-based and industry-oriented subjects are incorporated into the commerce and management curriculum of **Sant Gadge Baba Amravati University (SGBAU), Amravati**. The responses indicate students' perceptions regarding the presence and effectiveness of practical and vocational courses such as Computer Skills, Accounting with Tally, Entrepreneurship Development, and other industry-relevant subjects in the curriculum. Options ranging from "Very high integration" to "No integration" help measure the level of curriculum alignment with industry requirements. If most respondents select higher levels of integration, it suggests that the curriculum successfully incorporates practical and skill-based learning, thereby enhancing students' professional competencies and employability in the modern business environment.

9) Hypothesis Testing

1. Hypothesis 1

- **H₀₁ (Null Hypothesis):** There is **no significant integration** of skill-based and industry-oriented subjects in the commerce and management curriculum of SGBAU.

- **H₁₁ (Alternative Hypothesis):** There is a **significant integration** of skill-based and industry-oriented subjects in the commerce and management curriculum of SGBAU.

Step I: Prepare a expected frequency Table.

Sr. No	Opinion	Respondents		Chi-Square Test $X^2 = \sum \frac{(O - E)^2}{E}$
		Observed Frequency	Expected Frequency	
1	Very High Integration	18	10	6.40
2	High Integration	15	10	2.50
3	Moderate Integration	9	10	0.10
4	Low Integration	5	10	2.50
5	No Integration	3	10	4.90
	Total	50	The table value of Chi Square is 9.49 at 4 degrees of freedom and 5% level of significance.	

Step II -

To calculate the chi-square test statistic for the provided observed and expected frequencies, we'll use the formula:

$$X^2 = \sum \frac{(O - E)^2}{E}$$

$$X^2 = 16.40$$

Step III –

To determine the degrees of freedom for the chi-square test, we use the formula:

$$D.F = N-1$$

$$= 5-1$$

$$= 4$$

Step IV: Conclusion:

Calculated value

151.57

>

Table Value

13.28

The above table presents the Chi-square analysis of students' responses regarding the extent of integration of skill-based and industry-oriented subjects in the commerce and management curriculum of **Sant Gadge Baba Amravati University (SGBAU), Amravati**. A total of **50 respondents** were surveyed to understand their perceptions about the inclusion of practical and industry-relevant subjects in the B.Com curriculum. The observed frequencies indicate that **18 students (36%) reported very high integration and 15 students (30%) reported high integration**, while **9 students (18%) indicated moderate integration**. Only **5 students (10%) and 3 students (6%)** expressed low or no integration respectively.

The expected frequency for each category was taken as **10** based on equal distribution of responses. The calculated Chi-square value obtained from the data is **16.40**, which is higher than the table value **9.49** at **4 degrees of freedom and 5% level of significance**. Therefore, the **null hypothesis is rejected** and the **alternative hypothesis is accepted**.

This result clearly indicates that there is a **significant integration of skill-based and industry-oriented subjects in the commerce and management curriculum of SGBAU**. The high proportion of positive responses reflects that courses such as computer applications, accounting software, and other practical subjects contribute effectively to developing students' practical knowledge, technical competencies, and industry readiness. Hence, the curriculum supports the objective of enhancing employability and aligning commerce education with modern industry requirements.

10) Analysis and Findings of Responses

The responses of **50 students** regarding the integration of skill-based and industry-oriented subjects in the commerce and management curriculum of **Sant Gadge Baba Amravati University (SGBAU), Amravati** were analyzed using percentage method. The findings for each option are as follows:

1. Very High Integration – 18 Respondents (36%)

- Out of 50 respondents, **18 students (36%)** stated that skill-based and industry-oriented subjects are integrated at a very high level in the curriculum.
- This indicates that a large proportion of students perceive that courses such as computer skills, accounting software, and practical subjects strongly contribute to industry-oriented learning.
- It reflects a positive perception regarding the modernization of the commerce curriculum.

2. High Integration – 15 Respondents (30%)

- **15 students (30%)** believed that the integration of skill-based subjects in the curriculum is high.
- These students recognize the presence of vocational and practical courses that enhance employability and professional competencies.
- This response further supports the view that the curriculum includes a substantial number of practical subjects.

3. Moderate Integration – 9 Respondents (18%)

- **9 students (18%)** reported a moderate level of integration.
- These respondents feel that although skill-based subjects are included, there is still scope for improvement in terms of practical exposure and industry collaboration.

4. Low Integration – 5 Respondents (10%)

- **5 students (10%)** indicated that the level of integration is low.
- This group suggests that some areas of the curriculum still emphasize theoretical learning more than practical or industry-oriented skills.

5. No Integration – 3 Respondents (6%)

- Only **3 students (6%)** stated that there is no integration of skill-based subjects in the curriculum.
- This minimal percentage indicates that very few students perceive the absence of practical learning components.

11) Implications of the Analysis

Based on the above analysis of students' responses regarding the integration of skill-based and industry-oriented subjects in the commerce and management curriculum of **Sant Gadge Baba Amravati University (SGBAU), Amravati**, the following implications can be derived:

1. Positive Curriculum Development

- The majority of students (66%) indicating very high and high integration suggests that the curriculum has been effectively designed to include skill-based and practical subjects.

2. Improvement in Employability Skills

- The presence of subjects such as computer applications, accounting software, and entrepreneurship helps students develop professional competencies required in modern industries.

3. Alignment with Industry Requirements

- The integration of industry-oriented courses indicates that the university curriculum is gradually aligning with the needs of the contemporary business environment.

4. Scope for Further Enhancement

- The responses showing moderate and low integration highlight the need to further strengthen practical components, internships, and industry collaborations.

5. Encouragement of Experiential Learning

- Practical courses and field-based learning activities promote experiential learning, enabling students to apply theoretical knowledge in real business situations.

6. Support for Policy Reforms

- The integration of skill-based education reflects the objectives of recent educational reforms aimed at improving vocational and professional learning in higher education.

7. Need for Continuous Curriculum Revision

- Regular updates in the syllabus are necessary to incorporate emerging technologies, digital tools, and modern business practices to keep commerce education relevant.

12) Conclusion

The present study titled “**Integration of Skill-Based and Industry-Oriented Subjects in Commerce and Management Curriculum: A Study of Sant Gadge Baba Amravati University (SGBAU), Amravati**” aimed to examine the extent to which skill-based and industry-oriented subjects are incorporated in the commerce and management curriculum. In the modern business environment, higher education institutions are expected to provide practical knowledge and professional competencies that enhance students’ employability and industry readiness. The study adopted a **descriptive research design**, and primary data were collected through a structured questionnaire from **50 students** studying in various colleges affiliated with SGBAU. The collected data were analyzed using **percentage analysis and Chi-square test** to understand students’ perceptions regarding the integration of skill-based courses such as computer applications, accounting software, entrepreneurship development, and other practical subjects included in the B.Com curriculum. The analysis revealed that **36% of respondents perceived very high integration and 30% perceived high integration** of skill-based and industry-oriented subjects in the curriculum, indicating a positive perception among the majority of students. The calculated **Chi-square value (16.40)** was greater than the table value (9.49), leading to the rejection of the null hypothesis and acceptance of the alternative hypothesis. This confirms that there is a significant integration of skill-based subjects in the curriculum.

The findings suggest that the inclusion of practical and vocational courses contributes to developing students’ professional skills, technological competencies, and industry awareness. However, the study also highlights the need for continuous curriculum improvement, stronger industry collaboration, and increased practical exposure. Overall, the integration of skill-based education plays a crucial role in making commerce and management education more relevant and effective in the contemporary business environment.

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