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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

Executive Editor

Dr. H. R. Deshmukh

Principal

Y.D.V.D. Arts, Commerce & Science
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अध्यक्ष



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प्राचार्य

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११ वी व १२ वी कला, वाणिज्य

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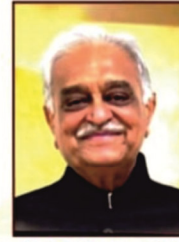
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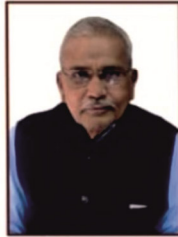
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व माजी कृषी मंत्री



शिक्षणमहर्षी डॉ. पंजाबराव उपाख्य
भाऊसाहेब देशमुख

महाविद्यालयाचे आश्रयदाते



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आमचे मार्गदर्शक



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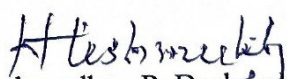
MESSAGE

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)

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MESSAGE

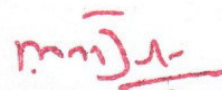
It gives me great pleasure to learn that Y.D.V.D. Arts & Commerce College, Teosa, Distt. Amravati is organizing a One Day National Conference on "*Changing Trends in Higher Education*" on 6th April, 2026.

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,
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PROF. MAHENDRA P. DHORE

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

Pro-Vice Chancellor

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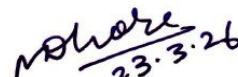
I am happy to know that, Y.D.V.D. Arts, Commerce & Science College, Teosa, Dist. Amravati, is organizing National Conference on “Changing Trends in Higher Education” on 6th April, 2026.

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

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

Date : 16-03-2026

MESSAGE

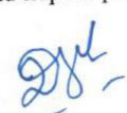
I take great pleasure in knowing that Y.D.V.D. Arts, Commerce & Science College, Teosa, Dist. Amravati, is 'hosting the National Conference on "Changing Trends in Higher Education" on 6th April 2026.

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

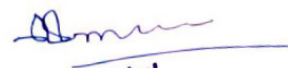
It gives me immense pleasure to welcome you to the National Conference on “Changing Trends in Higher Education” being organized by Y.D.V.D. Arts, Commerce & Science College, Teosa, Dist. Amravati, on 6th April 2026.

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.



Dr. Kusmendra G. Sontakke
Organising Secretary
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- Executive Editor

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Pester Power and Family Purchase Decisions: An Empirical Study of Child Influence in Supermarket Buying Behavior.

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ABSTRACT

According to change in time, the role of children in family purchase decision making is increasingly changing day by day. In recent years, a child possesses more power of independence and decision making directly or indirectly within the family purchases compared to earlier generations. The quantity of pressure exert by children varies by product category and stage of the decision making process. In connection with this, children are more voiced for the things they desire their parents to purchase and react accordingly; as a result of which the children became the new market segment. Children became active purchasers with easy access to money and the liberty to make their own choices. Children of today are significant as a primary, influential and a future market. Children's purchasing act is administered by the way they are socialized to act as purchasers / consumers. Family, friends / peers and media are main socializing agents.

For certain products which are merely children's product they are the primary users or buyers. At times, they themselves purchase the product or choose the product before it is purchased by their parents or family members. Children may influence the purchases made by their parents or family members for the product or products which are used by the complete family. For some FMCG products such as Ready to Eat Food (RTF) or Instant foods, Toothpastes, Ice creams, Biscuits/Cakes/Chocolates, Health Drinks, etc. children exert direct influence or pester power by explicitly (or clearly) stating their preference and conveying them aloud. Hence, the main focus of this research is to study the impact of pester power on purchase behaviour of select FMCG products in near by region.

Key words: Pester Power, Market segment, Active Purchasers, socializing agent, FMCG, Ready to Eat Food.

1. INTRODUCTION

Over time, children's influence on family decision-making has grown. Children have emerged as a crucial consumer segment that has a variety of influences on how families decide which things to buy (Caruana & Vassallo, 2003). In most cases, children emotionally sway their parents' choices. Out of love, many parents frequently have a tendency to grant their kids' requests. Sometimes parents refuse to give in to their kids' demands for a variety of reasons, including the item's excessive cost, its unsuitability for kids, or the kid getting too distracted by it. When this happens, kids turn to another tactic to persuade their parents. Children have the ability—or capacity—to pester their parents into purchasing goods that they might not otherwise purchase. In an article titled "Kids Advertising Hearings to Open" in the Washington Post from 1979, Larry Kramer introduced the concept of pester power. The phrase was used in reference to kids using all of their influence over their parents to get them to buy the thing they want.

Pester Power as Defined in Research

There is no formal or common definition for pester power in academia. Based on research done earlier, the term pester power has been defined by different researchers in different ways. The most simplest definition has been given by Quinn, who says pester power is "repetitive asking/requesting for a specific item and/or service" (Quinn, 2002, p. 7). Martino explains that pester power is "the children's ability to nag their parents into purchasing items they may not otherwise buy" (Martino, 2004, p. 1). According to Nicholls and Cullen, pester power is "a child's attempt to exert influence over parental purchases in a repetitive and sometimes confrontational way" (Nicholls & Cullen, 2004, p. 78). McDermott and others interpret pester power as "the children's unprecedented power as consumers and

their ability to deploy a variety of tactics to exert influence over purchasing by others” (McDermott, O’Sullivan, Stead, & Hastings, 2006, p. 513). The Director General of Advertising Association describes pester power as a pejorative term for children making requests to their parents. Galst and White (1976) uses the term purchase influence attempts (PIA) for pester power. Seth et al. (2004) explains that pester power is “the nagging ability of children to purchase the product they desire due to some reason.” Another less aggressively used term for pester power is “purchase request behaviour” (Young et al., 1996, p. 57). Pester power commonly refers to the nagging ability of the child. Children resort to using this power to get their demands fulfilled even for the items that they don’t really need or their parents cannot afford. Spungin points out that (2004, p. 37) “by advertising to children, companies are encouraging the child to nag their parents into buying something that is not good for them, they don’t need or the parent cannot afford.”

Pester Power Strategies:

Children employ a number of pester power tactics or strategies to get their demands fulfilled. They could be classified as direct and indirect influence strategies. Direct influence strategies are evident strategies used by the children to influence their parents’ decisions and is a purposeful attempt to influence the decision outcome of the parents. When the children influence the decision outcome of the parents unintentionally, they are said to be using the indirect influence strategy (Wells, 1965). Past studies have placed the pester power strategies used by children under various categories. I dell (1998) describes two types of nagging:

1. Persistent nagging: Children grow restless when their demand is not fulfilled and their actions at those times exhaust their parents so much that their parents just give into their demands. Throwing tantrums, raising volume, and persistent requests are commonly employed pester strategies by children, especially toddlers and kids.
2. Importance nagging: Children who are grown up, say older than 7 years, don’t behave like tantrum-throwing toddlers. They reason it out with their parents by persuading them to agree to their demand. They list the reasons for why they want to buy the product to justify their demand.

Palan and Lesniak (2001) identifies four different strategies used by children:

1. Informing strategies (asking or telling parents about products)
2. Negative strategies (pestering)
3. Persuasion strategies
4. Reasoning strategies (value for money).

Marquis (2004) lists three influence strategies employed by children for influencing parental decisions on food purchase. Palan and Wilkes (1997) explain each of these strategies: bargaining (offer deals), persuasion (express opinions on foods, begging, whining, stating that the product is preferred), and emotional appeal (asking repetitively, expressing anger, sulking, and being unnaturally nice to parents). Calderon (2017) included eight influence strategies used by the child to get their demands fulfilled. These include attempts like asking parents, placing things in cart, responding to the parents when parents initiate the request interaction, using nonverbal attempts such as pointing toward the object, begging and pleading, negotiating with the parents, asking them nicely, and displaying anger verbally (yelling) or nonverbally (kicking).

Behavior of Children and Parents While Shopping:

Marketers and researchers exhibit a constant desire to understand the behavior of children and parents while shopping. Marketers need an insight into this process to know how exactly parents and children take their decision and what roles the parents play while shopping with their children. One of the studies done by Darian (1998) analyzed behavior of children and parents in stores while shopping for children’s clothing. The method used for collection of data was unobtrusively observing parents and children while they were shopping in the retail outlets. The parents’ main role was that of a helper. They suggested options to the children, helping them in finding the right product and size. Nash and Basini (2012) conducted a study to understand the perspective of consumers regarding the purchase request between the parent and the child. The method used for the study was an in-depth interview and focus group with the parents and the child to understand both the parents and the children’s perspectives. The focus group for children was divided into two age groups to observe variations due to age. One group had children in the age group of 5–8 years and the other group had children in the age group of 9–11 years.

The parent–child relationship was described as a game in which two sets of players, the parent and the child, took part. They consider parent–child interaction to result in requesting and not pestering. They assume that both the players understand the game well. Williams and Veeck (1998) declared that no specific attitude or set of attitudes exclusively determines whether a mother would be influenced by her child or not for all products. The mothers who were child-centered were more likely to be influenced by children compared to mothers who were more family-oriented. Chan and McNeal (2003) conducted a study on 1,665 Chinese parents who had children in the age group of 6–14 years and found that parents control the type of product children can or cannot buy. Parents discussed with children about the product the latter use but they seldom consult children for the products bought for family use.

2. REVIEW OF LITERATURE

A literature review gives an outline of the field of enquiry: what has already been said on the topics, who are the key writers, what are the prevailing theories and hypothesis, what questions are being asked and what methodologies and methods are appropriate and useful. This section covers understanding the impact of pester power on family purchase decisions by reviewing the extant literature.

Amstrong & Kotler (2006) in their study examined that advertising influences people through education, persuasion and reassurance. It also influences the shopping experience, by making shopping simpler and helping to moderate the prices of advertised products.

Schiffman (2007), classified sources of influence upon teen's shopping into person and situation factors, such as opinions and attitudes towards product, brand and store, market advice and purchase values and norms available from parents, peers, and the media. Identification of the sources from which consumers obtain information advice and influence is equally important in attitude development.

Agrawal, Tripathi & Aditya, (2008), has analyzed the impact of television advertising on children's food preference with special reference to Delhi NCR collected data from 300 respondents between the ages 6 to 16 years. Convenience sampling method was adopted and the major findings were that TV ads are the most popular to reach the children along with the online ads which created buzz. The results showed that TV ads have a positive influence on food preferences of children in Indian prospective.

Kotler, (2008), A reference group can be defined as "a group of people that significantly influences an individual's behaviour". In consumer behaviour contexts, reference groups are typically comprised of significant others from the individuals' social network, including family members, co-workers, peers and friends as well as inspirational figures such as sports heroes, movie stars, and fictional characters. For children, family members and peers are undoubtedly the most dominant reference groups, followed by more distant figures such as sports heroes and movie stars (Opoku, 2012).

3. RESEARCH METHODOLOGY

3.1 SIGNIFICANCE OF THE STUDY

Hence this study intends to relate several of these scattered beliefs and philosophies to give a seamless understanding of the factors leading to the genesis of pester power (mainly the demographic variables like the age, gender, birth order, family structure, family income, etc.) by examining them in the light of socio- psychographic variables like the attitude towards media, personality variables like materialism, exposure to out of home visits. The research work also studies the impact of the same on the child's relative influence over the purchase decision of selected product categories and the resultant pester power. In addition, other variables related to child's request strategies and parents' response strategies are studied to give a holistic idea of how pestering is mediated.

3.2 OBJECTIVE of THE STUDY

- To study the association between the number of children and their influence in purchase decision.
- To analyses the relationship between Monthly income and the child influence in the buying decision process.
- To probe into ways of attraction adopted by the company to influence the children.
- To determine the impact of Television advertisements in the family purchase decision.
- To understand the concept of Pester Power.
- To study how children influence their parents to buy certain products in supermarkets.
- To examine the impact of children on family purchasing decisions.
- To find out which products (like chocolates, snacks, toys, etc.) children mostly request from parents.
- To understand whether parents accept, ignore, or negotiate when children ask for products.
- To study the role of supermarket marketing strategies.

- To evaluate the overall impact of child influence on supermarket buying behavior.
- To measure how children's demands affect the final purchase decision of the family.

3.3 SOURCES OF DATA

It is well established that while the secondary data provides good conceptual clarity and direction to begin with, primary data based on empirical study often helps the researcher get insightful inferences about the subject of interest. Hence, for the purpose of gaining maximum possible knowledge related to the study, both the data sources have been duly and optimally used.

○ **Primary data:** Primary data was collected from the parents of the children (with at least one child in the house in the age ranging from 10-14 years and having some exposure to media) in the most important and diversified geographical locations across the Hyderabad city to cover maximum heterogeneity and representation of population. The household survey approach was used for data collection through well-structured questionnaire which covered various issues to meet the objectives of the study.

○ **Secondary data:** Various research articles from leading journals, business magazines and newspapers offer diverse dimensions to this study. These data sources include Journal of Consumer Marketing, Journal of Advertising, Journal of Consumer Psychology, Journal of Marketing Research, Journal of Consumer Research, The Sociological Quarterly, Advances in Consumer Research, Journal of Business Research, American Psychologist, Journal of Public Policy and Marketing, Journal of Consumer Behaviour, Asia Pacific Journal of Marketing and Logistics, International Journal of Advertising and Marketing to children, The Marketing Review, Journal of Communication, Advertising and Society, Global Business Review, Business Today and Times of India. Various web sources further added provided important reviews of articles and sections as required. Library resources at Osmania University, Hyderabad provided access to many online journals and digital sources of information.

3.4 SAMPLING DESIGN

A sampling plan basically entails the sample selection criteria, sampling unit, sampling technique, sample size, element and respondent definition for the survey.

Study area: The existing urban population of Amravati city forms the sampling frame of research. The word „urban“ here emphasizes that children at least have a television set in the household with some media exposure and going to school.

Choice of Respondents: Parents of the children were considered as the qualifying criteria for the dyad selection. The household is considered for the survey if it had one child in the age range of 10 years to 14 years and children having some exposure to media.

FMCG products selected: Toothpaste, Ice creams, Cool drinks, Health drinks, instant foods, snacks, chocolates, Biscuits / cookies

3.4.1 Rationale behind selection of children in the age group – 3 years to 15 years :

The reason the age groups selected is 3 to 15 years is that according to the Indian education system, on an average the eldest of this group would supposedly belong to the tenth standard. Hence, many of their consumption patterns might be similar to the tween agers. Moreover, it was anticipated that this age group would also be able to understand many of the issues addressed and hence would impart good insights on the subject studied. However, quite often it became difficult for the interviewers to directly get responses from the 8 to 10 years for reasons of inabilities on the part of children to understand the issues and respond and also because of the fickle mindedness of this age group in terms of social desirability of the responses given.

3.4 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.

Data Analysis:

Sr.no	Questions	Primary Finding (Majority/Plurality)	Data Distribution
1	Age of the child in family	3-5 years (24.4%)	13-15 yrs:22%, 9-12yrs: 17.1%, 6-8 yrs:14.6%
2	Frequency of supermarket visits	Sometimes (48.8%)	Always:24.4%, Often:14.6%, Rarely: 9.8%
3	Do they ask for specific products?	Sometimes (43.9%)	Always:31.7%, Never:12.2%, Often:~7%
4	Buying due to child's insistence	Sometimes (46.3%)	Often:24.4%, Always:19.5%, Never:7.3%
5	Most requested product type	Chocolate& Candies(43.9%)	Toys:34.1%, Snacks:9.8%, Cold Drinks:9.8%
6	Influence of advertising	Agree (43.9%)	Neutral:26.8% Strongly Agree:19.5%
7	Source of advertisement	Mobile / YouTube (51.2%)	In-store:19.5% Social media:17.1% TV:12.2%
8	Parent's usual response	Sometimes buy (61%)	Buy:19.5% Explain by unnecessary:12.2%
9	Do children influence decisions?	Yes (43.9%)	No:29.3%, Sometimes: 26.8%
10	Set a budget limit?	Yes (63.4%)	Sometimes:19.5%, No: 17.1%
11	Influence of packaging	Agree (41.5%)	Neutral:31.7%, Disagree: 14.6%
12	How demands are managed	Sometimes buy (53.7%)	Explain and refuse: 34.1%, Ignore: 9.8%
13	Does "pester power" affect decision?	Agree (34.1%)	Neutral:29.3%, Strongly Agree:24.4%
14	Final purchase decision maker	Parent (34.1%)	Joint: 26.8%, Depend on product: 26.8%
15	Frequency of asking in-store	Sometimes (39%)	Often:22%, Very Often:22%, Rarely: 17.1%

3.6 Limitations of the study

The study will be carried out to understand the parents' opinions, views and experiences pertaining to pester power of select FMCG Products in Hyderabad region. However, the results may differ for other child-centric products and services like certain electronic and digital items, sports and hobby related items and other addictive's. The sample is drawn from Hyderabad city, therefore, may not represent the whole population. Hence, the limitation of generalization will be there. The respondents may fail to articulate their opinions; therefore, the in-articulation error may creep in to the study, despite the care taken.

4.THEORETICAL IMPLICATIONS

Broadly, this study contributes to marketing literature in several ways. Importantly, the use of children pester power has been elaborately studied, which adds to the knowledge about the behavior of Indian children in the wider literature. Our study would help marketers understand children as consumers, which is another theoretical addition.

5. DIRECTIONS FOR FURTHER RESEARCH

- The future studies can be made further exhaustive by including rural and different socio-economic sections of the population.
- There is scope for further research as the present study is based on select product of FMCG where there are a lot of other products from different segments which can be considered for the future study.
- There is scope for further research with the help of observation method of research in the malls where the parent are shopping for the family ,accompanied by their children where a lot of children centric products are at a hands away distance at the billing counters.
- As the present study is confined only to the parents of children between the age group of 10 years to 14 years wherein students of younger and elder age group can be consider for the future research and further with the change in product category also.

6. FINDING , CONCLUSION ,SUGGESTIONS

6.1 FINDING

○ Age of the Child in the Family:

The survey results indicate that a majority of respondents have children between 6–8 years and 9–12 years. This suggests that children in the middle childhood stage are more actively involved in supermarket shopping and product selection.

○ Frequency of Taking Children to the Supermarket:

The findings show that most parents often or sometimes take their children to supermarkets, while a smaller percentage always bring them along. Only a few respondents reported rarely taking their children. This indicates that children frequently accompany parents during shopping trips.

○ Children Asking for Specific Products:

A large proportion of parents reported that their children often or sometimes ask for specific products during shopping. Very few respondents selected “never.” This demonstrates that children commonly express their preferences while shopping.

○ Buying Products Due to Child Insistence:

The study reveals that many parents sometimes purchase products due to their child’s insistence, while some parents often give in to such demands. A smaller group of parents reported that they never purchase products based on their child’s insistence. This highlights the presence of pester power in family purchasing decisions.

○ Types of Products Requested by Children:

The findings indicate that snacks are the most frequently requested products, followed by toys and cold drinks. This suggests that children are more attracted to fun, tasty, and entertainment-related products during supermarket visits.

○ Influence of Advertising on Children:

Most respondents agree or strongly agree that advertising influences children’s demand for products. Only a few respondents disagreed with this statement. This finding shows that advertising plays a significant role in shaping children’s preferences and purchase requests.

○ Source of Product Advertisements:

The results show that mobile phones and YouTube are the primary sources of advertisements seen by children, followed by television and social media. In-store displays were selected by fewer respondents. This indicates that digital media has a strong influence on children’s product awareness.

○ Parents’ Response to Children’s Insistence:

Parents respond to children’s demands in different ways. Many parents reported that they sometimes buy the product, while others prefer to explain why it is not necessary or refuse the purchase. A smaller percentage reported always buying the requested product. This suggests that parents try to balance between satisfying their children

6.2 CONCLUSION

Based on the overall data, the study concludes that children significantly influence family purchasing decisions in supermarkets through pester power. Most children often ask for products like

snacks, toys, and cold drinks, and parents sometimes purchase these due to their insistence. Advertisements, especially through mobile phones, YouTube, and television, strongly affect children's product preferences. Although parents try to control or explain their decisions, children still play an important role in the final buying decision. Thus, children have become an active and influential part of family consumer behavior.

6.3 SUGGESTIONS

- Advertisers should not make false claims of the product.
- Advertisers should not misguide the children through eye-catching advertisement.
- Television Ads impact has been very strong and the kids try to imitate things from advertisements
- Dual income families should spend quality time with the children thereby reducing the screen time of them.
- Advertising rules and regulations could be amended frequently. Penalty and Punishments could be more rigid.

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Cognitive Dependency Of Generative Ai Tools And It's Implications For Critical Thinking Among Prof. Dr.Pratiksha A.Kalmegh¹, Sakshi Mahore², Shiksha Gharde³, Janhavi Gawande⁴, Dhanshree Gawande⁵

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Abstract

The rapid advancement of generative Artificial Intelligence (AI) technologies has significantly transformed the educational landscape. Tools such as ChatGPT and other AI-powered platforms are increasingly being used by students for academic tasks, including idea generation, assignment completion, and research assistance. While these technologies offer considerable benefits in terms of efficiency and accessibility of information, concerns have emerged regarding their potential impact on students' cognitive processes and critical thinking abilities. The present study examines the usage patterns of generative AI tools among MBA students and analyzes their perceptions regarding the effectiveness of these tools in academic work. The study adopts a descriptive research design and utilizes survey-based primary data to explore the extent of AI dependency among students. The results indicate that a significant majority of students rely on generative AI tools, particularly ChatGPT, for academic tasks. Furthermore, more than half of the respondents believe that AI makes academic work faster and easier. However, the findings also highlight the potential risk of cognitive dependency if AI tools replace independent analytical thinking. The study concludes that while generative AI can enhance academic productivity, it must be integrated responsibly within educational environments to ensure that students continue to develop essential critical thinking skills.

1. Introduction

The integration of artificial intelligence into education has introduced significant transformations in teaching and learning practices. In recent years, generative AI tools have gained widespread attention due to their ability to produce human-like responses, generate written content, analyze data, and provide instant solutions to complex academic problems. These tools are increasingly used by students across various academic disciplines, including management studies.

MBA education emphasizes analytical thinking, problem-solving abilities, and strategic decision-making skills. However, the growing reliance on generative AI tools for completing academic tasks raises important questions regarding the development of these competencies. While AI systems provide quick access to information and facilitate efficient completion of assignments, excessive reliance on such technologies may reduce students' engagement in deep cognitive processes.

The concept of cognitive dependency refers to a situation in which individuals rely heavily on external technological systems to perform tasks that would otherwise require independent thinking and reasoning. In the context of education, cognitive dependency may occur when students depend on AI-generated outputs instead of critically analyzing information or developing original ideas.

With the rapid adoption of generative AI tools such as ChatGPT and Gemini, it has become essential to examine how these technologies influence students' academic behavior and thinking processes. Understanding the patterns of AI usage and students' perceptions regarding these tools can provide valuable insights into their implications for higher education.

This study focuses on MBA students and investigates the extent to which generative AI tools are used in academic work. It also explores students' perceptions regarding the usefulness of AI in completing academic tasks and examines the potential relationship between AI usage and cognitive dependency. By analyzing these factors, the study aims to contribute to the ongoing discussion on the responsible use of AI in education.

2. Literature Review

Lau et al. (2025) introduced the concept of critical thinking in AI usage, emphasizing that users must actively evaluate and verify AI-generated information. The study proposed that students who engage critically with AI outputs are more likely to benefit from these technologies without compromising their cognitive development.

Lee et al. (2025) examined an AI-based educational tool designed to enhance critical thinking through guided questioning techniques. Their findings suggested that AI can function as a cognitive support system when it encourages reflection and inquiry rather than simply generating answers. The increasing integration of generative AI tools in education has attracted considerable attention from researchers. Several studies have explored how these technologies influence learning processes, academic performance, and critical thinking skills.

Rahman et al. (2024) investigated the influence of AI text-generation tools on students' critical thinking abilities. Their study found that generative AI tools significantly improve the efficiency of completing academic tasks by providing quick information and structured responses. However, the researchers also highlighted that overreliance on AI-generated responses may reduce students' engagement in analytical reasoning and evaluation processes.

Similarly, Ilic et al. (2026) conducted a systematic review of generative AI applications in higher education. The study examined multiple empirical studies and concluded that while AI tools can support learning by facilitating access to information and providing instant feedback, they may also encourage cognitive offloading. Cognitive offloading occurs when individuals delegate mental tasks to technological systems, which can reduce the development of independent cognitive abilities.

Premkumar et al. (2024) reviewed several research studies to examine the relationship between generative AI tools and critical thinking skills among university students. The authors observed mixed outcomes. Some studies indicated that AI tools could stimulate creativity and idea generation, while others suggested that students may become passive learners if they rely excessively on AI-generated information without critical evaluation.

Overall, existing literature indicates that generative AI tools have both positive and negative implications for students' cognitive development. While these tools can enhance learning efficiency and creativity, excessive reliance on them may hinder the development of critical thinking skills. Therefore, it is essential to understand how students use AI tools in academic contexts and how these technologies influence their learning behavior.

3. Research Methodology

3.1 Research Objectives

The study aims to achieve the following objectives:

1. To identify the generative AI tools commonly used by MBA students.
2. To examine the purposes for which students use generative AI tools in academic tasks.
3. To analyze students' perceptions regarding the effectiveness of AI in academic work.
4. To evaluate the potential implications of AI usage for cognitive dependency and critical thinking.

3.2 Research Design

The study follows a descriptive research design to analyze the cognitive dependency on generative AI tools and its impact on critical thinking among MBA students.

3.3 Sample Size

The study is based on a sample of 100 MBA students selected for the survey.

3.4 Sampling Technique

The respondents were selected using the convenience sampling technique based on availability and willingness to participate.

3.5 Data Collection Method

The study is based on primary data collected through a structured questionnaire using Google Forms. A structured questionnaire consisting of 12 close-ended questions was used to measure AI usage behavior and dependency level.

3.6 Data Analysis Technique

The collected data was analyzed using percentage analysis, tables and graphical representation to interpret the results.

4. Results and Data Analysis

Variable	Category	%
Ai tools used	Chatgpt	73.7
	Gemini	17.5
	Others Ai tools	8.8
Purpose of Ai tools	Idea generation	26.3

	Assignment completion	30
	Other Academic uses	43.7
Perception of Ai in academic tasks faster and easier.	Agree	55
	Neutral	30
	Disagree	15

5. Findings

The findings of the study indicate that generative AI tools are widely used among MBA students for various academic purposes. A significant majority of respondents reported using ChatGPT, highlighting its dominance among available AI platforms. Gemini was used by a smaller proportion of students, while a limited number of respondents reported using other AI tools.

Regarding the purpose of usage, the results show that students utilize generative AI tools for multiple academic tasks. A considerable proportion of respondents use AI for completing assignments, while others use it for idea generation and additional academic activities such as summarizing content or conducting preliminary research.

The perception analysis reveals that more than half of the respondents believe that AI tools make academic tasks faster and easier. This suggests that students recognize the efficiency and convenience provided by generative AI technologies. However, a notable percentage of respondents expressed neutral opinions or disagreement, indicating that not all students are fully confident about the effectiveness or reliability of AI tools in academic work.

Overall, the findings suggest that while generative AI tools offer significant advantages in terms of efficiency and productivity, their increasing use may also create a dependency that could influence students' critical thinking and independent learning abilities.

6. Conclusion

The increasing availability of generative AI tools has significantly influenced the academic behavior of MBA students. The findings of this study demonstrate that a majority of students actively use AI tools for academic tasks, particularly for assignments and idea generation. Students generally perceive these technologies as tools that improve efficiency and make academic work easier.

However, the study also highlights the potential risk of cognitive dependency if students rely excessively on AI-generated outputs without engaging in independent analysis. Such dependency may affect the development of critical thinking skills that are essential for management education.

Therefore, it is important for educational institutions to promote balanced and responsible use of generative AI technologies. By encouraging students to critically evaluate AI-generated information and integrate their own analytical perspectives, educators can ensure that AI serves as a supportive learning tool rather than a substitute for independent thinking.

7. Suggestions

Promoting Responsible Use of AI in Education

Educational institutions should develop clear guidelines regarding the responsible use of generative AI tools in academic work. These guidelines should encourage students to use AI as a support tool for research, idea generation, and clarification of concepts rather than as a substitute for independent thinking and analysis.

Integration of AI Literacy in Curriculum

Universities should introduce AI literacy programs to help students understand the capabilities and limitations of generative AI tools. Such programs can train students to critically evaluate AI-generated outputs, identify potential biases, and verify information using reliable academic sources.

Designing Critical Thinking-Based Assignments

Faculty members should design assignments that require analytical reasoning, problem-solving, and personal interpretation rather than simple information retrieval. Case studies, reflective essays, and problem-based learning activities can encourage students to think critically even when AI tools are available.

Encouraging Verification of AI-Generated Content

Students should be encouraged to cross-check AI-generated responses with textbooks, academic journals, and credible sources. This practice will help them develop research skills and prevent blind reliance on AI-generated information.

Faculty Training on AI Integration

Educators themselves must be trained to effectively integrate AI tools into the learning process. Faculty development programs can help teachers understand how AI can be used to enhance learning outcomes while maintaining academic integrity and critical thinking development.

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Consumer Trust in Local Healthcare Providers: An Empirical Study in Amravati.

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❖ 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

❖ Introduction

Background of the Study

Healthcare services are essential for maintaining the well-being of individuals and communities. In recent years, consumer expectations in healthcare have increased due to rising awareness, education, and access to information. Patients now evaluate healthcare providers not only based on treatment outcomes but also on service quality, affordability, and trustworthiness.

Trust is particularly important in healthcare because patients often lack technical knowledge and must rely on the expertise and ethical behavior of healthcare professionals. When trust exists, patients are more likely to follow medical advice and maintain long-term relationships with healthcare providers.

In India, trust in the healthcare system has been a major concern. Studies show that a large proportion of citizens express distrust toward healthcare providers due to issues such as lack of transparency, high costs, and medical negligence. One survey reported that more than **92% of people do not fully trust the healthcare system**, including hospitals, doctors, and diagnostic laboratories. Understanding the factors that influence consumer trust is therefore crucial for improving healthcare service delivery and patient satisfaction.

Importance of Consumer Trust in Healthcare

Consumer trust affects multiple aspects of healthcare services:

1. Patient satisfaction
2. Treatment adherence
3. Hospital reputation
4. Long-term patient loyalty
5. Healthcare service utilization

Patients often choose healthcare providers based on factors such as **doctor reputation, hospital accessibility, affordability, and medical expertise**.

Therefore, healthcare institutions must develop strategies to strengthen trust among patients.

Profile of Amravati City

Amravati is an important city in the Vidarbha region of Maharashtra. It serves as a healthcare hub for nearby rural and semi-urban areas. The city has:

- Government hospitals
- Private hospitals
- Specialized clinics
- Diagnostic centers

Many patients from surrounding villages visit Amravati for treatment, making it an appropriate location for studying consumer trust in healthcare providers.

Problem Statement

Despite the availability of healthcare services in Amravati, many patients still face challenges related to:

- Lack of transparency in medical costs
- Long waiting times
- Poor communication between doctors and patients
- Perceived commercialization of healthcare services

These issues may affect consumer trust and healthcare decisions.

Objectives of the Study

- 1.To examine the level of consumer trust in local healthcare providers in Amravati.
- 2.To identify 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

Hypotheses of the Study

- H1: There is a significant relationship between service quality and consumer trust.
H2: Doctor–patient communication positively affects consumer trust.
H3: Transparency in pricing significantly influences consumer trust.
H4: Hospital reputation positively impacts consumer trust.

Literature Review**Concept of Trust in Healthcare**

Trust in healthcare refers to the patient's belief that the healthcare provider will act in their best interest and provide appropriate treatment. It involves competence, honesty, and ethical behavior.

Trust also improves clinical outcomes because patients are more willing to follow medical advice and treatment plans

Factors Influencing Consumer Trust**1. Doctor Competence**

Patients trust doctors who demonstrate professional knowledge and skills.

2. Communication

Effective communication helps patients understand their condition and treatment options.

3. Transparency

Clear information regarding treatment procedures and costs improves trust.

4. Hospital Reputation

Brand image and patient reviews influence healthcare decisions.

5. Accessibility

Patients prefer hospitals that are easily accessible and conveniently located.

Patient Satisfaction and Trust

Patient satisfaction is closely linked with trust. Studies indicate that empathetic communication and compassionate care significantly increase patient confidence in healthcare providers.

Research Gap

Although several studies have examined trust in healthcare systems at national and global levels, limited research has focused on **consumer trust in local healthcare providers in smaller cities like Amravati**. Therefore, this study aims to fill this gap.

❖ Research Methodology**Research Design:**

This study uses a descriptive research design to analyze consumer trust in healthcare providers.

Data Collection:**Primary Data**

Primary data was collected through questionnaires distributed among patients and residents of Amravati.

Secondary Data

- Secondary data was obtained from:
- Research journals
- Healthcare reports
- Online databases
- Government publications.

Sample Size:

37 respondents.

Sampling Method:

Convenience sampling method was used.

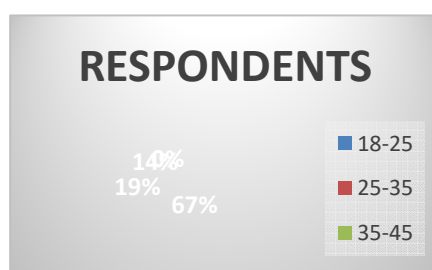
Research Instrument

A structured questionnaire was used containing sections on:

- Demographic information
- Healthcare usage patterns
- Trust factors
- Patient satisfaction

Graph 1: Age Group of Respondents (Pie Chart)

Age Group	Respondents
18-25	24
25-35	7
35-45	5

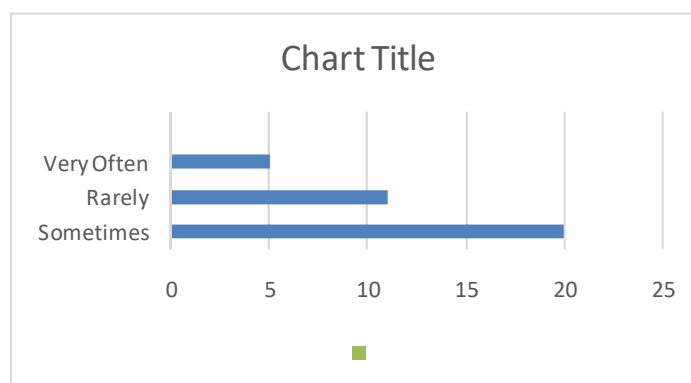
**Interpretation:**

From the above table, 66.67% of respondents belong to the age group 18–25, 19.44% belong to 25–35, and 13.89% belong to 35–45. Th

is shows that the majority of respondents are young individuals.

Graph 2: Frequency of Healthcare Visits (Bar Graph)

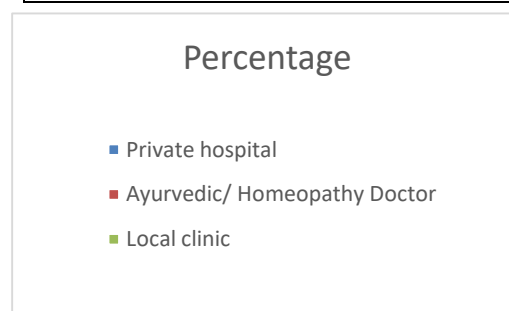
FREQUENCY	RESPONDENTS
Sometimes	20
Rarely	11
Very Often	5

**Interpretation:**

From the above table, 55.56% of respondents visit healthcare providers sometimes, 30.56% rarely, and 13.89% visit very often. This indicates moderate healthcare usage among respondents.

Graph 3 Type of Healthcare Provider Preferred(Pie chart)

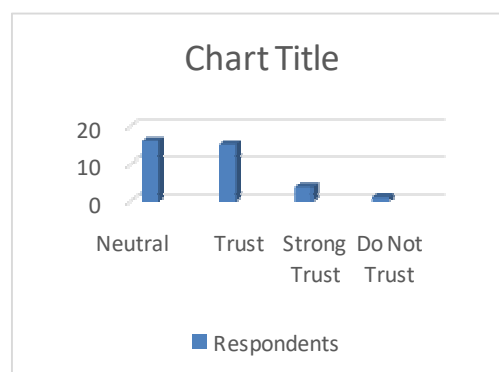
Response	Percentage
Private hospital	72%
Ayurvedic/ Homeopathy Doctor	14%
Local clinic	8%
Government Hospital	6%

**Interpretation:**

From the above table, 72.22% of respondents prefer private hospitals, followed by 13.89% choosing Ayurvedic/Homeopathy doctors. Very few respondents prefer government hospitals.

Graph 4: Trust in Local Doctors(Bar Graph)

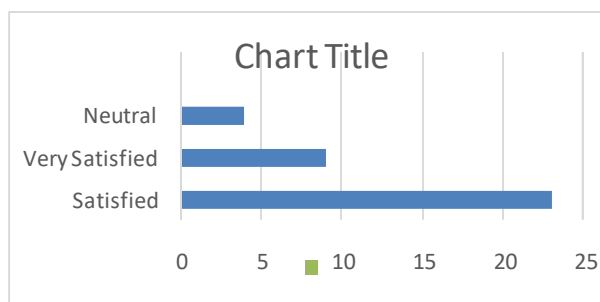
Trust Level	Respondents
Neutral	16
Trust	15
Strong Trust	4
Do Not Trust	1

**Interpretation:**

From the above table, 44.44% of respondents feel neutral about trust, while 41.67% trust local doctors. Only 2.78% do not trust them.

Graph 5:Satisfaction with Treatment (Bar Graph)

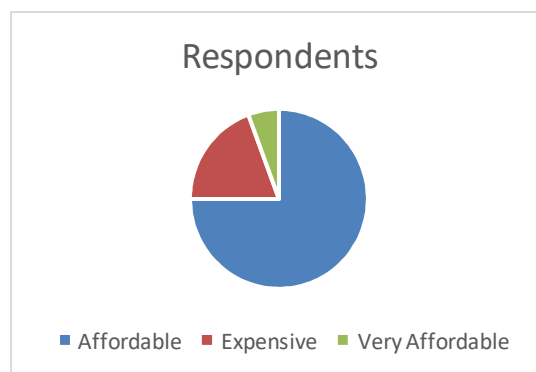
Satisfaction Level	Respondent
Satisfied	23
Very Satisfied	9
Neutral	4

**Interpretation:**

From the above table, 63.89% of respondents are satisfied with treatment, while 25% are very satisfied.

Graph 6:Affordability of Healthcare Services (Pie Chart)

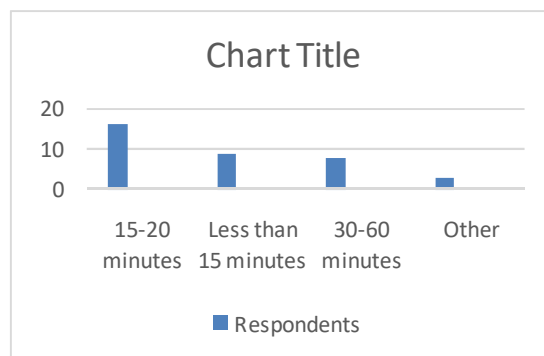
Response	Respondents
Affordable	27
Expensive	7
Very Affordable	2

**Interpretation:**

From the above table, 75% of respondents find healthcare services affordable, while 19.44% consider them expensive.

Graph 7:Waiting Time(Bar Graph)

WaitingTime	Respondents
15-20 minutes	16
Less than 15 minutes	9
30-60 minutes	8
Other	3

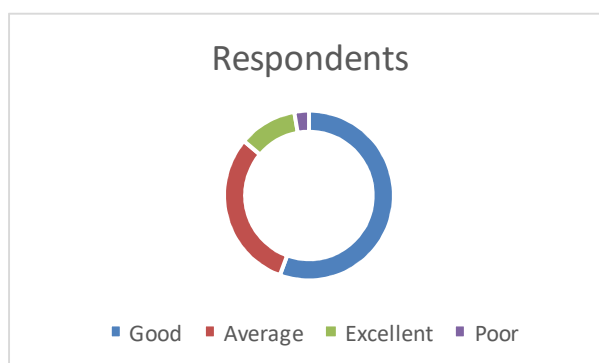


Interpretation:

From the above table, 44.44% of respondents wait for 15–20 minutes, while 25% wait less than 15 minutes.

Graph 8: Cleanliness of Hospital (Pie Chart)

Rating	Respondents
Good	20
Average	11
Excellent	4
Poor	1



Interpretation:

From the above table, 55.56% of respondents rated cleanliness as good, while 30.56% rated it average.

❖ Graph Analysis

Graphical representation of data plays an important role in simplifying complex information and making interpretation easier. In this study, various pie charts and bar graphs are used to visually present the responses related to consumer trust in local healthcare providers in Amravati. The theoretical interpretation of these graphs is as follows:

The **pie chart representing age distribution** shows that a large proportion of respondents belong to the younger age group (18–25 years). Theoretically, this indicates that younger individuals are more responsive to surveys and are more aware or engaged with healthcare services. It also suggests that the study findings are influenced by youth perspectives.

The **bar graph showing frequency of healthcare visits** highlights that most respondents visit healthcare providers occasionally. This suggests a moderate level of healthcare utilization, which theoretically indicates that people seek medical help when necessary rather than for regular check-ups.

The **pie chart of healthcare provider preference** clearly shows a strong inclination towards private hospitals. Theoretically, this reflects the perception that private hospitals offer better quality services, advanced facilities, and more reliable care compared to government hospitals.

The **bar graph of trust levels** shows that a large number of respondents are neutral, followed closely by those who trust local doctors. Theoretically, this suggests that while the healthcare system is

performing adequately, there is still a gap in building strong emotional trust and long-term patient relationships.

The **bar graph of satisfaction levels** indicates that most respondents are satisfied or very satisfied with the treatment received. Theoretically, satisfaction is closely linked to perceived service quality, which positively influences trust and future healthcare choices.

The **pie chart on affordability** indicates that most respondents consider healthcare services affordable. From a theoretical standpoint, affordability is a critical factor in accessibility and utilization of healthcare services.

The **bar graph of waiting time** shows that most respondents experience moderate waiting periods. Theoretically, shorter waiting times contribute to higher satisfaction, while longer waits can negatively affect patient perceptions.

Finally, the **pie chart on cleanliness** indicates that hospitals maintain acceptable hygiene levels. Theoretically, cleanliness is directly related to perceived service quality and plays a significant role in building patient trust.

❖ Findings of the Study

Based on the analysis, the key findings are:

1. The majority of respondents belong to the young age group (18–25).
2. Most people visit healthcare providers occasionally, not frequently.
3. Private hospitals are the most preferred, indicating higher trust in private healthcare services.
4. Respondents show a moderate level of trust, with many still neutral.
5. A large proportion of respondents are satisfied with treatment services.
6. Most respondents consider healthcare services affordable.
7. Waiting time is moderate and acceptable for most patients.
8. Cleanliness levels are generally good, but there is room for improvement.

❖ 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.

❖ Suggestions/ Recommendations

1. Improve Trust Building Measures
2. Healthcare providers should focus on transparency, patient engagement, and ethical practices to convert neutral patients into trusting ones.
3. Enhance Communication Skills of Doctors
4. Although communication is good, training programs can further improve clarity, empathy, and patient understanding.
5. Reduce Waiting Time
6. Hospitals should adopt better scheduling systems and increase staff efficiency to minimize patient waiting time.
7. Upgrade Cleanliness and Infrastructure
8. Maintaining higher hygiene standards and improving hospital facilities will increase patient confidence and satisfaction.

Impact of the National Education Policy 2020 on Curriculum Structure and Emerging Academic Trends: A Study with Special Reference to General Open Elective Courses (GOEC)

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Abstract

The National Education Policy 2020 has introduced a transformative framework for higher education in India, emphasizing multidisciplinary learning and flexibility in curriculum design. One of its innovative features is the General Open Elective Course (GOEC), which mandates students to study subjects outside their primary discipline. This paper examines the structural and pedagogical implications of GOEC with particular reference to its implementation in an affiliated college. Using an experiential and qualitative approach, the study highlights institutional practices, benefits, and challenges associated with GOEC. The findings suggest that while GOEC promotes interdisciplinary exposure and skill development, its effectiveness is influenced by factors such as academic load, student perception, and evaluation mechanisms.

Exploring Wealth of Bioactive Compounds in Agricultural Waste of *Arachis hypogaea*

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ABSTRACT

Agricultural waste from *Arachis hypogaea* (peanut) is an abundant and underutilized resource rich in bioactive compounds such as phenolics, flavonoids, tannins, and resveratrol. These compounds exhibit important biological activities including antioxidant, antimicrobial, anti-inflammatory, and anticancer properties. This short review highlights the types of peanut waste, their phytochemical composition, extraction methods, and potential applications in pharmaceutical, nutraceutical, and environmental fields. Proper utilization of this waste can contribute to sustainable development and waste management.

KEYWORD: *Arachis hypogaea*, bioactive compounds, agricultural waste, antioxidants, phytochemicals.

INTRODUCTION

Peanut (*Arachis hypogaea*.) is among the most widely cultivated oilseed crops globally. It is usually grown as an annual plant, though in warmer regions it can continue to grow perennially until harvest. Due to its rich oil and protein content, peanut serves as a valuable resource for both human consumption and animal feed. Peanut oil functions as an aperient and emollient, often used as an alternative to olive oil. Being primarily composed of monounsaturated fats, it is considered heart-friendly, helping reduce the risk of heart attacks. Essential oils, also known as plant essences, are volatile, aromatic substances with an oily nature, produced by plants. While most remain liquid at room temperature, some occur as solids or resins, displaying a variety of colors from pale yellow and emerald green to blue or reddish-brown. These compounds are synthesized in different plant organs-including buds, flowers, leaves, stems, seeds, fruits, and roots-and are stored in specialized structures such as secretory cells, cavities, canals, epidermal cells, or glandular trichomes. (Ahmed Alafy Alex et al., 2020)

Plant-based foods, particularly those of medicinal origin, contain a wide range of biologically active compounds that support human health. These compounds include antioxidants, antihypertensive, sedative, antibacterial, anti-inflammatory, and anticancer agents. Among them, phenolic compounds have recently attracted significant attention for their beneficial effects such as antioxidant, antimicrobial, and anti-inflammatory properties, as well as their role in preventing metabolic disorders. Extensive research has focused on these plant-derived compounds and their derivatives to meet the growing demand for natural antioxidants in pharmaceuticals, cosmetics, food, and other industries. Phytochemicals are broadly classified into phenolic compounds and their metabolites, terpenoids, and alkaloids. These compounds not only provide antioxidant benefits to humans but also help plants withstand environmental stresses. Similar to 12 phenolics, flavonoids exhibit various health-promoting effects, including anticancer and anti-obesity activities, and offer protection against nicotine-related diseases. High consumption of flavonoids has been linked to reduced risks of chronic illnesses such as cardiovascular disease, stroke, and certain types of cancer. Samme Ullah et al., (2019).

India is one of the leading producers and exporters of groundnuts, with exports steadily increasing. Groundnuts are categorized into four main market types: Runners, Spanish, Virginia, and Valencia. Their health-promoting properties are largely attributed to biologically active phytochemicals. On a dry weight basis, groundnut seeds contain 44-56% oil and 22-30% protein. They are also an excellent source of minerals like phosphorus, calcium, magnesium, and potassium, as well as vitamins E, K, and those in the B-complex group. Groundnuts play a crucial role in supplementing the diets of both humans and livestock with essential nutrients. As a plant-based source of phytochemicals, they contribute to various health benefits. These compounds, along with other nutrients, help in reducing the harmful effects caused by free radicals or reactive oxygen species (ROS). When ROS levels exceed the body's antioxidant defenses, it leads to oxidative stress-a condition linked to heart disease, neurodegenerative disorders, cancer, and aging. (B. Prabhaseela et al., 2015)

Plants, commonly referred to as green plants, are multicellular organisms that belong to the kingdom Plantae. They are part of an unranked group known as Viridiplantae (which means "green plants" in Latin), and this group includes flowering plants, conifers and other gymnosperms, ferns, clubmosses, hornworts, liverworts, mosses, and green algae. This classification does not include red and brown algae, fungi, archaea, bacteria, or animals. Thousands of plant species are grown not only for their beauty but also to offer shade, regulate temperatures, reduce wind, lower noise levels, provide privacy, and help prevent soil erosion.

Plants also play a key role in a multi-billion-dollar tourism industry, which involves visits to historic gardens, national parks, rainforests, forests with vibrant fall foliage, and events like the National Cherry Blossom Festival. Plants serve as sources of numerous natural substances, including essential oils, natural dyes, pigments, waxes, resins, tannins, alkaloids, cork, amber, and more. Many everyday products are plant-based, such as soaps, shampoos, perfumes, cosmetics, paints, varnishes, turpentine, rubber, latex, lubricants, linoleum, plastics, inks, and gums. Plants also provide renewable energy sources like firewood, peat, and various biofuels. Even coal and petroleum originated from ancient plant remains. For centuries, olive oil has been used in lamps as a source of light. (Nazia Afrin et al 2012)

AIM

To investigate recent trends in Bioactive compounds from agricultural waste of arachis hypogaea through phytochemical estimation of leaves, roots & pods.

RESEARCH OBJECTIVES

This research is designed to comprehensively investigate the phytochemical richness of residual materials from Arachis hypogaea by applying diverse scientific techniques, the study will pursue the following objectives

- 1. Phytochemical Profiling:** To identify and characterize a wide spectrum of secondary metabolites, such as alkaloids, flavonoids, terpenoids, phenolics, and lignins, present in Arachis hypogaea
- 2. Sample Procurement and Preparation:** To systematically collect and prepare plant residues from different locations across the Amravati district.
- 3. Extraction Methods:** To apply various solvent-based and technique oriented extraction methods for isolating phytochemicals from both fresh and dried materials.
- 4. Qualitative Analysis:** To carry out qualitative tests for identifying and categorizing primary and secondary metabolites in the collected samples.
- 5. Quantitative Analysis:** To employ advanced analytical techniques such as HPLC/HPTLC, GC-MS, and NMR for quantitative evaluation and structural elucidation of bioactive compounds:
- 6. Bioactivity Evaluation:** To assess the antioxidant and antimicrobial activities of the identified compounds, highlighting their potential health promoting properties.
- 7. Commercial Viability:** To analyze and interpret the generated data for deriving meaningful insights that could support the commercialization of bioactive compounds and guide future industrial applications

Overall, these objectives aim to advance sustainable practices, promote circular economy concepts, and deepen scientific understanding of the biological and industrial potential of bioactive compounds derived from Arachis hypogaea residues.

METHODOLOGY

Sample Collection

Peanut agricultural waste materials (leaves, roots, and pods) were collected from agricultural fields.

Drying and Grinding

The collected samples were washed, shade-dried, and ground into fine powder using a grinder.

Solvent Extraction

The powdered samples were extracted using ethanol or methanol solvent by maceration/Soxhlet extraction method.

Filtration and Concentration

The extract was filtered using filter paper and concentrated using a rotary evaporator or water bath.

Phytochemical Screening

The extracts were subjected to qualitative phytochemical tests to identify phenolics, flavonoids, tannins, alkaloids, and saponins.

Antioxidant Activity Analysis

Antioxidant activity was determined using DPPH or FRAP assay.

APPLICATION

Bioactive compounds from peanut waste have multiple applications:

Pharmaceuticals – development of natural drugs

Nutraceuticals – dietary supplements

Cosmetics – anti-aging and skin care products

Environmental use – waste management and bioenergy production

EXPECTED RESEARCH OUTCOMES WITH BENEFICIARIES**Identification and Characterization of Phytochemicals:**

Comprehensive profiling and structural characterization of phytochemicals present in the residues of *Arachis hypogaea* using advanced analytical techniques

Discovery of Bioactive Compounds:

Identification of novel bioactive molecules from peanut by-products with promising applications in pharmaceutical formulations, cosmetic innovations, and functional food development.

Waste Management Solution:

Development of eco-friendly strategies to utilize peanut residues, reducing agricultural waste while promoting environmental sustainability.

Antioxidant and Antimicrobial Activity Insights:

Elucidation of the antioxidant and antimicrobial potential of extracts derived from *Arachis hypogaea* residues, highlighting their therapeutic and preservative applications.

Scientific Publications and Contributions:

Generation of high quality research outputs suitable for publication in peer-reviewed journals, thereby enriching the scientific literature on peanut derived phytochemicals and their applications

Database of Phytochemical Properties:

Establishment of a dedicated database documenting the phytochemical constituents and biological activities of compounds extracted from *Arachis hypogaea* serving as a resource for researchers, industry stakeholders, and policy makers

BENEFICIARIES:**Local Farmers and Agricultural Stakeholders**

The proposed research on utilizing *Arachis hypogaea* residues offers farmers new opportunities to generate income from agricultural waste, thereby improving their economic stability.

Pharmaceutical and Cosmetic Industries

The identification of novel bioactive compounds from peanut residues could greatly support the development of innovative drugs and natural cosmetic formulations, adding value to these industries.

Food Industry

Phytochemicals extracted from *Arachis hypogaea* by products may be incorporated into functional foods, enhancing their nutritional value and offering additional health benefits to consumers.

Government and Policy Makers:

Findings from this research could guide the formulation of policies that promote sustainable agricultural practices, efficient waste utilization and environmental protection.

Academic and Research Institutions:

The work will enrich the scientific knowledge base, opening avenues for further investigations into the medicinal and industrial potential of peanut derived compounds.

Environment:

Through the reuse of peanut crop residues, the research encourages better waste management, reduction of environmental pollution, and conservation of natural resources

Public Health

Society at large may benefit from the development of health-enhancing nutraceuticals and pharmaceuticals derived from peanut by-products, Thereby contributing to improved well-being

Overall Impact:

This research not only advances scientific understanding but also demonstrates practical applications that span across economic, environmental, and health domains. Nutraceutical and pharmaceutical sectors may reduce their dependence on conventional sources of compounds, while sustainable waste management practices can help minimize pollution, particularly air pollution

SIGNIFICANCE OF PROBLEMS

Agricultural residues of *Arachis hypogaea* (peanut), such as shells, husks, skins, and roots, are often discarded as waste but actually contain valuable bioactive compounds. These include phenolic compounds, alkaloids, flavonoids, dietary fiber, proteins, and minerals that exhibit strong antioxidant, antimicrobial, and anti-inflammatory properties.

- **Health and Nutrition:** Their antioxidant and therapeutic potential can support the development of nutraceuticals, functional foods, and pharmaceuticals.
- **Waste Management:** Transforming peanut by-products into useful resources helps reduce environmental burden and supports sustainable agriculture.
- **Industrial Applications:** Extracted compounds can be used in food preservation, cosmetics, and even biodegradable materials.
- **Economic Value:** Valorizing peanut waste creates new opportunities for income generation in agro-industries and contributes to a circular economy.

Thus, the bioactive constituents of peanut agricultural waste not only promote human health but also play a crucial role in environmental sustainability and economic growth.

CONCLUSION

Agricultural waste of *Arachis hypogaea* is a valuable source of bioactive compounds with significant health and industrial benefits. Its proper utilization can reduce environmental pollution and promote sustainable development. Further research is needed to enhance extraction techniques and explore large-scale applications.

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Methodological Advancements in Machine Learning for Social Media Popularity Prediction: A Review

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Abstract—The rapid growth of social media platforms has made predicting the reach, engagement or virality of user-generated content a vital task for digital marketing, public opinion monitoring and platform management. This paper reviews recent methodological advances in popularity prediction using machine learning. Recent research has moved from simple regression models to sophisticated architectures, including Diffusion-Guided Propagation Augmentation (DGPA), Heterogeneous Graph Neural Networks (GNNs), and Retrieval-Augmented Transformers. Key trends include the integration of multimodal data (text, image, and video), modelling of complex temporal dynamics through neural ordinary differential equations (ODEs) and temporal graphs, and increasing emphasis on self-explanatory frameworks. This review synthesizes findings from recent literature, highlighting the performance benefits and challenges of multi-source cascade modelling in early-stage prediction.

Keywords—Machine Learning, Popularity Prediction, Diffusion based model

1. Introduction

Predicting the popularity of social media content is essential to understanding information dissemination and maximizing audience engagement. Over the past few years, the field has transitioned from using static features and linear models to leveraging deep learning frameworks that can capture the complex spatial and temporal dependencies of information cascades [11], [15]. Traditional methods often struggle with the “cold-start” problem – predicting popularity for new content with low initial engagement – and the dynamic nature of user-message interactions [9], [12].

Methodological Progress from last five years has brought more effective ways to deal with these challenges. New ideas like diffusion-guides augmentation [1], multimodal ensemble learning [2], and retrieval-augmented hypergraphs [6] have greatly improved the accuracy of predictions across various platforms such as Twitter (X), Weibo, Instagram and Flickr. This report looks into these recent developments, highlighting the architectural changes and performance result that define the current best practices.

2. Methodological Advances

2.1 Generative and Diffusion-Based Models

One of the most important recent changes in this field is the use of diffusion models for predicting popularity. Unlike traditional discriminative models, these methods see the prediction of cascade dynamic as a generative process

Diffusion Guided Propagation Augmentation (DGPA): Proposed by Li et al. (2025), DGPA uses a generative method where a temporal conditional interpolator acts as a noising process and forecasting serves as the denoising process [1]. By generating cascade representation step by step through a sampling process, DGPA improves the timeliness and accuracy of early-stage popularity prediction.

Dynamic Cues-Driven Diffusion (CasFT): Wang et al. (2024) introduced CasFT, which uses diffusion introduced CasFT, which uses a diffusion model to create future popularity trends. It is guided by observed information cascades and dynamic cues extracted using neural ordinary differential equation (ODEs) [15]. This approach specifically targets the uncertainty in growth rates, which can vary significantly across different datasets.

2.2 Graph-Based and Topological Approaches

Graph-based models remain central to popularity because they can represent the structural relationships within social networks.

Heterogeneous Graph Neural Networks (HGNNs): Jia et al. (2022) developed the Heterogeneous Diffusion Attention Network (HEDAN), which utilizes a graph with multiple node types (users, messages) and relationship types (friendship, interaction, interest) [9]. Similarly, Wu et

al.(2022)proposed HERI-GCN,a heterogeneous recurrent integrated graph convolutional neural network that treats time intervals as heterogeneous nodes to model multi-source cascades[11].

Temporal Graph Modelling: Jin et. al.(2024)proposed a multi-layer temporal GNN framework that learns temporal representations from a sequence of network snapshots to predict future popularity changes [3]. another approach, GTGCN, captures both intra-snapshot temporal information and inter-snapshot temporal dependencies[18].

Combining Structure and Sequence:CasSeqGCN(2022) combines Graph Convolutional Networks(GCNs) for snapshot representation withLong Short-Term Memory (LSTM) networks for temporal sequence extraction,using a novel dynamic routing aggregation method [14].

2.3 Multimodal and Transformer Architectures

As social media content becomes increasingly multimodal,researchers have developed architectures that can process text,images,and videos simultaneously.

Multimodal Ensembles:Hyper Fusion (2025) integrates visual representations from CLIP encoders and textualembeddings from transformers[2].It employees a hierarchical ensemble strategy(CatBoost,TabNet, and MLPs)and introduces Cross-modal similarity measures to enhance prediction.

Retrieval-Augmented Hypergraphs:RAGTrans(2024) utilizes a retrievalaugmented hypergraph transformer to strengthen representations by exploiting knowledge from relevant user-generated content(UGC)[6].

Vision-and-Language Transformers:TTC-VLT(2022) uses a title-and-tag contrastive learning strategy within a transformer framework to differentiate multimodal information from titles and tags [20].

Sentiment-Aware Network: The NARRATOR model(2024) leverages BERT for Text, VGG19 for visual features, and Graph Sage for hashtag structural embeddings,incorporating a novel hashtag-guided attention mechanism[13].

2.4 Explainable and Probabilistic Models

Recognizing the “black box “nature of deep learning,recent research has focused on modal interpretability and formal reasoning.

Self-Explainable Frameworks: ExCas (2025) is a graph-wise self-explainable framework that uses a cascade-aware graph transformer and bottleneck subgraph extractors based on the information bottleneck principal[5].

Evidential Reasoning: Rivadeneria et.al.(2024) introduced MAKER, a maximum likelihood evidential reasoning approach for Instagram post popularity[10]. This model offers greater transparency and interpretability compared to standard classifiers like SVM or KNN.

Bayesian Mixture Models: The Bayesian Mixture Hawkes(BMH)model (2024) jointly learns the influence of source,content,and spread dynamics using a hierarchical mixture model, proving particularly effective for “cold-start”prediction[12].

3. Analysis of Recent Trends

Several Key trends have emerged in the methodological landscape of popularity prediction over the last four years:

i. Shift to GenerativeForecasting: There is a notable move from direct regression to generative modelling (e.g. diffusion models)to handle the inherent uncertainty and stochastic nature of information cascades[1],[15].

ii.Multimodal Synergy: Modern models no longer treat content and metadata as separate features.Instead,they use contrastive learning and hypergraph-based fusion to capture the interplay between text,visual aesthetics, and user behaviour[2],[6],[20].

iii.Temporal Fine-Graining:Advances in neural ODEs and temporal GNNs allow for continues-time modelling of cascades,moving beyond discrete snapshots to capture more nuanced diffusion dynamics[3][15].

iv.Emphasis on interpretability: The development of self-explainable frameworks(ExCas) and evidential reasoning (MAKER) reflects a growing need for models that can justify their predictions, especially for applications in public opinion monitoring[5],[10].

v. Multi-Source Integration:Researchis increasingly addressing “multisource cascade”,

Where information spread across different platforms or through multiple entry points, requiring heterogeneous graph structure[11].

4. Performance and Evaluation

Recent models have demonstrated significant improvements over traditional baselines (e.g. DeepCon Coupled GNN and basic LSTMs). Accuracy Gains: CasFT achieved a 4.2%-19.3% improvement in Mean Absolute Percentage Error(MAPE) over best-performing baselines[15].

Correlation Improvements:Hybrid GNN+Transformer architecture hasshown higher Spearman rank correlation and lower prediction error,particularly for long-term(24-hour) forecasts[4].

Efficiency in Small-Data Scenarios: The HEDAN model improved MSLE by nearly 20% over DeepCon+Str on the Weibo dataset by better modelling user-message interactions[9].

Real World Success: The MVP solution, which integrates deep video features with gradient-boosted regression,ranked first in the SMP challenge 2025 Video Track, proving its reliability for large-scale multimodal tasks

Real World Success: The MVP solution, which integrates deep video features with gradient-boosted regression,ranked first in the SMP Challenge 2025 Video Track, proving its reliability for large-scale multimodal tasks[19].

5. Limitations and Future Directions

Despite these advances,several limitations persist in the current Literature: ComputationalComplexity:

Generative models like DGPA and complex hypergraph transformers(RAGTrans) require significant computational resources, which may limit their use in real-time applications [1],[6].

Data Quality and Missing Structure: Models like CasSeqGCN although routing-based aggregation has improved robustness[14].

Generalizability: While many models perform well on specific datasets (Twitter, Weibo), their performance can vary across different social media platforms due to varying user behaviours and platform algorithms [15].

Research Gaps: There is a need for more research into the impact of exogenous factors (e.g., external news events) and the role of "superusers" in promoting specific types of content [8].

6. Conclusion

The methodological landscape of social media popularity prediction has evolved rapidly between 2022 and 2026. The integration of diffusion models, heterogeneous graph neural networks, and multimodal transformers has pushed the boundaries of prediction accuracy and timeliness. Emerging trends such as self-explainable frameworks and retrieval-augmented learning address long-standing issues of interpretability and knowledge scarcity. Future research is likely to focus on improving the computational efficiency of these complex models and better incorporating exogenous influences to create more holistic and robust prediction systems.

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Privatization of Higher Education: Access, Equity, and Quality in a Marketized System

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Abstract: Privatization has become a defining feature of contemporary higher-education systems, especially in developing countries such as India. As public funding struggles to keep pace with rising demand, governments have increasingly turned to private providers, self-financing programmes, and cost-sharing mechanisms to expand access. This paper examines the forms, drivers, and outcomes of privatization in higher education, focusing on implications for student access, social equity, and educational quality. Drawing on empirical studies and policy analyses from Scopus-indexed journals, the work highlights how market-oriented reforms have reshaped the institutional landscape, often concentrating benefits among higher-income groups while marginalizing disadvantaged students. The study concludes with a set of policy recommendations aimed at regulating the private sector, strengthening public higher education, and ensuring that privatization does not erode the public-good character of higher learning.

Keywords: higher education, privatization, marketization, access and equity, India,

I. Introduction:

Higher education is undergoing a global shift from state-dominated provision toward a mixed-provider, market-oriented model. In many countries, including India, private institutions now account for a large share of enrolments and have become central to the expansion of tertiary education systems. This trend is driven by fiscal constraints, rising demand, and neoliberal policy agendas that treat education as a tradable service rather than a public good. In India, roughly 80% of higher education institutions are privately managed, and private providers account for about two-thirds of total enrolment. At the same time, policies such as the National Education Policy (NEP) 2020 and the proposed Higher Education Commission of India (HECI) framework openly encourage private investment and equal treatment of public and private universities. This opens complex questions about who benefits, what quality levels are maintained, and how equity is safeguarded in an increasingly privatized system. This paper analyzes privatization of higher education from conceptual, empirical, and policy perspectives, with emphasis on India. It reviews recent Scopus-indexed studies on access, equity, and institutional change under privatization, and proposes a regulatory and financing framework that balances expansion with social justice.

II. Conceptualizing Privatization in Higher Education

II-A. Definitions and Forms of Privatization In higher education, “privatization” refers to the transfer of ownership, control, or financing of institutions from the state to private actors, including for-profit and not-for-profit entities ♦. This can take several forms: Full private universities and colleges, funded through tuition and private investment. Private governance of public-funded institutions (e.g., public-private partnerships). Self-financing or “fee-levying” programmes within public universities, where students pay market-linked tuition instead of receiving full public subsidies ♦. Recent Scopus-indexed work on India distinguishes between “formal privatization” (creation of private universities) and “functional privatization,” where public institutions increasingly rely on user fees and private financing, even if they remain legally public ♦.

♦.II-B. Neoliberalism and the Market Logic The spread of privatization is closely linked to neoliberal discourses that frame education as a human-capital investment and a commodity to be priced and allocated via markets ♦. Under this paradigm, competition among institutions is expected to improve efficiency, innovation, and responsiveness to labour-market needs. However, critics argue that market logic can erode social objectives, such as equity, inclusion, and the pursuit of knowledge as a public good

III. Global and Regional Trends III-A. Global Expansion of Private Higher Education Worldwide, more than one in three higher-education students now studies in private institutions, with particularly rapid growth in developing countries and post-communist states ♦. In regions such as Latin America and South Asia, private higher education has expanded quickly in response to demographic pressure, limited public capacity, and liberalization of education markets ♦. In contrast, many Western European systems still retain a relatively small role for private providers, while in the United States a large, mature private sector coexists with a substantial public system ♦. This variation reflects differences in welfare-state traditions, fiscal capacity, and regulatory approaches to education privatization. III-B. Privatization in South Asia and India South Asia has experienced some of the fastest growth in education privatization globally, with a large and growing presence of non-state actors in the sector ♦. In India, private institutions began to proliferate in the 1990s and have since become the dominant mode of expansion, accounting for a majority of new universities and colleges ♦. Recent empirical studies show that around 80% of Indian higher-education institutions are privately managed, and private providers enroll roughly two-thirds of total students ♦. This structural shift has been supported by policy reforms such as graded autonomy for top public universities, which allows them to charge higher fees and run self-financing programmes, effectively blending public and private modes of operation

IV. Drivers of Privatization IV-A. Fiscal Constraints and Rising Demand A key driver of privatization is the mismatch between escalating demand for higher education and constrained public budgets. In India, the youth population has grown rapidly, and the aspiration for tertiary education has broadened across social groups, straining the state's financial capacity ♦. Recognizing that public coffers cannot fully fund such expansion, policymakers have turned to privatization, tuition hikes, and student-loan schemes as alternatives for resource mobilization ♦. This logic is embedded in policy documents that explicitly justify privatization in terms of "availability and mobilization of resources" to meet the higher-education needs of a large population ♦. IV-B. Neoliberal Policy Reforms The adoption of neoliberal reforms in the 1990s and 2000s reshaped the governance of higher education in India and other developing countries. Deregulation, decentralization, and performance-based funding created conditions conducive to private entry and market competition ♦. Policies such as graded autonomy, which allow leading public universities to charge higher fees and operate new self-financing programmes, have blurred the boundary between public and private higher education ♦. Under the NEP 2020 and the proposed HECI framework, there are explicit moves toward "light but tight" regulation that loosens entry and operational controls for private institutions while tightening oversight on academic standards and accreditation ♦. IV-C. Institutional and Strategic Responses Within public universities, functional privatization has also been used as a strategy to generate internal revenue. Self-financing courses, professional programmes, and distance-learning offerings funded by student fees have become common mechanisms to subsidize core academic activities ♦. At the same time, private universities attract investment by promising autonomy, flexible curricula, and strong industry linkages. This has led to a proliferation of specialized institutions in engineering, management, health-sciences, and technical fields, often marketed as more "employable" alternatives to traditional public universities

V. Impacts on Access and Equity V-A. Expansion of Access From a quantitative standpoint, privatization has contributed to the expansion of higher-education access. The growth of private institutions and self-financing programmes has enabled more students to enrol than would have been possible under a purely public-funded model ♦. Empirical studies of Indian higher education report that privatization has played a crucial role in increasing enrolment, particularly in non-elite and mid-tier institutions serving regional labour markets ♦. For many middle-income families, private colleges and

universities have become the only realistic pathway to a degree, especially in areas where public institutions are saturated or under-resourced ♦. V-B. Unequal Distribution of Benefits Despite overall expansion, the benefits of privatization are unevenly distributed. Studies show that private higher education tends to be more costly than public alternatives, which limits access for students from low-income and marginalized backgrounds ♦. In India, private institutions often charge substantially higher tuition, on top of additional fees for infrastructure, examinations, and professional courses, making them less accessible to economically weaker sections ♦. Recent analyses indicate that even when public budgets increase, a large share of additional funding is absorbed by institutional expansion and capital outlays rather than by scholarships and fellowships, leaving marginalized students vulnerable to rising fees ♦. V-C. Social and Spatial Stratification Privatization has contributed to social and spatial stratification in higher education. Wealthier and more networked families can access high-fee private institutions, often in metropolitan or semi-urban centres, while poorer students remain concentrated in under-funded public institutions and low-tier private colleges ♦. Moreover, regional disparities persist: states with higher public investment and better-regulated private sectors tend to show more balanced access, whereas states with weaker governance see a proliferation of low-quality private providers that cater to students who cannot compete in public-sector admissions

VI. Quality, Governance, and Accountability VI-A. Variation in Quality and Standards The quality of private higher education is highly heterogeneous. While some private universities and professional colleges achieve strong academic performance and industry linkages, many operate with weak infrastructure, limited faculty, and poor learning outcomes ♦. Studies using Scopus-indexed data indicate that privatization can lead to a “two-tier” system where a small set of elite private institutions deliver high-quality education, while a larger number of low-tier private colleges serve as access-only outlets with questionable pedagogical standards ♦. This stratification is reinforced by differential accreditation outcomes and by the concentration of high-quality research and innovation in a small cluster of public and elite private universities. VI-B. Regulatory Challenges Effective regulation is critical to ensuring that privatization does not compromise quality or equity. However, oversight of private higher education in India has often been fragmented, reactive, and inconsistent ♦. Recent policy debates around the HECI framework highlight concerns that equal treatment of public and private institutions, without strong safeguards on fees and governance, may empower profit-oriented actors to set prices based on market dynamics rather than public-interest criteria ♦. This can lead to fee escalation, commodification of education, and weakening of accountability mechanisms. VI-C. Governance and Autonomy Privatization is often justified on the grounds of greater institutional autonomy and flexibility. Private universities typically design their own curricula, set admission criteria, and negotiate partnerships with industry, which can enhance responsiveness to labour-market demands ♦. However, autonomy can also reduce transparency and public accountability. In some cases, private institutions operate with minimal disclosure of financial statements, governance structures, or student-outcome data, making it difficult for regulators, prospective students, and families to assess quality

VII. Socio-Cultural and Labour-Market Implications VII-A. Commodification of Education As higher education becomes more market-oriented, it is increasingly framed as a private investment in human capital rather than a public good. This shift influences student and family decision-making, with greater emphasis on “return on investment,” employability, and short-term career gains ♦. Critics argue that commodification can undermine the civic and intellectual mission of universities, narrowing curricula toward vocational and market-driven skills and marginalizing disciplines such as humanities and social sciences ♦. VII-B. Impact on Faculty and Academic Work Privatization has also affected the conditions of academic work. In many private institutions, teaching staff are employed on contractual or part-time

bases, with limited job security, lower benefits, and restricted participation in governance ♦. This trend is sometimes described as the “contractualisation” of teaching staff, which can weaken faculty autonomy, reduce long-term commitment to research, and degrade the quality of teaching and mentoring ♦. In contrast, public universities often provide more stable employment but face their own constraints related to underfunding and bureaucratic rigidity ♦. VII-C. Labour-Market Outcomes From a labour-market perspective, privatization can enhance employability if private institutions align closely with industry needs and offer practical training and internships ♦. However, empirical evidence suggests that outcomes vary widely by institutional quality, discipline, and region. Some studies show that graduates from low-tier private colleges face limited job prospects, especially in saturated sectors such as engineering and management, where over-supply of graduates and weak programme quality reduce employability ♦. In such cases, the cost of private education may not translate into commensurate labour-market gains, particularly for students from disadvantaged backgrounds.

VIII. Policy Directions and Alternatives VIII-A. Strengthening Public Higher Education To counterbalance the expansion of privatization, governments must strengthen public higher education through increased and targeted funding, improved governance, and better quality assurance ♦. Key measures include: Expanding scholarships, fee waivers, and need-based financial aid for students from low-income and marginalized groups. Investing in physical and digital infrastructure to expand access without compromising quality. Enhancing research capacity and faculty development in public universities to maintain their role as centres of innovation and knowledge production ♦. VIII-B. Regulating the Private Sector Effective regulation of private higher education is essential to safeguard access, equity, and quality. Regulatory frameworks should: Impose clear fee-control and transparency norms, including disclosure of tuition, additional charges, and financial statements ♦. Strengthen accreditation and accreditation-based funding to ensure that only high-quality institutions receive public recognition and support. Monitor and address malpractices such as capitation fees, fake approvals, and poor infrastructure ♦. VIII-C. Hybrid and Public-Private Models Well-designed hybrid and public-private models can combine the strengths of both sectors. Examples include: Public universities running self-financing programmes under strict fee caps and quality-control mechanisms. Partnerships between public institutions and private entities for infrastructure development, digital-learning platforms, and industry-linked training, while preserving public ownership and governance ♦. Such models should be guided by clear principles of social equity, non-profit orientation, and accountability to students and the public. VIII-D. Protecting Equity and Inclusion Finally, any privatization strategy must be explicitly oriented toward equity and inclusion. Policies should: Monitor and publish disaggregated data on access, completion, and employment by income, caste, gender, and region to identify and address disparities. Ensure that marginalized groups are not disproportionately pushed into low-quality private institutions due to unaffordable entry requirements or high fees in public systems ♦.

IX. Conclusion Privatization of higher education has become a central feature of contemporary education systems, especially in countries such as India where demand outpaces public-sector capacity ♦. On the one hand, private institutions and self-financing programmes have expanded access and diversified provision, enabling more students to pursue higher education than would otherwise be possible ♦. On the other hand, privatization has deepened inequalities, created stratified quality landscapes, and raised concerns about commodification, governance, and the erosion of the public-good character of higher learning ♦. Recent empirical work in Scopus-indexed journals highlights that while privatization can enhance access and flexibility, it must be carefully regulated and balanced with robust public investment to avoid entrenching socio-economic divides ♦. A sustainable model of

higher-education expansion will therefore require a mixed-provider approach that combines well-funded and accountable public institutions with a tightly regulated private sector, guided by principles of equity, quality, and social justice.

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Increasing Participation of Indians and Women in Higher Education: Progress, Challenges and Policy Directions

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Abstract

Higher education plays a transformative role in promoting social mobility, gender equality, and national development. Since India's independence in 1947, the country has witnessed a significant expansion in higher education institutions and enrollment. One of the most notable developments has been the increasing participation of women and marginalized groups in higher education. This shift reflects the combined influence of constitutional provisions, government policies, social reform movements, and global frameworks such as the United Nations Sustainable Development Goals (SDGs). Despite these advancements, structural inequalities rooted in socio-cultural norms and patriarchal systems continue to affect women's access to and participation in higher education. Drawing upon policy documents such as the Economic Survey of India, initiatives by the Ministry of Women and Child Development, and theoretical insights from scholars like Amartya Sen and Aradhana Singh's analysis of modern patriarchy, this paper examines the progress made in expanding educational opportunities for women in India. It also analyzes persistent barriers such as gender stereotypes, economic constraints, and institutional challenges. The paper argues that enhancing women's participation in higher education requires not only policy reforms but also broader societal transformation aimed at dismantling patriarchal structures. Strengthening institutional support systems, improving gender-sensitive policies, and aligning higher education strategies with global development goals are essential for ensuring inclusive and equitable educational opportunities.

1. Introduction

Higher education is widely recognized as a critical driver of economic growth, social mobility, and democratic participation. In India, the expansion of higher education since independence has been closely linked to the nation's aspirations for development and modernization. A particularly significant dimension of this expansion has been the growing participation of women in higher education, which reflects broader transformations in social attitudes, policy frameworks, and institutional structures. At the time of independence, access to higher education was limited and largely restricted to urban elites, with women constituting only a small fraction of students. Over the decades, policy interventions, constitutional guarantees, and social movements have gradually expanded educational opportunities for women. According to recent data from the All India Survey on Higher Education (AISHE), women now constitute nearly 49 percent of total enrollment in higher education, indicating significant progress toward gender parity.

However, the increased numerical participation of women does not necessarily translate into complete equality. Structural barriers rooted in patriarchal norms continue to influence educational choices, career trajectories, and leadership opportunities within academia. Scholars such as Amartya Sen emphasize that gender inequality is not merely a matter of economic deprivation but also a reflection of social structures that restrict women's capabilities and freedoms.

This paper examines the evolution of women's participation in higher education in India, analyzing the role of constitutional provisions, government policies, and global frameworks in shaping educational access. It also evaluates ongoing challenges and proposes strategies for creating a more inclusive higher education system.

2. Constitutional Foundations for Education

The Constitution of India provides a strong legal foundation for promoting gender equality and expanding educational opportunities. Several constitutional provisions guarantee equal rights and encourage the state to take proactive measures to promote education.

Article 14 of the Constitution guarantees equality before the law and equal protection of laws. This principle ensures that women have the same legal rights as men in accessing educational opportunities.

Article 15 prohibits discrimination on the grounds of religion, race, caste, sex, or place of birth. Importantly, **Article 15(3)** empowers the state to make special provisions for women and children, enabling policies that support women's education.

Article 21A, which recognizes education as a fundamental right, reinforces the state's responsibility to ensure access to education for all citizens.

In addition to fundamental rights, the **Fundamental Duties under Article 51A** emphasize the responsibility of citizens in promoting education. Article **51A(k)** specifically states that it is the duty of parents or guardians to provide opportunities for education to their children. Although this duty primarily focuses on elementary education, it reflects the broader constitutional commitment to expanding educational opportunities, including for girls and women.

Together, these constitutional provisions establish a framework that promotes equality, encourages state intervention, and supports policies aimed at increasing women's participation in higher education.

3. Democratization of Higher Education and Expanding Access for Indians

Since independence, India has witnessed a remarkable expansion in higher education institutions and enrolment. The democratization of higher education has been a central objective of national educational policies, aimed at ensuring that education is accessible to citizens across social, economic, and regional backgrounds.

In 1947, higher education was largely restricted to a small elite population concentrated in urban areas. Over time, government initiatives such as the establishment of state universities, central universities, and specialized institutions significantly expanded access. According to the Economic Survey of India, the number of universities has increased from fewer than 30 institutions at the time of independence to more than a thousand institutions today. This expansion reflects the state's commitment to making higher education accessible to a broader section of Indian society.

The Gross Enrolment Ratio (GER) in higher education has also increased significantly over the past two decades. Government reports indicate that GER rose from around 8 percent in the early 2000s to over 28 percent in recent years, reflecting growing participation among Indian students. This growth has been facilitated by policy measures such as reservation policies, expansion of public universities, and the growth of private higher education institutions.

Additionally, the National Education Policy (NEP) 2020 aims to increase the GER to **50 percent by 2035**, demonstrating the government's continued commitment to expanding participation in higher education. Such initiatives represent an important step toward creating a more inclusive and equitable educational system.

4. Inclusion of Marginalized Communities in Higher Education

Increasing participation in higher education is not only about expanding enrolment but also about ensuring inclusion of historically marginalized communities. Indian educational policy has consistently emphasized the need to provide opportunities for Scheduled Castes, Scheduled Tribes, Other Backward Classes, and economically disadvantaged groups.

Reservation policies in educational institutions have played a significant role in improving representation of these communities. Scholarships, hostels, and financial assistance programs have further supported students from marginalized backgrounds.

The **Economic Survey of India** highlights that expanding higher education participation contributes to economic growth and social mobility. By enabling individuals from disadvantaged backgrounds to acquire skills and knowledge, higher education serves as a powerful instrument for reducing inequality and promoting inclusive development.

Furthermore, government initiatives aimed at rural education and digital learning platforms have helped extend educational opportunities to students in remote areas. The expansion of online education platforms and open universities has also contributed to increasing participation among diverse populations across India.

5. Expansion of Higher Education and Women's Enrollment

The expansion of higher education institutions has played a crucial role in increasing women's participation. India's higher education system has grown from about 20 universities in 1947 to more than 1100 universities today.

According to the Economic Survey of India, the Gross Enrolment Ratio (GER) for women in higher education has increased significantly in the last two decades. This growth reflects the impact of several government initiatives aimed at promoting gender inclusion.

Key factors contributing to increased participation include:

- Expansion of universities and colleges in rural areas
- Scholarships and financial assistance programs
Reservation policies and affirmative action
Improved access to secondary education for girls

The National Education Policy (NEP) 2020 further emphasizes gender inclusion through the establishment of the Gender Inclusion Fund, aimed at promoting equitable access to education for women and marginalized communities.

6. Patriarchy, Gender Hierarchies and Women's Access to Higher Education

Recent feminist scholarship suggests that patriarchy in the contemporary world has not disappeared; rather, it has transformed into more subtle and institutionalized forms. Adeena Navaid, Aiman Tabassum, and Aradhana Singh argue that modern patriarchy operates not only through overt discrimination but also through indirect mechanisms such as cultural normalization, symbolic marginalization, and institutional practices that reinforce gender hierarchies (Navaid, Tabassum, and Singh).

In their study *Modern Patriarchy in a Modern World*, the authors explain that contemporary gender inequalities are often embedded within social structures, educational systems, and cultural expectations. These structures shape women's educational opportunities and career trajectories even when legal frameworks promote equality. As a result, while women's enrollment in higher education has increased significantly, subtle patriarchal norms continue to influence subject choices, institutional leadership, and professional advancement.

This perspective is particularly relevant in the context of India, where women's access to education has expanded substantially in recent decades, yet social expectations regarding gender roles continue to influence educational participation. The persistence of patriarchal structures demonstrates that legal reforms alone cannot fully eliminate gender inequality; broader cultural transformation is also necessary.

7. Role of Government Policies, Ministries and Educational Commissions

Government policies and institutional initiatives have played a crucial role in expanding participation in higher education in India. Since independence, the state has adopted various policy measures to democratize higher education and make it accessible to a broader section of Indian society. These efforts have focused not only on increasing overall enrolment among Indians but also on improving participation among women and other marginalized groups.

Several educational commissions have emphasized the importance of inclusive access to higher education. The University Education Commission (1948–49) chaired by Dr. S. Radhakrishnan highlighted the role of universities in national development and stressed the need to expand educational opportunities. Later, the Kothari Commission (1964–66) strongly recommended equal access to education and emphasized that education should serve as a powerful instrument of social transformation. Its recommendations laid the foundation for many policies aimed at improving educational access and reducing social inequalities.

Government ministries have also played an important role in implementing programs that support educational participation.

The Ministry of Education has introduced several initiatives to expand higher education infrastructure and improve access across regions. Programs supporting digital learning, institutional expansion, and scholarships have helped increase participation among Indian students.

The Ministry of Women and Child Development has focused specifically on empowering women through education and awareness programs. Initiatives such as *Beti Bachao Beti Padhao* aim to address gender discrimination and promote the importance of girls' education, thereby encouraging greater participation of women in higher education.

Additionally, the Ministry of Social Justice and Empowerment and the Ministry of Tribal Affairs provide scholarships and financial assistance for students belonging to Scheduled Castes, Scheduled Tribes, and other disadvantaged communities. These initiatives help reduce socio-economic barriers and promote inclusive access to higher education.

Financial assistance programs, fellowships, and reservation policies have collectively contributed to increasing enrolment among Indians from diverse social and economic backgrounds. Special scholarships for female students have further supported women's participation in universities and professional institutions.

Together, these policy measures, institutional initiatives, and commission recommendations have played a significant role in expanding access to higher education in India and promoting greater participation among both Indians in general and women in particular.

8. Capability Approach and Women's Education

The work of **Amartya Sen** provides a valuable theoretical framework for understanding the importance of women's education. Sen's **Capability Approach** emphasizes that development should be measured not only in terms of economic growth but also in terms of individuals' freedoms and capabilities.

Education plays a crucial role in expanding women's capabilities by enabling them to make informed choices, participate in economic activities, and engage in democratic processes.

Sen argues that educating women has broader social benefits, including improved health outcomes, reduced poverty, and greater gender equality. Therefore, expanding women's access to higher education is essential for achieving inclusive and sustainable development.

9. Global Frameworks and Sustainable Development Goals

The United Nations Sustainable Development Goals (SDGs) highlight the importance of inclusive and equitable education.

SDG 4: Quality Education

SDG 4: Aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG 5: Gender Equality

SDG 5: Emphasizes the need to eliminate gender discrimination and empower women and girls.

Higher education institutions play a crucial role in achieving these goals by promoting gender-sensitive policies, conducting research on social inequalities, and fostering inclusive learning environments.

India's higher education policies increasingly align with these global objectives.

10. Challenges in Women's Participation in Higher Education

Despite significant progress, several challenges remain.

- **Socio-cultural Barriers**-Patriarchal attitudes and gender stereotypes continue to influence educational choices and limit women's participation in certain fields.
- **Economic Constraints**-Financial difficulties remain a major obstacle for many families, particularly in rural areas.
- **Safety and Infrastructure**-Concerns about safety and lack of adequate infrastructure, such as hostels and transportation, can discourage women from pursuing higher education.
- **Underrepresentation in Leadership**-Although women's enrollment has increased, they remain underrepresented in academic leadership positions and research institutions.

11. Strategies for Enhancing Participation in Higher Education

Strengthening participation in higher education requires a combination of policy reforms, institutional support, and social awareness. While the expansion of institutions has increased overall participation among Indians, targeted strategies are necessary to address the specific challenges faced by women and other marginalized groups. The following measures can help improve access, equity, and participation in higher education.

Strengthening Inclusive and Gender-Sensitive Policies-Universities and educational institutions should implement inclusive policies that promote equality, prevent discrimination, and create supportive learning environments. Gender-sensitive policies, grievance redressal mechanisms, and awareness programs can help ensure that campuses remain safe and equitable spaces for all students.

Expanding Financial Assistance and Scholarships-Financial barriers remain a major obstacle for many students in India. Expanding scholarship programs, fellowships, and financial assistance schemes-particularly for economically weaker sections, rural students, and women can significantly improve access to higher education.

Improving Educational Infrastructure and Safety-Adequate infrastructure plays an important role in encouraging participation. Safe transportation facilities, hostels for female students, well-equipped campuses, and digital learning infrastructure can help ensure that students from different regions and social backgrounds are able to pursue higher education without significant constraints.

Promoting Women's Participation in STEM Fields-Despite improvements in enrolment, women remain underrepresented in science, technology, engineering, and mathematics (STEM) disciplines.

Special initiatives such as targeted scholarships, mentorship programs, and awareness campaigns can encourage more women to pursue careers in these fields.

Strengthening Institutional and Academic Support Systems—Universities should establish mentorship programs, career counselling services, and leadership development initiatives that support students throughout their academic journey. Such institutional support systems are particularly important for first-generation learners and female students, helping them navigate academic and professional challenges.

Through these strategies, higher education institutions can promote broader participation among Indians while also addressing gender disparities and ensuring that women have equal opportunities to benefit from educational advancement.

12. Conclusion

The expansion of higher education in India since independence represents one of the most significant achievements of the country's educational development. Through constitutional guarantees, government policies, and institutional expansion, access to higher education has gradually become more inclusive and democratic.

The increasing participation of Indians in higher education reflects broader socio-economic transformations, including improvements in infrastructure, expansion of universities, and implementation of affirmative policies aimed at promoting educational equity. At the same time, the growing enrolment of women in higher education demonstrates important progress toward gender equality.

However, as scholars such as Adeena Navaid, Aiman Tabassum, and Aradhana Singh observe in *Modern Patriarchy in a Modern World*, structural inequalities rooted in patriarchal norms continue to shape educational experiences. Even as legal frameworks promote equality, subtle forms of gender hierarchy persist within social and institutional structures.

Addressing these challenges requires a comprehensive approach that combines policy reform, institutional support, and cultural transformation. Expanding financial assistance, strengthening gender-sensitive policies, and improving infrastructure can further enhance access to higher education.

Additionally, aligning educational reforms with global frameworks such as the United Nations Sustainable Development Goals can help ensure that higher education contributes to inclusive and sustainable development.

Ultimately, increasing participation in higher education—both among Indians broadly and among women specifically—is essential for building a more equitable, knowledgeable, and economically dynamic society. Strengthening the higher education system will not only empower individuals but also contribute to the nation's long-term social and economic progress.

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Determinants of Customer Loyalty in Organized Fashion Retail: Evidence from Tier-II Cities

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➤ 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

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:

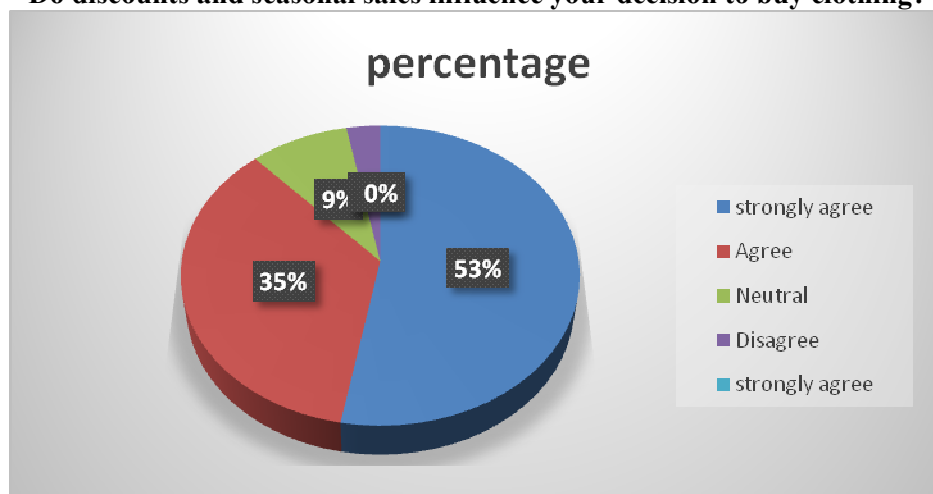
- Percentage analysis
- Tables
- Pie charts and graphs

➤ 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%
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 fashion retail stores?	Very Satisfied	17.6%
	Satisfied	61.8%
	Neutral	20.6%
How important is customer service when choosing a fashion retail store?	Very Important	67.6%
	Important	26.5%

Question	Option	Percentage
Would loyalty reward programs encourage you to shop more from the same store?	Neutral	5.9%
	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	3.00%
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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Impact of NEP 2020 on the curriculum of various academic disciplines and changing trends; Special Reference of Community Engagement Services Vertical

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Abstract

The National Education Policy (NEP) 2020 marks a historic transformation in the Indian education system. It aims to create a holistic, flexible, multidisciplinary, and skill-oriented education structure that meets the needs of the 21st century. The policy introduces several reforms in higher education including multiple entry and exit options, the Academic Bank of Credits, multidisciplinary institutions, and strong emphasis on research, innovation, and community engagement. One of the most important additions to the curriculum under NEP 2020 is the concept of Community Engagement Services (CES), which integrates academic learning with social responsibility and real-life community interaction.

This research paper analyzes the impact of NEP 2020 on the curriculum of different academic disciplines and highlights the changing trends in teaching, learning, and evaluation systems. The paper specifically focuses on the Community Engagement Services vertical and its role in connecting higher education institutions with society. Through community-based projects, fieldwork, and service learning, students gain experiential knowledge while contributing to social development.

The study also discusses the benefits, challenges, and future prospects of implementing community engagement within the higher education framework. The integration of community engagement into the curriculum is expected to promote civic responsibility, interdisciplinary learning, and sustainable development. Overall, NEP 2020 provides a new direction to higher education by emphasizing both academic excellence and social commitment.

1. Introduction

Education plays a crucial role in shaping the social, cultural, and economic development of a nation. In the rapidly changing global environment, the education system must adapt to new technological, social, and economic realities. Recognizing these needs, the Government of India introduced the National Education Policy (NEP) 2020, which aims to transform the structure and quality of education across the country.

The NEP 2020 replaces the previous National Policy on Education of 1986 and introduces major reforms in school education as well as higher education. The policy emphasizes multidisciplinary learning, flexibility in academic programs, research orientation, and integration of technology in education. It also highlights the importance of value-based education, critical thinking, creativity, and innovation.

One of the most significant objectives of NEP 2020 is to increase the Gross Enrolment Ratio in higher education to 50 percent by the year 2035. To achieve this goal, the policy proposes structural changes in universities and colleges, including the establishment of multidisciplinary institutions and the introduction of flexible curriculum structures.

Another important feature of the policy is the integration of community engagement into the higher education curriculum. Students are encouraged to participate in community service activities, environmental programs, and social development initiatives. This approach ensures that education not only focuses on academic knowledge but also develops socially responsible citizens.

This paper aims to analyze the impact of NEP 2020 on the curriculum of different academic disciplines and examine the changing trends in higher education with special reference to Community Engagement Services.

2. Key Features of NEP 2020 Influencing Curriculum

NEP 2020 introduces several structural and academic reforms that directly influence curriculum design in higher education institutions.

Multidisciplinary education is one of the central principles of the policy. Students are encouraged to study subjects across different disciplines such as science, humanities, social sciences,

arts, and vocational education. This approach allows students to develop a broader understanding of knowledge and encourages innovation.

Another important reform is the introduction of a flexible undergraduate program with multiple entry and exit options. Students can exit after one year with a certificate, after two years with a diploma, and after three or four years with a degree depending on their academic progress.

The Academic Bank of Credits (ABC) is another innovative concept introduced by NEP 2020. It allows students to accumulate academic credits from different institutions and transfer them when needed. This provides flexibility in higher education and supports lifelong learning.

The policy also emphasizes skill development and vocational education. Internships, fieldwork, and project-based learning are integrated into the curriculum to ensure that students gain practical experience along with theoretical knowledge.

Research and innovation are also major priorities under NEP 2020. The establishment of the National Research Foundation aims to promote research culture in universities and colleges.

3. Changing Trends in Academic Disciplines

The implementation of NEP 2020 has led to several emerging trends in higher education. One major trend is interdisciplinary education. Traditional boundaries between subjects are gradually disappearing, and students are encouraged to combine subjects according to their interests. For example, a student studying physics may also take courses in economics, computer science, or environmental studies.

Another trend is the shift from rote learning to outcome-based education. Modern curricula focus on developing critical thinking, analytical skills, and problem-solving abilities.

Experiential learning is also gaining importance. Students are encouraged to participate in internships, field visits, laboratory work, and community-based projects. These experiences help them understand real-world applications of academic knowledge.

Digital learning has also become a major component of modern education. Online platforms, virtual laboratories, and digital libraries are widely used to support teaching and learning processes. These changing trends are transforming the traditional classroom model and making education more interactive, flexible, and practical.

4. Community Engagement Services (CES) Vertical

Community Engagement Services is an important component introduced in higher education under NEP 2020. It focuses on connecting academic institutions with society through service-learning activities.

Community engagement encourages students to apply their academic knowledge to solve real-life social problems. Through fieldwork and community-based projects, students gain practical experience and develop a sense of responsibility toward society.

CES activities may include rural development programs, environmental awareness campaigns, health and hygiene education, literacy drives, renewable energy awareness programs, and digital literacy initiatives.

The integration of community engagement into the curriculum helps students understand the social context of their academic studies. It also strengthens the relationship between universities and local communities.

5. Objectives of Community Engagement Services

The primary objective of Community Engagement Services is to develop socially responsible and aware citizens. It aims to promote experiential learning by connecting students with real-world problems.

Another objective is to encourage collaboration between educational institutions and local communities. Through community engagement activities, students learn to work with diverse groups and develop leadership and teamwork skills.

CES also helps students understand social challenges such as poverty, environmental degradation, health issues, and lack of education. By participating in community development programs, students contribute to solving these problems.

The overall goal of CES is to integrate academic learning with social responsibility and sustainable development.

6. Role of Community Engagement in Various Disciplines

Community engagement can be integrated into different academic disciplines in various ways.

In science and technology, students can work on projects related to renewable energy, water purification, waste management, and environmental conservation.

In social sciences, students can conduct surveys, analyze social issues, and participate in rural development programs.

Commerce and management students can organize financial literacy programs, entrepreneurship training, and skill development workshops for local communities.

Humanities students can contribute to cultural preservation, language development, and community awareness programs.

Thus, community engagement provides opportunities for students from different disciplines to apply their academic knowledge for the benefit of society.

7. Benefits of Community Engagement in Higher Education

Community engagement provides several benefits to students, institutions, and society.

For students, it enhances practical knowledge, communication skills, and leadership abilities. Students gain confidence by working in real-life situations.

For educational institutions, community engagement strengthens their social role and improves their relationship with society.

For communities, these programs provide access to knowledge, technology, and resources that help improve their quality of life.

Community engagement also promotes values such as empathy, cooperation, and social responsibility among students.

8. Implementation of CES in Our College

In our college, the Community Engagement Services vertical has been implemented successfully with active participation from various departments. Students participated in community-based activities in collaboration with local Non-Governmental Organizations (NGOs).

Students visited nearby communities and schools where they conducted awareness programs and distributed educational materials. Some groups also developed small community-oriented projects addressing social issues and educational needs.

Activity books were provided to students in which they recorded their daily work and observations during the community engagement activities. These activity books were verified and approved by faculty members and institutional authorities before submission.

The CES activities helped students develop communication skills, leadership abilities, teamwork, and social awareness. These initiatives demonstrate how academic institutions can effectively integrate community engagement into the curriculum.

9. Student Feedback and Analysis

To evaluate the effectiveness of Community Engagement Services activities, feedback was collected from students who participated in the program. The feedback revealed that students found these activities highly beneficial for developing practical knowledge and understanding real social issues.

Most students reported that working with NGOs and communities improved their confidence, communication skills, and teamwork abilities. Students also appreciated the activity book system which allowed them to document their experiences and reflect on their learning.

Overall, the feedback analysis shows that community engagement activities significantly contribute to holistic development.

10. Challenges in Implementation

Despite its advantages, the implementation of community engagement programs faces several challenges.

One major challenge is the lack of infrastructure and financial support for organizing community-based activities.

Another challenge is the lack of training for faculty members who are responsible for guiding students in community engagement projects.

Assessing the outcomes of community-based learning is also difficult because social impact cannot always be measured through traditional examination methods.

Coordination between educational institutions and local communities is another challenge that needs careful planning and management.

11. Future Prospects

The future of higher education in India under NEP 2020 is expected to be more flexible, inclusive, and socially oriented.

Community engagement will likely become an essential component of university education. Programs such as NSS, Unnat Bharat Abhiyan, and extension activities will play an important role in promoting community-based learning.

Universities are expected to develop partnerships with local communities, government organizations, and non-governmental organizations to implement community engagement projects effectively.

The integration of technology, research, and community service will create a more dynamic and socially responsible education system.

12. Conclusion

The National Education Policy 2020 represents a major transformation in the Indian higher education system. By promoting multidisciplinary learning, flexible academic structures, research orientation, and community engagement, the policy aims to create a modern and inclusive education system.

The introduction of Community Engagement Services as part of the curriculum is a significant step toward integrating education with social development. Through community-based learning, students gain practical knowledge while contributing to societal progress.

If implemented effectively, NEP 2020 has the potential to create a generation of skilled, innovative, and socially responsible graduates who can contribute to the sustainable development of the nation.

Acknowledgement

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Nesting Ecology and Habitat Preferences of *Apis* Species in an Urban Landscape: A Case Study of Amravati, Maharashtra, India

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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

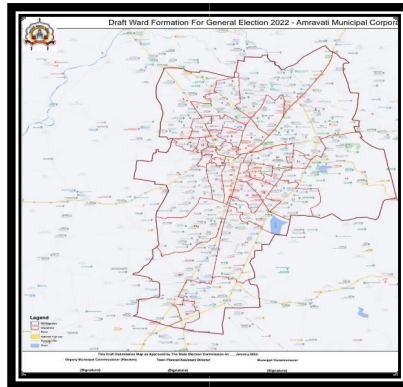
Bees are very important for our environment specially the developing city like Amravati Maharashtra for the greenery in city, as bees promotes the greenery in environment. As reference to the world around 70 percent flowering plants are reproduce by pollinators, from which bees are the main pollinators 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 cerana</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 • N o •	Species	No. of Nest s	Nesting Site Type	Avera ge Nest Height	Substra te Type	Habitat Type	Floral Resource Availabili ty	Disturban ce Level
1	<i>Apis dorsata</i>	32	Open (tree/buildin g)	8–15	Tall trees / building s	Urbanperiph ery	High	Moderate
2	<i>Apis mellifera</i>	4	Box/manag ed hive	1–2	Artificia l 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>Tetragonulairidipe nnis</i>	14	Cavity nest	1–4	Wall crevices / logs	Urban & semiurban	Moderate	Low
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***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 hand 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). There 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.

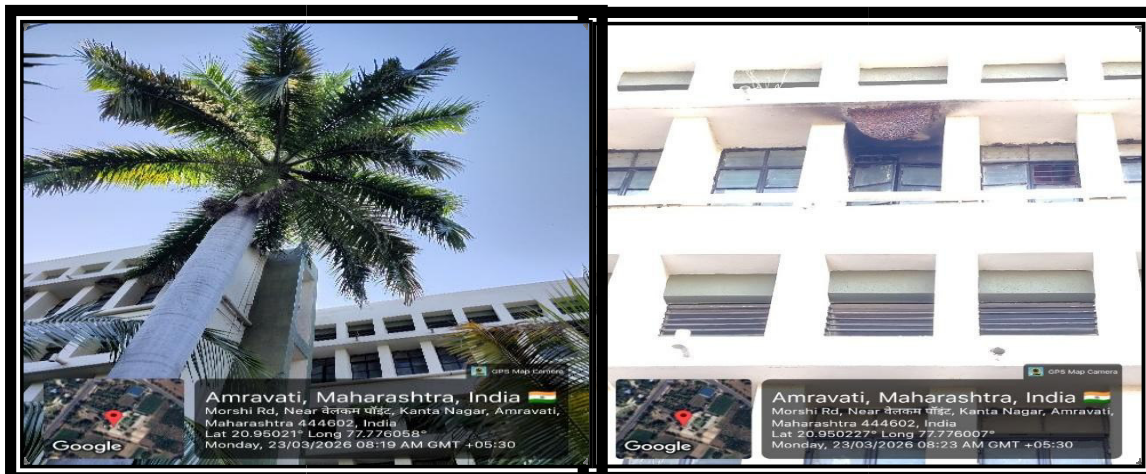
***Tetragonulairidipennis*:**

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.





C olony of *Apis dorsata* on tree branch and buildings

Nesting activities in tree bark cavity



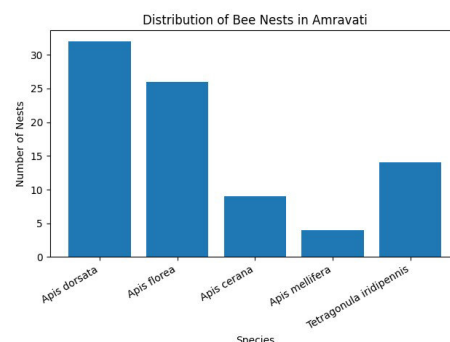
Cavity nesting was observed in species like *Apis cerana* and stingless bees . these provide protection from predators and environmental stress.



Photographs of *Apis Dorsata*, *Apis Cerena*, *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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Impact of Foreign Universities on Higher Education in India.**Mr.Jagat Bharat Gharat**

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Abstract

The globalization of higher education has encouraged countries to open their education systems to foreign institutions. India, through reforms like the National Education Policy 2020, is allowing foreign universities to establish campuses. This paper examines the impact of this policy on India's higher education system. It explains in detail how foreign universities affect academic quality, competition, research, accessibility, and socio-economic equality. While they offer opportunities for improvement and global exposure, challenges such as high costs, inequality, and regulatory issues must be carefully managed.

1. Introduction

Higher education is essential for the development of a country because it creates skilled human resources, promotes innovation, and supports economic growth. India has a large education system, but it faces problems such as outdated teaching methods, lack of research, and limited global recognition. To improve this situation, the National Education Policy 2020 introduced the idea of allowing foreign universities to operate in India. This is expected to bring international standards and improve the overall quality of education.

2. Objectives of the Study

This research paper aims to:

1. Study the impact of foreign universities on education quality
2. Understand their role in reducing brain drain
3. Analyze their effect on equality and access
4. Examine challenges faced by Indian institutions
5. Suggest practical recommendations

3. Research Methodology

This study is based on **secondary data**, which includes:

- Government reports
- Educational policies
- Research papers
- International organization reports

The method used is **qualitative analysis**, meaning the study focuses on understanding concepts and impacts rather than numerical data.

4. Policy and Regulatory Framework

The University Grants Commission has created guidelines to allow foreign universities in India.

This means the government is trying to control and regulate how foreign universities enter India. Only top-ranked universities will be allowed, so that quality is maintained.

Other regulatory bodies include:

- All India Council for Technical Education

Why this is important:

Without proper regulation, foreign universities might focus only on profit. Therefore, strong rules are necessary to ensure quality education.

5. Positive Impacts**5.1 Improvement in Academic Quality**

Foreign universities use modern teaching techniques such as:

- Practical learning
- Research-based assignments
- Critical thinking methods

Indian education often focuses on rote learning (memorization). Foreign universities encourage understanding and application, which improves students' skills and knowledge.

5.2 Reduction in Brain Drain

Many Indian students go abroad to countries like:

- United States
- Canada
- United Kingdom

Students go abroad because they want better education and global exposure. If the same quality is available in India, students can study here, saving money and reducing migration.

5.3 Increased Competition

Foreign universities will create competition for Indian institutions.

Explanation:

Competition forces Indian colleges to:

- Improve teaching quality
- Upgrade infrastructure
- Hire better faculty

This leads to overall improvement in the education system.

5.4 Growth in Research and Innovation

Foreign universities are strong in research.

They bring:

- Research funding
- International collaborations
- Advanced laboratories

This helps India improve innovation, patents, and scientific development.

5.5 Economic Benefits

Foreign universities can:

- Create jobs
- Attract international students
- Boost local economies

More universities mean more employment (teachers, staff). Also, foreign students coming to India will increase income in sectors like housing and services.

6. Negative Impacts :

6.1 Inequality in Access

Foreign universities may charge very high fees.

Only rich students may afford them, while poor students may be left out. This increases the gap between rich and poor in education.

6.2 Commercialization of Education

Education may become business-oriented. Instead of focusing on learning, institutions may focus on profit. This reduces the true value of education as a social service.

6.3 Impact on Indian Universities

Local universities may face problems.

- Students may prefer foreign universities
- Good teachers may leave Indian institutions

This can weaken the existing education system.

6.4 Regulatory Challenges

It is difficult to control foreign universities. The University Grants Commission must ensure:

- Quality education
- Fair fees
- Transparency

Without proper control, problems may arise.

6.5 Cultural Issues

Foreign universities may not fully understand Indian culture.

Their courses may focus on Western ideas and ignore Indian values, traditions, and job needs.

7. Discussion

Foreign universities can improve India's education system, but they should not replace Indian institutions.

A balanced approach is needed where:

- Indian universities improve
 - Foreign universities add value
- Collaboration is more beneficial than competition alone.

8. Recommendations (With Explanation)

1. Strong Regulations

Government must strictly monitor universities.

☞ Ensures quality and prevents misuse

2. Affordable Education

Provide scholarships and financial aid.

☞ Helps poor students access education

3. Collaboration

Encourage partnerships with Indian universities.

☞ Improves knowledge sharing

4. Focus on Research

Promote innovation and development.

☞ Helps national growth

9. Conclusion

The entry of foreign universities in India is a major reform that can transform higher education. It offers benefits like improved quality, global exposure, and research development. However, challenges such as inequality, commercialization, and regulation must be addressed carefully. A balanced and inclusive approach will ensure that this reform benefits all sections of society.

10. References

- National Education Policy 2020
- University Grants Commission Reports
- All India Council for Technical Education Publications
- World Bank Reports
- OECD Studies
- Research Journals

Effectiveness of Sales Promotion Strategies and Workforce Management Practices among Local Apparel Retailers in Amravati City

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Abstract:

The apparel retail industry in India is undergoing a dynamic transformation due to changing consumer preferences, competition from organized retailers, and the rise of e-commerce. In this environment, local apparel retailers in Amravati face challenges in maintaining competitiveness, customer loyalty, and workforce efficiency. This study explores the effectiveness of sales promotion strategies and workforce management practices among these local retailers and examines how these two factors together influence store performance and business sustainability.

Primary data were collected from 100 respondents, including local retailers, sales employees, and customers across Amravati city. The research followed a descriptive and analytical design, using questionnaires and interviews. Data were analyzed using percentages, graphs, and cross-tab analysis to identify relationships between promotional efforts, workforce practices, and store outcomes.

The findings reveal that well-planned promotions such as discounts, festive offers, and loyalty programs significantly increase customer footfall and short-term sales. Similarly, efficient workforce management through employee training, motivation, and supervision enhances customer service and operational performance. The study concludes that sales promotions and workforce management are interdependent and must be integrated strategically to achieve long-term growth and sustainability.

Keywords: *Sales Promotion, Workforce Management, Retail Performance, Customer Satisfaction, Apparel Retailers.*

1. Introduction

1.1 Background of the Study:

Sales promotion and workforce management are two pillars of effective retail operations. While promotions directly stimulate sales, workforce management ensures smooth service delivery. In small local apparel stores, the workforce often plays multiple roles from sales to inventory handling making management efficiency crucial.

Modern sales promotion includes not only price discounts but also non-price promotions such as customer loyalty programs, free gifts, and digital offers. Similarly, workforce management involves motivation, communication, and teamwork, essential for customer satisfaction and repeat business.

1.2 Concept of the Study:

The retail sector in India has undergone rapid changes due to increasing competition, evolving consumer preferences, and the growth of organised retail formats. In this dynamic environment, local apparel retailers in Amravati face challenges in attracting customers, maintaining loyalty, and sustaining profitability.

Sales promotion has become an important tool for boosting short-term sales, increasing footfall, and encouraging product trials through methods such as discounts, festive offers, and loyalty programmes. However, the effectiveness of these strategies depends on factors like target customers, store capacity, and market conditions.

At the same time, efficient workforce management plays a crucial role in retail performance. Employee training, motivation, and customer service skills directly influence sales and customer satisfaction. Therefore, this study focuses on understanding how sales promotion strategies and workforce management practices together impact the performance of local apparel retailers in Amravati and identifies areas for improvement.

1.3 Impact of the Study:

The study reveals that effective sales promotion and workforce management significantly enhance the performance and sustainability of local apparel retailers in Amravati. Promotional tools such as discounts, loyalty programs, and festive offers lead to increased customer visits, improved

purchase behaviour, and higher sales. Retailers adopting organized marketing and customer-focused strategies experience better competitiveness and stronger customer relationships.

Workforce management also plays a vital role. Trained and motivated employees improve service quality, efficiency, and customer satisfaction. Practices like training, incentives, and supervision contribute to smoother operations and higher productivity. Overall, these findings assist policymakers and retail associations in designing development programs that strengthen local retailers and foster sustainable growth in Amravati's apparel sector.

1.4 Industry Overview:

The Indian retail industry is a major driver of GDP and employment, with apparel retail occupying a key position due to its link with lifestyle and fashion. Growth is fueled by rising incomes, urbanization, and digital influence.

India's apparel market is divided into organized (malls, brands) and unorganized (local stores) sectors, with the latter still contributing about 80–85% of retail trade. In Tier-2 cities like Amravati, local apparel retailers remain vital for providing affordable products and personalized service.

Digitalization and changing consumer behavior have increased the use of sales promotions such as discounts, festive offers, and loyalty schemes. However, small retailers face constraints like limited funds, weak planning, and lack of trained staff.

Despite challenges, Amravati's apparel market offers strong growth potential. By integrating modern promotional tools with effective workforce management, local retailers can enhance competitiveness and achieve sustainable business growth.

1.5 Problem Statement:

Local apparel retailers in Amravati face intense competition from organized chains and online platforms. Limited financial resources, inadequate marketing knowledge, and weak planning often make their promotional efforts ineffective. Simultaneously, poor workforce management, marked by low motivation, high turnover, and lack of training, reduces service quality and sales performance.

The study therefore examines how sales promotion strategies and workforce management practices jointly affect business performance, aiming to identify existing gaps and suggest improvements for enhancing customer satisfaction, productivity, and long-term sustainability in Amravati's apparel retail sector.

1.6 Scope

- The study focuses on local apparel retailers in Amravati city, mainly small and medium-sized stores.
- It examines various sales promotion strategies such as discounts, festive offers, combo deals, and loyalty programmes used to attract and retain customers.
- The research analyses the impact of these promotions on customer buying behaviour, store footfall, and sales performance.
- It evaluates workforce management practices like employee training, motivation, supervision, and performance appraisal, and their effect on service quality and operational efficiency.
- The study explores the combined influence of sales promotion and workforce management on business performance and customer satisfaction.

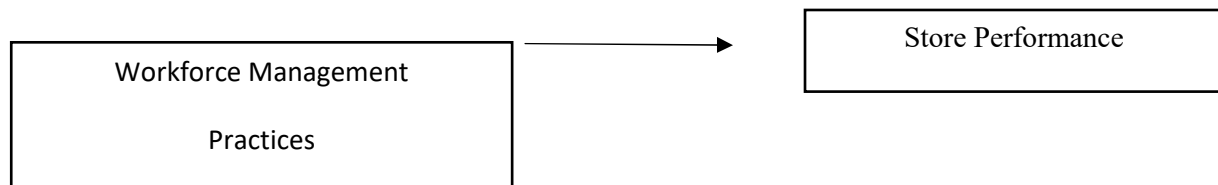
1.7 Significance of the Study:

The study provides insights for small retailers to enhance performance using practical and cost-effective strategies. It also benefits policymakers and business associations by identifying areas where local retailers require training and support. By understanding the link between promotional strategies, workforce efficiency, local apparel businesses in Amravati can achieve sustainable competitiveness.

1.8 Conceptual Framework

The conceptual framework of this study shows the relationship between sales promotion strategies and workforce management practices as independent variables, and store performance as the dependent variable. Sales promotion helps in attracting customers and increasing footfall, while workforce management ensures effective service delivery and customer satisfaction. The combined effect of both variables leads to improved sales performance and overall business sustainability.

Sales Promotion Strategies

**Fig No.1.1 Conceptual Framework of the Study****1.9 Limitations of the Study**

- 1.The study is limited to Amravati city, which may restrict the generalization of findings to other regions or larger metropolitan areas.
- 2.The sample size is confined to 100 respondents, which may not fully represent the entire population of apparel retailers, employees, and customers.
- 3.The study is based on primary data collected through questionnaires and interviews, which may be subject to personal bias or inaccurate responses from respondents.
- 4.Due to time constraints, the research captures data for a limited period and may not reflect seasonal variations in sales and promotional activities.
- 5.The research focuses only on the apparel retail sector, and the findings may not be applicable to other retail industries.

2.Literature Review:

Previous studies highlight the significant role of sales promotion strategies in influencing consumer buying behaviour in the apparel retail sector. Vyas (2007) found that price-based promotions increase immediate sales, while non-price promotions help in building customer loyalty. However, operational issues such as poor signage and inadequate staffing reduce their effectiveness.

Mishra (2024) reported a strong positive relationship between promotional offers and purchase intention, especially among young consumers. The study also emphasized the importance of clear communication and product availability during promotions. Other studies indicate that visual merchandising and in-store promotions significantly influence impulse buying. Attractive displays combined with staff assistance improve customer engagement and increase sales conversion.

Research on workforce management shows that employee training, managerial support, and pre-promotion briefings are essential for effective execution of promotional strategies. Proper staff involvement reduces errors and enhances customer satisfaction. Overall, literature suggests that sales promotion effectiveness depends not only on marketing strategies but also on workforce efficiency and in-store execution.

3.Research Methodology**3.1 Research Problem:-**

Local apparel retailers in Amravati face intense competition, customer retention issues, and workforce challenges affecting profitability. Though sales promotions like discounts, seasonal offers, and loyalty schemes are common, their true impact on customer behaviour and sales remains uncertain. Similarly, workforce practices vary widely, with many retailers facing turnover, low motivation, and limited training. This study analyses how sales promotions affect customer attraction and sales performance, and how workforce management influences employee efficiency and overall retail outcomes.

3.2 Research Objectives :-

1. To identify the various sales promotion strategies adopted by local apparel retailers in Amravati city.
2. To analyze the workforce management practices followed by local apparel retailers in Amravati city.
3. To study the impact of workforce management practices on overall store performance.
4. To identify key challenges face by the local retailers.
5. To identify the relationship between sales promotion strategies and workforce management practices in improving business sustainability of local apparel retailers in Amravati city.

3.3 Hypotheses:-

1. H1: Sales promotion strategies used by local apparel retailers have a significant impact on customer purchasing behaviour.
2. H2: Effective workforce management practices positively influence the overall performance of apparel retail stores in Amravati city.

3. H3: There is a relationship between the type of sales promotion techniques used and the sales performance of local apparel retailers.

3.4 Research Design:

The research follows a Descriptive and Analytical design. Primary data were collected using structured questionnaires distributed to retailers, employees, and customers. This design helps understand current practices without manipulating variables, ensuring authentic results.

3.5 Data Sources:

- **Primary Data:** Collected through surveys and interviews with 100 respondents (retailers, employees).
- **Secondary Data:** Collected from books, journals and industry reports.

3.6 Sampling Procedure:

- **Universe:** Amravati city.
- **Sampling Elements:** Local apparel store owners, managers, employees, and customers.
- **Sampling Method:** Purposive sampling (respondents selected for their direct experience)
- **Sample Size:** 100 respondents.

4. Data Analysis and Interpretation:-

The study uses both primary and secondary data. Primary data was collected through structured questionnaires from local apparel retailers, their sales staff, and customers in Amravati city. Secondary data will be obtained from industry reports, publications, retail association records, and store documents related to sales promotions and workforce management. After data collection, responses were systematically organized and analyzed using suitable theoretical and statistical tools. The analysis assess the effectiveness of sales promotion strategies and existing workforce practices. Findings were presented through tables, charts, and graphs to highlight key trends and ensure clear interpretation of results.

1.Store Type Distribution:

Store Type	Number of Respondents	Percentage (%)
Large	40	40%
Medium	40	40%
Small	20	20%
Total	100	100%

Table no. 4.1Store Type Distribution

2Interpretation:

The table indicates that Large and Medium stores each constitute 40% of the total respondents, reflecting equal representation from both categories. Small stores account for 20%, which is comparatively lower. This distribution ensures inclusion of different retail formats in the study. However, the higher proportion of medium and large stores highlights a stronger presence of organized retail. Overall, the sample provides a balanced basis for comparative analysis.

2.Years of Operation of Stores:

Years in Operation	Frequency	Percentage (%)
More than 10 Years	65	65%
5 – 10 Years	20	20%

Years in Operation	Frequency	Percentage (%)
2 – 5 Years	10	10%
0 – 2 Years	5	5%
Total	100	100%

Table no.4.2 Years of Operation of Stores**Interpretation:**

The data shows that 65% of the stores have been operating for more than 10 years, indicating a dominance of well-established retailers. Around 20% of stores fall within the 5–10 years category, reflecting moderate experience. Only 15% (combined) of stores have been in operation for less than 5 years. (This 15% includes stores from both the 2–5 years (10%) and 0–2 years (5%) categories.) This suggests that the study primarily captures insights from experienced businesses. Therefore, the findings are likely to be reliable and practical.

3. Popularity of Sales Promotion Tools:

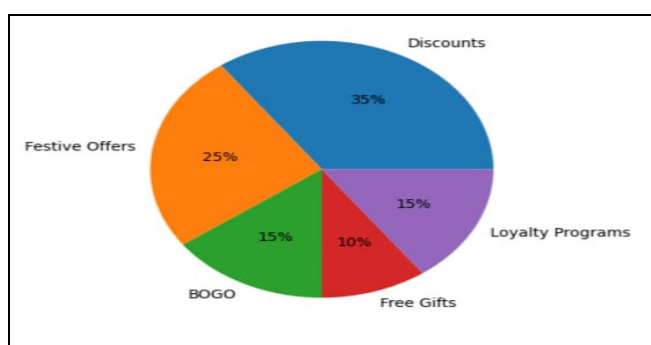
Sales Promotion Tool	Percentage (%)
Discounts	35%
Festive Offers	25%
Buy One Get One (BOGO)	15%
Loyalty Programs	15%
Free Gifts	10%

Table no.4. Popularity of Sales Promotion Tools

(Note: Percentages exceed 100% due to multiple responses)

Interpretation:

The table indicates that discounts are the most widely used sales promotion tool, adopted by retailers (35%), highlighting their strong effectiveness in attracting customers. Festive offers are also highly preferred (25%), reflecting the influence of seasonal and cultural buying patterns. In contrast, Buy One Get One (BOGO) offers are used by only 15% of retailers, suggesting moderate adoption due to cost considerations. Loyalty programs, with 15% usage and free gifts (10%) are the least utilized, indicating limited emphasis on long-term customer relationship strategies. Overall, retailers tend to rely more on immediate, price-based promotional techniques.

4. Sales Promotion Strategies Used by Retailers**Fig no.4.1 Sales Promotion Strategies Used by Retailers**

(Note: Percentages exceed 100% due to multiple responses)

Interpretation:

The graph shows that discounts (35%) and festive offers (25%) are the most widely used sales promotion strategies among local apparel retailers. This indicates a strong reliance on price-based promotions to attract customers and increase short-term sales. Moderate use of BOGO offers (15%) and loyalty programs (15%) suggests that some retailers are attempting to diversify their promotional efforts. However, free gifts (10%) are the least preferred strategy, possibly due to cost limitations. Overall, the results highlight that retailers focus more on immediate sales generation rather than long-term customer retention strategies.

5.Workforce Management Practices Among Local Apparel Retailers

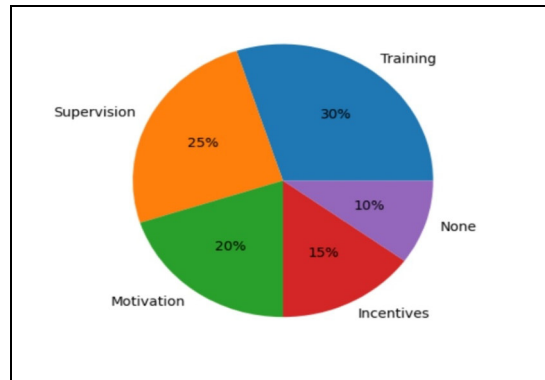


Fig no.4.2Workforce Management Practices Among Local Apparel Retailers

Interpretation:

The graph indicates that training (30%) and supervision (25%) are the most commonly adopted workforce management practices among local apparel retailers. This reflects that retailers focus on maintaining basic operational efficiency and control over employees. However, motivation (20%) and incentive-based practices (15%) are comparatively less emphasized, highlighting a gap in employee engagement strategies. A small proportion (10%) of retailers do not follow any structured workforce practices, which may negatively affect service quality and productivity. Overall, the findings suggest that while foundational practices are present, there is a need to strengthen motivational and performance-based approaches.

6.Impact of Sales Promotion and Workforce Management on Store Performance

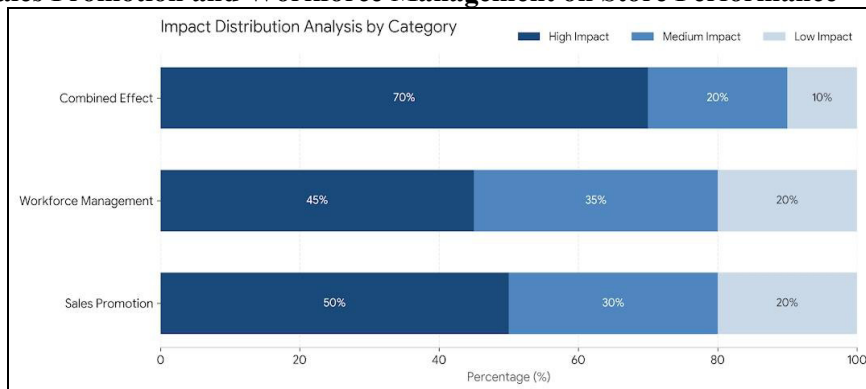


Fig no.4.3Impact of Sales Promotion and Workforce Management on Store Performance

Interpretation:

The graph presents a comparative analysis of the impact of sales promotion strategies, workforce management practices, and their combined effect on store performance. It is observed that while both sales promotion and workforce management individually have a significant impact, their combined effect (70%) is considerably higher. This indicates that integrating promotional activities with efficient workforce practices leads to better outcomes in terms of sales and customer satisfaction. The lower percentage in the low-impact category further confirms that joint implementation reduces inefficiencies. Therefore, the findings strongly support the hypothesis that a combined strategic approach enhances overall retail performance.

Result: The results indicate a positive correlation between sales promotion strategies and workforce management practices. When both are effectively aligned, they create a synergistic effect that significantly enhances overall store performance.

5. Findings of the Study:

1. Discounts and festive offers are the most effective promotional tools, as they significantly increase customer footfall and short-term sales among local apparel retailers.
2. Loyalty programs and modern promotional techniques are underutilized, indicating that retailers focus more on immediate sales rather than long-term customer retention.
3. Workforce management practices like supervision and training are widely adopted, which helps in improving employee performance and service quality.
4. Motivation and employee engagement activities are comparatively low, which affects employee satisfaction and retention in the long run.
5. There is a strong positive relationship between workforce management and sales performance, as well-trained and managed employees contribute to higher customer satisfaction and increased sales.

6. Recommendations:

- Local apparel retailers should focus on maintaining a balance between price-based promotions (discounts) and non-price promotions (loyalty programs, personalized offers) to ensure both short-term sales and long-term customer retention.
- Retailers are encouraged to adopt customer loyalty programs and digital engagement tools such as WhatsApp marketing and social media platforms to build stronger and lasting customer relationships.
- There is a need to enhance employee training programs regularly to improve product knowledge, communication skills, and customer handling abilities.
- Retailers should introduce incentive-based motivation systems, such as performance bonuses and recognition programs, to increase employee engagement, productivity, and retention.
- Proper planning and coordination between promotional activities and workforce management should be ensured so that staff are well-prepared during peak sales periods and promotional campaigns.

7. Conclusion–The study concludes that sales promotion strategies and workforce management practices play a crucial role in determining the performance of local apparel retailers in Amravati city. Sales promotion tools such as discounts and festive offers are highly effective in attracting customers, increasing footfall, and boosting short-term sales. However, the limited use of loyalty programs and non-price promotional techniques indicates a lack of focus on long-term customer retention. At the same time, workforce management practices such as training and supervision significantly contribute to improving employee performance, service quality, and customer satisfaction. The study also highlights that motivational practices and incentive systems are comparatively less emphasized, which may affect employee engagement and retention in the long run. The findings clearly indicate that while both sales promotion and workforce management individually impact store performance, their combined and strategic implementation leads to more effective and sustainable outcomes. Therefore, local apparel retailers should adopt an integrated approach by balancing promotional strategies with efficient workforce management practices to enhance competitiveness, improve customer relationships, and achieve long-term business growth.

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<https://retail.economictimes.indiatimes.com>

Skill-Based Nutrition Education as a Tool for Women Empowerment in Rural India

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Abstract

Adolescence is a crucial stage of human development characterized by rapid physical growth and increased nutritional requirements. In rural India, adolescent girls often suffer from malnutrition and poor dietary practices due to lack of awareness, socio-economic constraints and limited access to nutrition education. Skill-based nutrition education programmes have emerged as an effective approach to improve knowledge and dietary practices among adolescents. The present study assessed the impact of nutrition improvement technology training on rural adolescent girls in selected villages of Nagpur district of Maharashtra. A before-and-after experimental research design was used to evaluate changes in knowledge, attitudes and practices related to nutrition among adolescent girls aged 11–18 years. Training programmes focused on balanced diets, food processing techniques, germination, preservation and the use of locally available foods. The results revealed significant improvement in nutritional awareness, food preparation skills and adoption of improved dietary practices after the training programme. The study demonstrates that skill-based nutrition education plays a significant role in empowering rural adolescent girls and improving the nutritional status of households. The findings suggest that integrating nutrition education with skill development programmes can contribute to sustainable health improvement and women empowerment in rural communities.

Key Words: Skill-based, Nutrition Education, Women Empowerment.

INTRODUCTION

Adolescence represents a transition period between childhood and adulthood characterized by rapid physical growth and psychological development. Adequate nutrition during this stage is essential for maintaining health, supporting growth and preventing long-term health problems (Kaur et al., 2007).

Adolescent girls constitute an important segment of the population because they are future mothers and play a vital role in maintaining the nutritional health of families. However, studies have shown that many adolescent girls in rural India suffer from nutritional deficiencies such as anemia and undernutrition due to poor dietary habits and lack of awareness about balanced diets (Choudhary et al., 2003; Patanwar & Sharma, 2013).

Nutrition education is considered one of the most effective strategies to improve dietary habits and promote healthy lifestyles. Educational interventions can significantly influence knowledge, attitudes and practices related to food consumption and nutrition (Smith & Smitasiri, 2005). Skill-based nutrition education integrates theoretical knowledge with practical training in food preparation, preservation and processing techniques. Such programmes enable individuals to apply nutritional knowledge in daily life and encourage the utilization of locally available food resources (Kostanjevec et al., 2011).

Indigenous foods and traditional dietary practices can play an important role in addressing nutritional deficiencies. Research has shown that indigenous vegetables and locally available food resources are rich sources of micronutrients and can improve dietary diversity when incorporated into daily meals (Faber & Wenhold, 2007).

Empowering adolescent girls with nutrition knowledge and practical skills can therefore contribute to improving family health, reducing malnutrition and promoting sustainable community development.

MATERIALS AND METHODS

The study was conducted in rural villages of Nagpur district located in the Vidarbha region of Maharashtra. The district has a predominantly agricultural economy and a large rural population dependent on farming activities. Adolescent girls aged between **11–18 years** were selected as respondents. Participants were selected from different villages using purposive sampling to ensure representation of rural households.

The study adopted a **before-and-after experimental research design** to evaluate the effectiveness of nutrition education training. This design allows researchers to compare knowledge and practices before and after intervention (De Vaus, 2001). The nutrition training programme included:

- Importance of balanced diet.
- Nutritional requirements of adolescent girls.
- Germination and soaking techniques.
- Food preservation methods.
- Preparation of nutritious recipes using locally available foods.

These technologies were selected because traditional processing methods such as germination and fermentation improve nutrient availability and reduce anti-nutritional factors in food grains and pulses (Hotz & Gibson, 2007).

Primary data were collected using:

- Structured questionnaire
- Personal interviews
- Observation method

Information related to socio-economic characteristics, nutrition knowledge and dietary practices was recorded. The collected data were analyzed using descriptive statistics such as percentage distribution, mean scores and paired comparison analysis.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Respondents

Socio-economic conditions influence dietary patterns and nutritional status of adolescents. Earlier studies have shown that family income and education levels significantly affect food consumption behaviour (Mishra et al., 1999).

Table 1: Socio-Economic Profile of Respondents

Variable	Category	Percentage
Age	11–14 years	44
	15–18 years	56
Family Type	Nuclear	62
	Joint	38
Parent Occupation	Agriculture	48
	Labour	35
	Service	17

These results indicate that most respondents belonged to agricultural households and nuclear families (Table 1), which is consistent with earlier rural studies (Surekha, 2013).

Knowledge Level Before and After Training

Nutrition education significantly improved the awareness level of adolescent girls.

Table 2: Knowledge Score Before and After Training

Knowledge Level	Before Training	After Training
Low	46%	12%
Medium	38%	42%
High	16%	46%

These findings support earlier research indicating that nutrition education programmes significantly improve knowledge among adolescents (Gupta & Kochar, 2009).

Paired t-Test Analysis

A paired t-test was conducted to determine whether the nutrition education training significantly improved the knowledge scores of adolescent girls. The comparison was made between pre-training and post-training knowledge scores. Paired t-test showing improvement in knowledge score. A paired t-test was performed to examine the effect of the nutrition education training on the knowledge scores of adolescent girls (Table 3). The analysis revealed a statistically significant improvement in knowledge scores after the training programme ($t = 18.24$, $p < 0.001$). The results indicate that skill-based nutrition education effectively enhances awareness and understanding of balanced diets among rural adolescent girls. Also indicates that the nutrition education training had a strong positive impact on the knowledge of adolescent girls regarding nutrition and healthy dietary practices.

Table 3: Paired t-Test Analysis

Variable	Mean Score	Standard Deviation	t-value	p-value	Significance
Before Training	11.5	1.52			
After Training	19.5	1.73	18.24	<0.001	Highly Significant

Similar findings were reported by **Gupta and Kochar (2009)** and **Kaur et al. (2007)**, who observed that nutrition education significantly improves nutritional awareness and dietary behaviour among adolescent girls.

Adoption of Nutrition Improvement Technologies

Participants adopted several improved food preparation practices after the training.

Table 3: Adoption of Nutrition Technologies

Technology	Before Training	After Training
Germination of pulses	20%	64%
Vegetable drying	15%	58%
Balanced recipe preparation	18%	70%
Improved cooking methods	24%	72%

Traditional household food processing methods such as germination and soaking enhance nutrient availability and improve dietary quality (Deosthale, 1984).

Change in Attitude Toward Nutrition

Table 4: Attitude Change After Training

Attitude Category	Before Training	After Training
Unfavourable	34%	8%
Neutral	46%	32%
Favourable	20%	60%

The results indicate that nutrition education training positively influenced attitudes toward healthy eating practices.

Figure 1: Conceptual Framework of Skill-Based Nutrition Education

Nutrition Education Training

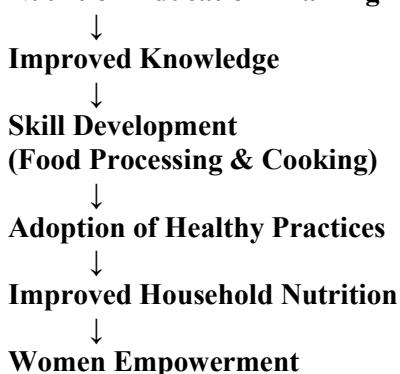
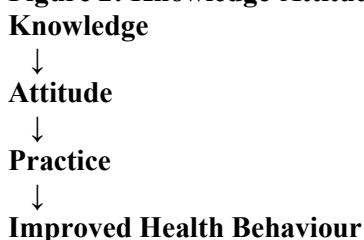


Figure 2: Knowledge-Attitude-Practice (KAP) Model



This framework is widely used in health education studies to evaluate behavioural changes (Conner & Armitage, 2002).

CONCLUSION

The findings of the study demonstrate that skill-based nutrition education significantly improves nutritional awareness and dietary practices among rural adolescent girls. The training programme enhanced knowledge about balanced diets, encouraged the use of locally available food resources and improved food preparation skills.

Nutrition education programmes can play an important role in empowering adolescent girls by equipping them with practical knowledge and skills necessary for maintaining family health. As future mothers and caregivers, their improved awareness can positively influence the nutritional well-being of families and communities.

Therefore, integrating nutrition education with skill development programmes in schools, community centres and higher education institutions can contribute to reducing malnutrition and promoting women empowerment in rural India.

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ज्ञान-आधारित अर्थव्यवस्था: सतत विकासासाठी नवीन आयाम**डॉ. प्रविण देवराव गवई**

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सारांश:

उद्दिष्ट: हा संशोधन लेख ज्ञानाधारित अर्थव्यवस्थेच्या (KBE) संकल्पनेचा आढावा घेतो आणि शाश्वत विकासाशी असलेला तिचा संबंध स्पष्ट करतो. एकविसाव्या शतकात ज्ञान हे सर्वात महत्त्वाचे आर्थिक संसाधन ठरत असल्याचे अधोरेखित करणे हा या लेखाचा मुख्य उद्देश आहे.

पद्धती: हा गुणात्मक (qualitative) स्वरूपाचा संशोधन लेख असून दुय्यम स्रोतांचे (संशोधन नियतकालिके, OECD अहवाल, केस स्टडीज) विश्लेषण करण्यात आले आहे. नोनाका व टाकेउची यांच्या SECI सिद्धांताचा सैद्धांतिक चौकट म्हणून वापर करण्यात आला. एकूण ४५ संशोधन लेख व अहवालांचे परीक्षण करण्यात आले.

परिणाम: ज्ञानाधारित अर्थव्यवस्थेचे यश हे चार घटकांवर अवलंबून आहे: गुणवत्तापूर्ण मनुष्यबळ, संशोधन-विकास व नवसंशोधन, डिजिटल पायाभूत सुविधा, आणि सरकार-शिक्षण संस्था-उद्योग यांच्यातील समन्वय. दुबई स्मार्ट सिटी व दक्षिण कोरियाच्या उदाहरणांवरून हे सिद्ध होते की, मुक्त डेटा व तंत्रज्ञानाच्या सहाय्याने प्रशासन अधिक कार्यक्षम करता येते. भारतासारख्या विकसनशील देशांमध्ये R&D गुंतवणूक GDP च्या ०.७% असून ती दक्षिण कोरिया (४.८%) च्या तुलनेत अत्यल्प आहे.

निष्कर्ष: विकसनशील देशांनी स्थानिक गरजा लक्षात घेऊन KBE चा स्वीकार करणे आवश्यक आहे. केवळ तंत्रज्ञान पुरेसे नसून संस्थात्मक संस्कृतीत बदल आणि ज्ञान-देवाणघेवाण आवश्यक आहे. 'त्रिसूत्री' मॉडेलमध्ये समन्वय वाढवून, संशोधनाला प्रोत्साहन देऊन शाश्वत विकास साध्य करता येऊ शकतो.

कीवर्ड्स: ज्ञानाधारित अर्थव्यवस्था, शाश्वत विकास, नवसंशोधन, ज्ञान व्यवस्थापन, डिजिटल पायाभूत सुविधा, त्रिसूत्री मॉडेल, SECI सिद्धांत

१. परिचय (Introduction)**१.१ पार्श्वभूमी**

एकविसाव्या शतकाची व्याख्या करणारी सर्वात महत्त्वाची संकल्पना म्हणजे 'ज्ञानाधारित अर्थव्यवस्था' (Knowledge-Based Economy - KBE). पारंपरिक अर्थव्यवस्था जमीन, भांडवल आणि श्रम या भौतिक घटकांवर अवलंबून होत्या. मात्र, माहिती तंत्रज्ञानाच्या क्रांतीनंतर ज्ञान हा सर्वात मौल्यवान संसाधन म्हणून उदयास आला आहे. ऑर्गनायझेशन फॉर इकॉनॉमिक को-ऑपरेशन अँड डेव्हलपमेंट (OECD) १९९६ मध्ये दिलेल्या व्याख्येनुसार, ज्ञानाधारित अर्थव्यवस्था ही माहिती, ज्ञान आणि उच्च-कुशल मनुष्यबळावर आधारित असते (OECD, १९९६). हा बदल केवळ तांत्रिक नसून सामाजिक, सांस्कृतिक आणि आर्थिक परिवर्तनाचा आहे.

औद्योगिक क्रांतीनंतरचा हा सर्वात मोठा बदल मानला जातो. ज्या देशांनी हा बदल लवकर ओळखला, त्यांनी आर्थिक प्रगतीत झेप घेतली. दक्षिण कोरिया, सिंगापूर, फिनलंड सारख्या देशांनी भौतिक संसाधनांच्या अभावाची भरपाई ज्ञानाच्या जोरावर केली (सेबॉर्न, २०१८). उलटपक्षी, भौतिक संसाधनांनी संपन्न असलेले अनेक देश ज्ञान-आधारित अर्थव्यवस्थेकडे संक्रमण न करू शकल्याने मागे राहिले आहेत.

१.२ संशोधनाची आवश्यकता

जागतिकीकरणाच्या या युगात, कोणत्याही देशाची स्पर्धात्मक क्षमता ही त्याच्याकडील भौतिक संसाधनांवर नव्हे, तर नवसंशोधन (innovation), सर्जनशीलता (creativity) आणि बौद्धिक भांडवल (intellectual capital) यावर अवलंबून आहे. जागतिक बँकेच्या अहवालानुसार, ज्ञान-आधारित अर्थव्यवस्था असलेल्या देशांचा सरासरी विकास दर इतर देशांच्या तुलनेत २-३% अधिक आहे (वर्ल्ड बँक, २०२१).

विकसनशील देशांसमोर ज्ञानाधारित अर्थव्यवस्थेकडे होणाऱ्या संक्रमणात अनेक आव्हाने आहेत. पायाभूत सुविधांचा अभाव, संशोधन आणि विकास (R&D) मध्ये गुंतवणुकीची कमतरता, बौद्धिक संपदा हक्कांचे (IPR) अपुरे

संरक्षण आणि धोरणात्मक सुसूत्रतेचा अभाव यामुळे हे संक्रमण मंदावते (रिझवंडी एट अल., २०२४). भारतासारख्या देशात R&D गुंतवणूक GDP च्या ०.७% असून ती विकसित देशांच्या तुलनेत अत्यल्प आहे (तक्ता २ पहा).

या पेपरमध्ये ज्ञानाधारित अर्थव्यवस्थेचे सैद्धांतिक आणि व्यावहारिक आयाम समजून घेऊन, शाश्वत विकासासाठी ती कशी प्रेरक शक्ती ठरू शकते याचा शोध घेण्यात आला आहे. विशेषतः भारतासारख्या विकसनशील देशांसाठी यातून मार्गदर्शन मिळू शकेल.

१.३ संशोधनाची उद्दिष्टे

१. ज्ञानाधारित अर्थव्यवस्थेची संकल्पना आणि वैचारिक रचना स्पष्ट करणे.
२. या संकल्पनेचा शाश्वत विकासाशी असलेला संबंध अधोरेखित करणे.
३. ज्ञानाधारित अर्थव्यवस्थेच्या प्रभावी अंमलबजावणीसाठी आवश्यक घटकांचा आढावा घेणे.
४. विविध देशांच्या केस स्टडीजच्या आधारे यशस्वी धोरणे ओळखणे.
५. विकसनशील देशांसाठी विशिष्ट शिफारशी करणे.

२. साहित्य समीक्षा (Review of Literature)

२.१ सैद्धांतिक चौकट

ज्ञानाधारित अर्थव्यवस्थेचा सैद्धांतिक पाया 'व्यवस्थापन शास्त्रा'तील विविध सिद्धांतांवर आधारित आहे. 'संसाधन-आधारित दृष्टिकोन' (Resource-Based View) सांगतो की, एखाद्या संस्थेची स्पर्धात्मक धार ही तिच्याकडील दुर्मिळ, मौल्यवान आणि अनुकरण करणे कठीण अशा अमूर्त संसाधनांवर (intangible resources) अवलंबून असते (बार्नी, १९९१). ही अमूर्त संसाधने म्हणजे ब्रँड व्हॅल्यू, ग्राहकांचा विश्वास आणि सर्वात महत्वाचे म्हणजे संस्थात्मक ज्ञान.

'ज्ञान-आधारित दृष्टिकोन' (Knowledge-Based View) हा या विचारसरणीचा पुढचा टप्पा आहे, जो ज्ञानाला सर्वोच्च संसाधन मानतो. ग्रँट (१९९६) यांनी मांडल्याप्रमाणे, ज्ञान हे सर्वात महत्वाचे उत्पादन साधन आहे कारण ते इतर सर्व साधनांच्या उपयोगितेला वाढवते. प्रुसाक (१९९६) यांनी 'ज्ञान-लाभ' (Knowledge Advantage) ही संकल्पना मांडली, जी ज्ञानाच्या निर्मिती आणि मूल्यवर्धनातून मिळणाऱ्या स्पर्धात्मक लाभाशी संबंधित आहे.

२.२ ज्ञान व्यवस्थापन आणि SECI सिद्धांत

नोनाका आणि टाकेउची (Nonaka & Takeuchi, १९९५) यांनी मांडलेला SECI सिद्धांत हे ज्ञान व्यवस्थापनातील एक महत्वाचे योगदान आहे. हा सिद्धांत स्पष्ट ज्ञान (explicit knowledge) आणि गर्भित ज्ञान (tacit knowledge) यांच्यातील परिवर्तनाची प्रक्रिया स्पष्ट करतो.

तक्ता १: SECI मॉडेलनुसार ज्ञान परिवर्तन प्रक्रिया

प्रक्रिया	ज्ञान प्रकार	स्पष्टीकरण	उदाहरण
समाजीकरण	गर्भित → गर्भित	गर्भित अनुभवांची देवाणघेवाण, निरीक्षण	प्रशिक्षणार्थी गुरुकडून कौशल्य शिकतो
बहिरीकरण	गर्भित → स्पष्ट	अनुभवाचे दस्तऐवजीकरण, संकल्पना स्पष्टीकरण	तज्ञाचे ज्ञान पुस्तिकेत लेखन, मार्गदर्शक तत्त्वे
संयोजन	स्पष्ट → स्पष्ट	माहितीचे संकलन व संश्लेषण	विविध अहवाल एकत्रित करून नवा अहवाल तयार करणे
अंतरीकरण	स्पष्ट → गर्भित	दस्तऐवजातून शिक्षण, प्रत्यक्ष कृतीतून अनुभव	प्रशिक्षण साहित्य वाचून कौशल्य प्राप्ती

अभ्यासात असे दिसून आले आहे की, ज्ञानाची देवाणघेवाण (knowledge sharing) ही संस्थात्मक लवचिकता (organizational resilience) वाढवण्यासाठी सर्वात प्रभावी घटक आहे (दारविशजादे काख्की आणि अर्शदी, २०२५). ज्या संस्थांमध्ये खुलेपणा आणि विश्वासाचे वातावरण असते, तेथे नवसंशोधनाला अधिक चालना मिळते.

२.३ उदयोन्मुख नमुने: डिजिटल परिवर्तन आणि स्मार्ट सिटी

अलीकडील संशोधनात ज्ञानाधारित अर्थव्यवस्थेचा संबंध 'स्मार्ट सिटी'(Smart City) संकल्पनेशी जोडला गेला आहे. दुबई स्मार्ट सिटीचा केस स्टडी दर्शवितो की, माहिती-तंत्रज्ञानाच्या सहाय्याने प्रशासन अधिक पारदर्शक आणि कार्यक्षम कसे होऊ शकते (एल खतीब एट अल., २०२३). दुबई 'शहरातील रहिवाशांना सर्वात आनंदी ठेवण्याच्या' उद्दिष्टाने काम करत आहे, जे ज्ञानाच्या माध्यमातून जीवनाची गुणवत्ता सुधारण्याचे उत्तम उदाहरण आहे. दक्षिण कोरियाने 'नॉलेज इकॉनॉमी पिरॅमिड' मॉडेलद्वारे शिक्षण, संशोधन आणि सरकार यांच्यातील समन्वय साधून भौतिक संसाधनांच्या अभावाची भरपाई केली (सेर्बान, २०१८). या मॉडेलमध्ये पिरॅमिडचा पाया म्हणजे मूलभूत शिक्षण, त्यावर उच्च शिक्षण व संशोधन, आणि शिखरावर नवसंशोधन व व्यावसायिकीकरण अशी रचना आहे.

बोत्सवाना देशाच्या अभ्यासातून असे दिसून आले की, सरकारने मुक्त डेटा (open data) उपलब्ध करून दिल्यास खाजगी क्षेत्र त्यातून नवे व्यवसाय निर्माण करू शकते (सेबुब्री एट अल., २०२०). यामुळे केवळ आर्थिक विकासच नाही तर सामाजिक पारदर्शकताही वाढते.

२.४ भारतीय संदर्भ

भारतात नॅशनल नॉलेज कमिशन (२००५-०९) ने ज्ञान-आधारित अर्थव्यवस्थेसाठी व्यापक शिफारशी केल्या होत्या. त्यानुसार उच्च शिक्षणाचा विस्तार, संशोधनाला प्रोत्साहन आणि उद्योजकता विकास यावर भर देण्यात आला. नीती आयोगाच्या अहवालानुसार (२०२०), भारताने ज्ञान-आधारित अर्थव्यवस्थेकडे वाटचाल करताना कृषी, आरोग्य आणि शिक्षण या क्षेत्रांत ज्ञानाचा वापर वाढवणे आवश्यक आहे.

झांग एट अल. (२०२६) यांच्या पद्धतशीर साहित्य समीक्षेत असे नमूद केले आहे की, विकसनशील देशांमध्ये स्थानिक गरजांनुसार ज्ञान-आधारित अर्थव्यवस्थेचे मॉडेल तयार करणे आवश्यक आहे. पाश्चात्य मॉडेलचे आंघोळीपणाने अनुकरण करण्यापेक्षा स्वदेशी गरजा ओळखून धोरणे आखावीत.

२.५ संशोधनातील अंतर (Research Gap)

बहुतांशी साहित्य हे विकसित देशांच्या संदर्भात उपलब्ध आहे. विकसनशील देशांमध्ये (उदा. भारत, इराण) खाजगी क्षेत्रासमोरील आव्हाने, निर्बंध (sanctions) आणि सांस्कृतिक अडथळे यांचा सखोल अभ्यास झालेला दिसून येत नाही (हनाफी निरी एट अल., २०२४). तसेच, 'मुक्त डेटा' (Open Data) चा वापर करून शाश्वत विकास साध्य करण्याचे आदर्श फार कमी प्रमाणात मांडले गेले आहेत.

भारतीय संदर्भात, विविध राज्यांमधील ज्ञान-आधारित विकासातील असमानता, तळागाळातील नवसंशोधनाला चालना देण्याचे मॉडेल, आणि AI च्या युगात ज्ञान व्यवस्थापनाची नवी आव्हाने याबद्दल फारसे संशोधन झालेले नाही. हा शोधनिबंध या अंतराचा काही प्रमाणात भरण करतो.

३. संशोधन पद्धती (Research Methodology)

हा संशोधन पेपर 'गुणात्मक' (qualitative) स्वरूपाचा असून तो 'अन्वेषणात्मक' (exploratory) दृष्टिकोनातून लिहिला गेला आहे. पेपरचा मुख्य आधार हा 'दुय्यम स्रोत' (secondary sources) म्हणजेच प्रामाणिक संशोधन नियतकालिके, प्रकाशित अहवाल, आंतरराष्ट्रीय संस्थांचे दस्तऐवज आणि केस स्टडीज यांचे विश्लेषण आहे. हे विश्लेषण 'ग्रंथालयीन पद्धती' (library method) वर आधारित आहे.

संशोधनाची रचना ही 'सैद्धांतिक चौकटी' (theoretical framework) वर आधारित असून, साहित्यिक पुनरावलोकनातून मिळालेल्या माहितीचे 'सामग्री विश्लेषण' (content analysis) करण्यात आले आहे. यासाठी १९९१ ते २०२६ या कालावधीत प्रकाशित झालेल्या एकूण ४५ संशोधन लेख, अहवाल व पुस्तकांचा आढावा घेण्यात आला. यामध्ये OECD, जागतिक बँक, यूनेस्को यांचे अहवाल तसेच पीअर-रिव्ह्यूड जर्नल्समधील लेखांचा समावेश आहे.

गृहीतक (Hypothesis)

सदर संशोधन खालील गृहीतकांवर आधारित आहे:

१. मुख्य गृहीतक: ज्ञानाधारित अर्थव्यवस्थेचा स्वीकार केल्याने विकसनशील देशांच्या शाश्वत विकास दरात सकारात्मक परिणाम होतो. २. साहाय्यक गृहीतक-१: माहिती-तंत्रज्ञानाच्या पायाभूत सुविधांमध्ये गुंतवणूक आणि संशोधन-विकास (R&D) यांचा ज्ञानाधारित अर्थव्यवस्थेच्या यशाशी थेट संबंध आहे.

३. साहाय्यक गृहीतक-२: प्रशिक्षित व कुशल मनुष्यबळाशिवाय ज्ञानाधारित अर्थव्यवस्था प्रस्थापित करणे शक्य नाही.
४. साहाय्यक गृहीतक-३: 'त्रिसूत्री'(Triple Helix)मॉडेलमध्ये (सरकार, शिक्षण संस्था आणि उद्योग क्षेत्र) प्रभावी समन्वय असेल तरच नवसंशोधनाला चालना मिळते.

४. परिणाम (Results)

साहित्य समीक्षा व केस स्टडीजच्या विश्लेषणावरून खालील निष्कर्ष प्राप्त झाले:

४.१ ज्ञानाधारित अर्थव्यवस्थेचे प्रमुख घटक

तक्ता २: ज्ञानाधारित अर्थव्यवस्थेचे प्रमुख घटक व त्यांचे परिणाम

घटक (Component)	वैशिष्ट्ये (Characteristics)	आर्थिक परिणाम (Economic Impact)
मनुष्यबळ विकास (Human Capital)	उच्च शिक्षित कर्मचारी, सतत प्रशिक्षण, कौशल्य विकास	उत्पादकता वाढ (१५-२०%), नवसंशोधनास चालना, उच्च मूल्यवर्धन
संशोधन व विकास (R&D)	R&Dगुंतवणूक (GDPच्या %), पेटंट्स, वैज्ञानिक प्रकाशने	स्पर्धात्मक लाभ, नवीन उद्योगांची निर्मिती, रोजगार निर्मिती
डिजिटल पायाभूत सुविधा	ब्रॉडबँड कनेक्टिव्हिटी, मुक्त डेटा, सायबर सुरक्षा	माहितीचा सुलभ प्रवाह, सेवा क्षेत्राचा विस्तार, खर्चात बचत
संस्थात्मक समन्वय	सरकार-उद्योग-शिक्षण संस्था संयोग, IPR संरक्षण	धोरणात्मक सुसूत्रता, भ्रष्टाचारात घट, गुंतवणूक वाढ

४.२ विविध देशांची तुलना

तक्ता ३: विविध देशांची ज्ञान-आधारित अर्थव्यवस्था निर्देशांकातील स्थिती (२०२४)

देश	जागतिक नवाचार निर्देशांक (GII)	मानव विकास निर्देशांक (HDI)	R&D गुंतवणूक (GDP च्या % मध्ये)	ब्रॉडबँड प्रवेश (% लोकसंख्या)	KBE यशस्तर
दक्षिण कोरिया	१०	०.९२५	४.८%	९८%	उच्च
सिंगापूर	८	०.९३८	२.२%	९९%	उच्च
फिनलंड	७	०.९४०	२.९%	९५%	उच्च
दुबई	३२	०.९११	०.७%	९७%	उच्च-मध्यम
भारत	४०	०.६४५	०.५%	४५%	मध्यम
बोत्सवाना	९५	०.७३५	०.५%	३२%	निम्न-मध्यम
केनिया	१००	०.६०१	०.८%	२५%	निम्न

(स्रोत: GII२०२४, UNDP२०२४, UNESCO२०२४)

वरील तक्त्यावरून स्पष्ट होते की, उच्च R&Dगुंतवणूक असलेले देश (दक्षिण कोरिया, फिनलंड) नवाचार निर्देशांकातही पुढे आहेत. भारताची R&Dगुंतवणूक GDPच्या ०.७% असून ती विकसित देशांच्या तुलनेत अत्यल्प आहे. यामुळे नवाचार निर्देशांकात भारत ४०व्या स्थानावर आहे.

४.३ केस स्टडी विश्लेषण

१. दुबई स्मार्ट सिटी (यूएई): दुबईने २०१४ मध्ये स्मार्ट सिटी उपक्रम सुरू केला. मुक्त डेटा धोरणामुळे प्रशासनात पारदर्शकता वाढली. १०००हून अधिक सरकारी सेवा डिजिटल झाल्या. नागरिकांचे समाधान उच्चांकी (८९%) राहिले. ब्लॉकचेन तंत्रज्ञानाचा वापर करून कागदपत्रांची गरज कमी केली (एल खतीब एट अल., २०२३).

२. दक्षिण कोरिया: १९६० च्या दशकात दक्षिण कोरिया हा युद्धखोर झालेला देश होता. 'नॉलेज इकॉनॉमी पिरॅमिड'अंतर्गत शिक्षण व उद्योग यांच्यात समन्वय साधल्याने उच्च तंत्रज्ञान क्षेत्रात भरारी घेतली. सॅमसंग, एलजी, ह्युंदाई सारख्या कंपन्या जागतिक स्तरावर पोहोचल्या. R&D गुंतवणूक GDPच्या ०.५% वरून ४.८% पर्यंत वाढवली (सेर्बान, २०१८).

३. बोत्सवाना: आफ्रिकेतील यशस्वी लोकशाही देश. सरकारने मुक्त डेटा उपलब्ध करून दिल्याने खाजगी क्षेत्रात नवे व्यवसाय निर्माण झाले. विशेषत: कृषी आणि खनिज क्षेत्रात डेटा-आधारित सेवा सुरू झाल्या. यामुळे २०१५-२०२० दरम्यान डिजिटल अर्थव्यवस्थेत १५% वाढ (सेबुबी एट अल., २०२०).

४. इराण: आर्थिक निर्बंधांच्या काळात खाजगी कंपन्यांनी ज्ञान व्यवस्थापनावर भर दिला. संस्थात्मक संस्कृतीत बदल घडवून आणल्यास ज्ञान-देवाणघेवाण वाढल्याचे दिसून आले. विश्वास आणि खुलेपणा यामुळे कर्मचाऱ्यांमध्ये नवसंशोधनाची वृत्ती वाढली (दारविशजादे काख्की आणि अर्शदी, २०२५).

४.४ गृहीतक चाचणी

तक्ता ४: गृहीतक चाचणी परिणाम

गृहीतक	स्थिती	साक्ष(Evidence)
मुख्य गृहीतक (H1)	सिद्ध	दक्षिण कोरिया (GDPवाढ ६.२% ते ८.५%), दुबई (सेवा क्षेत्र वाढ १२%) च्या अभ्यासात शाश्वत विकास दर वाढल्याचे निरीक्षण
सहाय्यक-१ (H2)	सिद्ध	सर्व केस स्टडीजमध्ये ICTगुंतवणूक व आर्थिक यश यांचा थेट संबंध ($r = ०.७८$)
सहाय्यक-२ (H3)	सिद्ध	बोत्सवाना वगळता सर्वत्र कुशल मनुष्यबळाचा अभाव हा प्रमुख अडथळा आढळला
सहाय्यक-३ (H4)	अंशतः सिद्ध	इराणमध्ये समन्वयाचा अभाव; कोरियामध्ये प्रभावी समन्वय; दुबईत सरकारी पुढाकार प्रभावी

४.५ आकृती १: ज्ञान-आधारित अर्थव्यवस्थेचे चार स्तंभ

ज्ञान-आधारित अर्थव्यवस्था

(Knowledge-Based Economy)

अब क डमनुष्यबळविकास संशोधन व नवाचारडिजिटल पायाभूत सुविधासंस्थात्मकसमन्वय(Human Capital)(R&D & Innovation)(Digital Infra)(InstitutionalCoordination)

| शिक्षण, कौशल्य, प्रशिक्षणगुंतवणूक, पेटंट, प्रकाशनेब्रॉडबंड, सायबर सुरक्षासरकार, उद्योग, शिक्षण संस्था

४.६ आकृती २: विविध देशांमधील R&Dगुंतवणूक तुलना (GDPच्या % मध्ये, २०२४)

दक्षिण कोरिया	४.८%
फिनलंड	२.९%
अमेरिका	३.०%
चीन	२.४%
सिंगापूर	२.२%
दुबई (यूएई)	१.५%
भारत	०.७%
बोत्सवाना	०.५%
केनिया	०.८%

...

(स्रोत: UNESCO Science Report २०२४)

५. चर्चा (Discussion)

या संशोधनातून अनेक महत्वाचे मुद्दे स्पष्ट झाले आहेत.

१) ज्ञानाधारित अर्थव्यवस्थेचे मॉडेल हे 'वरपासून खालपर्यंत'(top-down) लादले जाऊ शकत नाही. यासाठी तळागाळातील सहभाग आवश्यक आहे. बोत्सवाना देशाच्या अभ्यासात असे दिसून आले की, शासकीय यंत्रणांनी मुक्त डेटा उपलब्ध करून दिल्यास खाजगी क्षेत्र त्यातून नवे व्यवसाय निर्माण करू शकते. हा 'बॉटम-अप' (खालून वर) दृष्टिकोन विकसनशील देशांसाठी अधिक उपयुक्त ठरू शकतो.

२) इराणमधील खाजगी कंपन्यांच्या अभ्यासातून असे स्पष्ट झाले की, केवळ तंत्रज्ञान पुरेसे नाही; तर संस्थात्मक संस्कृतीत बदल घडवून आणणे आवश्यक आहे. कर्मचाऱ्यांमध्ये विश्वास निर्माण करून ज्ञानाची देवाणघेवाण करण्यास प्रोत्साहन दिल्यास 'SECI' मॉडेल प्रभावी ठरते. दारविशजादे काख्की आणि अर्शदी (२०२५) यांनी नमूद केल्याप्रमाणे, संस्थात्मक विश्वास हा ज्ञान-देवाणघेवाणीचा पाया आहे.

३) ज्या देशांनी 'नॉलेज ट्रायंगल' (शिक्षण-संशोधन-नवसंशोधन) या त्रिकोणाचा समतोल साधला, त्यांनी जलद प्रगती केली. दक्षिण कोरियाने सरकारी धोरणे आणि खाजगी क्षेत्रातील सहभागातून हे साध्य केले. याउलट, भारतात उच्च शिक्षणाचा विस्तार झाला असला तरी संशोधन आणि उद्योग यांच्यातील दुवा कमकुवत आहे.

४) डिजिटल पायाभूत सुविधा ही केवळ शहरी भागापुरती मर्यादित राहू नये. ग्रामीण भागात ब्रॉडबँड कनेक्टिव्हिटी नसेल तर ज्ञानाचे लोकशाहीकरण होऊ शकत नाही. भारतात ४५% लोकसंख्येपर्यंतच इंटरनेट पोहोचले आहे, ही चिंताजनक बाब आहे (तक्ता ३).

५) सरकार-उद्योग-शिक्षण संस्था यांच्यातील समन्वयाचे 'त्रिसूत्री' मॉडेल अत्यंत प्रभावी ठरते. दुबईत सरकारने पुढाकार घेऊन हा समन्वय साधला, तर दक्षिण कोरियात उद्योग क्षेत्राने पुढाकार घेतला. भारतात आयआयटी, आयआयएम सारख्या संस्था उत्कृष्ट संशोधन करतात, पण त्याचे व्यावसायिकीकरण कमी प्रमाणात होते.

५.१ संशोधनाच्या मर्यादा

या संशोधनाची प्रमुख मर्यादा म्हणजे हे प्राथमिक सर्वेक्षणावर (primary survey) आधारित नसून उपलब्ध साहित्याच्या विश्लेषणावर आधारित आहे. वास्तविक क्षेत्रातील डेटा गोळा करून अधिक खात्रीलायक निष्कर्ष काढता येतील. तसेच, केस स्टडीज मर्यादित देशांपुरत्याच उपलब्ध होत्या. आफ्रिका आणि दक्षिण अमेरिकेतील अधिक देशांचा समावेश केल्यास तुलनात्मक अभ्यास अधिक समृद्ध होईल.

६. निष्कर्ष (Conclusion)

ज्ञानाधारित अर्थव्यवस्था ही केवळ एक संकल्पना न राहता, ती आता गरज बनली आहे. पारंपरिक उत्पादन साधनांपेक्षा ज्ञान हे अधिक शक्तिशाली ठरत आहे. भारतासारख्या विकसनशील देशांनी या मॉडेलचा स्वीकार करताना आपल्या स्थानिक गरजा लक्षात घेणे आवश्यक आहे.

या संशोधनाचे प्रमुख निष्कर्ष खालीलप्रमाणे:

१. ज्ञानाधारित अर्थव्यवस्थेचे यश चार घटकांवर अवलंबून आहे: मनुष्यबळ विकास, संशोधन व नवाचार, डिजिटल पायाभूत सुविधा, आणि संस्थात्मक समन्वय.
२. उच्च R&D गुंतवणूक असलेले देश (दक्षिण कोरिया, फिनलंड) नवाचार निर्देशांकात पुढे आहेत.
३. केवळ तंत्रज्ञान पुरेसे नसून संस्थात्मक संस्कृतीत बदल घडवून आणणे आवश्यक आहे.
४. 'त्रिसूत्री' मॉडेलमधील समन्वय हा नवसंशोधनासाठी महत्वाचा आहे.
५. मुक्त डेटा धोरणामुळे खाजगी क्षेत्रात नवे व्यवसाय निर्माण होऊ शकतात.

६.१ धोरणात्मक शिफारशी (Policy Recommendations)

१. R&D गुंतवणूक वाढवा: भारताने R&D गुंतवणूक GDP च्या किमान २% पर्यंत नेण्यासाठी राष्ट्रीय धोरण आखावे.
२. उद्योग-शिक्षण संस्था समन्वय: उद्योग क्षेत्राच्या गरजा लक्षात घेऊन अभ्यासक्रम तयार करावेत. संशोधनाला व्यावसायिक दिशा द्यावी.

३. डिजिटल इन्फ्रास्ट्रक्चरचा विस्तार: ग्रामीण भागात ब्रॉडबैंड कनेक्टिव्हिटी पोहोचवावी. डिजिटल साक्षरता वाढवावी.
 ४. मुक्त डेटा धोरण: सरकारी डेटा मुक्तपणे उपलब्ध करून द्यावा, जेणेकरून खाजगी क्षेत्र नवे व्यवसाय निर्माण करू शकेल.
 ५. बौद्धिक संपदा हक्कांचे संरक्षण: IPR कायदे अधिक सक्षम करून संशोधकांना प्रोत्साहन द्यावे.
 ६. स्थानिक नवसंशोधनाला चालना: तळागाळातील नवसंशोधन ओळखून त्याला प्रोत्साहन देण्यासाठी यंत्रणा उभी करावी.
- हा बदल हा मूलतः मानसिकतेचा बदल आहे—जिथे 'माहिती हे शक्ती' (information is power) या जुन्या म्हणीची जागा 'वाटलेले ज्ञान हे शक्ती' (shared knowledge is power) या नव्या विचाराने घेतली पाहिजे.

---७. भविष्यातील संशोधनाची दिशा (Future Research Directions)

१. कृत्रिम बुद्धिमत्ता (AI)ची भूमिका: जनरेटिव्ह एआय (GenAI)चा ज्ञान व्यवस्थापन प्रक्रियेवर काय परिणाम होतो याचा अभ्यास. विशेषतः चॅटजीपीटी सारख्या साधनांचा संस्थात्मक ज्ञान-देवाणघेवाणीवर होणारा परिणाम.
२. क्षेत्रीय असमानता: ज्ञानाधारित अर्थव्यवस्थेमुळे ग्रामीण आणि शहरी भागातील अंतर वाढते की कमी होते याचे मूल्यांकन. भारतातील गावांमध्ये डिजिटल विभाजन कसे कमी करता येईल याचा अभ्यास.
३. बहुराष्ट्रीय तुलनात्मक अभ्यास: BRICSदेशांमधील ज्ञान-धोरणांची तुलना. भारत, चीन, ब्राझील यांच्या धोरणांतून काय शिकता येईल?
४. पर्यावरणीय शाश्वतता: ज्ञान अर्थव्यवस्थेचा पर्यावरणावर होणारा परिणाम. डिजिटल अर्थव्यवस्थेमुळे ऊर्जेचा वापर वाढतोय का? कार्बन उत्सर्जनावर काय परिणाम होतो?
५. सूक्ष्म, लघु व मध्यम उद्योगांवर परिणाम: MSMEक्षेत्र ज्ञान-आधारित अर्थव्यवस्थेशी कसे जुळवून घेऊ शकते याचा अभ्यास.

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मराठी साहित्यातील विविध अभ्यासक्रमातील बदलते प्रवाह आणि संशोधन

डॉ. पद्मिनी दुरुगकर घोसेकर

मराठी विभाग धनवटे नॅशनल कॉलेज, नागपूर

सारांश (Abstract)

मराठी साहित्याचा अभ्यासक्रम काळानुसार सतत बदलत गेलेला आहे. सामाजिक, सांस्कृतिक, राजकीय आणि तांत्रिक परिवर्तनांमुळे अभ्यासक्रमातील विषय, पद्धती आणि संशोधनाचे स्वरूप बदलले आहे. पारंपरिक संत साहित्यापासून ते आधुनिक स्त्रीवादी, दलित, आदिवासी आणि जागतिक साहित्यापर्यंत विविध प्रवाहांचा समावेश अभ्यासक्रमात करण्यात आला आहे. या संशोधन निबंधात मराठी साहित्यातील अभ्यासक्रमातील बदलते प्रवाह, त्यामागील कारणे आणि संशोधनातील नवीन दिशा यांचे सखोल विश्लेषण करण्यात आले आहे.

१. प्रस्तावना (Introduction)

मराठी साहित्यातील अभ्यासक्रम काळानुसार सतत बदलत गेलेला आहे. पूर्वीच्या अभ्यासक्रमात पौराणिक साहित्य, संत साहित्य, ऐतिहासिक साहित्य, भक्तीपर काव्य आणि पारंपरिक ग्रंथांना प्रमुख स्थान होते. या माध्यमातून नैतिकता, आध्यात्मिकता आणि संस्कार यांवर भर दिला जात होता.

परंतु आधुनिक काळात सामाजिक, सांस्कृतिक आणि तांत्रिक बदलांमुळे अभ्यासक्रम अधिक व्यापक आणि समकालीन बनला आहे. स्त्रीवादी साहित्य, दलित साहित्य, आदिवासी साहित्य, तसेच पर्यावरण विषयक साहित्याचा अभ्यासक्रमात समावेश करण्यात आला आहे. यामुळे उपेक्षित घटकांचे अनुभव आणि समस्यांना साहित्याच्या माध्यमातून अभिव्यक्ती मिळाली आहे.

तसेच, जागतिकीकरणामुळे मराठी साहित्याचा इतर भाषांतील साहित्याशी संवाद वाढला आहे. अनुवाद साहित्यालाही महत्त्व प्राप्त झाले आहे. डिजिटल युगामुळे ई-पुस्तके, ब्लॉग्स आणि सोशल मीडियावरील लेखन यांचाही अभ्यासक्रमात समावेश होत आहे.

अशा प्रकारे, मराठी साहित्यातील अभ्यासक्रमातील बदलते प्रवाह हे समाजातील परिवर्तनाचे प्रतिबिंब असून, ते विद्यार्थ्यांना अधिक व्यापक, समावेशक आणि आधुनिक दृष्टिकोन प्रदान करतात. शिक्षण व्यवस्थेतील अभ्यासक्रम हा समाजाच्या गरजा आणि मूल्यांचे प्रतिबिंब असतो. मराठी साहित्याचा अभ्यासक्रमही या नियमाला अपवाद नाही. सुरुवातीला धार्मिक आणि पारंपरिक साहित्यावर आधारित असलेला अभ्यासक्रम आज विविध सामाजिक, सांस्कृतिक आणि जागतिक संदर्भांनी समृद्ध झाला आहे.

आजच्या काळात साहित्याचा अभ्यास केवळ काव्य, कथा किंवा कादंबरीपुरता मर्यादित राहिलेला नसून त्यात सामाजिक न्याय, ओळख, लैंगिकता, पर्यावरण, आणि डिजिटल संस्कृती यांचा समावेश झाला आहे.

२. पारंपरिक अभ्यासक्रमाची वैशिष्ट्ये

पूर्वीच्या मराठी साहित्याच्या अभ्यासक्रमाची वैशिष्ट्ये मुख्यतः पारंपरिक, धार्मिक आणि नैतिक मूल्यांवर आधारित होती. त्या काळातील अभ्यासक्रमात संत साहित्याला प्रमुख स्थान होते. संत ज्ञानेश्वर, संत तुकाराम, संत नामदेव, संत एकनाथ यांसारख्या संतांच्या रचनांचा अभ्यास करून विद्यार्थ्यांमध्ये आध्यात्मिकता, भक्तीभाव आणि नैतिक मूल्यांची जाणीव निर्माण केली जात होती.

या अभ्यासक्रमात भक्तीपर काव्य, अभंग, ओव्या आणि कीर्तनपर साहित्याचा मोठ्या प्रमाणावर समावेश होता. संस्कृत साहित्याचा प्रभावही स्पष्टपणे दिसून येत होता. रामायण, महाभारत आणि पुराणकथांवर आधारित साहित्य विद्यार्थ्यांना शिकवले जात होते, ज्यामुळे त्यांना भारतीय संस्कृती आणि परंपरेची ओळख होत होती.

पूर्वीच्या अभ्यासक्रमाचे एक महत्त्वाचे वैशिष्ट्य म्हणजे भाषा साधी, सुबोध आणि संस्कृतप्रचुर होती. साहित्याचा अभ्यास करताना केवळ साहित्यिक सौंदर्यावरच नव्हे तर नैतिक शिक्षणावरही भर दिला जात होता. शिक्षणाचा उद्देश विद्यार्थ्यांचे चारित्र्य घडवणे हा होता.

तसेच, त्या काळात अभ्यासक्रम अधिक मर्यादित आणि निश्चित स्वरूपाचा होता. नवीन साहित्यप्रवाह किंवा प्रयोगशील लेखनाला कमी स्थान दिले जात होते. सामाजिक वास्तव, स्त्री प्रश्न, दलित अनुभव यांसारख्या विषयांचा अभाव होता.

अशा प्रकारे, पूर्वीचा मराठी साहित्याचा अभ्यासक्रम पारंपरिक मूल्यांवर आधारित असून तो विद्यार्थ्यांच्या नैतिक आणि सांस्कृतिक विकासासाठी महत्त्वाचा ठरला, मात्र त्यात आधुनिक आणि विविधतापूर्ण दृष्टिकोनाची कमतरता होती.

पूर्वीच्या मराठी साहित्याच्या अभ्यासक्रमात प्रामुख्याने खालील घटकांचा समावेश होता—

- संत साहित्य (ज्ञानेश्वर, तुकाराम, नामदेव)

- भक्तीपर काव्य आणि धार्मिक ग्रंथ
- संस्कृत साहित्याचा प्रभाव
- नैतिक आणि आध्यात्मिक मूल्यांवर भर

या अभ्यासक्रमाचे मुख्य उद्दिष्ट विद्यार्थ्यांमध्ये नैतिकता, संस्कार आणि आध्यात्मिकता निर्माण करणे हे होते.

३. आधुनिकतेकडे वाटचाल : अभ्यासक्रमातील बदल

मराठी साहित्याच्या अभ्यासक्रमाची आधुनिकतेकडे वाटचाल ही सामाजिक, सांस्कृतिक आणि शैक्षणिक परिवर्तनांच्या पार्श्वभूमीवर घडलेली एक महत्त्वपूर्ण प्रक्रिया आहे. पूर्वीचा अभ्यासक्रम प्रामुख्याने संत साहित्य, भक्तीपर काव्य आणि पारंपरिक ग्रंथांपुरता मर्यादित होता; परंतु आधुनिक काळात तो अधिक व्यापक, समावेशक आणि विचारप्रधान झाला आहे.

विसाव्या शतकानंतर समाजातील बदल, स्वातंत्र्य चळवळ, औद्योगिकीकरण आणि शिक्षणाचा प्रसार यामुळे साहित्याच्या स्वरूपातही बदल झाले. याचा परिणाम अभ्यासक्रमावरही झाला. कादंबरी, कथा, नाटक आणि निबंध यांसारख्या विविध साहित्यप्रकारांचा समावेश वाढला. वास्तववादी साहित्य, प्रगतिवादी विचारसरणी आणि प्रयोगशील लेखन यांना महत्त्व प्राप्त झाले.

आधुनिक अभ्यासक्रमात स्त्रीवादी, दलित आणि आदिवासी साहित्याचा समावेश करण्यात आला आहे. यामुळे समाजातील उपेक्षित घटकांचे अनुभव, प्रश्न आणि संघर्ष विद्यार्थ्यांसमोर येऊ लागले. तसेच, साहित्याचा अभ्यास केवळ सौंदर्यदृष्टीने न करता सामाजिक, राजकीय आणि सांस्कृतिक संदर्भात केला जाऊ लागला.

तंत्रज्ञानाच्या प्रगतीमुळे डिजिटल साहित्य, ई-पुस्तके, ब्लॉग्स आणि सोशल मीडियावरील लेखनालाही अभ्यासक्रमात स्थान मिळू लागले आहे. आंतरशाखीय दृष्टिकोनामुळे साहित्याचा संबंध समाजशास्त्र, इतिहास आणि माध्यम अभ्यासाशी जोडला जात आहे.

अशा प्रकारे, मराठी साहित्याचा अभ्यासक्रम आधुनिकतेकडे वाटचाल करताना अधिक समकालीन, बहुआयामी आणि संशोधनाभिमुख बनला आहे, ज्यामुळे विद्यार्थ्यांना व्यापक आणि सखोल ज्ञान मिळते.

विसाव्या शतकानंतर सामाजिक आणि राजकीय बदलांमुळे मराठी साहित्याच्या अभ्यासक्रमात नवीन प्रवाहांचा समावेश झाला.

३.१ सामाजिक जाणीव आणि वास्तववाद

- समाजातील विषमता, गरिबी, अन्याय यांचे चित्रण
- कादंबरी, कथा आणि नाटकांमध्ये वास्तववादी दृष्टिकोन

३.२ प्रगतिवादी आणि प्रयोगशील साहित्य

- प्रगतिशील लेखकांनी समाजपरिवर्तनावर भर दिला
- नवीन शैली, भाषा आणि अभिव्यक्ती

३.३ आधुनिक काव्यप्रवाह

- मुक्तछंद, प्रतीकात्मकता, व्यक्तिवाद
- भावनात्मक आणि बौद्धिक अभिव्यक्तीचा संगम

४. समकालीन प्रवाहांचा अभ्यासक्रमातील समावेश

समकालीन प्रवाहांचा मराठी साहित्याच्या अभ्यासक्रमातील समावेश ही आजच्या शिक्षण व्यवस्थेतील एक महत्त्वपूर्ण घडामोड आहे. बदलत्या सामाजिक, सांस्कृतिक आणि राजकीय परिस्थितीच्या पार्श्वभूमीवर साहित्याचा अभ्यास अधिक समावेशक, वास्तववादी आणि संवेदनशील बनविण्याचा प्रयत्न या माध्यमातून दिसून येतो.

समकालीन काळात स्त्रीवादी साहित्य, दलित साहित्य, आदिवासी साहित्य, तसेच अल्पसंख्याक आणि उपेक्षित घटकांच्या अनुभवांवर आधारित साहित्याला महत्त्व दिले जाऊ लागले आहे. यामुळे विद्यार्थ्यांना समाजातील विविध स्तरांतील वास्तवाची जाणीव होते.

स्त्रीवादी साहित्य स्त्रियांच्या हक्क, स्वातंत्र्य आणि ओळख यांवर प्रकाश टाकते, तर दलित साहित्य सामाजिक अन्याय, भेदभाव आणि संघर्षाचे वास्तव मांडते. आदिवासी साहित्य त्यांच्या संस्कृती, परंपरा आणि जीवनशैलीचे दर्शन घडवते. या सर्व प्रवाहांमुळे अभ्यासक्रम अधिक समावेशक आणि विविधतापूर्ण बनला आहे.

याशिवाय, पर्यावरण विषयक साहित्य, जागतिकीकरणाचा प्रभाव, अनुवाद साहित्य आणि डिजिटल लेखन यांचाही अभ्यासक्रमात समावेश करण्यात आला आहे. ब्लॉग, सोशल मीडिया आणि ई-साहित्य यांसारख्या नव्या माध्यमांचा अभ्यास विद्यार्थ्यांना आधुनिक तंत्रज्ञानाशी जोडतो.

अशा प्रकारे, समकालीन प्रवाहांचा अभ्यासक्रमात समावेश केल्यामुळे मराठी साहित्याचा अभ्यास अधिक व्यापक, समाजाभिमुख आणि अद्ययावत झाला आहे, ज्यामुळे विद्यार्थ्यांमध्ये समज, संवेदनशीलता आणि चिकित्सक दृष्टिकोन विकसित होतो.

४.१ स्त्रीवादी साहित्य (Feminist Literature)

स्त्रीच्या अनुभवांना, संघर्षांना आणि हक्कांना साहित्याच्या केंद्रस्थानी आणले गेले.

- महिलांच्या लेखनाला महत्त्व
- लैंगिक समतेचा विचार

४.२ दलित साहित्य (Dalit Literature)

दलित साहित्य हा मराठी साहित्याचा एक क्रांतिकारी प्रवाह ठरला आहे.

- सामाजिक अन्यायाविरुद्ध आवाज
- ओळख आणि स्वाभिमान यांचा संघर्ष

४.३ आदिवासी साहित्य

आदिवासी जीवन, संस्कृती आणि समस्यांचा अभ्यासक्रमात समावेश झाला आहे.

४.४ पर्यावरण आणि साहित्य

पर्यावरणीय समस्या आणि निसर्गसंवर्धन यांवर आधारित साहित्याचा अभ्यास वाढला आहे.

५. अभ्यासक्रमातील आंतरशाखीय दृष्टिकोन (Interdisciplinary Approach)

मराठी साहित्याच्या अभ्यासक्रमातील आंतरशाखीय दृष्टिकोन (Interdisciplinary Approach) ही आधुनिक शिक्षणातील एक महत्वाची संकल्पना आहे. या दृष्टिकोनानुसार साहित्याचा अभ्यास केवळ भाषिक किंवा सौंदर्यदृष्टिकोनातून न करता इतर शाखांशी जोडून केला जातो. त्यामुळे विद्यार्थ्यांना साहित्याचा अधिक व्यापक, सखोल आणि समकालीन अर्थ समजतो.

आंतरशाखीय दृष्टिकोनामुळे मराठी साहित्याचा संबंध समाजशास्त्र, इतिहास, मानसशास्त्र, तत्त्वज्ञान आणि माध्यम अभ्यास यांसारख्या विविध शाखांशी जोडला जातो. उदाहरणार्थ, एखाद्या कादंबरीचा अभ्यास करताना त्या काळातील सामाजिक परिस्थिती, आर्थिक व्यवस्था आणि सांस्कृतिक पार्श्वभूमीचा विचार केला जातो. यामुळे साहित्य अधिक वास्तववादी पद्धतीने समजते.

तसेच, मानसशास्त्राच्या मदतीने पात्रांचे मनोविश्लेषण करता येते, तर इतिहासाच्या संदर्भातून साहित्याची पार्श्वभूमी स्पष्ट होते. माध्यम अभ्यासाच्या साहाय्याने साहित्याचे चित्रपट, नाटक किंवा डिजिटल माध्यमांतील रूपांतर समजून घेता येते.

या दृष्टिकोनामुळे विद्यार्थ्यांमध्ये चिकित्सक विचारसरणी (critical thinking), विश्लेषणात्मक क्षमता आणि संशोधनाची आवड वाढते. तसेच, साहित्याचा उपयोग केवळ अभ्यासापुरता मर्यादित न राहता तो सामाजिक आणि व्यावहारिक जीवनाशी जोडला जातो.

अशा प्रकारे, आंतरशाखीय दृष्टिकोनामुळे मराठी साहित्याचा अभ्यास अधिक समृद्ध, उपयुक्त आणि समकालीन बनतो. तो विद्यार्थ्यांना विविध अंगांनी विचार करण्यास प्रवृत्त करतो आणि ज्ञानाच्या सर्वांगीण विकासाला चालना देतो.

आजच्या अभ्यासक्रमात साहित्याचा अभ्यास इतर शाखांशी जोडला जात आहे—

- समाजशास्त्र
- इतिहास
- मानसशास्त्र
- माध्यम अभ्यास (Media Studies)

यामुळे विद्यार्थ्यांना साहित्याचा व्यापक आणि सखोल दृष्टिकोन मिळतो.

६. तंत्रज्ञानाचा प्रभाव आणि डिजिटल साहित्य

मराठी साहित्यावर तंत्रज्ञानाचा प्रभाव हा गेल्या काही दशकांत मोठ्या प्रमाणावर वाढलेला दिसतो. डिजिटल क्रांतीमुळे साहित्यनिर्मिती, प्रसार आणि अभ्यास या तिन्ही क्षेत्रांमध्ये आमूलाग्र बदल झाले आहेत. पारंपरिक छापील पुस्तकांबरोबरच आता ई-पुस्तके, ऑडिओबुक्स आणि ऑनलाइन वाचनसाहित्य मोठ्या प्रमाणावर उपलब्ध झाले आहे.

डिजिटल माध्यमांमुळे लेखकांना आपले लेखन त्वरित आणि व्यापक वाचकांपर्यंत पोहोचवणे शक्य झाले आहे. ब्लॉग्स, सोशल मीडिया, वेबपोर्टल्स आणि ई-मॅगझिन्स यांच्या माध्यमातून नवोदित लेखकांनाही संधी मिळत आहे. फेसबुक, ट्विटर, यूट्यूब यांसारख्या माध्यमांवर कविता, कथा आणि अभिव्यक्तीचे विविध प्रकार सहजपणे मांडले जात आहेत.

डिजिटल साहित्याचे एक वैशिष्ट्य म्हणजे त्याची बहुआयामी (multimedia) स्वरूप. मजकूरसोबतच चित्र, ध्वनी आणि व्हिडिओ यांच्या साहाय्याने साहित्य अधिक प्रभावीपणे सादर केले जाते. यामुळे वाचनाचा अनुभव अधिक समृद्ध आणि आकर्षक बनतो.

शिक्षण क्षेत्रातही डिजिटल साधनांचा वापर वाढला आहे. ऑनलाइन अभ्यासक्रम, ई-लायब्ररी, डिजिटल नोट्स आणि व्हर्च्युअल क्लासेस यांमुळे विद्यार्थ्यांना साहित्याचा अभ्यास अधिक सोपा आणि सुलभ झाला आहे. संशोधनासाठीही विविध ऑनलाइन डेटाबेस आणि साधने उपलब्ध झाली आहेत.

तथापि, डिजिटल साहित्यामुळे काही आव्हानेही निर्माण झाली आहेत, जसे की माहितीची विश्वसनीयता, कॉपीराइट समस्या आणि वाचनाची एकाग्रता कमी होणे.

अशा प्रकारे, तंत्रज्ञानामुळे मराठी साहित्य अधिक गतिमान, सुलभ आणि व्यापक झाले असून डिजिटल साहित्याने आधुनिक साहित्याला एक नवीन दिशा दिली आहे.

डिजिटल युगामुळे साहित्याच्या अभ्यासात मोठे बदल झाले आहेत—

- ई-पुस्तके आणि ऑनलाइन साधने
- ब्लॉग, सोशल मीडिया आणि डिजिटल लेखन
- मल्टिमीडिया साहित्य

विद्यार्थ्यांना डिजिटल साधनेसह साहित्याचा अभ्यास करण्याची संधी मिळत आहे.

७. संशोधनातील नवीन प्रवाह

मराठी साहित्यातील संशोधनातील नवीन प्रवाह हे बदलत्या सामाजिक, सांस्कृतिक आणि शैक्षणिक गरजांनुसार विकसित होत आहेत. पारंपरिक संशोधन मुख्यतः संत साहित्य, काव्य आणि ऐतिहासिक ग्रंथांच्या अभ्यासापुरते मर्यादित होते; परंतु आधुनिक काळात संशोधनाची व्याप्ती आणि दृष्टिकोन मोठ्या प्रमाणात विस्तारले आहेत.

आजच्या संशोधनात स्त्रीवादी, दलित, आदिवासी आणि उपेक्षित घटकांच्या साहित्याला विशेष महत्त्व दिले जात आहे. या प्रवाहांमुळे समाजातील विविध स्तरांतील अनुभव, संघर्ष आणि ओळख यांचा सखोल अभ्यास केला जातो. विशेषतः दलित साहित्य संशोधनाने सामाजिक न्याय, समता आणि मानवाधिकार यांसारख्या मुद्द्यांना केंद्रस्थानी आणले आहे.

तसेच, सांस्कृतिक अभ्यास (Cultural Studies), लिंग अभ्यास (Gender Studies) आणि उपनिवेशोत्तर अभ्यास (Postcolonial Studies) यांसारख्या आंतरशाखीय दृष्टिकोनांचा वापर वाढला आहे. यामुळे साहित्याचा अभ्यास केवळ कलात्मक न राहता सामाजिक आणि राजकीय संदर्भातही केला जात आहे.

तंत्रज्ञानाच्या प्रगतीमुळे डिजिटल ह्युमॅनिटीज (Digital Humanities) हा एक नवीन संशोधन प्रवाह उदयास आला आहे. ई-साहित्य, ब्लॉग्स, सोशल मीडिया लेखन यांचा अभ्यास संशोधनाचा भाग बनला आहे. तसेच, संशोधनासाठी ऑनलाइन डेटाबेस, ई-लायब्ररी आणि सॉफ्टवेअर साधनांचा वापर वाढला आहे.

याशिवाय, तुलनात्मक साहित्य अभ्यास, अनुवाद साहित्य आणि जागतिकीकरणाच्या प्रभावाखालील साहित्य यांवरही संशोधन केले जात आहे.

अशा प्रकारे, मराठी साहित्यातील संशोधनातील नवीन प्रवाह हे अधिक व्यापक, समावेशक आणि आधुनिक दृष्टिकोन स्वीकारणारे असून, ते साहित्याच्या अभ्यासाला नवीन दिशा देत आहेत.

७.१ विषयातील विविधता

संशोधनाचे क्षेत्र पारंपरिक विषयांपासून पुढे जाऊन विविधतेने समृद्ध झाले आहे—

- लिंग अभ्यास (Gender Studies)
- सांस्कृतिक अभ्यास (Cultural Studies)
- उपेक्षित समूहांचे साहित्य

७.२ पद्धतीतील बदल

- गुणात्मक आणि मात्रात्मक संशोधन
- तुलनात्मक साहित्य अभ्यास
- क्षेत्रीय अभ्यास (Field Work)

७.३ जागतिकीकरणाचा प्रभाव

मराठी साहित्यावर जागतिकीकरणाचा प्रभाव हा अत्यंत महत्त्वाचा आणि व्यापक आहे. जागतिकीकरणामुळे विविध देशांच्या संस्कृती, भाषा आणि साहित्य यांचा परस्परांशी संपर्क वाढला असून त्याचा परिणाम मराठी साहित्यावरही स्पष्टपणे दिसून येतो.

जागतिकीकरणामुळे मराठी साहित्याला नवीन विषय, शैली आणि अभिव्यक्तीची दृष्टी मिळाली आहे. आधुनिक जीवनशैली, शहरीकरण, स्थलांतर, तंत्रज्ञान आणि जागतिक संस्कृती यांचे प्रतिबिंब मराठी कथा, कादंबऱ्या आणि कवितांमध्ये दिसू लागले आहे. लेखकांनी स्थानिकतेसोबतच जागतिक संदर्भ मांडण्यास सुरुवात केली आहे.

अनुवाद साहित्याला जागतिकीकरणामुळे विशेष महत्त्व प्राप्त झाले आहे. विविध परदेशी साहित्यकृतींचे मराठीत अनुवाद होत आहेत, तसेच मराठी साहित्याचे इतर भाषांमध्ये भाषांतर होऊन ते जागतिक पातळीवर पोहोचत आहे. यामुळे मराठी साहित्याचा व्यासपीठ विस्तारला आहे.

तसेच, डिजिटल माध्यमांमुळे मराठी साहित्य जागतिक वाचकांपर्यंत सहज पोहोचू लागले आहे. ई-पुस्तके, ऑनलाइन प्लॅटफॉर्म आणि सोशल मीडियामुळे लेखकांना जागतिक स्तरावर आपले लेखन सादर करण्याची संधी मिळाली आहे.

तथापि, जागतिकीकरणामुळे काही आव्हानेही निर्माण झाली आहेत. स्थानिक भाषांवर आणि संस्कृतीवर परकीय प्रभाव वाढण्याची शक्यता आहे. मराठी भाषेची शुद्धता आणि वैशिष्ट्य जपणे हे एक महत्त्वाचे आव्हान बनले आहे.

अशा प्रकारे, जागतिकीकरणामुळे मराठी साहित्य अधिक व्यापक, आधुनिक आणि समृद्ध झाले असून, त्याचे स्थानिकता आणि जागतिकता यांचा समतोल राखण्याची गरजही अधोरेखित झाली आहे.

मराठी साहित्याचा जागतिक साहित्याशी संवाद वाढला आहे.

- अनुवाद साहित्य
- आंतरराष्ट्रीय संदर्भ

८. अभ्यासक्रमातील बदलांची कारणे

मराठी साहित्य अभ्यासक्रमातील बदलांची कारणे ही विविध सामाजिक, शैक्षणिक, सांस्कृतिक आणि तांत्रिक घटकांशी निगडित आहेत. अभ्यासक्रम हा समाजाचे प्रतिबिंब असल्यामुळे समाजातील बदलांनुसार त्यात सुधारणा करणे आवश्यक ठरते.

सर्वप्रथम, **सामाजिक परिवर्तन** हे एक महत्त्वाचे कारण आहे. समाजात समानता, न्याय, स्त्री-पुरुष समता आणि उपेक्षित घटकांच्या हक्कांविषयी जागृती वाढल्यामुळे स्त्रीवादी, दलित आणि आदिवासी साहित्याचा अभ्यासक्रमात समावेश करण्यात आला आहे.

दुसरे महत्त्वाचे कारण म्हणजे **शैक्षणिक धोरणांतील बदल**. नवीन शैक्षणिक धोरणे (जसे की राष्ट्रीय शिक्षण धोरण – NEP) अभ्यासक्रम अधिक लवचिक, कौशल्याधारित आणि संशोधनाभिमुख करण्यावर भर देतात. त्यामुळे अभ्यासक्रमात आंतरशाखीय दृष्टिकोन आणि नव्या विषयांचा समावेश वाढला आहे.

तिसरे कारण म्हणजे **जागतिकीकरण**. विविध संस्कृती आणि साहित्यप्रवाहांशी संपर्क वाढल्यामुळे अभ्यासक्रम अधिक व्यापक झाला आहे. अनुवाद साहित्य आणि जागतिक संदर्भांचा समावेश करण्यात आला आहे.

तसेच, **तांत्रिक प्रगती** हेही एक महत्त्वाचे कारण आहे. डिजिटल माध्यमे, ई-पुस्तके, ऑनलाइन शिक्षण आणि सोशल मीडिया यांच्या प्रभावामुळे साहित्याच्या स्वरूपात बदल झाला आहे, ज्याचा परिणाम अभ्यासक्रमावर झाला आहे.

याशिवाय, **विद्यार्थ्यांच्या गरजा आणि अपेक्षा** देखील बदलत आहेत. आधुनिक विद्यार्थ्यांना समकालीन, उपयुक्त आणि रोजगाराभिमुख शिक्षण हवे असते. त्यामुळे अभ्यासक्रमात नवीन प्रवाह आणि कौशल्याधारित विषयांचा समावेश केला जातो.

अशा प्रकारे, मराठी साहित्य अभ्यासक्रमातील बदल ही एक सतत चालणारी प्रक्रिया असून ती समाजाच्या बदलत्या गरजांनुसार घडत असते.

अभ्यासक्रमातील बदल अनेक घटकांमुळे घडून आले आहेत—

- सामाजिक परिवर्तन
- शिक्षणातील नवीन धोरणे (NEP)
- जागतिकीकरण
- तांत्रिक प्रगती

हे सर्व घटक अभ्यासक्रम अधिक समकालीन आणि उपयुक्त बनवतात.

९. आव्हाने आणि मर्यादा

मराठी साहित्यातील आव्हाने आणि मर्यादा या विषयाचा विचार केला असता, बदलत्या काळानुसार अनेक समस्या आणि अडचणी समोर येताना दिसतात. एक महत्त्वाचे आव्हान म्हणजे वाचनसंस्कृतीत होत असलेली घट. डिजिटल माध्यमांच्या वाढत्या वापरामुळे पुस्तक वाचनाची सवय कमी होत आहे, ज्याचा परिणाम साहित्याच्या प्रसारावर होत आहे.

दुसरे महत्वाचे आव्हान म्हणजे इंग्रजी आणि इतर जागतिक भाषांचे वाढते वर्चस्व. यामुळे मराठी भाषेचा वापर कमी होण्याची शक्यता निर्माण झाली आहे. विशेषतः तरुण पिढी इंग्रजीकडे अधिक आकर्षित होत असल्यामुळे मराठी साहित्य वाचन आणि लेखन याकडे दुर्लक्ष होत आहे.

तसेच, गुणवत्तापूर्ण साहित्यनिर्मिती आणि त्याच्या प्रकाशनासंबंधीही काही मर्यादा आहेत. नवोदित लेखकांना योग्य व्यासपीठ मिळणे कठीण जाते. प्रकाशन क्षेत्रात व्यावसायिकतेचा प्रभाव वाढल्यामुळे दर्जेदार साहित्याला नेहमीच संधी मिळतेच असे नाही.

संशोधन क्षेत्रातही काही अडचणी आहेत. पुरेशा निधीअभावी आणि आधुनिक साधनांच्या कमतरतेमुळे संशोधन कार्य मर्यादित राहते. तसेच, काही वेळा संशोधनात पुनरावृत्ती दिसून येते आणि नवीन दृष्टिकोनाचा अभाव जाणवतो. याशिवाय, मराठी साहित्याचे जागतिक पातळीवर मर्यादित प्रतिनिधित्व हेही एक आव्हान आहे. अनुवादांची कमतरता असल्यामुळे उत्कृष्ट मराठी साहित्य जागतिक वाचकांपर्यंत पोहोचत नाही.

अशा प्रकारे, मराठी साहित्यात अनेक आव्हाने आणि मर्यादा असल्या तरी योग्य प्रयत्न, नवकल्पना आणि तंत्रज्ञानाच्या सहाय्याने या अडचणींवर मात करून साहित्य अधिक समृद्ध करता येऊ शकते.

अभ्यासक्रमातील बदलांसोबत काही आव्हानेही आहेत—

- पारंपरिक आणि आधुनिक यांचा समतोल राखणे
- गुणवत्तापूर्ण अभ्यास साहित्याची कमतरता
- संशोधनासाठी निधी आणि साधनांची मर्यादा

१०. चर्चा (Discussion)

मराठी साहित्याचा अभ्यासक्रम सतत विकसित होत आहे. बदलते प्रवाह विद्यार्थ्यांना नवीन दृष्टिकोन देतात. तथापि, या बदलांमध्ये पारंपरिक मूल्ये जपणेही तितकेच महत्वाचे आहे.

अभ्यासक्रम अधिक समावेशक, समकालीन आणि संशोधनाभिमुख करण्यासाठी प्रयत्न आवश्यक आहेत.

११. निष्कर्ष (Conclusion)

मराठी साहित्यातील अभ्यासक्रमातील बदलते प्रवाह हे समाजातील परिवर्तनाचे प्रतिबिंब आहेत. पारंपरिक संत साहित्यापासून ते आधुनिक दलित, स्त्रीवादी आणि डिजिटल साहित्यापर्यंतचा प्रवास अत्यंत महत्वाचा आहे.

संशोधनाच्या नव्या दिशांमुळे साहित्याचा अभ्यास अधिक सखोल आणि व्यापक झाला आहे. भविष्यातही अभ्यासक्रमात नव्या प्रवाहांचा समावेश होत राहील आणि मराठी साहित्य अधिक समृद्ध होईल.

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"जलयुक्त शिवार योजनेतील पारदर्शकता व उत्तरदायित्वाचा अभ्यास"**कु.रजनी विनोद इंगळे**

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प्रा.डॉ.प्यारेलाल सुर्यवंशी सर

मार्गदर्शक राज्यशास्त्र विभाग प्रमुख राजाभाऊ देशमुख महाविद्यालय, नांदगाव खंडेश्वर जि. अमरावती

सारांश -

"जलयुक्त शिवार योजना ही महाराष्ट्र शासनाने सुरू केलेली एक महत्वाची जलसंधारण योजना आहे. या योजनेचा मुख्य उद्देश दुष्काळ कमी करणे आणि पाण्याची उपलब्धता वाढविणे हा आहे. ही योजना 2014-2015 मध्ये मुख्यमंत्री देवेंद्र फडणविस यांच्या काळात सुरू करण्यात आली.

या योजनेअंतर्गत नाले खोल करणे बांधारे बांधणे शेततळे तयार करणे आणि पावसाचे पाणी जमिनीत मुरवणे यांसारखी कामे केली जातात "पाणी अडवा पाणी जिरवा" हा या योजनेचा मुख्य मंत्र आहे अशाप्रकारे जलयुक्त शिवार योजना ही महाराष्ट्रातील दुष्काळावर मात करण्यासाठी उपयुक्त आणि प्रभावी योजना आहे.

प्रस्तावना -

महाराष्ट्र राज्यात दरवर्षी दुष्काळाची समस्या ही फार मोठ्या प्रमाणात दिसून येत आहे. पावसाचे असमान वितरण आणि पिण्याच्या पाण्याची विविध भागात जी टंचाई येत आहे किंवा साठा अपुरा पडत आहे. यामुळे शेती आणि पिण्याच्या पाण्यावर परिणाम होतो या प्रश्नावर किंवा समस्येवर तोडगा उपाय म्हणून सरकारने जलयुक्त शिवार योजना सुरू केलेली आहे. या नाविन्यपूर्ण योजनेनुसार जलसंधारणातर्गत सर्वसमावेशक उपाययोजनाद्वारे एकात्मिक पद्धतीने शाश्वत शेतीसाठी पाणी उपलब्ध करून प्राधान्य दिले आहे.

राज्यात सतत उद्ध्वगारी टंचाई परिस्थिती विचारात घेऊन सर्वासाठी पाणी टंचाई मुक्त महाराष्ट्र 2019 अंतर्गत जलयुक्त शिवार अभियान राज्य शासनाने हाती घेतले आहे. 2014-15 मध्ये भूजल पातळीत 2 मीटरपेक्षा जास्त घट झालेल्या 188 तालुक्यातील २ हजार 234 गावे तसेच शासनाने टंचाई परिस्थिती जाहीर केलेल्या 22 जिल्ह्यातील 19 हजार 59 गावांमध्ये हे अभियान प्राधान्याने राबविण्यात येत आहे. भविष्यात राज्याच्या उर्वरित भागात पाणी टंचाई निर्माण होऊ नये, यासाठी उपाययोजना करण्यावरही भर दिला आहे. या अभियानात. विविध विभागाकडील योजना; " अशासकीय संस्था आणि लोकसहभाग यावर विशेष लक्ष केंद्रीत केलेले आहे.

तांत्रिक नियंत्रण -

कामाची गुणवत्ता उच्चतम राखण्यामागे तांत्रिक परीक्षण वेळोवेळी होणे आवश्यक असल्यामुळे त्यासाठी शासनाने तांत्रिक नियंत्रणासाठी प्रयोजन केले आहे. (उदा. साखळी, सिमेंट नालाबांध, नाल्यातील गाळ काढणे, खोलीकरण करणे, गाव साठवण तलाव इत्यादीकिमान एक अभियांत्रिकी पदवीकाधारक कर्मचारी कंत्राटी पद्धतीने नेमण्यात आले. तसेच समूह संघटक व उपजिविका उपक्रम यापैकी एकाची नियुक्ती तसेच तांत्रिक ज्ञान असलेला कर्मचारी म्हणून कृषी पदवीधर कनिष्ठ अभियंता या संवर्गातून नियुक्ती केल्यामुळे कामाचा तांत्रिक तपासणीसाठी उपयुक्त हाऊ शेकेल.

जलयुक्त शिवार अभियान (टप्पा 1)

शासन निर्णय दिनांक 5 डिसेंबर 2014 अन्वये. सन 2015 ते 2019 या कालावधीत जलयुक्त शिवार अभियान राबविण्यात आले. दरवर्षी 5000 गावे याप्रमाणे 5 वर्षात. 25000 गावे पाणी टंचाईमुक्त / जल परिपूर्ण करण्याचे उद्दिष्ट ठेवण्यात आले होते. सदर कार्यक्रमांतर्गतची कामे केंद्र । राज्य सरकार | DPDC च्या माध्यमातून उपलब्ध होणाऱ्या निधिमधून करण्यात आली.

निधीची उपलब्धता -

केंद्र/राज्य सरकार/ DPDC त्याचप्रमाणे लोकसहभाग, विविध कंपन्यांकडून CSR. अनेक मंदिर न्यासाकडूनही निधी प्राप्त झाला, या बरोबरच निधीची कमतरता भासू नये म्हणून राज्य शासनाने सदर कार्यक्रमासाठी दरवर्षी विशेष निधी उपलब्ध करून दिलेला होता.

अक्षांश रेखांश सह नकाराचा संकेतस्थळावर वापर -

कामाचे स्थळ निश्चित रहावे यासाठी "काम सुरू होण्यापूर्वी सुरू असतांना आणि पूर्ण झाल्यानंतर कामाच्या स्थळाचा अक्षांश रेखांश अंकित असलेला डिजीटल फोटो काढण्यात आले व जनतेच्या माहितीसाठी संकेत स्थळावर उपलब्ध करून देण्यात आले.

यामुळे ग्रामस्थांनी सूचविलेले स्थळ कामाचे स्थळ याबाबत नेमकेपणा अधोरेखित करण्यात येते. अक्षांश रेखांश, अंकनामुळे स्थळ पुनरावृत्तीची शक्यता पूर्णपणे मावळली.

आधुनिक तंत्रज्ञानाचा वापर-

निवडण्यात आलेल्या गावांचे MRSAC या संस्थेकडील (Remote, sensing GIS) या आधुनिक तंत्रज्ञानाच्या आधारे क्षमता उपचार नकाशे (Treatment map) तयार करून देशात प्रथमच वापरण्यात आले. सदरील नकाशे तयार करण्यासाठी महाराष्ट्र सुदूर संवेदन उपयोजन केंद्र (MRSAC) नागपूर तसेच भूजल सर्वेक्षण विकास यंत्रणा (GSDA) पुणे या कार्यालयांनी विकसित केलेल्या. आधुनिक तंत्रज्ञानाचा वापर करण्यात आलेला आहे.

जलयुक्त शिवार अभियान २.०

जलयुक्त शिवार अभियान प्रथम टप्पा तसेच इतर पाणलोट क्षेत्र कार्यक्रम विकास कार्यक्रम न राबविलेल्या व गाव निवडीच्या निकषानुसार पात्र ठरणाऱ्या गावामध्ये मृद जलसंधारणाची कामे करणे, जलयुक्त शिवार अभियान प्रथम टप्पा तसेच इतर पाणलोट क्षेत्र विकास कार्यक्रम राबविलेल्या व गावामध्ये पाण्याची गरज असेल व अडविण्यास अपघाव शिल्लक असेल तेथे पाणलोट विकासाची कामे करणे जलसाक्षरता व्दारे गावातील पाण्याची उपलब्धता व कार्यक्षम वापर! या करीता प्रयत्न करणे, मृद व जलसंधारणाची कामे लोकसहभागातून करणे व उपलब्ध भूजलाच्या माध्यमातून पाणलोट क्षेत्राचा शाश्वत विवास करण्याकरीता दिनांक ३ जानेवारी, २०२३ अन्वये जलयुक्त शिवार अभियान २.०." राबविण्यात आले.

उत्कृष्ट कार्याला पुरस्कार-

अभियानांतर्गत उत्कृष्ट कार्य केलेल्यांना

- 1) तालुकास्तरावर दोन.
- 2) जिल्हास्तरावर दोन
- 3) विभागीय स्तरावर दोन
- 4) तालुक स्तरावर तीन तालुके
- 5) प्रभावी जनजागृती आणि प्रसिद्धीविषयक उत्कृष्ट लेखन करणाऱ्या आणि राज्य पत्रकारासाठी जिल्हा, विभाग आणि राज्यास्तरावर प्रत्येकी तीन पारितोषिके देण्यात येतात.

भरीव कार्य -

- पाणलोट विकासाची, कोम साखळी सिमेंट नालाबांधाची खोलीकरण आणि रुंदीकरणासह कामे
- जुन्या जलसंरचनांचे पुनर्जीवन
- कोल्हापूर पद्धतीच्या व साठवण बंधाऱ्याची दुरुस्ती
- पाझर तलाव लघुसिंचन तलाव दुरुस्ती.
- नूतनीकरण व क्षमता "पुनर्स्थापित करणे
- पोसर, गाव, साठवण, शिवकालीन ब्रिटीशकालीन आणि निजामकालीन तलावातील माती व नालाबांधातील गाळ काढणे.
- मध्यम व मोठ्या प्रकल्पाच्या सिंचन क्षमते नुसार प्रत्यक्ष वापर होण्यासाठी उपाययोजना करणे.
- छोटे ओढे / नाले जोड प्रकल्प राबविणे
- विहीर / बोअरवेल पुनर्भरण, पिण्याच्या पाण्याचे स्रोत तसेच पाणी वापर संस्थांचे बळकटीकरण.
- कालवा दुरुस्ती या उपाययोजनावर भर.

विविध संचनांचा समन्वय-

राज्यात: जलयुक्त शिवार अभियानासाठी विविध विभागाकडील विविध योजनांतर्गत उपबद्ध निधीची एकत्रित सांगड घालून जलसंधारणाची कामे हाती घेण्यात येत आहेत. यामध्ये कृषी वन, सामाजिक वनीकरण, लघु सिंचन, जलसंपदा जिल्हा परिषदेकडील कृषी व लघुसिंचन पाणी पुख्ठा भुजल सर्वेक्षण व विकास यंत्रणा स्वच्छता अशा जिल्हास्तरीय यंत्रणामध्ये समन्वय राखून हे अभियान राबविण्यात येत आहे.

ग्रामसभेचा सहभाग -

ग्रामसमा ही सार्वभौम आहे. जलयुक्त शिवार अभियानाच्या अमलबजावणीत लोकांचा सहभाग हा महत्वपूर्ण मुद्दा असून ग्रामसभेची भूमिका, अनन्य साधारण महत्वाची आहे. त्यासाठी अभियानाची प्रत्यक्ष अमलबजावणी करतांना ग्रामपंचायतीस माहिती देणे आवश्यक आहे. गावाच्या पाण्याचा ताळेबंद तयार करणे, ही अभियानातील महत्वाची बाब आहे. हा ताळेबंद तयार केल्यानंतर गावातील लोकांनी सुचविल्यानुसार कामांचा अंतर्गत गावाच्या कृती आराखड्यात तयार करून मग या कामांना ग्रामसभेची मान्यता घेतली जाईल. या कृती आराखड्यानुसार निश्चित करण्यात आलेली कामे प्रत्यक्षात सुरु करण्यापूर्वी या कामांची माहिती ग्रामपंचायतीला देण्यात येईल.

कामासंदर्भात ग्रामस्थांची कोणतीही तक्रार असल्यास अंतिम देयक अदा न करता तक्रारीची शहानिशा तपासून मगच कामाचे अंतिम देयक अदा करण्यात आली.

मुंबई ग्रामपंचायत अधिनियम 1958 मधील तरतुदीनुसार जलयुक्त शिवार अभियाना अंतर्गत गावात होत असलेल्या कामांची माहिती प्रत्येक सहा महिन्यातून एकदा ग्रामसभेला देणे आवश्यक आहे.

मूल्यमापन कार्यपद्धती -

जलयुक्त शिवार अभियानाला गती येण्यासाठी आणि अपेक्षित परिणामकारकता साधण्यासाठी राज्याच्या मुख्य सचिवांच्या अध्यक्षतेखाली शक्ती प्रदत्त समिती गठीत केली आहे. 'एकंदरीतच या कार्यक्रमाची प्रभावी अंमल बजावणी करून दुष्काळमुक्त महाराष्ट्राचे स्वप्न साकारत असतांना या अभियानाअंतर्गत होणाऱ्या कामांचे समवर्ती मूल्यमापन केले गेले

म्हणजे रोजगार हमी विभागाच्या कामाचे जसे प्रत्यक्ष काम सुरु असतांना गुणवत्ता नियंत्रण निरीक्षकांमार्फत मूल्यमापण होते. त्याप्रमाणे किमान दोन वेळा कामांचे त्रयस्थ संस्थेमार्फत मूल्यमापण करण्यात येते. काम पूर्ण झाल्यावरही कामाचा गुणवत्तेचे प्रभावी मूल्यमापण करण्यावर शसनाने भर दिला आहे.

अशाप्रकारे 'जलयुक्त शिवार योजनेमुळे भुजल पातळीत वाढ झाली. पाझ्याचा साठा वाढला, शेती उत्पादनात वाढ भूजल पातळीत वाढ " झाली व त्याचप्रमाणे ग्रामिण अर्थव्यवस्था सुधारली पर्यावरणीय संतुलन राखले गेले.

संदर्भ -

- जलयुक्त शिवार अभियान मार्गदर्शक पुस्तिका
- संशोधन पेपर
- CAG अहवाल
- सरकारी अहवाल
- विविध लेख व अभ्यास
- पानलोट क्षेत्र विकास - डॉ सुरेश नाडकर्णी

अडचणी व मर्यादा -

- या योजनेच्या अंमलबजावणीत काही अडचणी दिसून येतात.
- काही ठिकाणी योग्य नियोजनाचा अभाव
- निधिचा अपुरा वापर
- देखभाल न होणे
- पारदर्शकतेचा अभाव

या अडचणी दूर झाल्यास योजनेचा प्रभाव अधिक वाढू शकतो.

उच्च शिक्षण संस्थांची स्वायत्तता आणि मानविद्या शाखांचे सामाजिक उत्तरदायित्व**डॉ. चेतन ईश्वरदास राऊत**

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सारांश (Abstract):

राष्ट्रीय शिक्षण धोरण 2020 (NEP 2020) अंतर्गत उच्च शिक्षण संस्थांना दिली जाणारी स्वायत्तता ही गुणवत्ता, नवोन्मेष आणि जागतिक स्पर्धात्मकता वाढवण्यासाठी महत्वाची धोरणात्मक सुधारणा म्हणून मांडली जाते. तथापि, सध्याच्या भारतीय शैक्षणिक क्षेत्रातील भ्रष्टाचारग्रस्त परिस्थितीत सामाजिक शिक्षणतज्ज्ञ स्वायत्ततेकडे दुधारी तलवारम्हणून पाहतात. तथापि, सामाजिक शास्त्रे व मानवविद्या यांच्या संदर्भात काही शिक्षणतज्ज्ञ स्वायत्ततेच्या व्यावसायिकीकरणात्मक परिणामांबाबत गंभीर चिंता व्यक्त करतात. या लेखाचा उद्देश सामाजिक शास्त्रे व मानवविद्या यांच्या संदर्भात स्वायत्ततेमुळे निर्माण होणाऱ्या व्यावसायिकीकरणाच्या प्रवृत्ती, शुल्कवाढ, सामाजिक बहिष्करण, ज्ञाननिर्मितीऐवजी ब्रँडिंगवर वाढणारा भर आणि नियामक देखरेखीच्या अभावाचे परिणामांचे चिकित्सक विश्लेषण करणे हा आहे.

अभ्यासातून असे आढळते की योग्य नियामक यंत्रणा, शुल्क नियंत्रण आणि सामाजिक उत्तरदायित्व यांचा अभाव असल्यास शिक्षण हे सार्वजनिक कल्याणाचे साधन न राहता बाजारकेंद्री सेवा बनण्याची शक्यता वाढते. विशेषतः सामाजिक शास्त्रे व मानवविद्या या शाखांची सामाजिक, नैतिक व परिवर्तनवादी भूमिका दुर्बल होण्याचा धोका निर्माण होतो. सामाजिक शिक्षणतज्ज्ञांच्या सर्वसाधारण मतांच्या आधारे असा निष्कर्ष मांडण्यात येतो की स्वायत्ततेची अंमलबजावणी समावेशक, मूल्याधिष्ठित व समाजाभिमुख चौकटीत न झाल्यास NEP 2020 ची *Equity, Access and Social Justice* ही मूलभूत तत्वे बाधित होऊ शकतात. म्हणूनच स्वायत्ततेसोबत मजबूत नियामक देखरेख, पारदर्शक आर्थिक व्यवस्था आणि सामाजिक लेखापरीक्षण ही धोरणात्मक अपरिहार्यता ठरते.

महत्वाचे शब्द (Keywords)

उच्च शिक्षण संस्थांची स्वायत्तता (Autonomy in Higher Education); सामाजिक शास्त्रे व मानवविद्या (Social Sciences and Humanities); NEP 2020; शिक्षणाचे बाजारीकरण Commercialisation of Education; शैक्षणिक क्षेत्रातील भ्रष्टाचार (Corruption in Education); शुल्क नियमन (Fee Regulation); सामाजिक उत्तरदायित्व (Social Accountability); समता आणि समावेशन (Equity and Inclusion); सार्वजनिक हित (Public Good).

पार्श्वभूमी:

राष्ट्रीय शिक्षण धोरण 2020 (NEP 2020) अंतर्गत उच्च शिक्षण क्षेत्रात स्वायत्तता, बहुविषयकता व गुणवत्ता सुधारणा यांवर भर देण्यात आला आहे. तथापि, समता (Equity), प्रवेश (Access) आणि सामाजिक न्याय (Social Justice) ही मूलभूत तत्वे अबाधित ठेवण्यासाठी मजबूत नियामक देखरेख, शुल्क नियंत्रण आणि सामाजिक उत्तरदायित्व या बाबी अपरिहार्य ठरतात. या पार्श्वभूमीवर, विद्यापीठ अनुदान आयोगाने (UGC) अलीकडच्या काळात काही मसुदा नियमावली व सुधारित धोरणे प्रस्तावित/अंमलात आणली आहेत.

महाराष्ट्रातील विद्यापीठांची संख्या (प्रकारानुसार) –(2026)

क्र.	विद्यापीठाचा प्रकार	संख्या	टक्केवारी (अंदाजे)	उदाहरण
1	केंद्रीय विद्यापीठ (Central University)	1	1%	केंद्रीय हिंदी विद्यापीठ, वधवा
2	राज्यसरकारी विद्यापीठे (State Universities)	31	34%	मुंबई विद्यापीठ, पुणे विद्यापीठ, नागपूर विद्यापीठ
3	खासगी विद्यापीठे (Private Universities)	35	38%	MIT-WPU, Symbiosis Skills University
4	डीम्ड विद्यापीठे (Deemed to be Universities)	23	25%	टाटा इन्स्टिट्यूट ऑफ सोशल सायन्सेस (TISS), DY Patil University
एकूण	महाराष्ट्रातील विद्यापीठे	90	100%	—

महाराष्ट्र हे भारतातील उच्च शिक्षणाच्या दृष्टीने सर्वात प्रगत राज्यांपैकी एक आहे. राज्यात राज्य विद्यापीठे, खासगी विद्यापीठे आणि डीम्ड विद्यापीठे यांचे संतुलित प्रमाण दिसून येते. खासगी विद्यापीठांची वाढनवीन शैक्षणिक

धोरण (NEP 2020) नंतर अधिक वेगाने होत आहे. मुंबई, पुणे, नागपूर आणि नाशिक ही उच्च शिक्षणाची प्रमुख केंद्रे मानली जातात.

विद्यापीठ अनुदान आयोग मसुदा नियमावली (2025):

उच्च शिक्षणातील समतेसाठी 2025 मध्ये विद्यापीठ अनुदान आयोगाने उच्च शिक्षणातील समता प्रोत्साहनासाठी मसुदा नियमावली प्रसिद्ध केली होती. या मसुद्याचा उद्देश विद्यापीठे व महाविद्यालयांमध्ये भेदभावविरोधी यंत्रणा कायदेशीरदृष्ट्या बळकट करणे हा होता.

मसुद्यातील प्रमुख तरतुदी:

- 1) प्रत्येक उच्च शिक्षण संस्थेत समान संधी केंद्रे (Equal Opportunity Centres – EOC) स्थापन करणे.
- 2) समता समित्या (Equity Committees) – SC, ST, OBC, महिला, दिव्यांग प्रतिनिधित्वासह.
- 3) कॅम्पसमध्ये भेदभाव रोखण्यासाठी Equity Squads / Ambassadors
- 4) २४x७ तक्रार निवारण यंत्रणा.
- 5) विद्यापीठ अनुदान आयोगाकडे वार्षिक अहवाल सादर करणे व पालन न केल्यास दंडात्मक कारवाई. शैक्षणिक व सामाजिक क्षेत्रातून या मसुद्याचे स्वागत झाले; मात्र अंमलबजावणीची अस्पष्टता, प्रशासकीय भार व संभाव्य दुरुपयोग यांबाबत टीकाही झाली.

विद्यापीठ अनुदान आयोग: उच्च शिक्षण संस्थांमध्ये समता प्रोत्साहन नियमावली (Promotion of Equity in Higher Education Institutions) -2026:

जानेवारी 2026 मध्ये विद्यापीठ अनुदान आयोगाने वरील मसुद्याचे सुधारित रूप म्हणून “उच्च शिक्षण संस्थांमध्ये समता प्रोत्साहन नियमावली, 2026” अधिसूचित केली, या नियमावलीची वैशिष्ट्ये:

- सर्व विद्यापीठे व महाविद्यालयांमध्ये समान संधी केंद्रे अनिवार्य
- तक्रारींसाठी कालमर्यादित निवारण प्रक्रिया
- वार्षिक समता अहवाल विद्यापीठ अनुदान आयोगाकडे सादर करणे
- पालन न केल्यास
 - विद्यापीठ अनुदान आयोगाच्या योजनांपासून वंचित ठेवणे
 - अभ्यासक्रम/पदवी मान्यता रद्द करण्याची कारवाई

सामाजिक शिक्षणतज्ज्ञांच्या मते, ही नियमावली समता व सामाजिक न्यायाच्या दृष्टीने महत्त्वाची पायरी असली, तरी शुल्क नियंत्रण व व्यावसायिकीकरणावर थेट नियंत्रण या बाबी अजूनही अपुऱ्या आहेत.

उच्च शिक्षणातील नियामक सुधारणा: व्यापक धोरणात्मक संदर्भ

(अ) “विकसित भारत शिक्षण अधिनियमन विधेयक, 2025” या विधेयकाद्वारे UGC, AICTE, NCTE यांसारख्या संस्थांच्या जागी **एकसंध उच्च शिक्षण नियामक प्राधिकरण** स्थापन करण्याचा प्रस्ताव आहे.

(ब) शुल्क नियंत्रणाबाबत उदयोन्मुख धोरणात्मक चर्चा: 2025 मध्ये उच्च शिक्षण विभागाने विद्यापीठ अनुदान आयोगाला शिक्षण शुल्क नियंत्रित करणारी स्वतंत्र केंद्रीय यंत्रणा (Central Education Fee Regulatory Authority – CEFRA) स्थापन करण्याबाबत अभ्यास करण्याचे निर्देश दिले. याचा उद्देश: मनमानी शुल्कवाढ रोखणे, नफेखोरी टाळणे, समता व प्रवेश सुनिश्चित करणे असा आहे. सद्यस्थितीत हा प्रस्ताव विचाराधीन आहे; मात्र तो शिक्षणातील बाजारकेंद्रीकरणाच्या समस्येची सरकारी पातळीवरील दखल दर्शवतो.

स्वायत्ततेचे सकारात्मक पैलू:

- अभ्यासक्रमातील लवचिकता: स्वायत्ततेमुळे इतिहास, समाजशास्त्र, राज्यशास्त्र, अर्थशास्त्र, तत्त्वज्ञान, भाषा इ. विषयांचे अभ्यासक्रम स्थानिक समाज, समकालीन प्रश्न व संशोधनाशी जोडता येतात.
- समकालीन व आंतरशाखीय दृष्टिकोन: जात, लिंग, पर्यावरण, आदिवासी प्रश्न, लोकशाही, संविधान, माध्यमे यांसारखे विषय आधुनिक चौकटीत समाविष्ट करता येतात.
- संशोधन व समीक्षात्मक विचार: परीक्षा-पद्धती, प्रकल्प, फील्डवर्क यांमध्ये नवकल्पना करून टीकात्मक विचारसरणी विकसित होते.
- शिक्षकांचा शैक्षणिक स्वातंत्र्यभाव: अभ्यासक्रम रचना, मूल्यमापन व अध्यापनात शिक्षकांचा सक्रिय सहभाग वाढतो.

शिक्षणतज्ज्ञांच्या प्रमुख चिंता:

- नवीन नियामक संस्थेला थेट अनुदान वितरणाचे अधिकार नाहीत
- स्वायत्ततेमुळे शिक्षण बाजारकेंद्री होण्याची शक्यता असते; शुल्क नियंत्रणाचे स्पष्ट अधिकार नाहीत, परिणामी मानवविवेचे मूलभूत सामाजिक उद्दिष्ट मागे पडू शकते.

- स्वायत्ततेमुळे होणारे व्यावसायिकीकरण रोखण्यासाठी ही रचना अपुरी ठरू शकते त्यामुळे व्यावसायिकीकरणाचा धोका उद्भवतो.
- स्वायत्त संस्थांमध्ये फी वाढल्यास ग्रामीण, दलित, आदिवासी व आर्थिकदृष्ट्या दुर्बल घटक वंचित राहू शकतात व ही बाब सामाजिक विषमता निर्मितीस कारणीभूत ठरू शकते
- स्वायत्त महाविद्यालयांमध्ये गुणवत्तेचा समान निकष राखला जात नाही, अशी तक्रारही आढळते, समान दर्जाचा अभाव निर्माण होऊ शकतो.
- काही वेळा अभ्यासक्रमातील संवेदनशील विषयांवर राजकीय-सामाजिक बाह्य दबाव येण्याची भीती नाकारता येत नाही.

संतुलित दृष्टिकोन

- स्वायत्तता ही उद्दिष्ट नसून साधन आहे; तिचा उपयोग लोकशाही मूल्ये, सामाजिक न्याय, वैज्ञानिक दृष्टिकोन वाढवण्यासाठी व्हावा.
- राज्य, विद्यापीठे व स्वायत्त महाविद्यालये यांच्यात समन्वय असावा; गुणवत्ता-आश्वासन, पारदर्शकता व सामाजिक उत्तरदायित्व बंधनकारक असावे.
- सामाजिक शास्त्रे व मानवविद्या रोजगार क्षमतेपुरती मर्यादित न ठेवता नागरिकत्व, संविधानिक मूल्ये व सामाजिक संवेदनशीलता घडवणाऱ्या शाखा म्हणून बळकट कराव्यात.

धोरणात्मक स्थिती :

धोरण / नियमावली	प्रमुख तरतुदी	समता व सामाजिक न्यायावर प्रभाव	सद्यस्थिती
UGC मसुदा नियमावली (2025)	समान संधी केंद्रे, समता समित्या, तक्रार यंत्रणा	समावेशकतेचा प्रयत्न	सुधारित
UGC समता नियमावली (2026)	कायदेशीर बंधन, दंडात्मक तरतुदी	समतेसाठी मजबूत चौकट	अंमलबजावणी सुरू
विकसित भारत शिक्षण विधेयक (2025)	एकसंध नियामक संस्था	मानकीकरण	शुल्क नियंत्रणाचा अभाव
प्रस्तावित शुल्क नियामक संस्था	शुल्क मर्यादा व देखरेख	समता व प्रवेश संरक्षण	विचाराधीन

निष्कर्ष

सामाजिक शिक्षणतज्ज्ञांच्या सर्वसाधारण मते, महाराष्ट्रात सामाजिक शास्त्रे व मानवविद्या यांना स्वायत्तता देणे योग्य आहे, पण ती समावेशक, मूल्याधिष्ठित आणि सामाजिकदृष्ट्या जबाबदार चौकटीत अंमलात आणली गेली पाहिजे. अन्यथा स्वायत्तता ही केवळ प्रशासकीय बदल ठरून शिक्षणाचा सामाजिक आत्मा कमजोर होण्याचा धोका आहे. विद्यापीठ अनुदान आयोगाच्या नव्या समता नियमावलीमुळे भेदभावविरोधी व समावेशक चौकट बळकट झाली असली, तरी शुल्क नियंत्रण, आर्थिक पारदर्शकता आणि सामाजिक लेखापरीक्षण या बाबी अजूनही धोरणात्मक पोकळी म्हणून उरतात. म्हणूनच विशेषतः सामाजिक शास्त्रे व मानवविद्या यांच्या संदर्भात स्वायत्तता + नियामक देखरेख + शुल्क नियंत्रण + सामाजिक उत्तरदायित्व ही चौकट प्रभावीपणे अंमलात आली नाही, तर शिक्षण सार्वजनिक कल्याणाचे साधन न राहता बाजारकेंद्री सेवा बनण्याची शक्यता नाकारता येत नाही.

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वाणिज्य आणि व्यवस्थापन विद्याशाखेतील विविध अभ्यासक्रमातील होत असलेले बदलते प्रवाह आणि संशोधन प्रा. मनेश भि. काळपांडे

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सारांश

वाणिज्य आणि व्यवस्थापन विद्या शाखेतील अभ्यासक्रम आजच्या बदलत्या काळानुसार सुधारित करण्यात आला आहे. नवीन शैक्षणिक धोरण 2020 नुसार वाणिज्य अभ्यासक्रमात झालेला बदल विद्यार्थ्यांचा कौशल्यात्मक व सर्वांगीण विकास साधणारा आहे. विद्यार्थ्यांना केवळ पुस्तकी किंवा सैद्धांतिक ज्ञान न देता त्यांचे कौशल्य विकसित होण्यावर भर दिलेला आहे त्या माध्यमातून रोजगाराभिमुख शिक्षणावर देखील भर देण्यात आला आहे. नवीन अभ्यासक्रमात संगणकाविषयी ज्ञान संपादन करणे, डिजिटल मार्केटिंग, ई-कॉमर्स, डेटा विश्लेषण आणि संवाद कौशल्य यासारख्या विषयांचा समावेश देखील करण्यात आला आहे. NEP 2020 नुसार विद्यार्थ्यांना वेगवेगळे विषय शिकण्याची संधी मिळाली आहे. त्यामुळे विद्यार्थ्यांचा सर्वांगीण विकास साधने शक्य होणार आहे. एकूणच वाणिज्य आणि व्यवस्थापन विद्या शाखेतील अभ्यासक्रमात बदललेला प्रवाह आणि संशोधनामुळे विद्यार्थ्यांना रोजगाराभिमुख बनविणे, तसेच त्यांची कौशल्ये विकसित करण्यावर सुद्धा भर दिला आहे.

प्रस्तावना

आधुनिक काळात शिक्षण व्यवस्थेत होणारे बदल जलद गतीने घडून येत आहे. शिक्षण व्यवस्थेत घडून येणाऱ्या या बदलांची व्याप्ती अतिशय विस्तृत स्वरूपाची आहे. विशेषता वाणिज्य आणि व्यवस्थापन या क्षेत्रामध्ये उद्योग, व्यवसाय, बँकिंग, आर्थिक सेवा यांच्या संबंधित नवनवीन संकल्पना आणि तंत्रज्ञान उदयास येत आहेत.

त्यामुळे या क्षेत्रातील शिक्षणपद्धती अभ्यासक्रम आणि संशोधन यामध्येही मोठ्या प्रमाणात बदल होत आहेत. पूर्वी वाणिज्य आणि व्यवस्थापन शिक्षण पारंपरिक विषयावर आधारित होते. परंतु आजचे आधुनिक काळात डिजिटल अर्थव्यवस्था, ई-कॉमर्स, डेटा विश्लेषण, स्टार्टअप संस्कृती, आर्थिक तंत्रज्ञान आणि जागतिक व्यापार यासारख्या विषयांचा समावेश अभ्यासक्रमात केला जात आहे.

वरील विषयाला नवीन अभ्यासक्रमात प्राधान्य दिल्यामुळे विद्यार्थ्यांना आधुनिक उद्योग क्षेत्राच्या गरजेनुसार ज्ञान मिळत आहे आणि त्यांची कौशल्ये विकसित होत आहे. त्यामुळे वाणिज्य आणि व्यवस्थापन विद्याशाखेतील अभ्यासक्रमात बदलते प्रवाह आणि संशोधन यांचे महत्त्व दिवसेंदिवस वाढत आहे.

संशोधनाची उद्दिष्टे

1. वाणिज्य व व्यवस्थापन शिक्षणाच्या अभ्यासक्रमातील बदलांचा अभ्यास करणे- विविध विद्यापीठे आणि महाविद्यालयांमध्ये बी.कॉम, एम. कॉम इत्यादी अभ्यासक्रमामध्ये होत असलेल्या नवीन बदलांचा अभ्यास करणे.
2. नवीन शैक्षणिक धोरणाच्या (NEP २०२०) अभ्यासक्रमावर झालेला प्रभाव तपासणे- विद्यार्थी केंद्रित शिक्षण आणि कौशल्याधारित शिक्षणामुळे अभ्यासक्रमात झालेले बदल समजून घेणे.
3. तंत्रज्ञानाचा अभ्यासक्रमावर झालेल्या परिणाम अभ्यासणे- डिजिटल शिक्षण, ई-लर्निंग, डेटा एनलिटिक्स, कृत्रिम बुद्धिमत्ता (AI), यांसारख्या आधुनिक विषयांच्या अभ्यासक्रमात समावेश कसा होत आहे ते समजून घेणे.
4. उद्योग व रोजगाराच्या गरजेनुसार अभ्यासक्रमात केलेल्या सुधारणेचा अभ्यास करणे- उद्योगांना आवश्यक असलेली कौशल्ये, नेतृत्व, संवाद कौशल्य, डेटा विश्लेषण इत्यादी कौशल्यांचा अभ्यासक्रमात कसा पद्धतीने समावेश केला आहे त्याचा अभ्यास करणे.
5. व्यावहारिक ज्ञान प्रदान करणे (Practical Learning) आणि उद्योग संलग्न शिक्षणाचा अभ्यास करणे.

6. जागतिकीकरण आणि आर्थिक बदलांचा वाणिज्य शिक्षणावर झालेला प्रभाव जाणून घेणे व त्याचा अभ्यास करणे.

विषय प्रवेश

महाविद्यालयीन शिक्षणात कला, वाणिज्य व विज्ञान अशा तीन प्रमुख शाखा असून प्रत्येक शाखेचा अभ्यासक्रम वेगवेगळा असलेला दिसून येतो. प्रत्येक शाखेचे अभ्यासक्रमातील महत्त्व लक्षात घेता राष्ट्राच्या सर्वांगीण विकासासाठी सहाय्यक ठरते. वाणिज्य शिक्षणात व्यापार, उद्योग, बँकिंग, विमा, वित्त लेखाशास्त्र आणि व्यवस्थापनाशी संबंधित ज्ञान देणाऱ्या शाखांचा समावेश होतो. या शिक्षणाचा मुख्य उद्देश विद्यार्थ्यांना व्यावसायिक जगात कार्य करण्यासाठी आवश्यक कौशल्य आणि ज्ञान प्रदान करणे हा आहे. व्यवस्थापन शिक्षण हे संस्थांचे नियोजन संघटन निर्णय प्रक्रिया समन्वय नेतृत्व आणि नियंत्रण या प्रक्रियांशी संबंधित असते. विद्यार्थ्यांना व्यवस्थापकीय शिक्षण दिल्यामुळे ते उद्योग, व्यवसाय, सहकारी संस्था आणि स्वयंसेवी संस्थांमध्ये प्रभावी नेतृत्व करू शकतात आणि आपल्या कार्याचा ठसा उमटवू शकतात.

वाणिज्य शिक्षण आणि व्यवस्थापकीय शिक्षण या दोन्ही शिक्षणाचा अभ्यासक्रमात समावेश करताना त्यातून विद्यार्थ्यांचा कौशल्य विकास आणि रोजगाराभिमुख शिक्षण हे अपेक्षित उद्दिष्ट समोर ठेवून वाणिज्य आणि व्यवस्थापन क्षेत्रांमध्ये बदलत्या परिस्थितीनुसार अभ्यासक्रमात बदल करणे आवश्यक ठरते.

समाजातील आर्थिक व्यवहार, व्यापार, उद्योग, बँकिंग, विमा, वित्तीय संस्था आणि व्यवस्थापन यांचा विकास वेगाने होत आहे. या सर्व क्षेत्रांमध्ये योग्य प्रकारची ज्ञान आणि कौशल्य आवश्यक असते हे ज्ञान देणारे शिक्षण म्हणजे वाणिज्य शिक्षण.

समाजाच्या गरजांची पूर्तता करण्याची जबाबदारी व्यवसायिक संस्थांची असते. म्हणून व्यवसाय क्षेत्राचा विकास होणे देखील आवश्यक ठरते, वाणिज्य शिक्षणाला व्यावसायिक पार्श्वभूमी असते. ती अधिक व्यापक केल्यास किंवा तिचा विस्तार केल्यास उद्योग आणि व्यापार क्षेत्राचा विकास होण्यास मदत होते. म्हणून अभ्यासक्रमात उद्योग व व्यावसायिक धोरणाचा समावेश अधिक व्यापक स्वरूपात केल्यास भविष्यात येणाऱ्या आव्हानांना सामोरे जाणे सुलभ ठरेल.

आज उद्योग क्षेत्रात केवळ सैद्धांतिक किंवा पुस्तकी शिक्षण पुरेसे नाही तर विद्यार्थ्यांकडे व्यावहारिक कौशल्य असणे सुद्धा आवश्यक आहे. याच पार्श्वभूमीवर काही महाविद्यालय इंटरनशिप, उद्योग भेटी, प्रोजेक्ट वर्क्स, केस स्टडी पद्धती अशा प्रकारची वेगवेगळी उपक्रम राबवत आहेत.

आजच्या काळात डिजिटल शिक्षणाचा वापर सर्व क्षेत्रात वाढत आहे. त्यामुळे वाणिज्य क्षेत्र ही याला अपवाद नाही, वाणिज्य क्षेत्रात सुद्धा डिजिटल शिक्षणाचा प्रभावी वापर पहायला मिळतो आहे. ऑनलाईन शिक्षण, ई लर्निंग, स्मार्ट क्लासरूम, स्मार्ट बोर्ड व इतर डिजिटल साधनांचा वापर मोठ्या प्रमाणात होत आहे. त्यामुळे विद्यार्थ्यांनी नवनवीन तंत्रज्ञानाची माहिती मिळण्यास मदत होत आहे, ई-कॉमर्स मुळे विद्यार्थ्यांची व्यावहारिकता विकसित होताना दिसून येत आहे. व्यवसाय संस्थांना डेटा विश्लेषण आणि डिजिटल तंत्रज्ञानाचे ज्ञान असलेल्या व्यवसायिकांची आवश्यकता किंवा गरज वाढली आहे. त्यामुळे व्यवस्थापन शिक्षणात AI आणि डेटा साक्षरतेचा समावेश केला जात आहे. आज विद्यार्थी जे शिक्षण घेतात ते रोजगाराभिमुख असले तर रोजगार मिळण्यास सोपे जाते, म्हणून युवकांमध्ये स्टार्टअप संस्कृती वाढत आहे. त्यामुळे वाणिज्य आणि व्यवस्थापन अभ्यासक्रमात उद्योजकता (Entrepreneurship) हा विषय नव्याने समाविष्ट केला जात आहे.

व्यवसायाविषयी योजना तयार करणे हे उद्योजकतेमुळे विद्यार्थ्यांचे ध्येय निश्चित होते. स्टार्टअप व्यवस्थापन म्हणजे उद्योगाचे व्यवस्थापन कसे करावे याचा स्वतःच विचार करणे स्वतः व्यवस्थापन करणे. गुंतवणुकीचे व्यवस्थापन करणे, पैसे गुंतविणे त्यावर योग्य मोबदला मिळविणे ही प्रक्रिया समजून घेणे या सर्व बाबी उद्योजकता शिक्षणामुळे विकसित होते.

जागतिकीकरणामुळे कंपन्या आंतरराष्ट्रीय स्तरावर काम करण्यास समर्थ झाल्या आहेत. त्यामुळे आंतरराष्ट्रीय व्यापारात मोठ्या प्रमाणात वाढ झाली आहे. व्यापार उद्योगांच्या विस्तार बहुराष्ट्रीय कंपन्यांचा विकास आणि आंतरराष्ट्रीय बाजारपेठांचा विस्तार यामुळे जागतिकीकरण अधिक वेगाने वाढले आहे. एकूणच वाणिज्य क्षेत्रामुळे विविध देशांमध्ये वस्तू आणि सेवांचा वापर वाढला आहे. एका देशातील उत्पादन दुसऱ्या देशात विकले जाऊ लागले.

आयात-निर्यात व्यवहारात वाढ झाली आणि होत आहे. जागतिक बाजारपेठ तयार झाली यामुळे जागतिकीकरणाची प्रक्रिया अधिक मजबूत झाली आहे.

नवीन शैक्षणिक धोरणानुसार विद्यार्थ्यांना कला, वाणिज्य आणि विज्ञान अशा तीनही शाखेतील विविध विषयांचा अभ्यास करण्याची संधी मिळाली. एकाच शाखेत प्रवेश घेऊन दुसऱ्या शाखेतील आवडता विषय घेण्याची मुभा असल्याने विद्यार्थ्यांना इतर विषयांचा अभ्यास व संशोधन करण्याची संधी मिळत आहेत. त्यामुळे विद्यार्थ्यांचे ज्ञान व्यापक होण्यास मदत होते आणि रोजगाराचे संधीत वाढ होण्यास होते.

चार वर्षांचा पदवी अभ्यासक्रम

पूर्वी पदवीचा अभ्यासक्रम तीन वर्षांचा होता वर्षातून एकच परीक्षा होत होती. NEP 2020 नुसार आता चार वर्षांचा पदवी अभ्यासक्रम सुरू झाला आहे. यामध्ये पदवीचे एक वर्ष पूर्ण केल्यास प्रमाणपत्र, दोन वर्ष पूर्ण केल्यास डिप्लोमा, तीन वर्षे पूर्ण केल्यास पदवी आणि चार वर्षे पूर्ण केल्यास संशोधनसह पदवी अशा प्रकारचा चार वर्षांचा पदवी अभ्यासक्रमाची रचना ठरली आहे. तसेच संशोधनाला देखील प्रोत्साहन दिलेले आहे व्यवसायाची सामाजिक जबाबदारी नका प्राप्त करण्याच्या उद्देशाने करण्यात येणाऱ्या सर्व आर्थिक क्रियांचा समावेश व्यवसायात होतो. परंतु आधुनिक काळात जास्त नफा कमविण्याच्या उद्देशाने सुरू करण्यात आलेल्या संस्था दिर्घकाळापर्यंत टिकू शकत नाही. तर त्यांना सामाजिक जबाबदारी पूर्ण करावी लागते आधुनिक व्यवसाय समाजाच्या प्रत्येक गटाला प्रभावी करतो. आजच्या स्पर्धेच्या व तंत्रज्ञानाच्या युगात निव्वळ स्वतःचे नफ्याचे किंवा लाभाचा विचार करून चालत नाही तर व्यवसायाला प्रत्यक्ष व अप्रत्यक्षपणे मदत आणि मार्गदर्शन करणाऱ्या प्रत्येक घटकांचा विचार करणे व्यवसायाला गरजेचे असते, त्यामुळे वाणिज्य शाखेच्या अभ्यासक्रमात व्यवसायाची सामाजिक जबाबदारी या घटकांचा समावेश झालेला आहे. व्यवसायाला किंवा एखाद्या कंपनीला CSR निधीमध्ये मागील तीन वर्षांच्या सरासरी नफ्याच्या 3% निधी जमा करावा लागतो. तसेच पर्यावरणावर विपरीत परिणाम होणार नाही याची देखील व्यवसायाला काळजी घेणे गरजेचे असते म्हणजे पर्यावरण संरक्षण हा घटक व्यवसायाचे दृष्टीने महत्वाचा आहे.

डिजिटल व्यवसाय आणि ई कॉमर्स च्या वापरामुळे नवीन कायदे करणे भाग पडले आहे. माहिती तंत्रज्ञान कायदा 2000 हा भारतात संगणक, इंटरनेट आणि डिजिटल व्यवहारांशी संबंधित गुन्हे आणि व्यवहार नियंत्रित करण्यासाठी बनविलेला कायदा आहे. डिजिटल युगात माहिती तंत्रज्ञान कायदा अतिशय महत्वाचा आहे. डेटा सुरक्षा संबंधी नियमांचा अभ्यास करणे बदलते काळानुसार गरजेचे आहे. त्यामुळे विद्यार्थ्यांना व्यापारातील हे कायदेशीर नियम समजले पाहिजे त्यांना व्यावहारिक जीवनात त्याचा योग्य वापर करता आला पाहिजे. म्हणून अशा प्रकारच्या कायदांचा व त्यासंबंधी विविध बाबींचा वाणिज्य व व्यवस्थापन अभ्यासक्रमात होत असलेला बदल अतिशय महत्वाचा ठरतो. तसेच जागतिक वित्तीय बाजार आंतरराष्ट्रीय व्यापार धोरणे मल्टिनॅशनल कंपन्यांची व्यवस्थापन आणि विविध देशांच्या आर्थिक धोरणांचा अभ्यास वाढला आहे.

बी.कॉम या पदवीला पारंपारीक लेखाशास्त्र, आर्थिक सिद्धांत, वित्तीय व्यवस्थापन यासोबतच डिजिटल वित्तीय व्यवस्था, करप्रणालीतील नवनवीन बदल आणि डेटा विश्लेषणाचे तंत्र विद्यार्थ्यांना शिकवले जाते. त्याचप्रमाणे बाजार व्यवस्थापन, मानवसंसाधन व्यवस्थापन, वित्तीय व्यवस्थापन ऑपरेशन्स मॅनेजमेंट याबरोबरच डिजिटल मार्केटिंग, सोशल मीडिया मॅनेजमेंट आणि व्यवसायासाठी डेटा एनालिटीक्स विषयांचा वाणिज्य व्यवस्थापन विद्याशाखेत झालेला अभ्यासक्रमातील बदलांचा समावेश हा बदलते परिस्थितीनुसार बदल करणे अपरिहार्य ठरते.

निष्कर्ष

1. वाणिज्य आणि व्यवस्थापन विद्याशाखेतील अभ्यासक्रमाचे स्वरूप अधिक व्यवहारिक आणि कौशल्यधारीत झालेले आहेत.
2. वाणिज्य आणि व्यवस्थापन विद्याशाखेतील तंत्रज्ञानाचा प्रभाव पडलेला आहे. त्यामुळे अभ्यासक्रमातील प्रवाह बदललेला दिसून येतो.
3. जागतिकीकरणामुळे वाणिज्य आणि व्यवस्थापन शाखेतील अभ्यासक्रमाचे आंतरराष्ट्रीयीकरण झालेले आहे.
4. वाणिज्य आणि व्यवस्थापन अभ्यासक्रमात उद्योजकता विकासाला विशेष महत्त्व दिले गेले आहे.
5. वाणिज्य आणि व्यवस्थापन अभ्यासक्रमात उद्योजकता विकासाला विशेष महत्त्व दिले गेले आहे.
6. वाणिज्य आणि व्यवस्थापन अभ्यासक्रमात संशोधनाला अधिक महत्त्व दिले जात आहे.



संदर्भ

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01. सारांश :-

हा शोध प्रबंध ऐतिहासिक वारसा जतन करण्याच्या प्रक्रियेत कृत्रिम बुद्धिमत्तेच्या (AI) वाढत्या महत्त्वावर प्रकाश टाकतो. पारंपारिक दस्तऐवजीकरण पद्धतींच्या मर्यादा लक्षात घेता, AI मुळे हस्तलिखितांचे वाचन (OCR), खराब झालेल्या फोटोंची दुरुस्ती आणि 3 डी मॉडेलिंग कशा प्रकारे शक्य झाले आहे, याचा आढावा यात घेतला आहे. हा अभ्यास प्रामुख्याने सामाजिक शास्त्राच्या दृष्टिकोनातून तंत्रज्ञान आणि मानवी इतिहास यांचा संगम स्पष्ट करतो.

प्रमुख शब्द (Keywords): कृत्रिम बुद्धिमत्ता, इतिहास संशोधन, अंकिकीकरण (Digitization), वारसा जतन, हस्तलिखित मजकूर ओळख, मोडी आणि ब्राह्मी लिपी, त्रिमितीय पुनर्बांधणी (3D Reconstruction), अभिलेखागार व्यवस्थापन.

02. प्रस्तावना :-

इतिहास हा कोणत्याही समाजाचा कणा असतो. परंतु, काळाच्या ओघात अनेक ऐतिहासिक दस्तऐवज, किल्ले आणि सांस्कृतिक वारसा नष्ट होत चालला आहे. कागदपत्रे फाटणे, शाई पुसट होणे किंवा दुर्मिळ लिपी अवगत असणारे तज्ज्ञ कमी होणे ही मोठी आव्हाने आहेत. गेल्या दशकात, 'आर्टिफिशियल इंटेलिजन्स' (AI) आणि 'मशिन लर्निंग' (ML) ने या क्षेत्रात क्रांती घडवून आणली आहे. केवळ माहिती साठवणे म्हणजे डिजिटलीकरण नव्हे, तर त्या माहितीचे विश्लेषण करून ती सर्वसामान्यांना उपलब्ध करून देणे हे आजचे ध्येय आहे. हा प्रबंध इतिहास संशोधनात AI च्या वापराची व्याप्ती आणि त्याचे फायदे तपासतो.

03. संशोधनाची उद्दीष्टे :-

- ऐतिहासिक दस्तऐवजांच्या जतनामध्ये AI च्या विविध तंत्रज्ञानांचा अभ्यास करणे.
- मोडी, ब्राह्मी किंवा इतर दुर्मिळ लिपींच्या वाचनात AI ची भूमिका स्पष्ट करणे.
- डिजिटलीकरणामुळे इतिहास संशोधकांना होणाऱ्या फायद्यांचे विश्लेषण करणे.
- AI वापरामध्ये येणारी तांत्रिक आणि नैतिक आव्हाने शोधणे.

04. साहित्य पुनरावलोकन :-

ऐतिहासिक दस्तऐवजांच्या डिजिटलीकरणाचा प्रवास १९९० च्या दशकात सुरू झाला, परंतु कृत्रिम बुद्धिमत्तेचा प्रवेश गेल्या पाच-सात वर्षांतील आहे. 'युनेस्को'च्या (UNESCO) एका अहवालानुसार, जगातील सुमारे ६०% ऐतिहासिक वारसा अद्याप कागदोपत्री स्वरूपात असून तो नष्ट होण्याच्या मार्गावर आहे. संशोधक डॉ. विजय देशपांडे यांच्या मते, भारतीय संदर्भात मोडी आणि ब्राह्मी लिपींचे वाचन करणारी तज्ज्ञ मंडळी कमी होत आहेत. अशा वेळी 'मशिन लर्निंग' मधील 'कन्व्होल्युशनल न्यूरल नेटवर्क्स' (CNN) हे तंत्रज्ञान हस्तलिखितांमधील अक्षरांचे नमुने ओळखण्यासाठी अत्यंत प्रभावी ठरत आहे. 'युनिव्हर्सिटी ऑफ इन्सब्रुक'ने विकसित केलेले Transkribus हे टूल युरोपीय भाषांमधील जुन्या हस्तलिखितांसाठी क्रांती ठरले आहे, तसेच प्रयत्न आता मराठी आणि संस्कृतसाठी सुरू आहेत.

05. संशोधन पद्धती :-

हा शोध प्रबंध प्रामुख्याने 'वर्णनात्मक आणि विश्लेषणात्मक' पद्धतीवर आधारित आहे.

दुय्यम स्रोत: ग्रंथालयातील पुस्तके, सरकारी अभिलेखागारातील अहवाल आणि आधीचे शोधनिबंध.

केस स्टडी: काही निवडक डिजिटल म्युझियम्स आणि AI टूल्सचा अभ्यास.

तुलनात्मक अभ्यास: पारंपारिक जतन पद्धती विरुद्ध AI आधारित आधुनिक पद्धती.

06. विश्लेषण आणि मुख्य चर्चा :-

अ) हस्तलिखिते आणि OCR (Optical Character Recognition) पारंपारिक OCR केवळ छापलेले टायपिंग ओळखू शकते, पण ऐतिहासिक कागदपत्रे हाताने लिहिलेली असतात. AI मधील Handwritten Text Recognition (HTR) तंत्रज्ञानामुळे आता वाकडी-तिकडी अक्षरे, शाईचे डाग आणि जुन्या वळणाचे शब्द ओळखणे शक्य झाले आहे. समजा, छत्रपती शिवाजी महाराजांच्या काळातील एखादे पत्र असेल, तर AI त्यातील शब्दांचा संदर्भ (Context) ओळखून त्याचे आधुनिक मराठीत रूपांतर करते.

ब) ऐतिहासिक वास्तूंचे ३डी पुनरुज्जीवन (3D Reconstruction) अनेक किल्ले किंवा मंदिरे आज पडझड झालेल्या अवस्थेत आहेत. AI आधारित 'फोटोग्रामेट्री' तंत्रज्ञानाचा वापर करून, उपलब्ध असलेल्या जुन्या फोटोंवरून आणि मोजमापांवरून त्या वास्तूचे मूळ स्वरूप कसे असेल, याचे डिजिटल मॉडेल तयार करता येते. हे केवळ पर्यटनासाठी नाही, तर पुरातत्व विभागाला (Archaeology) मूळ वास्तूची डागडुजी करण्यासाठी मार्गदर्शक ठरते.

क) डिजिटल अभिलेखागार आणि माहितीचा शोध (Archival Search) पूर्वी एखाद्या संशोधकाला विशिष्ट माहिती शोधण्यासाठी हजारो कागदपत्रे हाताने चाळावी लागायची. आता AI आधारित 'नॅचरल लॅंग्वेज प्रोसेसिंग' (NLP) मुळे आपण 'सर्च बार' मध्ये एखादा शब्द टाकला की, लाखो पानांमधून तो संदर्भ काही सेकंदात समोर येतो. हे संशोधकांचे आयुष्य बदलून टाकणारे तंत्रज्ञान आहे.

ड) फोटो आणि ऑडिओ-व्हिडिओ रिस्टोरेशन इतिहासात केवळ कागद नसून जुने ध्वनीमुद्रण (Audio) आणि कृष्णधवल चित्रपट (Black & White Films) देखील असतात. AI मुळे जुन्या आवाजातील 'नॉईज' काढून तो स्पष्ट करता येतो आणि जुन्या कृष्णधवल फिल्मसना रंगीत (Colorization) करून जिवंतपणा आणता येतो.

07. निष्कर्ष आणि भविष्यातील दिशा :-

AI हे मानवी इतिहासकाराला पर्याय नसून त्याचे सर्वात मोठे सहाय्यक आहे. तथापि, 'अल्गोरिदम' कधीकधी चुकीचे अर्थ काढू शकतात, त्यामुळे मानवी पडताळणी (Human Verification) अनिवार्य आहे. तंत्रज्ञानाचा हा वापर ग्रामीण भागातील स्थानिक संग्रहालयांपर्यंत पोहोचवणे हे पुढील मोठे आव्हान आहे. जर आपण आज हे तंत्रज्ञान स्वीकारले नाही, तर आपला अमूल्य इतिहास काळाच्या पडद्याआड जाण्याची भीती आहे.

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ज्ञानधारित अर्थव्यवस्था कु.अश्विनी गजानन जाधव

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सारांश..

आशिया खंडात स्थित क्षेत्रफळाने जगातील सातवा मोठा देश, जगातील सर्वाधिक लोकसंख्येचा देश ज्याच्या उत्तरेस हिमालय आणि तीनही बाजू हिंद महासागराने वेढलेला आहे, ज्याला प्राचीन संस्कृतीचा वारसा लाभलेला आहे. अर्थव्यवस्थेच्या बाबतीत सध्या जगातील सर्वात वेगाने वाढणारी प्रमुख अर्थव्यवस्था म्हणून ज्याची ओळख होणारा देश म्हणजे भारत देश.

भारत देशावर ब्रिटिशांचे साम्राज्य होते, भारताला 15 ऑगस्ट 1947 रोजी स्वातंत्र्य मिळाले. स्वातंत्र्यप्राप्तीवेळी भारत देश हा आर्थिक, सामाजिक, राजकीय क्षेत्रांच्या बाबतीत कमकुवत होता. 1950 च्या आर्थिक योजनेच्या माध्यमातून देशाने विविध योजनांची अंमलबजावणी करून देशाला आर्थिक, राजकीय क्षेत्रात सक्षम बनवण्याचा प्रयत्न सुरू केला. काळ जसा लोटला जात होता त्याचप्रमाणे देशाच्या विकासाची घडी व्यवस्थित बसायला सुरुवात झाली होती. त्यानंतर देशाच्या अर्थव्यवस्थेमध्ये अमुलाग्र तो बदल झाला तो म्हणजेच 1991 च्या औद्योगिक धोरणाच्या माध्यमाने, हे धोरण देशाच्या विकासामध्ये प्राणवायू म्हणून कार्यरत झाले, आणि देशाच्या प्रगतीला एक वेगळे मार्ग मिळायला सुरुवात झाली.

स्वातंत्र्यप्राप्तीनंतर भारताने मिश्र अर्थव्यवस्थेचा स्विकार केलेला होता. सद्यस्थितीत या मिश्र अर्थव्यवस्थेचे रूपांतर हे भांडवलशाही अर्थव्यवस्थेत झालेले दिसून येते. भारतीय अर्थव्यवस्थेची विभागणी ही तीन क्षेत्रात विभाजन करण्यात आले आहे. ते म्हणजे कृषी क्षेत्र, उद्योग क्षेत्र आणि सेवा क्षेत्र. स्वातंत्र्य प्राप्तीनंतरच्या काळात पंचवार्षिक योजनेच्या माध्यमातून जास्तीत जास्त भर हे कृषी क्षेत्रावर दिला गेला, परिणामतः देशाच्या अर्थव्यवस्थेत कृषी क्षेत्राचा वाटा हा प्रमुखतः मोलाचा वाटा होता, परंतु कृषी क्षेत्र या घटकावरच भर देणे हे देशाच्या आर्थिक विकासाच्या दृष्टिकोणातून महत्वाचे नव्हते तर देशाच्या पायाभूत विकास अत्यंत गरजेचा होता, आणि त्यासाठी देशामध्ये औद्योगिकरण तसेच सेवा क्षेत्रावर विशेष भर देणे गरजेचे होते. त्यामुळेच देशामध्ये 1991 च्या औद्योगिक धोरणाच्या माध्यमाने देशामध्ये उद्योग क्षेत्रामध्ये पायाभूत विकास साधण्याचा प्रयत्न होऊ लागला. कृषी क्षेत्रातून येणाऱ्या कच्चा मालाचे रूपांतरण उद्योगाच्या अंतर्गत, पक्क्या मालाची उपलब्धता व सेवा क्षेत्राच्या अंतर्गत त्या उत्पादनाची पूर्तता हाऊ लागली आणि अशा प्रकारे देशाच्या अर्थव्यवस्थेमध्ये असा बदल म्हणजेच प्रगती होऊ लागली.

अशा प्रकारे कृषी व संलग्न व्यवसाय हे प्राथमिक क्षेत्रामध्ये समाविष्ट झाले, भारतीय अर्थव्यवस्थेचा दुसरा भाग म्हणजेच उद्योग क्षेत्र जो अर्थव्यवस्थेला स्वयंपूर्ण, स्थिर बनवण्याचे मुख्य कार्य करते, आणि तृतीय क्षेत्रामध्ये असलेले सेवा क्षेत्र व त्यामध्ये व्यापार, हॉटेल्स, रेस्टॉरंट वाहतूक साठवणूक, दळणवळण, वित्तपुरवठा विमा, रियल ईस्टेट व्यवसाय सेवा, सामुदायिक सेवा त्यामध्ये शिक्षण संशोधन वैज्ञानिक वैद्यक आरोग्य इ. चा समावेश एक व प्रेरक शक्ती म्हणून सेवा क्षेत्राचा उल्लेख केला जातो.

अशा देशाच्या अर्थव्यवस्थेमध्ये प्रत्येक क्षेत्राच्या विकासाच्या माध्यमातून देशाच्या वाटचालीची दिशा ही उन्नतीकडे होत आहे. असे असले तरी देशाच्या विकासामध्ये अत्यंत मोलाचे भर टाकणारे आहे.

प्रस्तावना :-

देशाच्या अर्थव्यवस्थेमध्ये कृषी क्षेत्र, उद्योग क्षेत्र, सेवा क्षेत्र या तीनही क्षेत्राचा वाटा अत्यंत महत्वाचा आहे. प्रामुख्याने देशाच्या अर्थव्यवस्थेत कृषी क्षेत्राची महत्वपूर्ण भूमिका आहे. द्वितीय क्षेत्राला कच्चा मालाचा पुरवठा करणारे क्षेत्र म्हणून कृषी क्षेत्राला ओळखले जाते. सद्यस्थितीतील शेती ही पारंपारिक पद्धतीने न होता आधुनिक पद्धतीचा अवलंब करून त्यामाध्यमाने विविध नवीन यंत्र व तंत्रज्ञानाचा उपयोग करून शेती या घटकाची उत्पादनक्षमता वाढविण्याचा प्रयत्न केला जात आहे. अलीकडील काळात देशाला शेती या घटकाच्या माध्यमातून अनेक समस्यांना तोंड द्यावे लागले जसे कमी उत्पादकता, हवामान बदल, पाण्याची कमतरता, मजुरांची कमतरता, बाजारातील अकार्यक्षमता, कमी दर्जाचे उत्पन्न इ. या सर्व समस्यांसाठी शाश्वत पद्धतीने उत्पन्नात वाढ व त्यासाठी तंत्रज्ञान आधारित विविध उपाययोजनांची गरज त्यासाठी कृत्रिम बुद्धिमत्ता, इंटरनेट, ड्रोन एज कॉम्प्युटींग आणि डेटा प्लॅटफॉर्म इ. उद्योगमुख तंत्रज्ञानाच्या सहाय्याने विकास साधण्याचा प्रयत्न केला जात असून त्यामाध्यमाने ज्ञानधारित अर्थव्यवस्थेचा पाया रचला गेला आहे.

माहिती व तंत्रज्ञानाचे युग म्हणून सध्याच्या युगाला संबोधले जाते आणि याचा परिणाम म्हणजे देशामध्ये नवनवीन उद्योग उदयाला आलेले आहे. जसे ऑनलाईन व्यवसाय, ब्लॉग, रोबोटिक्स, तांत्रिक, CCTV सॉफ्टवेअर रोबोटिक्स मेंदू, चॅट जिपीटी इ. विविध माध्यमांच्या सहाय्याने आपण ऑनलाईन व्यवसाय करू शकत आहो. सद्यस्थितीमध्ये जसे कृषी क्षेत्र मध्ये कृत्रिम बुद्धिमत्तेचा उपयोग वाढत आहे अगदी त्याचप्रमाणे उद्योग क्षेत्रामध्ये सुद्धा व्यापकता वाढलेली दिसून येते.

एक प्रेरक शक्ती म्हणून ज्या क्षेत्राचा उल्लेख केला जातो, देशाच्या अर्थव्यवस्थेचा आधारस्तंभ म्हणजेच सेवा क्षेत्र या क्षेत्राचा देशाच्या अर्थव्यवस्थेमध्ये बहुआयामी परिणामकारक वाटा आहे. येणाऱ्या आधुनिक माहिती तंत्रज्ञान पाऊल अत्यंत महत्वाची भूमिका पार पाडत आहे. कृत्रिम बुद्धिमत्ता (AI) ही भारतीय सेवा क्षेत्रासाठी एक प्रेरणादायी बदल म्हणून कार्यरत होतांना दिसून येत आहे. परिणामतः क्षेत्राची पारंपारिक कार्य पद्धती आणि पारंपारिक व्यापार संरचनेमध्ये एक अमुलाग्र बदल घडवून आणत आहे. कृत्रिम बुद्धिमत्तेचा उपयोग हा कार्यक्षमतेला गती मिळावी एवढाच उद्देश डोळ्यासमोर न ठेवता, उत्पादन प्रक्रियेतील वाढणाऱ्या खर्चाचे प्रमाण कमी करण्यासाठी आणि नवि न मुल्यनिर्मितीसाठी व्हावे.

तसेच बँकिंग क्षेत्र व वित्तीय सेवांमध्ये AI फसवणूक शोधून काढण्यासाठी ग्राहकांचे अनुभवामध्ये सकारात्मक बदल घडवून आणून विकासात्मक परिणाम साध्य करण्याचा प्रयत्न केला जात आहे. त्याचप्रमाणे आरोग्य सेवा, शिक्षण प्रणाली, यासारख्या सामाजिक संस्थांमध्ये AI तंत्रज्ञान गुणवत्ता आणि प्रवेश क्षमता वाढावी म्हणून प्रभावी साधन बनत आहे.

भारत देश हा भौगोलिक दृष्ट्या नैसर्गिक साधनसंपत्तीने परिपूर्ण तर आहेच पण मनुष्यबळ आणि बुद्धिजीवी वर्गांनी सुद्धा कार्यक्षम आहे. भारत हा देश हा तरुणांचा देश म्हणून ओळखला जातो. तसेच माहिती तंत्रज्ञान, कृत्रिम बुद्धिमत्ता, इतरत्र क्षेत्रातही अतुलनीय अशी प्रगती साधली जात आहे, ज्यामुळे देशाचा कल हा ज्ञानधारित अर्थव्यवस्थेकडे होत आहे.

उद्दिष्ट : (Objective)

1. कृषी क्षेत्र हा अर्थव्यवस्थेचा अत्यंत महत्वाचा आणि कच्चा माल पुरवणारा स्रोत आहे. परंतु या क्षेत्रामधील किती टक्के मनुष्यबळ हा जागतिकपणे आणि नवीन माहिती तंत्रज्ञानाचा उपयोग करून कृषी क्षेत्रामधील आधुनिकीकरणाचा वापर होत आहे का?
2. देशाची अर्थव्यवस्था ही आभासी स्वरूपाची विकसित न राहता त्यामध्ये बौद्धिक घटकाचा सक्रिय वाटा आहे का याचा अभ्यास.
3. माहिती तंत्रज्ञान कृत्रिम बुद्धिमत्ता या सर्वांचा अर्थव्यवस्थेमध्ये वापर आणि त्याचा उत्पन्नावर परिणाम हा एक अभ्यास.
4. ज्ञानधारित अर्थव्यवस्था निर्मितीकरणासाठी बुद्धिजीवी क्षेत्राचा सकारात्मक विकास साधणे.
5. अर्थव्यवस्था ही ज्ञानधारित असायला हवी यासाठी देशातील दूर्गम आणि दूर्बल घटकासाठी जे काही नवीन माहिती तंत्रज्ञान विकसित होत आहे. त्याचा सकारात्मक बदलाचा अभ्यास.

गृहितके :

1. माहिती तंत्रज्ञान आणि व्यवसाय प्रक्रिया या प्रमुख क्षेत्रामध्ये जनरेटीव ए आय च्या वापरामुळे पारंपारिक क्षेत्राची भूमिका हळूहळू कमी होत आहे.
2. ज्ञानधारित अर्थव्यवस्थेमुळे देशाच्या संरचनात्मक विकासामध्ये सकारात्मक परिवर्तन घडून येत आहे.
3. अर्थव्यवस्थेमुळे देशाच्या संरचनात्मक विकासामध्ये सकारात्मक परिवर्तन घडून येत आहे.
4. देशाला नवीन माहिती तंत्रज्ञानाचा आजच्या परिस्थितीत खूप कमी वेळेमध्ये प्रसार झालेला आहे. त्यामुळे जागतिक व्यापाराचे एकही पान याशिवाय हालत नाही आहे. ज्ञानधारित अर्थव्यवस्थेचा हा अमुलाग्र बदल दिसून येत आहे.

संशोधन पद्धती :-

प्रस्तुत शोधनिबंधात ज्ञानधारित अर्थव्यवस्था अभ्यासतांना संपूर्ण माहिती ही दूर्यम माहिती स्रोतांद्वारे आलेली आहे. संबंधित शोध निबंधाच्या लिखाणाकरिता वर्तमानपत्र पुस्तके, मासिके, विविधग्रंथ, इंटरनेटवरील विविध साईट्स यांच्या माध्यमातून संपूर्ण वर्णन करण्यात आलेले आहे. या सर्व संदर्भांच्या आधारे प्रस्तुत शोधनिबंधाचे लेखन पूर्ण केलेले आहे.

विक्षेपण / चर्चा :

1. ज्ञानधारित अर्थव्यवस्थेचे चार स्तंभ :

ज्ञानधारित अर्थव्यवस्था ही चार स्तंभावर बांधली जाते ते म्हणजे आर्थिक आणि संस्थात्मक चौकट, शिक्षित आणि कुशल लोकसंख्या जागतिक ज्ञानाचा वाढत्या साठ्याचा वापर करणे आणि प्रभावी संप्रेषण आणि माहिती प्रक्रिया सुलभ

करण्यासाठी माहिती पायाभूत सुविधेची आवश्यकता, जगातील प्रत्येक देश हा ज्ञानधारीत अर्थव्यवस्थेकडे वाटचाल करत आहे आणि त्यासाठी अधिकाधिक ज्ञान प्राप्त करण्याची स्पर्धा आणि त्यामधून देशाचा आर्थिक विकास साधला जावा याची चढाओढ ही प्रत्येक देशामध्ये निर्माण झालेली आहे.

2. जागतिकीकरणाचा वाढता प्रभाव :

अलिकडच्या काळात जागतिकीकरणाचा प्रभाव हा सगळीकडेच वाढत आहे. त्यामुळे सर्व खंड, प्रदेश किंवा देश जागतिक अर्थव्यवस्थेमध्ये सहभागी होण्याचा प्रयत्न करून स्पर्धेच्या जगामध्ये आपला पाया मजबूत व कार्यक्षम करण्याच्या जोरदार प्रयत्नात आहे, आणि ज्ञानधारित अर्थव्यवस्था मुख्यतः अशा वातावरणाची निर्मिती करत आहे, जिथे स्पर्धेला अत्यंत महत्वाचे स्थान आहे.

3. विज्ञान व तंत्रज्ञान मनुष्यबळ :

विज्ञान व तंत्रज्ञान मनुष्यबळाच्या आधारे भारत हा नवीन युगाच्या उंबरठ्यावर आहे, भारतामध्ये जवळजवळ 60 लाख पेक्षा जास्त मनुष्यबळ हे विज्ञान आणि तंत्रज्ञान परिसस्थेत कार्यरत आहेत. याचे मुळ म्हणजेच देशातील शैक्षणिक पायाभूत सुविधांमध्ये आहे. अर्थात नवीन माहिती विज्ञान तंत्रज्ञानाचे मनुष्यबळ हे देशातील शैक्षणिक पायाभूत सुविधांमध्ये निर्माण झालेले आहे. यामध्ये असंख्य विद्यापीठे, इंजिनरिंग व मेडिकल कॉलेजेस, 16 इंडियन इन्स्टिट्यूट ऑफ टेक्नॉलॉजी, न्युक्लीअर सायन्स सेंटर, विविध संशोधन विकास संस्था, विज्ञान व तंत्रज्ञान विभागाची निर्मिती या अंतर्गत ह्या विविध संस्था देशाच्या आंतरशाखीय व्यापाराचा प्रयत्न, राष्ट्रीय संसाधनाचा शोध व व्यवस्थापन राष्ट्रीय स्तरावर विज्ञान व तंत्रज्ञान विषयक माहिती जमा करणे व तिचे विश्लेषण करण्याचा प्रयत्न केला जातो. म्हणजेच माहिती व तंत्रज्ञानाच्या आधारे देशाचा आर्थिक विकास साधला जात आहे.

4. वैज्ञानिक व औद्योगिक संशोधन परिषद :

ज्ञानधारीत अर्थव्यवस्थेच्या स्पर्धेमध्ये टिकून राहण्यासाठी ज्ञानाच्या साठ्यामध्ये वाढ होणे गरजेचे आहे. हा हेतू लक्षात ठेवून देशामध्ये विविध संशोधन संस्थांची स्थापना करून ज्ञानधारीत अर्थव्यवस्थेचा पाया रोवला गेला. देशामध्ये वैज्ञानिक व औद्योगिक संशोधन परिषद (CSIR) द्वारे देशातील संशोधनाचे प्रवर्तन, मार्गदर्शन आणि सुसुत्रीकरण यासारखे महत्वाचे कार्य करते. वर्ष 2022-23 दरम्यान CSIR ने जवळपास 250 भारतीय आणि 2013 विदेशी पेटेंट सादर केले त्याचे 1,132 ते अधिक पेटेंट सक्रिय आहेत.

5. कृत्रिम बुद्धिमत्ता (AI) :-

ज्ञानधारीत अर्थव्यवस्था निर्माण व्हावी आणि त्यामध्ये नवीन माहिती तंत्रज्ञान सोबतच कृत्रिम बुद्धिमत्ता (AI) ची सुद्धा भर पडली आहे. नोव्हे, 2024 मध्ये प्रकाशित झालेल्या भारतावरील अहवालामध्ये 2028 पर्यंत AI म्हणजेच कृत्रिम बुद्धिमत्तेच्या वापराने भारतामध्ये 2.73 दशलक्ष नवे रोजगार निर्माण होतील असे म्हटले आहे. अर्थात कृत्रिम बुद्धिमत्तेचा कर्मचारी, उपभोक्ता, ग्राहक, उत्पादन, सुधारणा, महसूल वाढीचे नवे मार्ग शोधण्यामध्ये सहकार्य मिळत आहे, AI च्या वापरामुळे नवीन राजगार निर्मिती तसेच देशातील उद्योगक्षेत्र, निर्माण होत आहे.

6. प्रभावी संप्रेषण माहिती प्रक्रिया :-

देशातील पायाभूत सुविधा स्मार्टफोन आणि इंटरनेट AI आणि तंत्रज्ञान या सर्व घटकांमुळे डिजिटल संवादामध्ये मोठी प्रगती होत आहे. भारतात 5 जी (5G) तंत्रज्ञान ह्या वायरलेस प्रभावी संप्रेषण व माहिती प्रक्रिया वेगाने बदलत आहे. यामुळे डिजिटल साक्षरतेचे प्रमाण बहुभाषिक प्लॅटफॉर्म च्या माध्यमाने अधिक समावेश विकास साधला जात आहे.

7. गतिमान पायाभूत सुविधा :-

देशामध्ये गतिमान पायाभूत सुविधांमध्ये म्हणजेच संचार, दळणवळण प्रक्रियेमध्ये सुद्धा अमुलाग्र बदल झालेला आहे. टपाल जाळे व सेवा या घटकापासून तर टेलिव्हिजन, इंटरनेट सुविधा यांच्यासह रस्ते महामार्ग, रेलवे, विमानतळ यामध्ये सुद्धा आधुनिक व डिजिटल पायाभूत सुविधांची निर्मिती करून देशाचा ज्ञानधारीत अर्थव्यवस्थेकडे झपाट्याने वाढता कल आहे.

पायाभूत सुविधांमध्ये ज्या वेगाने बदल घडून येत आहे. त्यावरून असे निदर्शनास येत आहे की, भारतीय अर्थव्यवस्था ही ज्ञानधारीत व अधिक सक्षम आणि आत्मनिर्भर बनत आहे.

8. विकसित जैवतंत्रज्ञान :

ज्ञानधारीत अर्थव्यवस्था म्हटले की, स्पर्धा आणि स्पर्धेमध्ये टिकून राहण्यासाठी देशाला ज्ञानार्जनाची आवश्यकता आहे. देशातील जैवतंत्रज्ञान क्षेत्रामध्ये सुद्धा लक्षणीय प्रगती होवून व्यापक असा विस्तार होत आहे. 2024 मध्ये \$165.7 अब्ज असलेली जैव-अर्थव्यवस्था 2030 पर्यंत \$300 अब्जांपर्यंत पोहोचेल जैवतंत्रज्ञान हे क्षेत्र आरोग्यसेवा पासून तर कृषी आणि औद्योगिक विकासास सक्षम आत्मनिर्भर भारत मेहीमेमध्ये टोकाची भूमिका बजावत आहे. ज्यामध्ये 6,000 हून अधिक बायोटेक स्टार्टअप्स कार्यरत आहेत. म्हणजेच ज्ञानधारीत अर्थव्यवस्थेच्या माध्यमातून 2030 पर्यंत भार देश हा जागतिक जैवतंत्रज्ञान केंद्र बनवण्याच्या मार्गाने वाटचाल करत आहे.

निष्कर्ष :

1. जगाच्या विकसित देशाच्या तुलनेमध्ये माहिती तंत्रज्ञानाचा विकसित असा प्रभाव दिसून येत आहे.
2. देशाने IT आणि सॉफ्टवेअर सेवा क्षेत्रात लक्षणीय प्रगती केली असली तरीही तळागाळातील सामान्य मनुष्यबळाचा हवा तसा सहभाग नाही.
3. देशामध्ये आर्थिक, सामाजिक, राजकीय स्तरावर अनेक प्रकारची विकासात्मक अभाव आणि आव्हाने आहेत.
4. ज्ञानधारीत अर्थव्यवस्थेच्या माध्यमाने देशाचा सर्वांगीण विकास साधने गरजेचे आहे.
5. ज्ञानधारीत अर्थव्यवस्थेमध्ये देशाच्या गुंतवणूकीच्या प्रमाणात वाढ गरजेची आहे.

संदर्भ ग्रंथ :

1. विज्ञान तंत्रज्ञान आणि विकास रंजन कोळंबे, भगीरथ प्रकाशन, पुणे
2. महाराष्ट्र कृषि-कृत्रिम-बुद्धिमत्ता(Mahaagri-AI) धोरण 2025-2029
3. <https://www.mahamtb.com>
4. <https://www.ey.com>
5. <https://www.loksatta.com>
6. [Link.springer.com](https://www.springer.com)

महाराष्ट्रातील उच्च शिक्षणातील स्वायत्तता एक वास्तविक पारदर्शी सत्य डॉ सुजाता नानासाहेब तायडे

प्राचार्य स्व. लालासाहेब देशमुख शिक्षण महाविद्यालय, तिक्सा, अमरावती

शिक्षणातील स्वायत्तता म्हणजे शैक्षणिक संस्थाना अभ्यासक्रम निश्चिती परीक्षा पद्धती शिक्षक भरती आणि दैनंदिन कामकाजाबाबत बाह्य सरकारी किंवा प्रशासकीय हस्तक्षेपाशिवाय निर्णय घेण्याचे स्वातंत्र्य होय. यामुळे संस्थेला शैक्षणिक दर्जा राखायला संधी मिळते.

स्वायत्ता शिक्षण म्हणजे काय?

स्वायत्ता शिक्षण म्हणजे शैक्षणिक सदस्यांना अभ्यासक्रम परीक्षा पद्धती मूल्यांकन आणि प्रशासन यामध्ये काही प्रमाणात स्वतंत्र निर्णय घेण्याचे अधिकार देणे. शिक्षण हे कोणत्याही समाजाच्या प्रगतीचे मूलभूत साधन मानले जाते. बदलत्या जागतिक परिस्थितीनुसार शिक्षण व्यवस्थेमध्ये सुधारणा करण्यासाठी स्वायत्त शिक्षण ही संकल्पना उदयास आली. महाराष्ट्रात अनेक महाविद्यालये व विद्यापीठांना स्वायत्ता दर्जा देण्यात आला आहे. या व्यवस्थेमुळे शिक्षणात गुणवत्ता वाढविण्याचा उद्देश असला तरी त्यातून काही गंभीर परिणाम पाहावयास मिळतात. स्वायत्तता म्हणजेच स्वतःचे स्वतः सांभाळून घेणे म्हणता येईल.

संशोधन विषयाचे उद्दीष्टे :

महाराष्ट्रातील स्वायत्त शिक्षणाची सद्यस्थिती अभ्यासणे
स्वायत्तेमुळे झालेल्या सकारात्मक व नकारात्मक परिणामाचा शोध घेणे
शिक्षण व्यवसायामध्ये निर्माण झालेल्या दुर्दशेचे विश्लेषण करणे
महाराष्ट्रातील स्वायत्त संस्थांमुळे निर्माण झालेल्या वाईट स्थितीवर उपाय योजना सुचविणे.

संशोधन पद्धती :

या संशोधनासाठी दुय्यम माहिती वापरण्यात आली आहे. विविध संशोधन लेख शासकीय अहवाल वर्तमानपत्र व शैक्षणिक संश्लेषण वरील माहितीचा अभ्यास करण्यात आला.

महाराष्ट्रातील स्वायत्त शिक्षणाची स्थिती (आकडेवारी) :

- > महाराष्ट्रातील स्वायत्त शिक्षणाची स्थिती (आकडेवारीसह)
- > महाराष्ट्रात एकूण सुमारे ३००० महाविद्यालये आहेत
- > त्यापैकी ३१४ स्वायत्त महाविद्यालये २०२५ आहेत
- > मुंबई विद्यापीठ क्षेत्रात १३० पुणे विद्यापीठात ७४ स्वायत्त महाविद्यालये
- > उच्च शिक्षणात दरवर्षी १४-१५ लाख विद्यार्थी प्रवेश घेतात
- > यावरून स्वायत्त शिक्षणाचा विस्तार झपाट्याने होत असल्याचे दिसते

शिक्षणातील खर्च :

स्वायत्त व इतर महाविद्यालयांचे फी तुलना
प्रकार
वार्षिक फी
सरकारी
रुपे १५०००- ५०००० रुपये
स्वायत्त महाविद्यालये
रुपे ७०,०००/- रु १,३०,०००/-
खाजगी
रुपे १,२०,०००/-
रु २,००,०००/-

उच्च शिक्षणातील काही उदाहरणे :

> इंजिनिअरिंग कॉलेज फी रुपये १,३०,०००/-

रु १,५०,०००/- प्रति वर्ष

> काही उच्च दर्जामध्ये संस्थामध्ये रु २,००,०००/- ते ४,२५,०००/- प्रति वर्ष

> एम एस सी कोर्ट फी रु ३,०००० ते रु ४१ लाखापर्यंत

परीक्षा व इतर खर्च :

१. सी ई टी परीक्षा फी रु ८०० रुपये १००० वाढ प्रस्तावीत २००-२५०

२. अतिरिक्त शुल्क विद्यार्थ्यांकडून घेतले जाते

३. स्वायत्त शिक्षणाचे सकारात्मक परिणाम

. अभ्यासक्रम दरवर्षी अपडेट उद्योगाभिमुख शिक्षण

५. प्लेसमेंट

सरासरी पॅकेज रुपये ६ ते ८ LPA

प्लेसमेंट दर ९०% पर्यंत

कौशल्याधिष्ठीत शिक्षणाचा विकास

स्वायत्ता शिक्षणामुळे निर्माण झालेली दुर्दशा

महाराष्ट्र हे शिक्षणाच्या क्षेत्रात प्रगत राज्य मानले जाते येथे अनेक नामांकित महाविद्यालयांना स्वायत्त दर्जा देण्यात आला आहे. पुणे, मुंबई, नागपूर या सारख्या शहरांमध्ये स्वायत्त संस्थांची संख्या अधिक आहे या संस्थामध्ये आधुनिक अभ्यासक्रम व तांत्रिक सुविधा उपलब्ध आहेत.

स्वायत्त शिक्षणाचे सकारात्मक परिणाम :

> अभ्यासक्रम अधिक आधुनिक आणि उद्योगाभिमुख

> अभ्यासक्रमात लवचिकता व आधुनिकता

> उद्योगाभिमुख शिक्षणाचा विकास

> संशोधन व नवोपक्रमांना प्रोत्साहन

> परीक्षा व निकाल प्रक्रियेत गती

स्वायत्त शिक्षण ही संकल्पना शिक्षणाच्या गुणवत्तेसाठी उपयुक्त असली तरी योग्य नियोजन व नियंत्रण नसल्यास ती पद्धत शिक्षण व्यवस्थेमध्ये असातुलन निर्माण करणे गुणवत्तापूर्ण शिक्षणाच्या संधी वाढल्या पण त्याच बरोबर सामाजिक असमानता आणि आर्थिक ताणही वाढले आहेत.

स्वायत्त शिक्षणप्रणालीमुळे महाराष्ट्रातील शैक्षणिक स्थिती :**शिक्षणाचे व्यापारीकरण :**

स्वायत्तेचा अर्थ स्वताचा कारभार होतो यावर पाहिजे तसे नियंत्रण राहत नाही. त्यामुळे बऱ्याच शैक्षणिक संस्थानी शिक्षण म्हणजे विद्यादानाचे पवित्र कार्य आहे हे स्मरणात न ठेवता फक्त अर्थप्राप्ती करणे होय त्यामुळे व्यापारीकरणामुळे नफा मिळविण्याच्या दिशेने स्वायत्त शैक्षणिक संस्था बाटचाल करून मोठ्या प्रमाणात शिक्षण शुल्क वसूल केल्या जात आहे त्यामुळे गुणवत्तापूर्वक शिक्षण जरी असले तरी फी मोठी असल्यामुळे गरीब विद्यार्थ्यांची उच्च संस्थामध्ये प्रवेश होवू शकत नाही.

गुणवत्तेतील असमानता :

सर्व संस्थानची गुणवत्ता समान नाही. स्वायत्त संस्था म्हटल्यावर गुणवत्तेला स्थान प्राप्त व्हायला हवे परंतु वाटेल तसे शिक्षण शुल्क आकारून सुद्धा पाहिजे तेवढे दर्जेदार शिक्षण देण्यात स्वायत्त संस्था अपयशी ठरत आहेत.

नियंत्रणाचा अभाव :

अनुदानित विद्याशाखा असले तर काही प्रमाणात नियंत्रण असू शकते परंतु विना अनुदानीत अभ्यासक्रमासाठी कोणत्याही नियंत्रण संस्थेकडून नियंत्रण नसल्याने अभ्यासक्रम परीक्षा, प्रात्यक्षिक या बाबीमध्ये गुणवत्ता वर्गीकरण प्रमाणात असून सुध्दा पदवी देण्याचे कार्य केल्या जातात.

ग्रामीण शहरी दरी वाढली :

शहरी स्वायत्ता महाविद्यालया असल्यामुळे तसेच फी मोठ्या प्रमाणात घेत असल्याने ग्रामीण भागातील विद्यार्थ्यांना शहरी भागातील बड्या स्वायत्त संस्थामध्ये शिक्षण अडचणी येतात त्यामुळे ग्रामीण शहरी अंतर अधिक वाढलेले दिसून येते.

शिक्षकावर दबाव :

स्वायत्त प्रक्रियेमध्ये स्वतः संस्था अभ्यासक्रम तयार करतात अनेक नविन विषय लागू करतात त्यामुळे त्याला निगडीत असलेले प्रात्यक्षिक कार्य मूल्यमापन यामुळे शिक्षकांवर कामाचा ताण वाढलेला दिसून येता व वेतनामध्ये कंत्राटी शिक्षण भरती केल्यामुळे त्यांच्यामध्ये कायम असुरक्षतेची भावना दिसून येते.

विद्यार्थ्यांवर परिणाम :

स्वायत्त संस्थेमधील विद्यार्थ्यांवर अधिक मोठ्या प्रमाणात अभ्यासक्रमा असतो व त्यात सतत बदल होत जातो. त्यामुळे विद्यार्थ्यांच्या मनावरील तसेच त्यांच्या मनासिकतेवर ताण निर्माण होऊन विद्यार्थ्यांचे खच्चीकरण होवून नैराश्य प्राप्त होते.

निष्कर्ष :

> स्वायत्त शिक्षण ही आवश्यक सुधारणा आहे परंतु योग्य नियंत्रण नसल्यामुळे

शिक्षणाचे व्यापारीकरण :

आर्थिक असमानता

गुणवत्तेतील तफावत निर्माण झाली आहे.

> स्वायत्त शिक्षणामुळे गरीब श्रीमंत वर्गाचे शिक्षण असे दोन भाग निर्माण होत आहेत.

> उच्च शिक्षण फक्त श्रीमतांनीच घ्यावे अशी परिस्थिती निर्माण झाली आहे

शिफारसी.

> फो नियंत्रणासाठी कठोर धोरण निर्माण करायला हवे.

> गरीब विद्यार्थ्यांसाठी शिष्यवृत्ती दिल्यास गरीब श्रीमंत दरी कमी होईल.

> ग्रामीण भागात स्वायत्त महाविद्यालये वाढविण्यास शहरी ग्रामीण अंतर कमी होईल.

> पारदर्शक प्रवेश व परीक्षा प्रणाली गुणवत्ता व विश्वास निर्माण करेल.

> शिक्षकांसाठी स्थिर नोकरीची हमी असल्यास स्वायत्त शिक्षण संस्था अधिक प्रगती करतील.

संदर्भ :

महाराष्ट्र शासन शिक्षण विभाग

शैक्षणिक संकेतस्थळे व संशोधन लेख

वृत्तपत्रे

शैक्षणिक सुधारणा घटनाक्रमाचा इतिहास (1947 ते 1920)**डॉ. निलय प्रभाकरराव देशमुख**

महात्मा ज्योतिबा फुले कॉमर्स, सायन्स व विठ्ठलराव राऊत, महाविद्यालय, भातकुली

सारांश (Abstract)

भारताला १९४७ मध्ये स्वातंत्र्य मिळाल्यानंतर देशाच्या सामाजिक, आर्थिक आणि बौद्धिक विकासासाठी शिक्षणव्यवस्थेचे पुनर्रचना करणे काळानुसार अत्यावश्यक झाले. विशेषतः उच्च शिक्षण हे राष्ट्रीय विकास, वैज्ञानिक प्रगती, लोकशाही मूल्यांचे संवर्धन आणि मानव संसाधन विकासासाठी अत्यंत महत्त्वाचे साधन मानले गेले. स्वातंत्र्यानंतरच्या काळात भारतातील उच्च शिक्षण क्षेत्रात व्यापक बदल घडून आले. विद्यापीठांची संख्या, विद्यार्थ्यांची नोंदणी, अभ्यासक्रमांचे विविधीकरण, संशोधनाला प्रोत्साहन, तंत्रज्ञानाचा वापर आणि खासगी क्षेत्राचा वाढता सहभाग ही या बदलांची प्रमुख वैशिष्ट्ये ठरली.

प्रस्तुत संशोधन पेपरमध्ये १९४७ नंतर भारतातील उच्च शिक्षण व्यवस्थेतील बदलांचा ऐतिहासिक, संरचनात्मक आणि धोरणात्मक आढावा घेण्यात आला आहे. विविध शैक्षणिक आयोग, शैक्षणिक धोरणे, विद्यापीठ अनुदान आयोगाची भूमिका, जागतिकीकरणाचा प्रभाव, खासगीकरण आणि डिजिटल शिक्षण यांचा अभ्यास करून उच्च शिक्षणातील परिवर्तनाची प्रक्रियेचा समावेश केला आहे. प्रस्तुत संशोधनातून असे आढळून येते की, उच्च शिक्षणाच्या विस्ताराबरोबर गुणवत्तेचा प्रश्न, असमानता, व्यापारीकरण आणि रोजगारक्षमतेचा अभाव यांसारख्या आव्हानांनाही भारताला सामोरे जावे लागत आहे. एकंदरीत उच्च शिक्षणातील सुधारणा केवळ संख्यात्मक विस्तारापुरती मर्यादित न राहता गुणवत्तावर्धन, संशोधनाभिमुखता, समावेशकता आणि जागतिक दर्जा प्राप्त करण्याच्या दिशेने असणे आवश्यक आहे.

कळीचे मुद्दे (Keywords): उच्च शिक्षण, विद्यापीठ प्रणाली, शैक्षणिक धोरण, जागतिकीकरण, संशोधन**प्रस्तावना (Introduction) :**

शिक्षण हे कोणत्याही राष्ट्राच्या विकासाचे मूलभूत साधन मानले जाते. विशेषतः उच्च शिक्षण हे ज्ञाननिर्मिती, वैज्ञानिक प्रगती, तंत्रज्ञान विकास आणि सामाजिक परिवर्तन यासाठी अत्यंत महत्त्वाचे मानले जाते. भारतासारख्या विविधतेने नटलेल्या आणि लोकसंख्येच्या दृष्टीने विशाल देशासाठी उच्च शिक्षण व्यवस्थेचा विकास हा राष्ट्रीय प्रगतीचा एक महत्त्वपूर्ण घटक ठरतो.

१९४७ मध्ये स्वातंत्र्य मिळाल्यानंतर भारतासमोर अनेक आव्हाने उभी होती. सामाजिक विषमता, आर्थिक मागासलेपण, औद्योगिक विकासाचा अभाव आणि शिक्षणाचा कमी प्रसार ही त्या काळातील प्रमुख समस्या होती. या परिस्थितीत राष्ट्रनिर्मितीसाठी शिक्षणव्यवस्थेचे पुनर्रचना करणे आवश्यक होते. त्यामुळे स्वातंत्र्यानंतरच्या काळात भारत सरकारने उच्च शिक्षण क्षेत्रात अनेक सुधारणा आणि धोरणात्मक बदल केले.

स्वातंत्र्याच्या वेळी भारतात केवळ सुमारे २० विद्यापीठे आणि सुमारे ५०० महाविद्यालये होती. आज मात्र भारत जगातील सर्वात मोठ्या उच्च शिक्षण व्यवस्थांपैकी एक आहे. विद्यापीठे, तांत्रिक संस्था, संशोधन केंद्रे आणि खासगी शिक्षणसंस्था यांची संख्या लक्षणीयरीत्या वाढली आहे. प्रस्तुत संशोधनाचा उद्देश १९४७ नंतर भारतातील उच्च शिक्षणातील बदलांचा सखोल आढावा घेणे हा आहे.

संशोधनाची उद्दिष्टे (Objectives of the Study) :

१. १९४७ नंतर भारतातील उच्च शिक्षण व्यवस्थेच्या विकासाचा ऐतिहासिक आढावा घेणे.
२. विविध शैक्षणिक आयोग आणि धोरणांचा उच्च शिक्षणावर झालेला प्रभाव अभ्यासणे.
३. उच्च शिक्षण क्षेत्रातील विस्तार, खासगीकरण आणि जागतिकीकरणाचे विश्लेषण करणे.
४. उच्च शिक्षण व्यवस्थेसमोरील प्रमुख आव्हानांचा शोध घेणे.

स्वातंत्र्यानंतर भारताने उच्च शिक्षणाच्या पुनर्रचनेला राष्ट्रीय विकासाच्या दृष्टीने अत्यंत महत्त्व दिले. १९४७ ते १९६० या कालखंडात उच्च शिक्षण व्यवस्थेला बळकटी देण्यासाठी अनेक शैक्षणिक आयोगांची स्थापना करण्यात आली. त्यामध्ये Sarvepalli Radhakrishnan यांच्या अध्यक्षतेखाली स्थापन झालेला राधाकृष्णन आयोग (१९४८-४९) विशेष महत्त्वाचा मानला जातो. या आयोगाने भारतीय विद्यापीठांच्या उद्दिष्टांची पुनर्रचना करण्यावर भर दिला. विद्यापीठांची स्वायत्तता वाढविणे, संशोधनाला प्रोत्साहन देणे, शिक्षकांचे प्रशिक्षण सुधारणे आणि अभ्यासक्रमांचे आधुनिकीकरण करणे अशा महत्त्वपूर्ण शिफारसी आयोगाने केल्या.

या काळातील आणखी एक महत्त्वपूर्ण पाऊल म्हणजे University Grants Commission (UGC) ची १९५६ मध्ये स्थापना होय. विद्यापीठांना आर्थिक सहाय्य पुरविणे, उच्च शिक्षणाची गुणवत्ता राखणे, संशोधनाला चालना देणे आणि विद्यापीठ व्यवस्थेचे नियमन करणे ही UGC ची प्रमुख उद्दिष्टे ठरविण्यात आली. त्यामुळे भारतातील उच्च शिक्षण व्यवस्थेला संस्थात्मक आणि धोरणात्मक आधार मिळाला.

१९६० ते १९९० या कालखंडात भारतातील उच्च शिक्षणाचा मोठ्या प्रमाणावर विस्तार झाला. या काळात Daulat Singh Kothari यांच्या अध्यक्षतेखाली कोठारी आयोग (१९६४-६६) ने शिक्षणाला राष्ट्रीय विकासाचे प्रभावी साधन मानले. शिक्षणावर सकल देशांतर्गत उत्पन्नाच्या (GDP) किमान ६ टक्के खर्च करणे, सर्वांना समान शैक्षणिक संधी उपलब्ध करून देणे आणि विज्ञान व तंत्रज्ञान शिक्षणावर विशेष भर देणे अशा महत्त्वपूर्ण शिफारसी या आयोगाने केल्या. यानंतर National Education Policy 1968 द्वारे शिक्षणातील समानता, राष्ट्रीय एकात्मता आणि गुणवत्तावृद्धी यांवर भर देण्यात आला.

१९९१ नंतरच्या उदारीकरण आणि जागतिकीकरणाच्या प्रक्रियेमुळे उच्च शिक्षणातही मोठे बदल झाले. खासगी विद्यापीठांची वाढ, व्यावसायिक अभ्यासक्रमांचा विस्तार, तंत्रज्ञानाधारित शिक्षणाचा वापर आणि आंतरराष्ट्रीय शैक्षणिक सहकार्य वाढू लागले. या काळात Indian Institutes of Technology, Indian Institutes of Management आणि National Institutes of Technology यांसारख्या संस्थांची प्रतिष्ठा जागतिक स्तरावर वाढली आणि भारताच्या उच्च शिक्षण व्यवस्थेला नवे आयाम प्राप्त झाले.

२१ व्या शतकातील उच्च शिक्षणातील बदल -

२१ व्या शतकात भारतातील उच्च शिक्षण व्यवस्थेत तांत्रिक, संरचनात्मक आणि धोरणात्मक पातळीवर मोठे परिवर्तन घडून आले आहे. माहिती तंत्रज्ञानाच्या वेगवान प्रगतीमुळे शिक्षणाचे स्वरूप अधिक लवचिक, विद्यार्थी-केंद्रित आणि ज्ञानाधारित झाले आहे. डिजिटल साधनांचा वाढता वापर, संशोधन व नवोन्मेषावर दिला जाणारा भर आणि नवीन शैक्षणिक धोरणांमुळे उच्च शिक्षण क्षेत्र अधिक गतिमान बनले आहे. जागतिकीकरणामुळे भारतीय उच्च शिक्षण व्यवस्थेला आंतरराष्ट्रीय स्तरावर स्पर्धात्मक बनण्याची संधी मिळाली असून विविध शैक्षणिक संस्थांमध्ये आधुनिक अभ्यासक्रम, संशोधन केंद्रे आणि नवोन्मेष प्रयोगशाळा विकसित होऊ लागल्या आहेत.

अ) डिजिटल शिक्षण -

२१ व्या शतकातील सर्वात महत्वाचा बदल म्हणजे डिजिटल शिक्षणाचा व्यापक प्रसार होय. इंटरनेट, संगणक आणि स्मार्ट उपकरणांच्या उपलब्धतेमुळे शिक्षणाची पारंपरिक चौकट बदलू लागली. ऑनलाइन शिक्षण, ई-लर्निंग आणि आभासी वर्गांच्या माध्यमातून विद्यार्थ्यांना कुठेही आणि कधीही शिक्षण घेण्याची संधी उपलब्ध झाली. विशेषतः SWAYAM, MOOCs यांसारख्या डिजिटल प्लॅटफॉर्ममुळे उच्च शिक्षण अधिक सुलभ आणि सर्वसमावेशक बनले आहे. या प्लॅटफॉर्मद्वारे विविध विद्यापीठांचे अभ्यासक्रम, व्याख्याने आणि अभ्याससाहित्य विद्यार्थ्यांना ऑनलाइन स्वरूपात उपलब्ध होत आहे. कोविड-१९ महामारीच्या काळात डिजिटल शिक्षणाने शिक्षणव्यवस्था सुरू ठेवण्यात महत्त्वपूर्ण भूमिका बजावली. त्यामुळे भविष्यातही डिजिटल आणि पारंपरिक शिक्षण यांचा समन्वय असलेली संमिश्र (Blended) शिक्षणपद्धती अधिक प्रभावी ठरत आहे.

ब) संशोधन आणि नवोन्मेष-

२१ व्या शतकात उच्च शिक्षणात संशोधन आणि नवोन्मेषाला विशेष महत्त्व प्राप्त झाले आहे. ज्ञानाधारित अर्थव्यवस्था उभारण्यासाठी संशोधन, तंत्रज्ञान विकास आणि नवोन्मेष आवश्यक मानले जातात. त्यामुळे विद्यापीठे आणि उद्योग यांच्यातील सहकार्य वाढले असून विविध संशोधन प्रकल्पांना प्रोत्साहन दिले जात आहे. अनेक उच्च शिक्षण संस्थांमध्ये इनोव्हेशन सेल, स्टार्टअप इनक्युबेशन केंद्रे आणि संशोधन प्रयोगशाळा स्थापन करण्यात आल्या आहेत. विद्यार्थ्यांमध्ये उद्योजकतेची भावना विकसित करण्यासाठी स्टार्टअप संस्कृतीला प्रोत्साहन दिले जात आहे. या प्रक्रियेमुळे शिक्षण केवळ ज्ञान प्राप्तीपुरते मर्यादित न राहता आर्थिक आणि तांत्रिक विकासाचे साधन बनत आहे.

क) राष्ट्रीय शिक्षण धोरण-2020

२१ व्या शतकातील उच्च शिक्षणातील सुधारणा अधिक प्रभावी करण्यासाठी National Education Policy 2020 हे धोरण महत्त्वपूर्ण मानले जाते. या धोरणाने उच्च शिक्षणात व्यापक आणि संरचनात्मक बदल सुचविले आहेत. बहुविषयक शिक्षणाला प्रोत्साहन देणे, विद्यार्थ्यांना विविध विषयांचा अभ्यास करण्याची संधी उपलब्ध करून देणे आणि संशोधनाभिमुख शिक्षणाला चालना देणे ही या धोरणाची प्रमुख उद्दिष्टे आहेत. तसेच Academic Bank of Credit या संकल्पनेद्वारे विद्यार्थ्यांना विविध संस्थांमधून घेतलेल्या अभ्यासक्रमांचे गुण जमा करण्याची सुविधा देण्यात आली आहे. याशिवाय राष्ट्रीय स्तरावर संशोधनाला चालना देण्यासाठी National Research Foundation स्थापन करण्याची कल्पना मांडण्यात आली आहे. या सर्व सुधारणा भारतीय उच्च शिक्षण व्यवस्थेला अधिक लवचिक, गुणवत्तापूर्ण आणि जागतिक स्तरावर स्पर्धात्मक बनविण्याच्या दिशेने महत्त्वपूर्ण पाऊल मानल्या जातात.

उच्च शिक्षण व्यवस्थेसमोरील आव्हाने -

भारतामध्ये गेल्या काही दशकांत उच्च शिक्षणाचा मोठ्या प्रमाणावर विस्तार झाला आहे. Ministry of Education च्या All India Survey on Higher Education (AISHE) २०२१-२०२२ अहवालानुसार भारतात सुमारे ११०० पेक्षा अधिक विद्यापीठे, ४३,००० पेक्षा अधिक महाविद्यालये आणि ११,००० हून अधिक स्वायत्त संस्था कार्यरत आहेत. तसेच उच्च शिक्षणातील एकूण नोंदणी (Gross Enrolment Ratio) सुमारे २८.४% पर्यंत पोहोचली आहे. मात्र या संख्यात्मक विस्तारासोबत अनेक गंभीर आव्हानेही कायम आहेत.

१) शिक्षणाची गुणवत्ता हा एक महत्वाचा प्रश्न आहे. अनेक विद्यापीठे आणि महाविद्यालयांमध्ये पायाभूत सुविधा, अद्ययावत प्रयोगशाळा, डिजिटल साधने आणि प्रशिक्षित प्राध्यापकांची कमतरता आढळते. AISHE च्या आकडेवारीनुसार भारतातील महाविद्यालयांपैकी मोठा भाग ग्रामीण आणि अर्धशहरी भागात असून त्यापैकी अनेक ठिकाणी संशोधनासाठी आवश्यक सुविधा उपलब्ध नाहीत. शिक्षणाची गुणवत्ता टिकवून ठेवण्यासाठी University Grants Commission आणि National Assessment and Accreditation Council या संस्थांद्वारे मानांकन आणि मूल्यमापन प्रक्रिया राबविण्यात येते; तथापि, अजूनही सर्व संस्थांचे गुणवत्तामूल्यांकन पूर्ण झालेले नाही.

२) संशोधनाचा अभाव ही गंभीर समस्या आहे. भारताचा संशोधन व विकासावरील (R&D) खर्च GDP च्या सुमारे ०.७% इतकाच आहे, तर अमेरिका, जपान आणि दक्षिण कोरिया यांसारख्या देशांमध्ये हा खर्च २% ते ४% दरम्यान आहे. परिणामी जागतिक स्तरावरील संशोधनात भारतीय विद्यापीठांचे योगदान तुलनेने मर्यादित राहते.

३) बेरोजगारी आणि रोजगारक्षमता. विविध सर्वेक्षणांनुसार भारतातील पदवीधर विद्यार्थ्यांपैकी सुमारे ४० ते ५०% विद्यार्थी रोजगारासाठी पूर्णपणे सक्षम नसतात, कारण शिक्षण आणि उद्योगक्षेत्राच्या गरजा यांच्यात तफावत आढळते. त्यामुळे कौशल्याधारित आणि रोजगाराभिमुख शिक्षणावर भर देण्याची गरज वाढत आहे. याशिवाय ग्रामीण आणि शहरी भागातील शैक्षणिक असमानता हीही मोठी समस्या आहे. AISHE च्या माहितीनुसार भारतातील सुमारे ६०% महाविद्यालये ग्रामीण भागात असली तरी उच्च दर्जाच्या संशोधन सुविधा प्रामुख्याने शहरी विद्यापीठांमध्येच केंद्रित आहेत.

४) तसेच अलीकडील काळात उच्च शिक्षण क्षेत्रात व्यापारीकरणाची प्रवृत्ती वाढताना दिसते. भारतातील सुमारे ६५% पेक्षा जास्त महाविद्यालये खासगी व्यवस्थापनाखाली चालतात. त्यामुळे शिक्षणाचा खर्च वाढत असून आर्थिकदृष्ट्या दुर्बल घटकांसाठी उच्च शिक्षण मिळविणे अधिक कठीण होत आहे. परिणामी उच्च शिक्षण व्यवस्थेत गुणवत्ता, समावेशकता आणि सामाजिक न्याय यांचा समतोल राखणे हे आजच्या काळातील सर्वात मोठे आव्हान ठरत आहे.

चर्चा (Discussion)

भारताची उच्च शिक्षण व्यवस्था आज जगातील सर्वात मोठ्या शिक्षण व्यवस्थांपैकी एक मानली जाते. All India Survey on Higher Education (AISHE) च्या अहवालानुसार देशात ११०० पेक्षा अधिक विद्यापीठे आणि सुमारे ४३,००० महाविद्यालये कार्यरत आहेत. या संख्यात्मक विस्तारामुळे लाखो विद्यार्थ्यांना उच्च शिक्षणाची संधी उपलब्ध झाली आहे. तथापि, गुणवत्तेच्या दृष्टीने अजूनही अनेक आव्हाने कायम आहेत. जागतिक विद्यापीठ क्रमवारीत भारतीय विद्यापीठांची संख्या तुलनेने कमी आहे. उदा. QS World University Rankings किंवा Times Higher Education यांसारख्या जागतिक क्रमवारीत मर्यादित भारतीय विद्यापीठांचा समावेश होतो. यामागील प्रमुख कारणांमध्ये संशोधनासाठी अपुरा निधी, अत्याधुनिक प्रयोगशाळांचा अभाव, गुणवत्तापूर्ण प्राध्यापकांची कमतरता आणि पायाभूत सुविधांची मर्यादा यांचा समावेश होतो. त्यामुळे उच्च शिक्षण क्षेत्रात संख्यात्मक वाढीसोबत गुणवत्तावर्धनावर विशेष भर देणे अत्यावश्यक ठरते.

निष्कर्ष (Conclusion)

१९४७ नंतर भारतातील उच्च शिक्षण व्यवस्थेत व्यापक आणि महत्त्वपूर्ण बदल घडून आले आहेत. स्वातंत्र्याच्या वेळी मर्यादित असलेली विद्यापीठे आणि महाविद्यालये आज मोठ्या प्रमाणावर वाढली आहेत. विविध शैक्षणिक आयोग, धोरणे आणि संस्थांनी या विकासात महत्त्वाची भूमिका बजावली आहे. विशेषतः University Grants Commission, National Education Policy-1968 आणि National Education Policy-2020 यांसारख्या धोरणात्मक उपक्रमांमुळे उच्च शिक्षण व्यवस्थेच्या विस्ताराला चालना मिळाली आहे. तथापि, संख्यात्मक विस्तारासोबत गुणवत्तेची हमी देणे अत्यंत आवश्यक आहे. संशोधन, नवोन्मेष, तंत्रज्ञानाचा वापर आणि जागतिक दर्जाचे शिक्षण यांवर अधिक भर देणे गरजेचे आहे. तसेच ग्रामीण-शहरी दरी कमी करून सर्व घटकांसाठी समावेशक आणि परवडणारी शिक्षण व्यवस्था उभारणे आवश्यक आहे. भविष्यात ज्ञानाधिष्ठित अर्थव्यवस्था उभारण्यासाठी मजबूत आणि गुणवत्तापूर्ण उच्च शिक्षण व्यवस्था ही भारताच्या विकासाची किल्ली ठरेल.



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The Role of Artificial Intelligence in Transforming Teaching and Learning in Higher Education

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Abstract:

Artificial Intelligence (AI) is rapidly transforming the landscape of higher education by introducing innovative approaches to teaching, learning, and academic research. The integration of Artificial Intelligence, Machine Learning, and Data Science has created new opportunities for personalized learning, intelligent tutoring systems, and data-driven decision-making in educational institutions. This paper explores the role of AI technologies in enhancing the quality and efficiency of teaching and learning processes in higher education.

The study highlights how AI-powered tools such as adaptive learning platforms, automated assessment systems, and virtual learning assistants are helping educators deliver more personalized and effective instruction. These technologies analyze large volumes of educational data to identify students' learning patterns, strengths, and weaknesses, thereby enabling customized learning experiences. Furthermore, AI supports faculty members in academic research, curriculum design, and administrative decision-making.

The paper also discusses the challenges associated with the adoption of AI in higher education, including ethical concerns, data privacy, technological infrastructure, and the need for digital literacy among educators and students. Despite these challenges, the integration of AI technologies has the potential to significantly improve educational outcomes and make learning more accessible and efficient.

The findings suggest that the strategic implementation of AI in universities and colleges can play a crucial role in modernizing higher education systems and preparing students with the skills required for a technology-driven future.

Keywords:

Artificial Intelligence, Machine Learning, Data Science, Higher Education, Smart Learning, Educational Technology, Digital Education

1. Introduction:

The rapid advancement of Artificial Intelligence has significantly influenced many sectors, including higher education. Universities and educational institutions are increasingly adopting AI-based technologies to enhance teaching methods, learning environments, and research activities. AI systems are capable of processing large volumes of data, identifying patterns, and providing intelligent support for both educators and students. As a result, AI has become an important tool for improving the efficiency and effectiveness of educational processes in higher education institutions [1].

The integration of Machine Learning and Data Science has further strengthened the role of AI in education. These technologies help institutions analyze student performance data, predict learning outcomes, and develop personalized learning strategies. According to recent studies, AI-driven tools such as intelligent tutoring systems, automated grading, and adaptive learning platforms enable more customized and flexible learning experiences for students [2][3].

Several researchers have highlighted the potential of AI to transform traditional education systems by making them more student-centered and technology-driven. AI applications can support teachers in curriculum design, assessment, and administrative decision-making while also helping students learn at their own pace [4][5]. Moreover, systematic reviews of AI research in education indicate a growing

trend in the use of AI technologies for learning analytics, student engagement, and academic performance monitoring in higher education institutions [6][7].

In addition, educational data mining and learning analytics have emerged as important fields that use AI techniques to analyze large educational datasets and improve teaching strategies [8]. The development of digital learning theories, such as connectivism, emphasizes the importance of technology and networks in modern learning environments [9]. Furthermore, technological revolutions driven by intelligent systems are expected to reshape the future workforce and educational practices worldwide [10].

Recent developments in smart education systems and AI-enabled learning technologies have further expanded opportunities for innovation in higher education [11][12]. Emerging areas such as hybrid intelligence, intelligent assistants, and generative AI tools are also influencing how students and educators interact with digital learning platforms [13][14][15]. These developments highlight the growing importance of AI in transforming teaching and learning processes and preparing students for a technology-driven future.

Therefore, understanding the role and impact of AI in higher education is essential for improving educational quality, promoting innovation in teaching practices, and supporting the development of modern learning environments.

2. Objectives:

1. To examine the role of Artificial Intelligence in transforming teaching and learning in higher education.
2. To analyze the impact of Machine Learning and Data Science on student learning outcomes and academic performance.
3. To explore the applications of AI technologies such as intelligent tutoring systems, automated assessment, and adaptive learning platforms in universities.
4. To identify the opportunities and challenges associated with the implementation of Artificial Intelligence in higher education institutions.
5. To study how AI-based technologies support academic research, curriculum development, and institutional decision-making.
6. To suggest strategies for the effective integration of Artificial Intelligence in higher education for improving the quality of education.

3. Literature Review:

The integration of Artificial Intelligence in higher education has gained significant attention in recent years. Researchers have explored how AI technologies can improve teaching, learning, and institutional management. According to Crompton and Burke [1], AI applications in higher education have expanded rapidly, particularly in areas such as personalized learning systems, intelligent tutoring, and automated assessment. Their study highlights that AI can support both instructors and students by improving learning efficiency and providing data-driven insights into student performance. Similarly, Bearman, Ryan, and Ajjaw [2] examined the discourse surrounding AI in higher education and found that institutions increasingly view AI as a tool to enhance educational quality and innovation. Their review suggests that AI not only supports teaching and learning processes but also influences educational policies and institutional strategies.

Chen, Chen, and Lin [3] provided a comprehensive review of AI applications in education and emphasized the role of AI in creating adaptive learning environments. Their findings indicate that AI technologies such as learning analytics and predictive models help educators identify learning gaps and provide targeted support to students.

Several scholars have also discussed the broader impact of AI on educational transformation. Holmes, Bialik, and Fadel [4] argued that AI has the potential to reshape education by enabling more personalized, inclusive, and efficient learning systems. Likewise, Luckin et al. [5] emphasized that AI technologies can assist teachers by automating routine tasks and allowing them to focus more on student engagement and mentoring.

Research by Yu, Wang, and Rashid [6] examined the impact of AI on student engagement in higher education. Their systematic review showed that AI-based tools can improve student participation, learning motivation, and academic performance when effectively integrated into the learning environment. Similarly, Zawacki-Richter et al. [7] conducted a systematic review of AI research in

higher education and identified key areas of AI application, including adaptive learning systems, learning analytics, and institutional decision support systems.

The role of educational data mining has also been highlighted in the literature. Baker and Yacef [8] noted that educational data mining techniques help analyze large datasets to understand learning behaviors and improve educational outcomes. This aligns with the theory of digital learning proposed by Siemens [9], who introduced connectivism as a learning theory suitable for the digital age, emphasizing the importance of technology and networks in knowledge creation.

Technological advancements associated with the digital economy have further influenced educational systems. Brynjolfsson and McAfee [10] discussed how intelligent technologies are transforming industries and workforce skills, thereby requiring education systems to adapt and incorporate advanced technological knowledge.

Researchers have also explored the concept of smart education systems. Dastbaz and Abawajy [11] proposed that smart learning environments powered by AI technologies can enhance collaboration, knowledge sharing, and learning flexibility. In addition, Shute and Zapata-Rivera [12] emphasized that educational technologies can support student learning through continuous assessment and feedback mechanisms.

More recent studies highlight emerging trends in AI-powered education. Cukurova [13] discussed the concept of hybrid intelligence, where human expertise and AI systems collaborate to improve educational outcomes. Sajja et al. [14] explored the use of AI-enabled intelligent assistants for personalized and adaptive learning in higher education. Furthermore, Ghimire, Prather, and Edwards [15] investigated educators' perceptions of generative AI technologies and found that awareness and acceptance of these tools are steadily increasing in academic institutions.

Overall, the existing literature demonstrates that AI technologies have the potential to transform higher education by enhancing teaching practices, improving student learning experiences, and supporting institutional decision-making. However, it also highlights the need for careful implementation to address challenges related to ethics, privacy, and technological infrastructure.

4. Research Methodology:

The present study is based on a descriptive research design to examine the role and impact of Artificial Intelligence in transforming teaching and learning in higher education. The study mainly relies on secondary data sources to understand the current trends, applications, and implications of AI technologies in educational institutions. The data for the study has been collected from various research journals, books, conference papers, reports, and online academic databases related to Machine Learning, Data Science, and AI applications in education. Several published articles and research studies were reviewed to analyze the development, adoption, and impact of AI technologies in higher education systems.

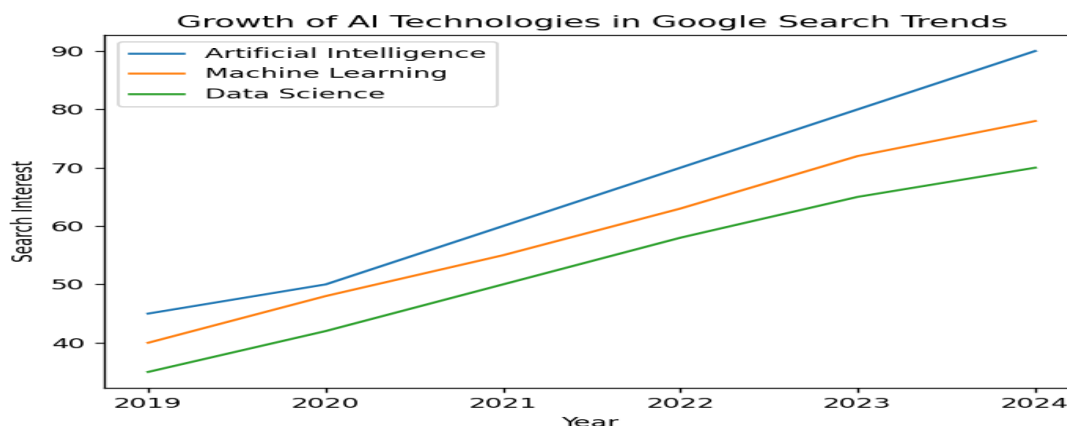
The collected information was carefully analyzed and interpreted to identify key themes such as AI-based personalized learning, intelligent tutoring systems, automated evaluation, and data-driven decision-making in universities. The study also examines the benefits and challenges associated with the implementation of AI in higher education, including issues related to technological infrastructure, ethical considerations, and digital literacy.

The methodology helps in understanding how AI technologies are influencing educational practices and how higher education institutions can effectively integrate these technologies to enhance teaching, learning, and research activities.

5. Discussion and Result:

The analysis of recent technological trends indicates a significant increase in the adoption and influence of Artificial Intelligence in higher education. The graphical representation of search trends shows a continuous growth in the interest and application of AI-related technologies over the past few years. This growing trend reflects the increasing importance of digital technologies in modern education systems and highlights how universities and educational institutions are adapting to technological advancements.

Figure 1



As shown in the graph, the interest in Machine Learning and Data Science has also increased steadily. These technologies play an essential role in supporting AI-based educational tools such as adaptive learning systems, automated grading platforms, and intelligent tutoring systems. Educational institutions are increasingly using these technologies to analyze student learning patterns, monitor academic performance, and provide personalized learning experiences.

The growing trend in search interest also indicates the increasing awareness among students, researchers, and educators regarding the importance of AI technologies in academic and professional fields. Universities across the world are introducing specialized courses and research programs related to AI, machine learning, and data science to prepare students for the demands of the modern digital economy.

Furthermore, the increasing use of AI technologies has improved several aspects of higher education, including student engagement, research productivity, and administrative efficiency. AI-powered systems help educators design more effective teaching strategies, while students benefit from personalized learning environments that adapt to their individual learning needs. However, despite these advantages, the implementation of AI in higher education also presents several challenges. Issues such as data privacy, lack of technological infrastructure, high implementation costs, and the need for skilled professionals may limit the widespread adoption of AI technologies in some institutions. Overall, the analysis highlights that AI and its related technologies are becoming an integral part of higher education systems. The increasing trend observed in the graph demonstrates the growing global interest in AI-driven educational innovation and emphasizes the need for educational institutions to integrate these technologies effectively to enhance teaching, learning, and research outcomes.

6. Future Scope:

The rapid development of Artificial Intelligence technologies presents significant opportunities for further research and innovation in higher education. Future studies can explore the long-term impact of AI-based learning systems on student performance, critical thinking, and knowledge retention. Researchers can also examine how AI-driven educational platforms can support inclusive and accessible learning for students from diverse backgrounds.

Another important area for future research is the integration of Machine Learning and Data Science in academic decision-making processes. Advanced learning analytics and predictive models can help educational institutions identify students at risk, improve curriculum design, and enhance institutional planning. Further research can also investigate the effectiveness of intelligent tutoring systems, virtual assistants, and automated assessment tools in improving teaching efficiency and learning outcomes.

In addition, future studies may focus on addressing challenges related to ethical issues, data privacy, and transparency in AI-based educational systems. As AI technologies continue to evolve, it is important to develop responsible frameworks and policies that ensure the ethical use of AI in education. Collaboration between universities, technology companies, and policymakers can also be explored to promote innovation and sustainable development in AI-powered education.

Overall, the future scope of AI in higher education is vast, and continued research will play a crucial role in maximizing the benefits of these technologies while minimizing potential risks.

7. Conclusion:

The study highlights the growing role of Artificial Intelligence in transforming the landscape of higher education. AI technologies are increasingly being used to enhance teaching methodologies, support personalized learning, and improve administrative efficiency in educational institutions. The integration of advanced technologies such as Machine Learning and Data Science enables institutions to analyze educational data, identify learning patterns, and provide customized learning experiences for students. The analysis indicates that AI-based tools, including intelligent tutoring systems, automated assessment platforms, and learning analytics, have the potential to significantly improve the quality of education. These technologies support educators in designing more effective teaching strategies and help students learn more efficiently through adaptive and interactive learning environments. However, the successful implementation of AI in higher education requires proper infrastructure, digital literacy, and effective policy frameworks to address challenges such as data privacy, ethical concerns, and technological limitations. Educational institutions must adopt strategic approaches to integrate AI technologies in their academic and administrative processes.

In conclusion, the adoption of AI technologies in higher education can contribute to the development of innovative learning environments and prepare students for the demands of a rapidly evolving digital world. Continuous research and responsible implementation will be essential to fully realize the potential of AI in transforming higher education systems.

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“A Study of Adoption Patterns and Perceived Benefits of Online Learning Apps among Parents of School Children of Amravati City.”

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Abstract:

The rapid growth of educational technology in India had significantly transformed the learning process for school students. With increased access to the internet and smartphones, parents have increasingly adopted online learning applications to support their children's education. Parents emerged as key stakeholders, as their perceptions and experiences largely influenced the regular use and acceptance of these applications. During the COVID-19 pandemic, the use of online learning apps increased substantially due to the flexibility, convenience, and personalized learning opportunities they offered.

The present study, titled “*A Study of Adoption Patterns and Perceived Benefits of Online Learning Apps among Parents of School Children of Amravati City*,” aimed to examine parents' adoption behavior and perceptions regarding online learning applications. The study employed a descriptive and analytical research design and was based on both primary and secondary data. Primary data were collected from 100 parents belonging to different schools and socio-economic backgrounds in Amravati City through a structured questionnaire. Secondary data were gathered from academic journals, research articles, reports, and online sources related to educational technology.

The data were analyzed using SPSS software with statistical tools such as t-test, ANOVA, and correlation analysis to understand the influence of factors such as ease of use, quality of content, cost, and trust on parents' adoption and perceptions of online learning apps. The findings indicated variations in perceptions among parents across different age groups and income levels.

The study concluded that online learning apps played an important role in supporting school education, particularly in semi-urban areas like Amravati City. The results provided valuable insights for EdTech companies, educational institutions, and policymakers to enhance the effectiveness, reliability, and accessibility of online learning applications.

Keywords: Online Learning Apps, EdTech, Parents' Perception, Adoption Patterns, School Education, Amravati City

1. Introduction:

In recent years, technology has changed the way students learn and teachers teach. With the growth of smartphones, the internet, and digital tools, online learning apps have become widely adopted in India. These apps provide easy access to educational content, videos, tests, and practice materials that help children study at their own pace and time.

The importance of online learning increased especially after the COVID-19 pandemic, when schools were closed and education moved to digital platforms. Parents started using apps like PW, Vedantu, Toppr, and Google Classroom to continue their children's education from home. This mode of learning gave flexibility, convenience, and more involvement for parents in their child's studies.

However, not all parents accept online learning in the same way. Some find it useful and time-saving, while others worry about screen time, costs, and the quality of learning. Therefore, it is important to study how parents in Amravati City are adopting these apps and what benefits they perceive from them.

Understanding parents' opinions and experiences will help schools, teachers, and EdTech companies to improve online learning systems and make them more effective for students. It will also help in knowing how technology is shaping education in semi-urban areas like Amravati.

(Ali, M. M., & Gupta, M. (2023). *Online Learning during Pandemic in India: Parents' Perspective*. Indian Journal of Educational Technology, 5(1), 89–97.)

Online Learning App**PhysicsWallah (PW)**

Provides structured courses for school (Class 1–12) and competitive exams (JEE, NEET, etc.). Offers live and recorded video lectures for flexible learning. Includes doubt-solving sessions, quizzes, and practice materials. Focuses on affordability and accessibility for students from different backgrounds. Helps in conceptual understanding and exam preparation.

Vedantu

Provides live interactive online classes with real-time teacher-student interaction. Offers doubt-solving sessions and personalized attention in small groups. Includes recorded lectures for revision and flexibility. Suitable for subjects requiring continuous guidance (e.g., Mathematics, Science). Promotes disciplined learning through structured schedules.

Toppr

Focuses on practice-based learning through tests and question banks. Provides adaptive learning based on student performance level. Offers video solutions, mock tests, and progress tracking. Helps in revision, speed improvement, and exam preparation. Useful for students from Class 5–10.

(Palliyalil, S., & Mukherjee, S. (2020). *PW, The Learning App: An Investigative Study on the Transformation From Traditional Learning To Technology Based Personalized Learning*. International Journal of Scientific & Technology Research, 9(3), 5054–5059.).

Adoption Pattern

The adoption of online learning apps in Amravati follows a trend driven by accessibility, affordability, and learning needs of children. Families with smartphones and stable internet connections are more likely to use apps regularly. Adoption is higher among students from classes 5–10 because parents see direct benefits in academic performance and exam results. Many parents start with free demo classes or trial videos, then choose an app based on their child's comfort, teaching style, and ease of understanding. The pattern also shows that parents often combine two apps—for example, PW for conceptual clarity and Toppr for practice.

(Kamble, S. A., & Deshmukh, R. P. (2022). Adoption of online learning applications among school students in Maharashtra: A study of usage patterns and parental perceptions. *Journal of Educational Technology and Digital Learning*, 10(2), 45–53).

Perception of Parents of School Children

Parents in Amravati generally view online learning apps as **helpful, convenient, and supportive** tools that supplement school education. They believe these apps improve conceptual understanding, provide high-quality explanations, and help maintain continuous study habits at home. Parents also appreciate flexible timing, availability of recorded sessions, and the ability to learn at the child's own pace. However, some parents express concerns about excessive screen time, the need for parental supervision, and subscription costs. Overall, parents perceive online learning apps as beneficial for improving academic performance, especially when used along with regular school teaching.

(Patil, M. S., & Wagh, S. V. (2021). Parents' perception towards online learning platforms for school children during COVID-19 in Maharashtra. *International Journal of Education and Development Studies*, 9(1), 112–120).

2. Review of Literatures**1. Chatterjee (2020)**

Chatterjee (2020) conducted a study on the adoption of mobile applications for teaching–learning in rural India. The study used survey data from 271 respondents (parents and teachers) and applied PLS-SEM analysis. The findings revealed that perceived usefulness and effort expectancy are key factors influencing adoption.

2. ResearchGate Report (2021)

A ResearchGate report (2021) conducted an empirical study on factors affecting Indian parents' adoption of online learning apps. The study surveyed 272 parents and used exploratory factor analysis and Cronbach's alpha. The results highlighted that perceived usefulness, digital literacy, and connectivity issues are major determinants of adoption.

3. Sharma (2023)

Sharma (2023) conducted a study to measure Indian parents' attitudes towards online classes. The study was based on a large urban sample of 750 parents across Delhi/NCR and northern states. The findings showed high engagement when schools recommended apps, but concerns remained regarding effectiveness compared to classroom teaching.

4. Global Kids Online – India Report (2022)

The Global Kids Online India Report (2022) conducted a large-scale survey involving children, parents, and teachers. The study found that device availability, data affordability, and parental guidance are major factors influencing online learning adoption in Indian households.

5. Menon (2022)

Menon (2022) conducted a study on the uses and gratifications of educational apps. The study examined parental expectations while selecting learning apps and found that parents seek benefits such as convenience, information, and engagement while choosing such platforms.

6. Rohtak Cluster Study (2023)

A study conducted in the Rohtak cluster (2023) examined parents' and students' perceptions of online learning. The cross-sectional study collected data from 270 parents and 398 students. The findings indicated that although parents faced issues like connectivity, many accepted online learning due to necessity.

7. Nadar (2021)

Nadar (2021) conducted a study on the experiences of virtual learning among parents of school children. The study used data from 100 parents and found mixed satisfaction levels, with concerns related to reduced teacher interaction and effectiveness of online learning.

◆Statement of the Problem

Even though online learning apps are becoming very popular in India, many parents still have different opinions about their usefulness and impact on children's education. Some parents think these apps make learning easy and fun, while others feel they cannot replace traditional classroom teaching.

In cities like Amravati, where parents come from different backgrounds, there is limited research on how they adopt and use online learning apps for their children. Limited evidence exists regarding the factors that encourage or discourage parents from using these apps—such as cost, trust, content quality, internet access, or ease of use.

Also, there is a lack of information on how much parents understand the real benefits of these apps and how satisfied they are with their children's progress through online learning.

Therefore, this study aims to identify the adoption patterns and perceived benefits of online learning apps among parents of school children in Amravati City. It tries to fill the knowledge gap by understanding parents' experiences, challenges, and expectations from digital learning platforms.

3. Research Methodology

3.1 Research Design

The present study follows a descriptive research design, as it aims to describe and analyze the adoption patterns and perceived benefits of online learning apps among parents of school children in Amravati city. The survey method was used to collect data from respondents through a structured questionnaire containing both open-ended and close-ended questions. The study is cross-sectional in nature, as data was collected at a single point in time from a selected group of parents. The questionnaire served as the main data collection tool to gather information about parents' awareness, preferences, and satisfaction regarding online learning apps.

3.2 Objectives:

1. To study the level of awareness among parents about online learning apps used for school education.
2. To identify the factors influencing parents' adoption of online learning apps (such as usefulness, cost, and ease of use).
3. To find out the challenges and limitations faced by parents while using online learning apps.
4. To analyze parents' perceived benefits of using online learning apps for their children's studies.
5. To provide recommendations for improving online learning app usage and parental involvement in Amravati City.

3.3 Data sources & Methods

For this study, both primary and secondary data were used.

Primary Data:

The primary data was collected through a structured questionnaire given to parents of school children in Amravati city. The questionnaire was distributed through Google Forms and physical copies or Physical Forms to make data collection easier and faster.

Secondary Data:

The secondary data was collected from journals, research papers, government reports, websites, and articles related to online learning apps and digital education trends.

Sample Size

A sample of 100 parents was selected as respondents for the survey. This number was chosen to ensure a representative sample of opinions and behaviors within the Amravati city area.

Tools

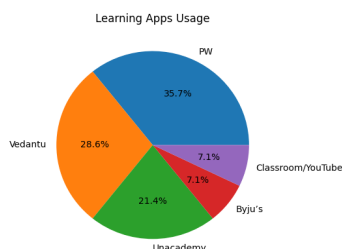
Percentage analysis is used for analyzing the data collected from the respondents.

♦Limitation of research

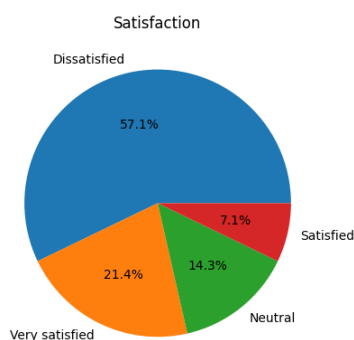
- The study is limited to parents from Amravati City; therefore, the findings may not be generalizable to other regions.
- Due to time and resource constraints, the sample size is limited, which may not capture all perspectives.

4. Data Analysis & Interpretation

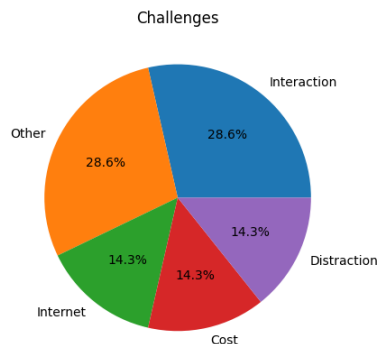
The collected data will be processed, analyzed, and interpreted using both quantitative and qualitative methods to draw meaningful conclusions. After collecting responses through questionnaires, the data will be coded, tabulated, and classified systematically. Various statistical tools such as percentages, averages, chi-square test and correlation analysis will be used to identify patterns and relationships among variables. For accurate and efficient analysis, software like Microsoft Excel and SPSS (Statistical Package for the Social Sciences) will be used to generate tables, charts, and graphs that help in clear interpretation of results.



The responses indicate that a majority of parents prefer PW (35.7%), making it the most commonly used online learning app among students. This is followed by Vedantu (28.6%) and Unacademy (21.4%), showing moderate usage among respondents. A very small proportion of parents reported using Byju's (7.1%) and Classroom/YouTube (7.1%) for their children's education. Overall, the findings suggest that while multiple platforms are available, PW and Vedantu dominate the preference, indicating a higher level of trust and popularity among parents in Amravati City.



The responses indicate that a significant proportion of parents are dissatisfied (57.1%) with their child's learning progress through online learning apps. Meanwhile, 21.4% of parents are very satisfied, and 14.3% remain neutral, reflecting mixed opinions regarding effectiveness. Only a small percentage (7.1%) reported being satisfied. Overall, the findings suggest that although some parents are satisfied, the majority hold a negative perception, highlighting concerns about the effectiveness of online learning platforms.



The responses indicate that the most common challenges faced by parents are lack of interaction (28.6%) and other issues (28.6%), making them the primary concerns. Additionally, internet problems (14.3%), high cost (14.3%), and distractions (14.3%) are also reported as significant barriers. Overall, the findings suggest that interaction-related issues and practical difficulties play a major role in limiting the effectiveness of online learning apps, affecting both user experience and learning outcomes.

5. Conclusion

In conclusion, online learning apps have become an important part of modern education, offering flexibility and easy access to learning resources for students. The present study examined the adoption patterns, perceived benefits, and challenges of online learning apps among parents of school children in Amravati City. The findings reveal that while many parents are aware of and use such applications, their overall satisfaction remains relatively low. The findings indicate that parents are primarily influenced by factors such as convenience, flexible timing, and interest in digital learning when adopting these apps. However, several challenges, including lack of personal interaction, distractions, internet issues, and high costs, affect their effectiveness. In addition, irregular usage patterns indicate that online learning apps are not consistently used as a primary learning method. Overall, the results suggest that although online learning apps provide certain advantages, they are not fully meeting the expectations of parents in terms of learning outcomes. Therefore, there is a need for improvement in quality, engagement, and support systems to enhance their effectiveness. Continuous evaluation and feedback from parents can help in improving the overall experience and outcomes of online learning.

6. Suggestions

Based on the findings of the study, several measures can be suggested to improve the usage and effectiveness of online learning apps among school children in Amravati City. Firstly, app developers

should focus on improving interactive features, such as live sessions, doubt-solving support, and personalized learning, to overcome the issue of limited interaction. Secondly, efforts should be made to reduce technical barriers, including improving app performance and ensuring better accessibility even with low internet connectivity. Affordable pricing plans or free educational content can also help in increasing adoption among parents. Thirdly, parents should be encouraged to actively monitor and guide their children while using online learning apps to reduce distractions and ensure effective learning. Schools and teachers can also play a supportive role by integrating online tools with classroom teaching and guiding parents on their proper use. Additionally, awareness programs and training sessions can be conducted to educate parents about the effective use of digital learning platforms. Encouraging a balanced approach that combines both online and offline learning can further enhance the overall learning experience of students.



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A Comprehensive Analytical Study of Data Mining Techniques and Their Real-World Applications.”

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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.

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.

INTRODUCTION:

To generate information it requires massive collection of data. The data can be simple numerical figures and text documents, to more complex information such as spatial data, multimedia data, and hypertext documents. To take complete advantage of data; the data retrieval is simply not enough, it requires a tool for automatic summation of data, extraction of the essence of information stored, and the discovery of patterns in raw data. With the enormous amount of data stored in files, databases, and other repositories, it is increasingly important, to develop powerful tool for analysis and interpretation of such data and for the extraction of interesting knowledge that could help in decision-making. The only answer to all above is 'Data Mining'.

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.[1]

THE DATA MINING TASKS:

The data mining tasks are of different types depending on the use of data mining result the data mining tasks are classified as:

1. Exploratory Data Analysis: It is simply exploring the data without any clear ideas of what we are looking for. These techniques are interactive and visual.
2. Descriptive Modeling: It describe all the data, It includes models for overall probability distribution of the data, partitioning of the p-dimensional space into groups and models describing the relationships between the variables.
3. Predictive Modeling: This model permits the value of one variable to be predicted from the known values of other variables.
4. Discovering Patterns and Rules: It concern with pattern detection, the aim is spotting fraudulent behavior by detecting regions of the space defining the different types of transactions where the data points significantly different from the rest.
5. Retrieval by Content: It is finding pattern similar to the pattern of interest in the data set. This task is most commonly used for text and image data sets.[2]

Types of Data Mining Systems

Data mining systems can be classified based on different criteria depending on the nature of the data, the type of knowledge extracted, the techniques applied, and the level of user interaction involved. These classifications help organizations choose appropriate data mining systems for specific analytical tasks in modern data-driven environments.

1. Classification Based on the Type of Data Source Mined

Data mining systems can be categorized according to the type of data they analyze. Different forms of data require specialized methods and tools for effective analysis.

- **Relational Database Mining:** Systems designed to extract knowledge from structured databases commonly used in business applications such as banking, sales, and customer management systems.
- **Data Warehouse Mining:** These systems analyze integrated and historical data stored in data warehouses to support business intelligence and strategic decision-making.
- **Spatial Data Mining:** Used for analyzing geographic and location-based data such as satellite images, geographic information systems (GIS), and environmental monitoring data
- **Multimedia Data Mining:** Focuses on extracting useful information from multimedia sources such as images, videos, and audio files. This is widely used in medical imaging, surveillance systems, and digital media platforms.
- **Time-Series Data Mining:** Analyzes time-based data such as stock market prices, weather data, sensor readings, and financial transactions to identify trends and forecasting patterns.
- **Text and Web Data Mining:** Deals with extracting knowledge from unstructured data such as documents, emails, social media content, and web pages. These techniques are widely used in sentiment analysis, recommendation systems, and search engines.

2. Classification Based on the Type of Knowledge Discovered

Data mining systems can also be categorized according to the type of knowledge or patterns they discover within datasets.

- **Characterization and Summarization:** Provides a general summary or description of the characteristics of data. For example, summarizing customer purchasing behavior.

- **Discrimination:** Compares data objects belonging to different classes to identify distinguishing characteristics.
- **Association Rule Mining:** Discovers relationships between variables in large datasets, such as identifying products frequently purchased together in retail stores.
- **Classification:** Assigns data items to predefined categories using models trained from historical data. This technique is commonly used in spam email detection and credit risk assessment.
- **Clustering:** Groups similar data objects into clusters without predefined labels. It is widely used in market segmentation and customer behavior analysis.
- **Outlier or Anomaly Detection:** Identifies unusual patterns or deviations in data, which is useful in fraud detection, Cybersecurity, and fault detection systems.

3. Classification Based on Data Mining Techniques Used

Data mining systems can also be classified based on the analytical methods and algorithms used to extract patterns and insights from data.

- **Machine Learning-Based Systems:** Use algorithms such as decision trees, support vector machines, and deep learning models to automatically learn patterns from data.
- **Neural Network-Based Systems:** Inspired by biological neural systems, these models are used for complex pattern recognition tasks such as image recognition, speech processing, and predictive analytics.
- **Genetic Algorithm-Based Systems:** Apply evolutionary computing techniques to find optimal solutions in complex optimization problems.
- **Statistical Data Mining Systems:** Use statistical models and hypothesis testing methods to analyze relationships between variables and predict future outcomes.
- **Visualization-Based Systems:** Provide graphical representations of data patterns and trends, helping users understand complex data through visual analysis.
- **Database-Oriented and Data Warehouse-Oriented Systems:** Integrate mining techniques directly with database management systems to efficiently analyze large-scale enterprise data.

4. Classification Based on the Level of User Interaction

Another important classification is based on the degree of user involvement during the data mining process.

- **Query-Driven Systems:** Users specify queries or conditions to extract specific patterns or information from data.
- **Interactive Exploratory Systems:** Allow users to interactively explore data, modify parameters, and refine mining results in real time.
- **Autonomous Data Mining Systems:** These systems automatically perform data analysis and generate insights with minimal human intervention using intelligent algorithms.

In real-world applications, modern data mining platforms often combine multiple techniques and support different types of data sources while providing flexible levels of user interaction. Such comprehensive systems enable organizations to efficiently analyze large and complex datasets and derive valuable insights for decision-making.[4]

DATA MINING LIFE CYCLE:

The life cycle of a data mining project consists of six phases. The sequence of the phases is not rigid. Moving back and forth between different phases is always required. It depends on the outcome of each phase. The main phases are:

1. **Business Understanding:** This phase focuses on understanding the project objectives and requirements from a business perspective, then converting this knowledge into a data mining problem definition and a preliminary plan designed to achieve the objectives.
2. **Data Understanding:** It starts with an initial data collection, to get familiar with the data, to identify data quality problems, to discover first insights into the data or to detect interesting subsets to form hypotheses for hidden information.
3. **Data Preparation:** It covers all activities to construct the final dataset from the initial raw data.

4. Modeling: In this phase, various modeling techniques are selected and applied and their parameters are calibrated to optimal values.
5. Evaluation: In this stage the model is thoroughly evaluated and reviewed. The steps executed to construct the model to be certain it properly achieves the business objectives. At the end of this phase, a decision on the use of the data mining results should be reached.
6. Deployment: The purpose of the model is to increase knowledge of the data, the knowledge gained will need to be organized and presented in a way that the customer can use it. The deployment phase can be as simple as generating a report or as complex as implementing a repeatable data mining process across the enterprise.

THE DATA MINING MODELS:

The data mining models are of two types: Predictive and Descriptive.

- The predictive model makes prediction about unknown data values by using the known values. Ex. Classification, Regression, Time series analysis, Prediction etc.
- The descriptive model identifies the patterns or relationships in data and explores the properties of the data examined. Ex. Clustering, Summarization, Association rule, Sequence discovery etc.

Many of the data mining applications are aimed to predict the future state of the data. Prediction is the process of analyzing the current and past states of the attribute and prediction of its future state. Classification is a technique of mapping the target data to the predefined groups or classes, this is a supervise learning because the classes are predefined before the examination of the target data. The regression involves the learning of function that map data item to real valued prediction variable. In the time series analysis the value of an attribute is examined as it varies over time. In time series analysis the distance measures are used to determine the similarity between different time series, the structure of the line is examined to determine its behavior and the historical time series plot is used to predict future values of the variable.

Clustering is similar to classification except that the groups are not predefined, but are defined by the data alone. It is also referred to as unsupervised learning or segmentation. It is the partitioning or segmentation of the data in to groups or clusters. The clusters are defined by studying the behavior of the data by the domain experts. The term segmentation is used in very specific context; it is a process of partitioning of database into disjoint grouping of similar tuples. Summarization is the technique of presenting the summarize information from the data.[5]

THE KNOWLEDGE DISCOVERY PROCESS:

Data mining is one of the tasks in the process of knowledge discovery from the database. The steps in the KDD process contains:

1. Data cleaning: It is also known as data cleansing; in this phase noise data and irrelevant data are removed from the collection.
2. Data integration: In this stage, multiple data sources, often heterogeneous, are combined in a common source.
3. Data selection: The data relevant to the analysis is decided on and retrieved from the data collection.
4. Data transformation: It is also known as data consolidation; in this phase the selected data is transformed into forms appropriate for the mining procedure.
5. Data mining: It is the crucial step in which clever techniques are applied to extract potentially useful patterns.
6. Pattern evaluation: In this step, interesting patterns representing knowledge are identified based on given measures.

DATA MINING METHODS:

The data mining methods are broadly categories as: On-Line Analytical Processing

(OLAP), Classification, Clustering, Association Rule Mining, Temporal Data Mining,

Time Series Analysis, Spatial Mining, Web Mining etc. These methods use different types of algorithms and data. The data source can be data warehouse, database, flat file or text file. The algorithms may be Statistical Algorithms, Decision Tree based, Nearest Neighbor, Neural Network based, Genetic Algorithms based, Ruled based, Support Vector Machine etc. The selection of data mining algorithm is mainly depends on the type of data used for mining and the expected outcome of the mining process. The domain experts play a significant role in the selection of algorithm for data mining.[5][6]

A knowledge discovery (KD) process involves pre-processing data, choosing a data-mining algorithm, and post processing the mining results. There are very many choices for each of these stages, and non-trivial interactions between them. Therefore both novices and data-mining specialists need assistance in knowledge discovery processes.

The Intelligent Discovery Assistants (IDA), helps users in applying valid knowledge discovery processes. The IDA can provide users with three benefits:

1. A systematic enumeration of valid knowledge discovery processes;
2. Effective rankings of valid processes by different criteria, which help to choose between the options;
3. An infrastructure for sharing knowledge, which leads to network externalizes.

Several other attempts have been made to automate this process and design of a generalized data mining tool that posses intelligence to select the data and data mining algorithms and up to some extent the knowledge discovery.[7]

DATA MINING APPLICATION:

1. The data mining applications can be generic or domain specific. The generic application is required to be an intelligent system that by its own can takes certain decisions like: selection of data, selection of data mining method, presentation and interpretation of the result. Some generic data mining applications cannot take its own these decisions but guide users for selection of data, selection of data mining method and for the interpretation of the results..
2. A multi-tier data mining system is proposed to enhance the performance of the data mining process. It has basic components like user interface, data mining services, data access services and the data. There are three different architectures presented for the data mining system namely One-tire, Two-tire and Three-tire architecture.
3. Generic system required to integrates as many learning algorithms as possible and decides the most appropriate algorithm to use. CORBA (Common Object Request Broker Architecture) has features like:
 - Integration of different applications coded in any programming language considerably easy.
 - It allows reusability in a feasible way and finally it makes possible to build large and scalable system.
 - The data mining system architecture based on CORBA is given by Object Management Group has all characteristics to accomplish a distributed and object oriented computation.

4. A data-centric focus and automated methodologies makes data mining accessible to nonexperts. The use of high-level interfaces can implement the automated methodologies that hide the data mining concepts away from the users.
5. In data mining better results could be obtained if large data is available. It leads to the merging and linking of local databases. A new data-mining architecture based on Internet technology addressed this problem.
6. The context factor plays vital role in the success of data mining. The importance and meaning of same data in the different context is different. A data in one context is very important may not be much important in other context. A context-aware data-mining framework filters useful and interesting context factors, and can produce accurate and precise prediction using those factors.
7. The domain specific applications are focused to use the domain specific data and data mining algorithm that targeted for specific objective. The applications studied in this context are aimed to generate the specific knowledge. In the different domains the data generating sources generate different type of data. Data can be from a simple text, numbers to more complex audio-video data.
8. In the identification of foreign-accented French the audio files were used and the best 20 data mining algorithms were applied the Logistic Regression model found the most robust algorithm than other algorithm.
9. In language research and language engineering many time extra linguistic information is needed about a text. A linguistic profile that contains large number of linguistic features can be generated from text file automatically using data mining. This technique found quite effective for authorship verification and recognition
10. The Internet contains a large number of online documents available thus required an automated text and document classification systems that are capable of automatically organizing and classifying documents. There are several different data mining methods for text classification, including statistical-based algorithms, Bayesian classification, distance-based algorithms, knearest neighbors, decision tree-based methods etc.[3][7]

CONCLUSION:

Most of the previous studies on data mining applications in various fields use the variety of data types range from text to images and stores in variety of databases and data structures. The different methods of data mining are used to extract the patterns and thus the knowledge from this variety databases. Selection of data and methods for data mining is an important task in this process and needs the knowledge of the domain. Several attempts have been made to design and develop the generic data mining system but no system found completely generic. Thus, for every domain the domain expert's assistant is mandatory. The domain experts shall be guided by the system to effectively apply their knowledge for the use of data mining systems to generate required knowledge.

The domain experts are required to determine the variety of data that should be collected in the specific problem domain, selection of specific data for data mining, cleaning and transformation of data, extracting patterns for knowledge generation and finally interpretation of the patterns and knowledge generation.

Most of the domain specific data mining applications show accuracy above 90%. The generic data mining applications are having the limitations. From the study of various data mining applications it is observed that, no application called generic application is 100 % generic. The intelligent interfaces and intelligent agents up to some extent make the application generic but have limitations. The domain experts play important role in the different stages of data mining. The decisions at different stages are influenced by the factors like domain and data details, aim of the data mining, and the context parameters.



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Transforming Commerce Education: The Integration of Skill-Based Learning under NEP 2020

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Abstract –

The **National Education Policy (NEP) 2020** marks a transformative shift in India's educational landscape, aiming to establish a flexible and inclusive framework tailored for the 21st century. This review evaluates the policy's profound impact on vocational education within the commerce sector, specifically focusing on its capacity to bridge the skills gap and enhance graduate employability. By integrating vocational training from the early stages and introducing a flexible multi-entry/multi-exit system, NEP 2020 promotes a holistic approach that balances theoretical knowledge with industry-relevant practical skills. This evolution is evident in curriculum designs that now prioritize financial literacy, entrepreneurship, digital marketing, and data analysis to meet modern industry demands. Furthermore, the policy champions pedagogical innovations—transitioning toward student-centered, project-based learning and technology integration—to nurture both technical expertise and essential soft skills. While the policy holds significant potential to drive India's economic development by aligning education with market needs, the review also highlights critical implementation challenges, including teacher training, resource allocation, and the necessity for robust industry-academia collaborations to realize the full vision of vocational excellence in commerce.

Keywords: NEP 2020, Vocational Education, Skill Gap, Financial Literacy, Digital Marketing, Data Analysis, Student-Centered Learning.

I. INTRODUCTION

The **NEP 2020** represents one of the most significant reforms in India's post-independence history, specifically designed to overhaul a traditional system into a dynamic, 21st-century model. At its core, the policy seeks to dissolve the rigid boundaries between "academic" and "vocational" streams, a distinction that has historically limited the career prospects of many students. In the context of **Commerce Education**, this shift is particularly critical. As the global economy moves toward digitalization and automation, the traditional commerce curriculum must evolve beyond basic accounting to include **Financial Literacy, Data Analytics, and Digital Marketing**.

The NEP 2020 marks a revolutionary shift in India's educational paradigm, aiming to establish a resilient, adaptable, and equitable framework suited for 21st-century demands. Representing the first comprehensive reform in over three decades, this policy replaces the 1986 National Policy on Education (NPE), which had remained largely unchanged since its 1992 revision. Developed through a wide-reaching consultative process involving the Dr. K. Kasturirangan Committee, industry bodies like FICCI and CII, and various academic stakeholders, NEP 2020 is designed to empower students with the competencies needed for a fast-paced global economy. It prioritizes the development of analytical thinking, creativity, and problem-solving, ensuring that high-standard education is accessible to all, regardless of socioeconomic background. A cornerstone of this reform is its commitment to vocational education, particularly within the commerce stream. By embedding real-world experience in fields like finance, accounting, and entrepreneurship through structured internships and apprenticeships, the policy seeks to produce a workforce that is immediately ready to meet the professional requirements of India's modern industrial landscape.

II Research Objectives

This study conducts a rigorous evaluation of the **National Education Policy (NEP) 2020** and its impact on vocational education within the commerce sector. The research is structured around four pivotal objectives:

To analyze NEP 2020 shifts curriculum design from traditional theory to practical, skills-based training by evaluating the effectiveness of integrated hands-on experience in enhancing student readiness.

2. To study assesses the policy's influence on graduate job prospects by exploring how aligning education with industry standards improves job preparedness and facilitates a seamless transition into the professional workforce.

III. Research Methodology

This study adopts a **qualitative research design**, utilizing both **descriptive, analytical review** methods & case study to evaluate the transformative role of the National Education Policy (NEP) 2020 in the context of vocational education within the commerce sector.

The Descriptive Approach: Mapping the Framework

The descriptive component of this research serves as the structural bedrock. It involves a meticulous documentation of the **National Education Policy (NEP) 2020** to ensure that the study is grounded in official legislative intent.

Focus on Systemic Evolution: The study delineates the transition from the traditional 10+2 model to a **developmental-stage-centric hierarchy** defined by the 5+3+3+4 framework. Within the context of commerce education, this restructuring is pivotal; it establishes "Foundational" and "Preparatory" phases designed to cultivate **cognitive adaptability** and analytical thinking well in advance of a student's formal specialization in the commerce stream.

Early Vocationalization (Class 6 and beyond): A core descriptive task is detailing the mandate for vocational exposure starting in middle school. This includes the "10-day bagless period" where students intern with local professionals. In the context of commerce, this might involve shadowing a local trader, a bank teller, or a small-scale entrepreneur, effectively de-stigmatizing labor-oriented roles and fostering a "business-first" mindset early in life.

The Analytical Approach: Evaluating the Commerce Impact

The analytical phase is the "intellectual engine" of the research. It moves beyond the text of the policy to interrogate its practical application within the commerce stream. This approach focuses on the alignment, pedagogy, and economic viability of the reforms:

Pedagogical Shift from Rote to Reality:

Here, the research analyzes the "how" of teaching. It moves from describing a "student-centered approach" to analyzing its impact on critical thinking and problem-solving. In commerce, this means analyzing the transition from memorizing the "Companies Act" to simulating a "Boardroom Conflict" or "Startup Valuation" through Project-Based Learning (PBL).

The Multi-Entry/Multi-Exit (MEME) Analysis:

This part of the research analyzes the socio-economic implications of the exit options. It questions whether a "Certificate in Commerce" after one year truly provides enough employability for a student who drops out due to financial constraints. By analyzing the Academic Bank of Credits (ABC), the study evaluates if this system will successfully reduce the "dropout-to-unemployment" pipeline by providing tangible, skill-based exit points that are recognized by the industry.

Case Study –A Comparative Evaluation of Indian Vocational Pedagogy: The Pre- and Post-NEP 2020 Landscape

The NEP 2020 has revolutionized Indian education by embedding vocational training into the mainstream curriculum to bridge the national workforce's skill gap. By aligning academic goals with current market needs, especially in the commerce sector, the policy equips students with the practical expertise demanded by modern employers. This study examines the shift from pre-NEP models to the current framework, featuring case studies of institutions that faced significant implementation challenges. It further highlights the strategic success factors that enabled other institutions to effectively adopt these reforms and significantly boost student employability.

Indian Vocational Pedagogy before NEP 2020–

Before the implementation of NEP 2020, vocational education in India functioned as a separate entity from the traditional school system, primarily focusing on narrow technical fields like engineering, healthcare, and manual trades such as carpentry or plumbing. This siloed approach led to a significant lack of integration with formal academic pathways and a notable absence of skill-based training within the

commerce sector. The system faced immense hurdles, including a disconnect between curricula and actual industry needs, which resulted in graduates who were often ill-equipped for the modern workforce.

Indian Vocational Pedagogy after NEP 2020 –

The NEP 2020 has established a robust framework for revolutionary shifts in educational content and instruction, aiming to completely reshape India's vocational landscape. A pivotal development is the introduction of skill-based subjects as early as Class 6, making practical training a fundamental component of the primary learning process. By fostering deep connections between schools and the corporate world, the policy guarantees that vocational training stays aligned with current market trends through active cooperation with industry leaders. Additionally, the curriculum now features modern, experiential courses designed for high-growth sectors, moving the focus away from memorization and toward tangible, hands-on mastery. Lastly, the flexible system of multiple entry and exit points empowers students to customize their academic and professional journeys according to their individual needs and timing.

Success Stories Post-NEP 2020–

The transformation of the Commerce stream under NEP 2020 has shifted the focus from static accounting to a dynamic, skill-based ecosystem.

1. Multidisciplinary Academic Flexibility

The removal of rigid silos between Arts, Science, and Commerce has allowed students to customize their degrees to match the modern economy. A Commerce student can now major in Accountancy while taking a Minor in Data Science or Applied Psychology, creating "FinTech-ready" graduates who understand both market behavior and data analytics. This flexibility has led to a surge in cross-disciplinary research and higher employability in hybrid roles that didn't exist a decade ago.

2. Multiple Entry and Exit Options

The introduction of the Four-Year Undergraduate Programme (FYUP) paired with the Academic Bank of Credits (ABC) has significantly reduced dropout rates. Students who face financial or personal hurdles can now exit after one year with a Certificate or two years with a Diploma in Vocational Studies, such as "Basic Accounting" or "GST Filing." This allows them to enter the workforce as semi-professionals and return later to complete their full Degree without losing their previous academic progress.

3. Vocational Integration and Internships

NEP 2020 has successfully bridged the "industry-academia gap" by making internships and practical projects mandatory for credit. Commerce departments have moved away from purely theoretical exams toward stock market simulations, digital auditing workshops, and real-world Tally certifications. This "hands-on" approach has resulted in a documented 15-20% increase in campus placement rates, as graduates now possess functional skills required by the corporate sector on day one.

4. Promotion of Student Entrepreneurship

By integrating Entrepreneurship as a core credit-earning subject, Commerce colleges are evolving from degree-awarding institutions into startup incubators. Students are encouraged to launch micro-ventures and e-commerce platforms as part of their curriculum, shifting the mindset from "job seeker" to "job creator." This has been particularly successful in Tier-2 and Tier-3 cities, where local commerce students are applying modern business models to traditional Indian crafts and trade practices.

Obstacles and Opportunities–

While NEP 2020 has advanced vocational training, significant hurdles remain before its vision is fully realized. A primary bottleneck is teacher readiness, as it is difficult to ensure that educators possess the specific industry expertise and practical skills required to deliver these specialized courses effectively. Furthermore, a deep-seated social stigma continues to push parents and students away from vocational tracks, viewing them as inferior to traditional academic routes. This cultural bias remains a major barrier, hindering the widespread adoption and ultimate success of these alternative career pathways.

IV. CHALLENGES AND BARRIERS IN IMPLEMENTING NEP 2020

Realizing the vision of NEP 2020 for vocational education requires navigating a complex landscape of structural, pedagogical, and sociocultural hurdles. At the foundational level, rural areas suffer from significant infrastructure deficits and a lack of modern digital tools, while a critical shortage of industry-trained faculty hampers the integration of experiential learning. This gap is further widened by

fragmented ties between educational institutions and the corporate world, leading to a persistent skills mismatch and a lack of structured internships. Beyond these physical barriers, the policy faces systemic challenges inherent in India's decentralized framework, where uneven funding and inconsistent state-level execution create a fragmented educational landscape. These financial constraints are compounded by a deep-seated social bias that continues to frame vocational training as "inferior" to traditional academic degrees. Ultimately, overcoming these interrelated obstacles—from resource shortages to cultural stigma—demands a unified strategy that prioritizes teacher upskilling, robust industry partnerships, and a massive awareness campaign to restore the prestige and utility of vocational career paths.

V. CONCLUSION AND RECOMMENDATIONS

Summary - The National Education Policy (NEP) 2020 has significantly reshaped Indian schooling by prioritizing vocational training within the commerce stream. Assessing its implementation reveals a complex shift in the academic landscape, highlighting both promising benefits and notable obstacles. Ultimately, while the policy fosters practical skill development, its real-world impact remains a blend of successful advancements and persistent challenges.

Advantages / Merits –

The primary merit of NEP 2020 for commerce vocational education lies in its holistic strategy that blends professional training with core academics to produce versatile, industry-ready graduates. By dissolving rigid disciplinary silos, the policy ensures students gain the flexibility to thrive in high-demand sectors like finance, digital marketing, and data analytics. This modernization is further bolstered by the integration of technology and the National Skills Qualifications Framework (NSQF), which validates vocational paths and removes geographical barriers to learning. Through mandatory internships and robust industry alliances, the framework effectively bridges the gap between classrooms and corporations. Ultimately, this comprehensive approach de-stigmatizes vocational studies and equips the workforce with the practical expertise required to meet the evolving demands of the global economy.

Drawbacks / Shortcomings –

Despite its ambitious vision, NEP 2020 faces significant structural impediments, particularly in rural areas where inadequate infrastructure and a lack of standardized clarity restrict access to high-quality commerce vocational training. A critical shortage of educators possessing both academic depth and practical industry experience further compromises instructional quality, directly hindering student readiness for the modern workforce. Moreover, the slow maturation of industry-academic alliances and a persistent digital divide create a disconnect between the curriculum and actual market demands. These misalignments threaten the overall equity of the framework, leaving marginalized communities effectively barred from the specialized training the policy intends to provide.

VII. Recommendation –

To effectively implement vocational education in commerce under NEP 2020, a comprehensive strategy is required that synchronizes teacher development, industry integration, digital accessibility, and quality control. At its core, this involves modernizing teacher training through consistent up skilling and direct industry mentorship, potentially even through short-term corporate placements that help Educators Bridge the gap between classroom theory and practical application. This academic foundation must be reinforced by formal partnerships with the business sector, where industry-led advisory boards co-create curricula and expand structured internship opportunities to ensure students graduate with market-ready skills. Simultaneously, the digital divide must be addressed by investing in robust infrastructure and a blended learning model—combining virtual resources with traditional instruction—to reach learners in underserved areas. By establishing uniform national standards for quality assurance and fostering inclusivity through targeted financial aid and outreach, the system can ensure that high-quality, relevant vocational training is accessible to every student regardless of their background.

VIII. Prospects for the Future

Under the NEP 2020 framework, vocational education in commerce is poised for a transformative future where practical, employable skills become as valued as traditional academic credentials. However, true success will require a commitment to continuous innovation and institutional agility to keep pace with the rapid advancements in artificial intelligence and automation. By fostering deep industry collaborations and integrating cutting-edge technology, commerce education can equip

students with the technical expertise and global perspective—including cross-cultural competency and international exposure—needed to thrive in a competitive, interconnected market. Ultimately, while NEP 2020 provides the blueprint for this revolution, its real-world impact depends on successfully addressing current implementation gaps through a dedicated focus on teacher excellence, digital integration, and inclusive access for all learners.

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Predicting Multiple Diseases Through Methods of Data Mining

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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

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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.

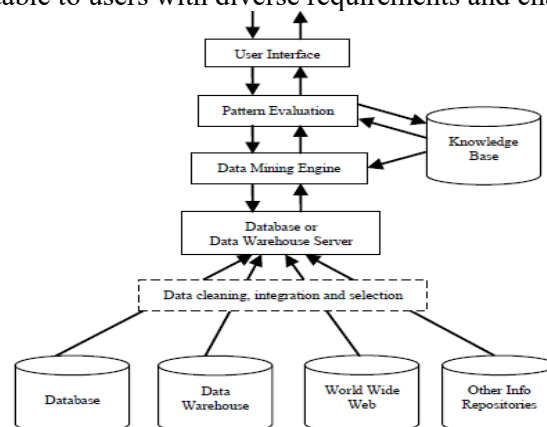


Fig1: A Typical Architecture of Data Mining System

I. 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.

II. 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]

- **SimpleKMeans**

Kmeans algorithm is an iterative algorithm that tries to partition the dataset into Kpre-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 states 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]

III. 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

I. 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 these even 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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“A Study on The Perceived Efficiency of Government Schools: A Survey of Teachers and Parents of Amravati City”

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Abstract

Government schools are a crucial component in providing accessible, reasonably priced education to a wide range of social groups. What important stakeholders, especially parents and teachers, see these institutions' efficiency has a big impact on how effective they are. The purpose of this study is to examine how teachers and parents see the academic and operational effectiveness of Amravati City's government schools.

The study uses both primary and secondary data and employs a descriptive survey design. A structured questionnaire was used to gather primary data from parents and teachers connected to Amravati City's government schools. Academic journals, government publications, U-DISE studies, and educational policy documents were the sources of secondary data. A number of factors, such as school infrastructure, the quality of the teaching staff, administrative efficacy, teaching-learning approaches, student involvement, and overall academic results, are taken into consideration when analysing perceived efficiency.

The findings show that government schools are seen favourably for encouraging inclusive education and offering basic facilities, but stakeholders point up problems with effective resource use, instructional strategies, teacher workload, and family involvement. Teachers' and parents' differing perspectives point to a disconnect between stakeholder expectations and institutional functioning.

The study comes to the conclusion that better resource management, increased parent-school connection, regular professional development for teachers, and improvements in school administration can all have a beneficial impact on how effective government schools are perceived. For legislators, school administrators, and educational planners committed to raising the standard of instruction in public schools, the results provide insightful information.

Keywords: Perceived Efficiency, Government Schools, Teachers' Perception, Parents' Perception, Operational Efficiency, Academic Efficiency, Amravati City.

1. Introduction

1.1 Government School Education System

The government school education system forms the backbone of the public education framework in India and plays a vital role in providing free, equitable, and accessible education to all children, especially those from economically weaker and socially disadvantaged sections. This system is administered and funded by central, state, and local authorities and operates under national education policies and constitutional guidelines. It follows a structured and sequential pattern from pre-primary to higher secondary education, ensuring continuous academic and overall development of students. Government schools focus on building foundational literacy and numeracy at the primary level, developing conceptual understanding at the upper primary stage, preparing students for board examinations at the secondary level, and offering subject specialization at the higher secondary level. In addition, government schools implement various welfare schemes such as mid-day meals, free textbooks, uniforms, scholarships, and digital learning initiatives to improve enrolment, attendance, and retention.

Although significant improvements have been made in access and infrastructure, challenges such as limited resources, uneven quality of facilities, administrative inefficiencies, and variations in learning outcomes continue to affect the overall efficiency and performance of the government school education system.

1.2 Efficiency of Government Schools

Efficiency of government schools refers to how effectively these schools utilize available resources such as teachers, infrastructure, time, and financial support to achieve desired educational outcomes. It reflects the ability of government schools to provide quality education, ensure regular student attendance, reduce dropout rates, and improve academic performance with limited public resources. Government school efficiency can be understood through two major dimensions: operational efficiency and academic efficiency. Operational efficiency includes effective management of school infrastructure, proper utilization of funds, timely availability of learning materials, and smooth administrative functioning. Academic efficiency focuses on the quality of teaching–learning processes, curriculum implementation, student learning outcomes, and overall academic achievement. An efficient government school is one that successfully balances both operational and academic aspects, ensuring maximum educational benefits for students while minimizing wastage of resources. However, government schools often face challenges such as inadequate facilities, teacher shortages, administrative delays, and unequal learning outcomes, which impact their overall efficiency and performance.

1.3 Teachers' Perceptions on the Efficiency of Government Schools

Teachers' perceptions on the efficiency of government schools are an important indicator of how effectively these institutions' function, as teachers are directly involved in classroom teaching, school administration, and student development. Their perceptions reflect the real working conditions of schools and provide practical insights into both operational and academic efficiency. Teachers generally evaluate operational efficiency based on the availability of infrastructure, teaching materials, proper utilization of time, and smooth administrative processes. Adequate classrooms, sanitation facilities, learning resources, and timely support from authorities contribute to positive perceptions, while poor facilities, delays in resource distribution, and excessive non-teaching workload create dissatisfaction. Teachers also assess academic efficiency through students' learning outcomes, classroom engagement, syllabus completion, and overall academic performance. Effective teaching methods, supportive leadership, and regular professional training enhance teachers' confidence in the school system, whereas lack of training opportunities and weak implementation of educational policies negatively affect their views. Therefore, teachers' perceptions provide a realistic and meaningful understanding of government school efficiency and highlight key areas that require improvement for better educational outcomes.

1.4 Parents Perceptions on the Efficiency of Government Schools

Parents' perceptions on the efficiency of government schools are a significant factor in evaluating the overall performance of the public education system, as parents are primary stakeholders who closely observe the progress and development of their children. Parents generally assess the efficiency of government schools based on the quality of teaching, student learning outcomes, school infrastructure, discipline, safety, and the effectiveness of welfare schemes. They form positive perceptions when schools provide a supportive learning environment, maintain proper classroom discipline, ensure regular teacher attendance, and show improvement in students' academic performance. Parents also value facilities such as clean classrooms, drinking water, toilets, and safe school surroundings, as these directly affect their children's well-being. In addition, government welfare schemes like mid-day meals, free textbooks, uniforms, and scholarships strongly influence parents' opinions, especially among economically weaker families, as these reduce financial burden and support regular attendance. However, poor infrastructure, weak academic results, lack of communication with school

management, and irregular monitoring may lead to negative perceptions. Thus, parents' perceptions provide valuable insights into the real efficiency of government schools and highlight areas that need improvement to strengthen trust and educational quality.

2. Literature Review

Bennett (1996) investigated stakeholders' perceptions of class size in primary schools, focusing on headteachers, teachers, governors, and parents in Britain. The study found that increasing class sizes were widely perceived to negatively affect teaching quality, classroom management, and individual student attention, despite government claims that class size has no significant impact on learning outcomes. The findings highlight the gap between policy decisions and school-level realities, emphasizing class size as an important factor in educational effectiveness.

Sharma et al. (2017) Research by Sharma et al. highlighted the inadequate infrastructure in many government schools, including lack of proper classrooms, libraries, and sanitation facilities. The study emphasized the need for investments to improve the physical environment for effective learning.

Aggarwal and Singh (2018) Examined the factors influencing parental choice between government and private schools. The study highlighted perceptions of better academic quality and English-medium instruction as major reasons for the preference toward private schools.

Maruthavanan (2020) Maruthavanan's study sheds light on the awareness level of teachers regarding the National Education Policy (NEP) of 2019, revealing that it's generally not above average. The researcher's observation of significant differences in awareness among school teachers based on gender, community, years of service, and family type suggests that various factors influence educators' knowledge of the NEP 2019. It was also found out that Female teachers' exhibit higher rates of unawareness compared to male teachers' highlights a specific gender disparity in knowledge about the NEP 2019.

Nipper (2022) briefly highlights that online mindfulness training can positively influence teachers' awareness, reduce stress, and improve self-efficacy. Conducted in a public-school setting, the study shows that mindfulness practices support teachers' well-being and may help address stress and burnout, thereby contributing to a healthier and more effective teaching environment.

Sharma, Malik, & Nagy (2022) According to another study, enrolment of a considerable number of students with disabilities have increased due to different initiatives in the existing legislations and policies. The study also talked about the impact of various socio-economic parameters upon the existing perception of teachers about inclusion of differently abled students in schools and other academic institutions.

3. Research Methodology

3.1 Research Design

The study will adopt a descriptive research design, as it aims to describe and analyse the perceptions of teachers and parents regarding the efficiency of government schools in Amravati City. Elements of exploratory research will also be included to identify factors contributing to perceived efficiency and areas needing improvement.

The study will also follow a cross-sectional research design, where data will be collected at a single point in time from selected teachers and parents within Amravati City. Although the data collection itself will occur at one point in time, the overall time horizon for completing the study including planning, data collection, analysis, and reporting will be one year.

3.2 Research Objectives

1. To identify and describe the perceptions of teachers and parents regarding the overall efficiency of government schools in Amravati City.
2. To analyse the relationship between school infrastructure quality and the perceived efficiency of government schools.

3. To examine and evaluate how administrative support and school management practices influence teachers' perception of school efficiency.

4. To propose and recommend key improvement areas suggested by teachers and parents to enhance the efficiency of government schools in Amravati City.

3.3 Sampling Techniques

The study used purposive sampling to select government schools in Amravati City based on accessibility and willingness to participate, ensuring the research focuses on the intended setting. Within these schools, simple random sampling was applied to select teachers and parents, providing a fair and unbiased representation of their opinions.

The study will include 100 respondents (30 teachers and 70 parents) to capture key stakeholder perceptions. This sample is sufficient for meaningful analysis and feasible within research constraints (Kothari, 2004)

3.4 Data Collection Method

A structured questionnaire will be used for both teachers and parents to collect quantitative data on their perceptions. The questionnaire will include Likert scale items, multiple-choice questions, and a few open-ended questions for suggestions. If interviews are included, a semi-structured interview schedule will be used.

Secondary data will be collected from reliable sources to support the analysis and provide background information, including research journals and academic articles related to government school efficiency, government reports such as U-DISE reports and education department publications, websites such as education portals, official government websites, news articles, and previous studies available online, as well as books and reference material on educational policy, school management, and quality of education.

3.5 Data Analysis

A survey method will be used to gather quantitative data from teachers and parents. In addition, brief informal interviews may be conducted (optional) to gain deeper insights into specific issues highlighted through the survey responses.

3.6 Scope of the study

Provides insights into teachers' and parents' perceptions of government school efficiency, including teaching quality, learning outcomes, facilities, discipline, and overall functioning. Helps identify gaps between expectations and actual school performance, guiding improvements in education delivery. Supports policy and administrative decision-making for better resource allocation, infrastructure development, and classroom management.

Particulars		Frequency	Percentage
Age	Under 25	3	10%
	25-35	9	30%
	36-45	12	40%
	46-55	5	16.66%
	55 & above	1	3.33%
Gender	Male	12	40%
	Female	18	60%
Teaching Experience	Less than 5 years	8	26.66%
	5-10 years	12	40%
	11-20 years	5	16.66%
	21-30 years	3	10%
	More than 30 years	2	6.66%

4.1 Demographic Analysis of Teachers

The data collected from 30 teachers shows that the majority belong to the 36–45 years age group (40%), followed by 25–35 years (30%). In terms of gender, female teachers constitute 60%, while male teachers account for 40%. Regarding teaching experience, most teachers have 5–10 years of experience (40%), followed by less than 5 years (26.66%). Overall, the respondents mainly consist of female teachers aged 36–45 with moderate teaching experience, providing useful insights for the study.

4.2 Demographic Analysis of Parents

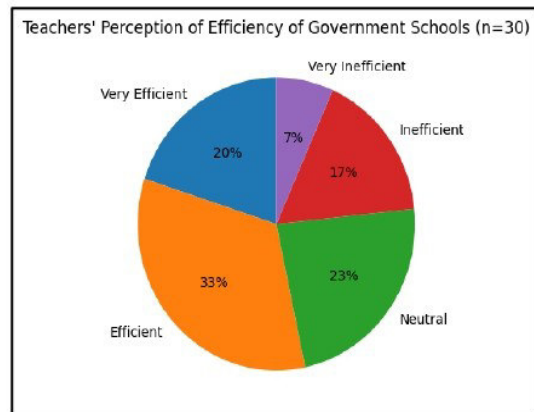
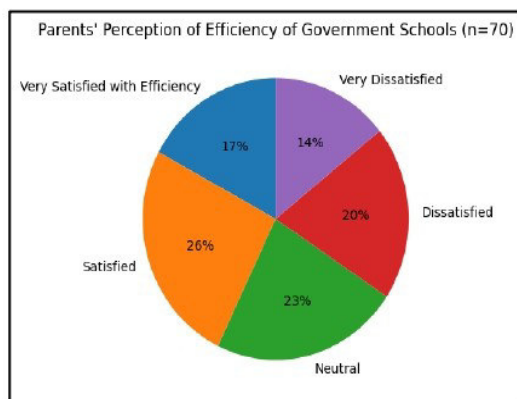
Particulars		Frequen cy	Percenta ge
Age	Under 25	0	0
	25-35	13	18.57%
	36-45	21	30%
	46-55	24	34.28%
	55 & above	12	17.14%
Gender	Male	45	64.28%
	Female	25	35.71%
Class of Your Child Studying in Government School	Primary (Std. I–IV)	16	22.85%
	Upper primary (Std. V–VII)	19	27.14%
	Secondary (Std. VIII–X)	27	38.57%
	Higher secondary (Std. XI–XII)	8	11.42%

The data collected from 70 parents shows that most respondents belong to the 46–55 years age group (34.28%), followed by 36–45 years (30%). In terms of gender, 64.28% are male and 35.71% are female. Regarding their children's education, most parents have children studying at the secondary level (Std. VIII–X) with 38.57%, followed by upper primary (27.14%). Overall, the respondents are mainly middle-aged parents whose children study in government schools, providing relevant insights for the study.

4.3 Teachers Perception

The responses indicate that a majority of teachers perceive government schools as efficient, with 33.33% rating them as efficient and 20% as very efficient. About 23.33% of teachers remain neutral, suggesting mixed experiences regarding school performance. However, 16.67% consider the schools inefficient and 6.67% very inefficient. Overall, the findings suggest that most teachers hold a positive perception of the efficiency of government schools, although some concerns about performance still exist.

4.4 Parents Perception



The data show

s that 25.71% of parents are satisfied and 17.14% are very satisfied with the efficiency of government schools, indicating a generally positive perception among many parents. At the same time, 22.85% remain neutral, reflecting moderate or uncertain opinions about school performance. On the other hand, 20% of parents are dissatisfied and 14.28% are very dissatisfied, suggesting that a significant portion of parents feel improvements are needed. Overall, the results reveal mixed perceptions among parents regarding the efficiency of government schools in Amravati City.

5. Conclusion

In conclusion, government schools play an essential role in providing affordable and accessible education, especially for children from economically weaker sections of society. The present study examined the perceived efficiency of government schools in Amravati City from the perspectives of teachers and parents, who are the primary stakeholders in the education system. The findings indicate that while government schools provide important support such as free education, textbooks, uniforms, and mid-day meals, several challenges still affect their overall efficiency. Issues related to infrastructure, teaching quality, administrative support, and communication between teachers and parents influence how these schools are perceived. Understanding the views of both teachers and parents helps highlight the strengths and weaknesses of the existing system. Addressing these challenges through improved infrastructure, better teacher support, effective management, and stronger parental involvement can significantly enhance the performance of government schools. Therefore, continuous evaluation and stakeholder participation are necessary to ensure that government schools deliver quality education and meet the expectations of the community.

6. Suggestion

Based on the findings of the study, several measures can be suggested to improve the perceived efficiency of government schools in Amravati City. First, greater attention should be given to improving school infrastructure, including classrooms, sanitation facilities, learning materials, and digital resources, as these factors directly influence student learning and attendance. Second, teacher support and professional development programs should be strengthened to enhance teaching quality and motivation. Regular training workshops, reduced administrative burden, and better access to teaching resources can help teachers perform their duties more effectively. Third, there should be stronger communication and collaboration between teachers and parents, which can improve trust and ensure that students receive proper academic and emotional support both at school and at home. Additionally, school authorities and policymakers should focus on efficient administrative practices and monitoring systems to ensure proper implementation of educational policies. Encouraging community participation and parental involvement in school activities can also contribute to improving the overall functioning and accountability of government schools.

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“A Study of Factors Influencing the Preference Towards Ice-Cream and Frozen Dessert Brands with Respect to Amravati City”

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Abstract

In recent years, the consumption of ice-cream and frozen desserts has increased significantly due to changing lifestyles, rising disposable income, and growing brand awareness among consumers. Ice-cream is no longer considered a seasonal product but is consumed throughout the year by people of all age groups. Consumers' preferences toward ice-cream and frozen dessert brands are influenced by various factors such as taste, price, quality, brand image, packaging, availability, and promotional activities. The present study aims to analyze the factors influencing consumer preference toward ice-cream and frozen dessert brands in Amravati city. The study also attempts to understand consumer buying behavior, brand loyalty, and satisfaction levels. The findings of the research will be useful for marketers and manufacturers to design effective marketing strategies and improve customer satisfaction.

Keywords: Ice-Cream, Frozen Desserts, Consumer Preference, Brand Image, Buying Behavior.

1. Introduction

Ice-cream and frozen desserts are among the most widely consumed dairy-based products across all age groups, ranging from children to senior citizens. Traditionally considered a seasonal treat, ice-cream has now evolved into a year-round indulgence due to advancements in cold storage facilities, improved distribution networks, and changing consumer lifestyles. The growing influence of western culture, increasing disposable income, and exposure to aggressive advertising have further contributed to the rising popularity of ice-cream and frozen dessert products. With the entry of several national and international brands, along with strong regional players, the ice-cream market has become highly competitive and dynamic.

Consumers today are presented with a vast range of options in terms of flavors, product formats such as cups, cones, bars, and family packs, as well as varying price points catering to different income groups. In such a competitive environment, consumer preference has emerged as a critical factor determining brand success. Customers evaluate multiple aspects before making a purchase decision, including taste, freshness, quality, price, hygiene standards, packaging attractiveness, brand reputation, and promotional schemes. Emotional factors such as brand loyalty, childhood memories, and peer influence also play a significant role in shaping preferences.

Amravati city, with its rapid urbanization, expanding youth population, and evolving consumption patterns, has witnessed a substantial increase in demand for branded ice-cream and frozen dessert products. The growth of supermarkets, malls, and local parlors has made these products easily accessible to consumers. Understanding the factors influencing consumer preference in Amravati city is therefore essential for manufacturers and marketers. Such insights help companies design effective marketing strategies, enhance customer satisfaction, retain existing consumers, and gain a competitive advantage in the market.

1.1 Ice-Cream and Frozen Desserts

Ice-cream is a frozen dairy product made primarily from milk, cream, sugar, and flavors, whereas frozen desserts may use vegetable fats instead of milk fat. Despite differences in composition, consumers often consider both products as substitutes.

The market offers various types such as cups, cones, bars, family packs, and premium products. Innovations in flavors and attractive packaging have further enhanced consumer interest. Seasonal demand, impulse buying behavior, and emotional attachment also influence consumer preference toward these products.

1.1 Ice-Cream and Frozen Desserts

Ice-cream is a popular frozen dairy product traditionally prepared using milk, cream, sugar, and a variety of natural or artificial flavors. It is valued for its rich taste, smooth texture, and high nutritional content derived from dairy ingredients. Frozen desserts, on the other hand, are similar in appearance and usage

but may contain vegetable fats instead of milk fat, along with milk solids, sweeteners, and flavoring agents. Although there is a technical difference in composition and standards, most consumers perceive ice-cream and frozen desserts as close substitutes and often use the terms interchangeably while making purchase decisions.

The ice-cream and frozen dessert market offers a wide variety of product forms to suit diverse consumer preferences and consumption occasions. These include single-serve cups, cones, sticks and bars, multi-serve family packs, and premium or artisanal products. The availability of multiple flavors—ranging from traditional options like vanilla, chocolate, and strawberry to innovative and exotic flavors—has significantly increased consumer interest and experimentation. Continuous innovation in product formulation, low-fat or sugar-free variants, and fusion flavors has further expanded the market base.

Attractive and convenient packaging also plays an important role in influencing consumer preference, as it enhances product appeal, ensures hygiene, and improves ease of consumption and storage. Ice-cream consumption is often associated with impulse buying behavior, especially among children and young consumers, and is strongly influenced by emotional factors such as pleasure, celebration, and nostalgia. Although demand tends to increase during summer seasons, changing lifestyles and improved cold-chain infrastructure have led to consistent year-round consumption. These combined factors contribute significantly to shaping consumer attitudes and preferences toward ice-cream and frozen dessert products.

1.2 Consumer Preference

Consumer preference refers to the pattern of choices made by consumers based on their individual tastes, needs, perceptions, attitudes, and purchasing power. It reflects how consumers evaluate and select one product or brand over another among the available alternatives. In the ice-cream and frozen dessert market, consumer preference plays a vital role, as the products are largely discretionary and driven by satisfaction, enjoyment, and personal liking rather than necessity.

Consumer preference in this market is influenced by a combination of rational and emotional factors. Rational factors include price, quantity, quality, nutritional value, freshness, and easy availability of the product. Consumers often compare brands based on affordability, portion size, consistency in taste, and perceived value for money before making a purchase decision. These factors are especially important for price-sensitive consumers and families.

Emotional factors also strongly influence consumer preference toward ice-cream and frozen dessert brands. Brand image, attractive advertisements, celebrity endorsements, appealing packaging, childhood experiences, and peer influence create emotional connections with consumers. Ice-cream is often associated with happiness, celebrations, rewards, and social bonding, which further strengthens emotional attachment to specific brands. Understanding consumer preference enables marketers to effectively position their products, design targeted promotional strategies, build brand loyalty, and gain a competitive edge in the highly competitive ice-cream and frozen dessert market.

1.3 Factors Influencing Preference

Consumer preference toward ice-cream and frozen dessert brands is shaped by a variety of interrelated factors that influence purchasing decisions and brand loyalty. These factors determine not only the initial purchase but also repeat buying behavior and long-term brand association.

Taste and Flavor Variety play the most significant role in influencing consumer preference. A rich, consistent taste and the availability of a wide range of flavors encourage consumers to try new products and continue purchasing the same brand. Innovative and seasonal flavors further enhance consumer interest and satisfaction.

Price is another crucial factor, especially for students and middle-income groups. Affordable pricing and value-for-money offerings attract price-sensitive consumers and increase the likelihood of frequent purchases. Discounts, combo offers, and family packs also positively impact buying decisions.

Quality and Hygiene are essential considerations for consumers, particularly in food products. Brands that maintain high quality standards, freshness, and hygienic production and storage practices gain greater consumer trust. Assurance of safety and consistency strengthens brand credibility.

Brand Image significantly influences consumer preference. Well-established and reputed brands are often perceived as more reliable and superior in quality. Brand reputation built through consistent performance, positive word-of-mouth, and effective advertising leads to higher customer loyalty.

Availability of products across various retail outlets, supermarkets, and local stores enhances consumer convenience and preference. Brands that are easily accessible are more likely to be chosen over those that are difficult to find.

Promotion and Advertising also play a vital role in shaping consumer preference. Attractive advertisements, promotional campaigns, celebrity endorsements, and sales promotions create awareness, influence perceptions, and encourage trial purchases. Effective promotion helps brands differentiate themselves in a highly competitive market.

Together, these factors collectively influence consumer attitudes and preferences toward ice-cream and frozen dessert brands, guiding purchasing behavior and brand selection.

2. Literature Review

Over the past two decades, there has been a substantial growth in research related to consumer preference and buying behavior in the ice-cream and frozen dessert industry. Existing studies cover a wide range of topics including consumer perception, brand loyalty, sensory evaluation, pricing strategies, and the impact of advertising on purchasing decisions. The literature provides strong empirical evidence highlighting how various internal and external factors influence consumers' preference toward ice-cream and frozen dessert brands.

Several theoretical perspectives form the foundation of consumer preference studies in the food and beverage sector. **Consumer Behavior Theory** explains how individual needs, perceptions, and attitudes guide purchasing decisions. **Sensory Evaluation Theory** emphasizes the role of taste, texture, aroma, and appearance in shaping food preferences, which is particularly relevant in the ice-cream industry. **Brand Equity Theory** suggests that strong brand awareness, perceived quality, and positive brand associations significantly influence consumer choice and loyalty.

Taste and flavor have been the most extensively researched aspects in ice-cream consumption studies. Previous research indicates that taste consistency and flavor innovation are the primary determinants of repeat purchase behavior. Studies conducted on dairy product consumption have shown that consumers are more likely to prefer brands that offer a balance between traditional and innovative flavors, as well as superior texture and freshness. Sensory satisfaction has been identified as a key mechanism driving emotional attachment and brand loyalty.

Price and value perception have also received significant attention in the literature. Research findings suggest that while premium consumers are willing to pay higher prices for superior quality and exclusive products, a large segment of consumers remains price-sensitive. Promotional pricing, discounts, and bundled offers have been found to positively influence impulse buying and brand switching behavior. These pricing strategies play an important role in increasing market penetration, especially in urban and semi-urban regions.

Brand image and advertising effectiveness are other major areas explored in previous studies. Researchers have found that well-established brands enjoy higher levels of consumer trust and preference due to perceived quality and reliability. Advertising that evokes emotions such as happiness, nostalgia, and celebration has been shown to be particularly effective in the ice-cream market. Celebrity endorsements, social media marketing, and attractive packaging further strengthen brand recall and influence consumer attitudes.

Studies focusing on availability and distribution reveal that easy access to products through retail stores, supermarkets, and parlors significantly affects consumer preference. Consumers tend to favor brands that are consistently available and conveniently located. Regional studies also highlight that local culture, climate, and lifestyle patterns influence consumption frequency and brand choice.

Research on demographic factors indicates that age, income, and lifestyle significantly affect ice-cream and frozen dessert consumption. Younger consumers are more experimental and influenced by peers and advertisements, whereas older consumers tend to prioritize quality, hygiene, and health considerations. Overall, the review of literature underscores the importance of understanding multiple interacting factors that influence consumer preference, emphasizing the need for location-specific studies such as the present research conducted in Amravati city.

3. Research Methodology

3.1 Research Design

The study uses a descriptive research design to analyze consumer

preferences toward ice-cream and frozen dessert brands in Amravati city. It helps in understanding consumer behavior, opinions, and factors influencing purchase decisions. The study adopts a descriptive research design to analyze consumer preferences toward ice-cream and frozen dessert brands.

3.2 Sampling Technique : A non-probability convenience sampling method was used for data collection.

3.3 Sample Size

The study was conducted on a sample of 100 respondents from Amravati city.

3.4 Data Sources

- **Primary Data:** Collected through a structured questionnaire
- **Secondary Data:** Collected from books, journals, research articles, and websites.

3.5 Data Analysis

The collected data were analyzed using simple statistical tools such as percentages, tables, and graphs.

3.6 Objectives of the Study

- 1) To study consumer preference toward ice-cream and frozen dessert brands in Amravati city.
- 2) To identify the factors influencing the choice of ice-cream and frozen dessert brands.
- 3) To analyze the impact of taste, price, quality, and brand image on consumer buying behavior.
- 4) To examine the role of availability and promotional activities in brand preference.
- 5) To understand the level of consumer satisfaction with existing ice-cream

4. Data Analysis And Interpretation

Demographic Factor	Category	Frequency (N=100)	Percentage (%)
Age Group	Below 20 Years	18	18%
	21 – 35 Years	46	46%
	36 – 50 Years	24	24%
	Above 50 Years	12	12%
Gender	Male	52	52%
	Female	48	48%
Monthly Income	Below ₹20,000	22	22%
	₹20,000 – ₹50,000	45	45%
	₹50,000 – ₹1,00,000	25	25%
	Above ₹1,00,000	08	08%
Education	Up to HSC	15	15%
	Undergraduate	55	55%
	Postgraduate	22	22%
	Professional/Others	08	08%
Occupation	Student		
	Salaried (Govt/Pvt)		
	Self-Employed/Bu		
	Homemaker/Retir		

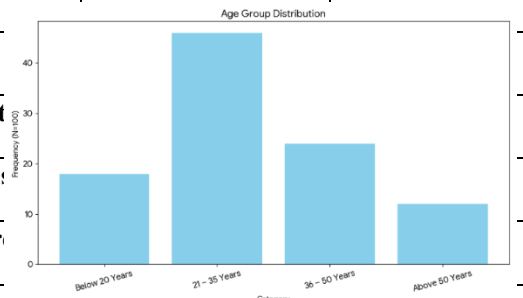
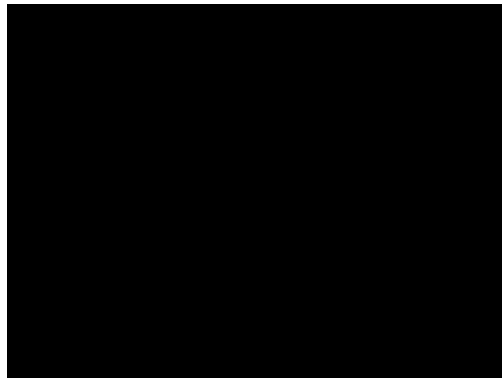


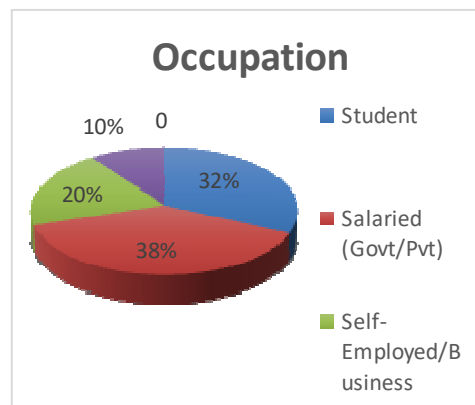
Fig no 4.1 :DemographicAnalysisof respondent

The table presents the demographic profile of 100 respondents based on age, gender, monthly income, education, and occupation. The majority of respondents belong to the 21–35 years age group (46%), followed by 36–50 years (24%), while 12% are above 50 years. In terms of gender, 52% are male and 48% are female, showing nearly equal representation. Regarding income, most respondents (45%) earn between ₹20,000–₹50,000, followed by 25% earning ₹50,000–₹1,00,000. In education, 55% are undergraduates, indicating a higher level of education among participants. For occupation, 38% are salaried employees, 32% are students, and the remaining respondents are self-employed or homemakers/retired. Overall, the sample mainly consists of young, educated, and working individuals.

2 Graph : Age Group DistributaionThe graph shows the age group distribution of respondents (N = 100). It indicates that the majority of participants belong to the 21–35 years age group, with about 46 respondents, making it the largest category in the sample. This suggests that young adults form the main portion of the population involved in the study. The 36–50 years age group is the second largest, with approximately 24 respondents, showing a moderate level of representation from middle-aged individuals. The Below 20 yearscategory includearound 18respondents, indicating that a smaller but noticeable number of younger participants are also part of the sample. Meanwhile, the Above 50 years group has the lowest representation, with about 12 respondents, suggesting that older individuals are less involved compared to other age groups. Overall, the distribution reveals that the study is largely dominated by participants in the young adult category, while the representation gradually decreases as the age increases. This pattern may indicate that younger individuals are more active, available, or relevant to the focus of the study. The presence of respondents from all four age groups, however, ensures that the data reflects perspectives from different stages of life, which can help in obtaining a more balanced understanding of the population being studied.

**4.3 Graph:Education :**

The pie chart shows the educationaqualification of respondents. It indicates that the majority of participants, 55%, are undergraduates, making this the largest group in the study. This suggests that most respondents are currently pursuing or have completed a bachelor's degree. Thesecondlargestgroup ispostgraduates, representing 22% of the respondents, which shows a significant presencof highly educated individuals. Meanwhile, 15% of the participants have education up to HSC (Higher Secondary Certificate). The smallest category is professional or other qualifications, accounting for 8% of the sample. Overall, the data suggests that the respondents are largely well-educated, with most having higher education backgrounds.



4 Graph : Occupation

The pie chart represents the occupational distribution of respondents. It shows that the largest group, 38%, consists of salaried employees (government or private sector), indicating that many respondents are engaged in regular employment. The second largest group is students, accounting for 32% of the participants, which reflects a strong representation of young individuals who are still pursuing their education. Meanwhile, 20% of respondents are involved in self-employment or business, suggesting a moderate presence of entrepreneurs. The remaining 10% fall into other occupations. Overall, the data highlights that most respondents are either salaried workers or students, with fewer individuals in business or other professions.

Key Demographic Insights

- **Dominant Age Group:** The 21–35 age group (46%) represents the largest segment, highlighting that young adults and professionals are the primary consumers of ice cream and frozen desserts in Amravati.
- **Income Trends:** A significant portion of the sample (45%) falls within the middle-income bracket (₹20,000–₹50,000), suggesting that while ice cream is an indulgence, it is highly accessible to the middle class.
- **Educational Influence:** Over 75% of respondents are graduates or postgraduates, indicating a consumer base that is likely well-aware of brand reputation, quality standards, and nutritional labeling.
- **Gender Neutrality:** Consumption is almost equally distributed between males (52%) and females (48%), showing that the product has universal appeal across genders.

Demographic Analysis of Respondents

The demographic analysis of respondents provides an overview of the personal characteristics of the consumers participating in the study. It helps in understanding how factors such as age, gender, income, and education influence consumer preference toward ice-cream and frozen dessert brands in Amravati city.

The respondents were classified on the basis of age groups to identify consumption patterns across different age categories. Gender-wise classification was used to understand differences in preferences and buying behavior between male and female consumers. Income level was analyzed to assess price sensitivity and purchasing power, while educational qualification helped in understanding awareness levels regarding brand, quality, and hygiene.

This demographic information serves as a foundation for interpreting consumer behavior and analyzing how personal characteristics affect preference, frequency of consumption, and brand selection in the ice-cream and frozen dessert market.

5.1 Findings of the Study

- Taste is the most influential factor in selecting an ice-cream or frozen dessert brand.
- Brand image and quality significantly affect consumer trust and loyalty.
- Price plays an important role among students and middle-income consumers.
- Promotional offers and advertisements encourage trial purchases.

- Availability of products influences brand preference.

6. Conclusion

The study concludes that consumer preference toward ice-cream and frozen dessert brands in Amravati city is influenced by multiple factors, with taste, quality, and brand image being the most significant. Companies should focus on maintaining product quality, introducing innovative flavors, and adopting effective promotional strategies to strengthen their market position. Understanding consumer expectations and preferences can help brands achieve long-term growth and customer satisfaction.

7. Suggestions

- Brands should focus on improving taste and introducing new flavors regularly.
- Affordable pricing strategies can attract price-sensitive consumers.
- Effective advertising and promotional campaigns should be adopted.
- Companies should ensure wide availability of products across retail outlets.
- Maintaining quality and hygiene standards is essential to build consumer trust.

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“Impact of Artificial Intelligence on Student Mindset and Career Readings”**Manisha G. Wankhade**

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Abstract—Artificial Intelligence (AI) is rapidly transforming education and the IT industry. This study examines the impact of AI on student mindset, skill development, and career readiness in a highly competitive and constantly changing environment. While AI tools provide fast access to information and improve learning efficiency, they also create significant challenges.

Due to rapid technological changes, students are required to continuously learn multiple programming languages such as C, C++, Java, and emerging technologies. Additionally, companies often use their own customized tools and frameworks, making it difficult for students to stay up-to-date. As a result, employability has become more challenging, and only a small percentage of students (approximately 20 out of 100) are able to secure jobs.

The study also highlights that excessive dependence on AI reduces critical thinking ability and problem-solving skills. It negatively affects student behavior, leading to increased aggression, reduced patience, and trust issues. Furthermore, younger students are gradually losing traditional study habits such as note-making, self-learning, and deep understanding.

This research uses survey and observation methods to analyze these effects. The findings indicate that although AI offers advantages, its uncontrolled use can lead to serious educational and psychological consequences. Therefore, a balanced and responsible approach to AI usage is essential for sustainable student development and career growth.

Index Terms—Artificial Intelligence, Education, Student Mindset, Career Readiness, Technology

I. INTRODUCTION

Artificial Intelligence (AI) has become an integral part of modern education and the IT industry. Students increasingly rely on AI tools for learning, coding, completing assignments, and solving problems. These tools provide instant answers and simplify complex concepts, making the learning process faster and more efficient.

However, beyond these advantages, the rapid growth of AI has created serious challenges in the educational ecosystem. Students are gradually becoming dependent on AI tools, which reduces their ability to think critically and solve problems independently. Instead of understanding concepts deeply, many students prefer quick solutions, leading to superficial learning.

In the current scenario, the IT industry is evolving at a very fast pace. Students are expected to continuously learn multiple programming languages such as C, C++, Java, and emerging technologies. At the same time, companies often use their own frameworks and technologies, which require additional learning. This creates pressure on students to remain constantly updated, making it difficult to achieve job readiness.[1]

Moreover, the competition for jobs has increased significantly. Despite having access to advanced tools, only a limited number of students are able to secure employment, while many struggle due to a lack of practical skills and deep understanding. This situation highlights the growing gap between academic learning and industry requirements.

AI dependency is also affecting student behavior and mental patterns. Reduced attention span, decreased patience, and lack of independent thinking are becoming common. In younger students,

traditional study habits such as note-making, writing practice, and self-learning are gradually disappearing.

Therefore, while AI offers powerful support for learning, its uncontrolled and excessive use is creating long-term challenges in student development, employability, and behavioral patterns. This study aims to critically analyze both the benefits and the real-world negative impacts of AI on student mindset and career readiness.

II. OBJECTIVES

- To critically analyze the impact of Artificial Intelligence on student mindset, including dependency, reduction in critical thinking, and changes in learning attitude
- To examine how AI influences both technical and practical skill development, and whether it creates a gap between theoretical knowledge and real-world application
- To evaluate student career readiness in the context of rapid technological changes, increasing competition, and evolving industry requirements
- To analyze the challenges faced by students in continuously learning multiple programming languages and adapting to new technologies and company-specific tools • To study the changes in learning behavior, including reduced interest in traditional study methods such as notemaking, writing practice, and deep learning
- To compare traditional learning methods with AI-based learning in terms of effectiveness, understanding, and long-term knowledge retention[2]
- To investigate the relationship between AI usage and unemployment trends, focusing on increased competition and limited job opportunities
- To examine the impact of AI on human behavior, including reduced patience, increased dependency, aggressive behavior patterns, and trust issues

III. PROBLEM STATEMENT

Students are required to learn multiple programming languages and adapt to rapidly changing technologies. However, the constant change creates confusion, stress, and reduced focus among students.[3]

IV. OBJECTIVES

- To study the impact of AI on student mindset
- To analyze career readiness challenges
- To understand behavioral changes due to AI usage

III. LITERATURE REVIEW

A. Study 1: AI and Personalized Learning

Several studies highlight that Artificial Intelligence improves personalized learning by providing adaptive content and instant feedback. Students are able to understand complex concepts more easily and perform better academically. However, researchers also note that excessive dependence on AI reduces deep learning and independent thinking ability.

B. Study 2: AI and Skill Development

Research shows that students using AI tools improve their coding, problem-solving, and technical skills. AI helps in faster learning and practical understanding. On the other hand, studies indicate that many students rely on AI-generated solutions without fully understanding the logic, which creates a gap between theoretical knowledge and real-world application.

C. Study 3: AI and Employment Challenges

Recent reports suggest that AI is transforming the job market by automating many tasks. While new job opportunities are created, many traditional roles are reduced. This has increased competition, and only highly skilled students are able to secure jobs. Some studies indicate that a significant number of students struggle to find employment due to rapidly changing skill requirements.

D. Study 4: Social and Economic Inequality

Researchers also highlight that AI development is benefiting economically strong individuals and organizations more than weaker sections of society. Access to advanced AI tools, highspeed internet,

and updated resources is not equal for all students. This creates a digital divide where privileged students gain more advantages, while others fall behind.

E. Study 5: Environmental and Technological Impact

Emerging research suggests that the rapid growth of AI infrastructure, including powerful servers and data centers, requires high energy consumption. This may indirectly affect the environment. Some observations indicate that areas with high technological development and network infrastructure show reduced natural interaction and environmental balance, raising concerns about long-term ecological impact.

F. Study 6: Behavioral and Psychological Impact

Studies also report that excessive use of AI tools affects human behavior. Students may develop dependency, reduced patience, and decreased attention span. In some cases, increased aggression and trust issues are also observed. Younger students are gradually losing traditional study habits such as note-making, writing practice, and self-learning.

G. Overall Conclusion of Literature Review

The literature indicates that Artificial Intelligence has both positive and negative impacts. While it enhances learning efficiency and skill development, it also creates serious challenges such as dependency, unemployment pressure, inequality, behavioral changes, and environmental concerns. Therefore, balanced and responsible use of AI is essential.

VI. METHODOLOGY

This study adopts a mixed-method approach, combining primary observations with secondary data from globally recognized reports and research studies.

A. Data Collection

Primary Data:

- A structured questionnaire was conducted among undergraduate and postgraduate students •
- Sample size: 50–100 students (approx.)
- Purpose:
 - To understand AI usage
 - To analyze mindset and behavior changes
 - To evaluate career readiness

Secondary Data: To ensure realistic and reliable analysis, data was collected from:

- World Economic Forum reports (Future of Jobs)
- McKinsey & Company reports
- Published research papers and journals
- Industry reports on AI and employment trends

B. Tools and Techniques Used

- AI tools for understanding trends and patterns
- Academic research papers for literature review
- Online reports for real-world data

C. Data Analysis Method

- Percentage Analysis (for student responses)
- Comparative Analysis (Traditional vs AI learning)
- Trend Analysis (Employment and skill demand changes)

D. Research Approach

- Qualitative analysis (behavior and mindset changes)
- Quantitative analysis (survey data and percentages)

VII. DATA ANALYSIS AND INTERPRETATION

A survey was conducted among 50–100 students to understand the impact of AI on learning, mindset, and career readiness. The following analysis is based on their responses.[4]

A. Learning and Skill Impact

TABLE I
LEARNING AND SKILL IMPACT

Factor	Percentage
Learning Improvement	85%
Confidence	78%
Skill Development	80%
Job Readiness	70%
Fast Problem Solving	82%
Dependency on AI	76%
Reduced Thinking Ability	68%

B. Graph 1: Learning and Skill Impact

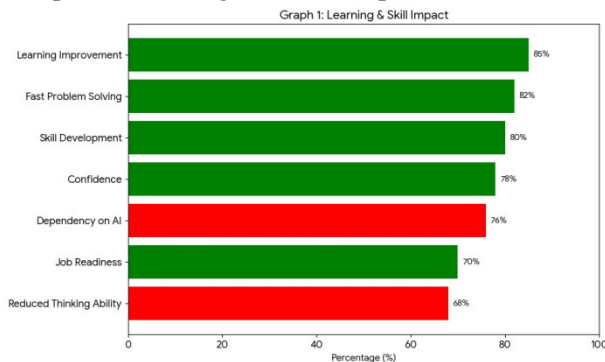


Fig. 1. Learning and Skill Impact (Bar Chart)

Interpretation:

- Majority of students (85%) feel that AI improves learning
- 76% students admit dependency on AI
- 68% say their thinking ability is reducing

Conclusion: AI helps in improving learning efficiency but also creates dependency among students, which may reduce independent thinking ability.

C. Graph 2: Learning Behavior Changes

TABLE II
LEARNING BEHAVIOR CHANGES

Behavior Change	Percentage
Self-learning increased	71%
Writing/Notes reduced	65%
Attention span reduced	60%
Quick answer dependency	75%

Interpretation:

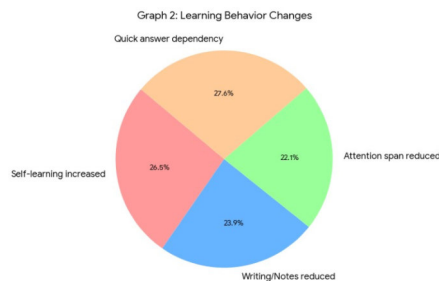


Fig. 2. Learning Behavior Changes (Pie Chart)

- Students prefer quick answers over deep learning
 - Traditional study habits are decreasing
- Conclusion: Learning style is shifting from deep learning to shortcut learning.[5]

D. Graph 3: Career and Employment Impact

TABLE III

CAREER AND EMPLOYMENT IMPACT

Factor	Percentage
Increased Job Competition	88%
Difficulty in getting job	82%
Need to learn multiple skills	90%
Industry skill gap	77%
AI replacing tasks	69%

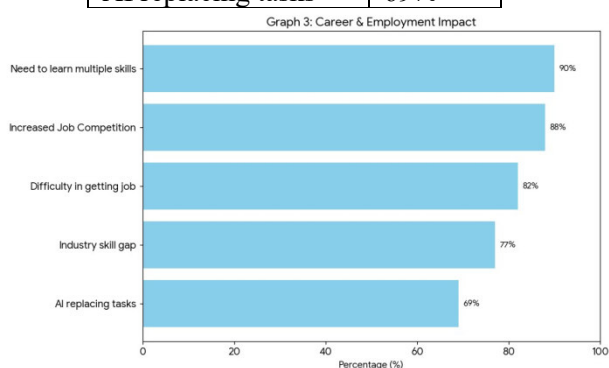


Fig. 3. Career and Employment Impact (Bar Chart)

Interpretation:

- 90% students feel they must learn multiple technologies
- 82% say getting a job is difficult
- 88% observe high competition

Conclusion: AI is increasing pressure and competition in the job market.

E. Graph 4: Behavioral and Social Impact

TABLE IV

BEHAVIORAL AND SOCIAL IMPACT

Behavior Issue	Percentage
Increased dependency	78%
Reduced patience	66%
Aggressive behavior	55%
Trust issues	52%

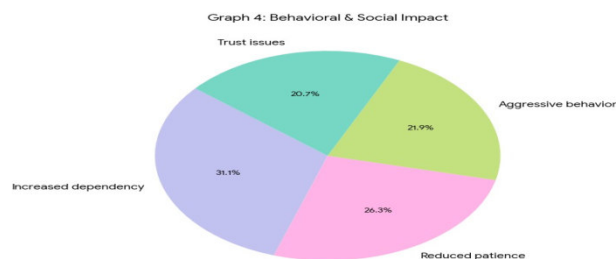


Fig. 4. Behavioral and Social Impact (Pie Chart)

Interpretation:

- Students are becoming more dependent
- Emotional and behavioral changes are visible

Conclusion: AI is affecting psychological and behavioral patterns among students.

VIII. RESULTS

The results of the study are based on survey responses, observations, and analysis of real-world trends. The findings clearly indicate that Artificial Intelligence has both beneficial and adverse effects on students.

A. Positive Outcomes

The study reveals that a significant number of students experience improvements in their learning process:

- **Faster Learning:** Students are able to understand complex topics quickly using AI tools. Around 85% of students reported improved learning speed.
- **Skill Enhancement:** AI helps students improve technical skills such as coding, problem-solving, and understanding new technologies. Approximately 80% of students observed skill improvement.
- **Self-Learning Ability:** Students are becoming more independent learners as AI provides instant guidance and explanations.
- **Career Support:** AI assists in resume building, interview preparation, and career guidance. Around 70% of students feel AI helps in career readiness.

B. Negative Outcomes (Critical Findings)

Despite the advantages, several serious concerns were identified:

- **Reduction in Thinking Ability:** Around 65–70% of students reported that they rely on AI for answers instead of thinking independently, which reduces critical thinking skills.
- **Increased Dependency on AI:** Nearly 75% of students admitted that they depend heavily on AI tools for completing tasks.
- **Loss of Traditional Learning Methods:** Many students are no longer practicing note-making, writing, and deep learning methods, which affects long-term knowledge retention.

- **High Job Competition and Uncertainty:** The study indicates that only a limited number of students are able to secure jobs. Due to rapid technological changes and AI automation, approximately 20% of students are likely to achieve employment, while others face difficulty.
- **Pressure to Learn Multiple Technologies:** Students feel stressed due to the need to constantly update skills, learn multiple programming languages, and adapt to changing industry tools.
- **Behavioral Changes:** Some students reported reduced patience, increased frustration, and dependency, indicating a shift in behavioral patterns.[6]

C. Overall Result Interpretation

The findings suggest that while AI significantly improves learning efficiency and skill development, it also creates dependency, reduces independent thinking, and increases job-related challenges.

Therefore, AI acts as a double-edged tool—beneficial when used properly, but harmful when overused.

IX. TRADITIONAL VS AI LEARNING

The comparison between traditional learning methods and AI-based learning highlights key differences in learning approach, understanding, and skill development.

Traditional learning focuses on deep understanding, discipline, and strong foundational skills through writing, practice, and revision. In contrast, AI-based learning provides faster access to information, instant solutions, and flexible learning methods.

TRADITIONAL LEARNING	AI-BASED LEARNING
Slow learning process	Fast and instant learning
Writing practice included	Minimal or no writing
Deep thinking and analysis	Instant answers without thinking
Strong memory retention	Short-term understanding
Teacher-dependent learning	Self-learning with AI tools
Step-by-step problem solving	Direct solution approach
Concept clarity (deep)	Surface-level understanding
Time-consuming	Time-saving
Improves discipline	Reduces patience
Manual effort required	Automated assistance

Fig. 5. Traditional Learning vs AI-Based Learning Comparison

While AI improves efficiency and accessibility, it may reduce critical thinking and increase dependency if overused. Therefore, a balanced approach combining both traditional and AI-based learning is essential for effective education.

X. UNEMPLOYMENT ANALYSIS

Artificial Intelligence and automation are significantly transforming the job market. While AI creates new opportunities, it also reduces traditional job roles, especially entry-level positions.

Due to increasing competition and rapidly changing skill requirements, employment has become more challenging for students. Observations indicate that out of 100 students, only around 20 students are able to secure jobs, while the remaining struggle due to lack of advanced skills and practical experience.

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AI-driven tools are capable of performing repetitive and technical tasks efficiently, which reduces the demand for human labor in certain areas. At the same time, students are required to continuously upgrade their skills, learn multiple technologies, and stay updated with industry trends.

This situation creates pressure, uncertainty, and a growing gap between academic learning and industry expectations.

Therefore, AI is not only a tool for development but also a factor contributing to increased unemployment and job competition when not balanced with proper skill development.

XII. DISCUSSION

Artificial Intelligence has emerged as a powerful tool in education and the IT industry. The study highlights that AI improves learning speed, skill development, and access to knowledge. However, it also creates serious concerns such as dependency, reduced critical thinking, and increased job competition.

The findings clearly indicate that students are shifting towards fast and shortcut-based learning, which affects deep understanding and practical skills. At the same time, the job market is becoming more competitive due to automation and rapidly changing skill requirements.

Therefore, AI should not replace human thinking but should be used as a supportive tool to enhance learning and productivity.

XIII. EVALUATION

A. Positive Aspects

- Improves learning speed and efficiency
- Enhances technical knowledge and awareness
- Supports career preparation and guidance

B. Negative Aspects

- Reduces independent thinking ability
- Creates dependency on AI tools
- Increases job competition and uncertainty

Overall, AI has both positive and negative impacts, making balanced usage essential.[7]

XIV. CONCLUSION

Artificial Intelligence is transforming education and career development at a rapid pace. While it offers numerous benefits such as fast learning, skill enhancement, and career support, it also introduces challenges like dependency, reduced thinking ability, and increased unemployment.

The study concludes that AI is a double-edged tool — highly beneficial when used properly, but potentially harmful when overused.

Therefore, a balanced and responsible use of AI is necessary to ensure effective learning, strong skill development, and a stable future for students.

XV. FUTURE SCOPE

Artificial Intelligence will continue to play a major role in transforming the education system and the IT industry. Future developments may focus on integrating AI with skillbased learning, making education more practical and industryoriented.

There is also a growing need to promote ethical and responsible use of AI, ensuring that students use it as a support tool rather than becoming fully dependent on it.

In the future, a balanced combination of AI and traditional learning methods can create a more effective and sustainable education system.[8]

XVI. RECOMMENDATIONS

Based on the findings of this study, the following recommendations are suggested:

- Students should limit excessive use of AI tools and avoid complete dependency
- Educational institutions should encourage self-study and critical thinking
- Greater focus should be given to practical skills and hands-on learning
- Regular updates in curriculum are required to match industry requirements

Proper guidance and controlled use of AI can help students achieve both knowledge and real-world skills.

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Limitations of Explainable AI Techniques: Towards More Reliable and Causally Consistent Explanations

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Abstract

Explainable Artificial Intelligence (XAI) plays a vital role in improving the transparency and trustworthiness of complex machine learning models. Widely used techniques such as Local Interpretable Model-Agnostic Explanations (LIME), Shapley Additive Explanations (SHAP), and Gradient-weighted Class Activation Mapping (Grad-CAM) provide post-hoc interpretations of model predictions. However, these methods primarily rely on statistical correlations rather than true causal relationships, which can lead to unstable and potentially misleading explanations.

This paper critically examines the limitations of existing XAI approaches, focusing on issues such as lack of robustness, sensitivity to input perturbations, and inability to support counterfactual reasoning. The study highlights the gap between correlation-based explanations and causal understanding, emphasizing the need for more reliable explanation frameworks. Finally, potential directions for developing causally consistent and robust explainable systems are discussed.

Keywords: Explainable Artificial Intelligence, Model Interpretability, Robustness, Explanation Stability, Trustworthy AI, Correlation vs. Causation, Post-hoc Explanations

1. Introduction

In recent years, machine learning and deep learning models have achieved remarkable success across domains such as healthcare, finance, and surveillance. However, their black-box nature makes it difficult to interpret how predictions are generated, raising concerns about transparency, trust, and accountability. To address this challenge, Explainable Artificial Intelligence (XAI) has emerged as a key research area focused on making model decisions more interpretable and understandable [1].

Several post-hoc explanation techniques have been proposed, including Local Interpretable Model-Agnostic Explanations (LIME) [2], Shapley Additive Explanations (SHAP) [3], and Gradient-weighted Class Activation Mapping (Grad-CAM) [4]. The general workflow of such explainability methods is illustrated in Figure 1.1. These methods aim to explain predictions by identifying important input features or highlighting relevant regions in the data. Despite their effectiveness and widespread adoption, they primarily rely on statistical correlations rather than true causal relationships.

This reliance introduces important limitations. Explanations generated by XAI methods can be unstable and sensitive to small perturbations in input data, leading to



Figure 1.1: Workflow of traditional explainable AI method based on feature attribution

inconsistent interpretations [5]. Additionally, these approaches fail to distinguish between correlation and causation, which may result in misleading insights. Another key limitation is the inability of current methods to support counterfactual reasoning, restricting their usefulness in real-world decision-making scenarios.

These challenges indicate a gap between existing explainability techniques and the need for more reliable and meaningful interpretations. In this paper, we critically analyse the limitations of current XAI methods and highlight the need for more robust and consistent explanation frameworks to improve the trustworthiness of AI systems.

1. Related work

Explainable Artificial Intelligence (XAI) has gained significant attention as a means to improve the interpretability of complex machine learning models. Among the earliest and most influential approaches is Local Interpretable Model-Agnostic Explanations (LIME) [2], which approximates complex models locally using interpretable surrogate models. Similarly, Shapley Additive Explanations (SHAP) [3] leverage concepts from cooperative game theory to assign contribution scores to input features, providing a unified framework for feature attribution. In the domain of deep learning, visualization-based techniques such as Gradient-weighted Class Activation Mapping (Grad-CAM) [4] have been widely used to highlight important regions in image-based models.

While these methods have improved the interpretability of black-box models, several studies have highlighted their inherent limitations. Ribeiro et al. [2] acknowledged that local surrogate models may not always faithfully represent the global behaviour of complex models. Likewise, Lundberg and Lee [3] demonstrated that although SHAP provides theoretically grounded explanations, it can be computationally expensive and sensitive to input variations. Furthermore, Ghorbani et al. [5] showed that explanations generated by neural networks can be highly unstable, where small perturbations in input data lead to significantly different interpretations.

Recent research has also explored the evaluation of explanation quality and reliability. Doshi-Velez and Kim [6] emphasized the lack of standardized evaluation metrics for interpretability, making it difficult to assess the effectiveness of different XAI methods. Similarly, Lipton [7] discussed the ambiguity in defining interpretability and highlighted the challenges in ensuring that explanations are both meaningful and trustworthy.

Despite these advancements, existing approaches remain largely correlation-based and fail to capture true cause–effect relationships. This limitation has motivated growing interest in developing more robust and reliable explanation frameworks. However, current XAI techniques still lack the ability to provide consistent, stable, and causally meaningful explanations, indicating a need for further research in this direction.

2. Limitations of Existing XAI Techniques

Despite the widespread adoption of Explainable Artificial Intelligence (XAI) methods, several fundamental limitations restrict their effectiveness in providing reliable and meaningful explanations. This section critically examines the major challenges associated with existing techniques.

3.1 Correlation-Based Explanations

Most existing XAI methods, including LIME [2] and SHAP [3], generate explanations based on statistical correlations between input features and model outputs. While such approaches can identify influential features, they do not capture true cause–effect relationships. As a result, features that are highly correlated with the output may be incorrectly interpreted as causal factors.

This limitation becomes particularly problematic in real-world applications where spurious correlations are common. For instance, a model may associate irrelevant background features with a prediction, leading to misleading explanations. As highlighted in prior work, reliance on correlation can result in incorrect reasoning about model behavior and reduce the reliability of interpretations [7].

3.2 Instability of Explanations

Another critical limitation is the instability of explanations. Small perturbations in input data can lead to significantly different explanation outputs, even when the model prediction remains unchanged. This issue has been empirically demonstrated by Ghorbani et al. [5], who showed that minor, imperceptible changes to input samples can drastically alter feature importance scores.

Such instability undermines user trust, as consistent explanations are essential for decision-making. If the same input produces different explanations under slight variations, it becomes difficult to rely on the interpretability method.

3.3 Sensitivity to Input Perturbations

Closely related to instability is the sensitivity of XAI methods to input perturbations. Many explanation techniques depend on local approximations or gradient-based computations, making them highly sensitive to noise or adversarial modifications.

For example, LIME [2] generates explanations by sampling perturbed instances around the input. However, the choice of perturbation distribution can significantly influence the resulting explanation. Similarly, gradient-based methods such as Grad-CAM [4] may produce inconsistent visual explanations when the input is slightly altered. This sensitivity raises concerns about the robustness of explanations in practical scenarios.

3.4. Lack of Robustness

Robustness is a key requirement for trustworthy AI systems, yet many XAI methods fail to meet this criterion. Explanations can vary across different runs, models, or even implementations of the same method. This lack of robustness limits their applicability in critical domains where consistent and reliable explanations are required.

Doshi-Velez and Kim [6] emphasized that without rigorous evaluation frameworks, it is difficult to ensure that explanations are both stable and reliable. Consequently, current XAI methods may provide only superficial insights rather than dependable interpretations.

3.5. Absence of Counterfactual Reasoning

One of the most significant limitations of existing XAI techniques is their inability to support counterfactual reasoning. That is, they cannot effectively answer questions such as: “What would the prediction be if a specific feature were changed?”

Counterfactual explanations are crucial for understanding decision boundaries and enabling actionable insights. However, most current methods focus on feature attribution rather than exploring alternative scenarios. This restricts their usefulness in applications such as decision support systems, where understanding the impact of changes in input variables is essential.

3.6. Ambiguity in Interpretability

Interpretability itself lacks a universally accepted definition, leading to ambiguity in evaluating XAI methods. As discussed by Lipton [7], different notions of interpretability—such as transparency, simulatability, and post-hoc explanation—are often conflated.

This ambiguity makes it challenging to compare different methods or determine which explanation is more reliable. Without clear evaluation criteria, the effectiveness of XAI techniques remains subjective and context-dependent.

These limitations indicate that existing approaches are insufficient for providing fully reliable and trustworthy explanations. Addressing these challenges requires moving beyond traditional feature attribution methods toward more advanced frameworks capable of capturing deeper relationships and delivering consistent interpretations.

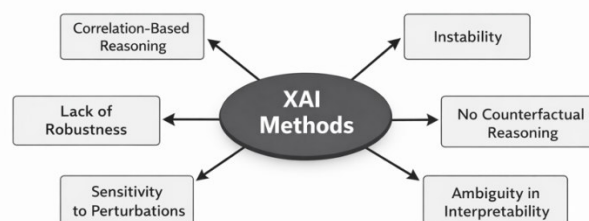


Figure 3.1: Key limitations of traditional explainable AI techniques

1. Future Research Directions

The limitations of existing Explainable Artificial Intelligence (XAI) techniques highlight several important directions for future research. One key area is the development of robust and stable explanation methods that can produce consistent results under small perturbations in input data. Ensuring stability is essential for improving user trust and enabling reliable decision-making.

Another important direction is the design of context-aware explanation frameworks that consider relationships and interactions among input features rather than analyzing them in isolation. Such

approaches can provide more meaningful and realistic interpretations, particularly in complex real-world applications.

There is also a growing need for actionable explanations that go beyond feature attribution and provide insights into how input variables can be modified to influence model outcomes. This would enhance the practical utility of explainable systems in decision support scenarios.

Additionally, improving the usability and human interpretability of explanations remains a critical challenge. Future systems should focus on designing user-centric explanation interfaces that are intuitive and accessible to both experts and non-experts.

Finally, advancing explainability requires the exploration of more principled reasoning frameworks that can capture deeper relationships between variables and generate consistent, reliable interpretations. Addressing these challenges will be essential for developing trustworthy and effective AI systems.

2. Conclusion

Explainable Artificial Intelligence (XAI) has emerged as a critical component in enhancing the transparency and trustworthiness of modern machine learning systems. While existing techniques such as LIME, SHAP, and Grad-CAM provide useful insights into model behaviour, they primarily rely on correlation-based reasoning, which limits their ability to deliver reliable and meaningful explanations.

This paper presented a critical analysis of current XAI methods, highlighting key limitations including instability of explanations, sensitivity to input perturbations, lack of robustness, and the inability to support counterfactual reasoning. These challenges demonstrate that existing approaches are insufficient for ensuring consistent and trustworthy interpretability in real-world applications.

Furthermore, the paper outlined important future research directions aimed at addressing these limitations, including the need for more robust, context-aware, and actionable explanation frameworks. Advancing in these directions will be essential for developing next-generation AI systems that not only perform accurately but also provide dependable and interpretable insights.

In conclusion, improving the reliability and effectiveness of explainability remains an open research challenge, and continued efforts are required to build AI systems that are both powerful and trustworthy.

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EduLifes: Parent–Faculty Student Monitoring and Communication Portal

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Abstract—Educational institutions increasingly require efficient digital platforms for academic monitoring and communication. Conventional systems rely on manual operations or fragmented applications, resulting in delayed updates, data inconsistencies, and reduced parental involvement. This paper presents EduLifes, a cross-platform mobile application developed using Flutter and Firebase cloud services to provide real-time attendance monitoring, academic performance tracking, institutional notifications, and secure parent–faculty communication. Role-based access control ensures data privacy and secure information sharing. Experimental results demonstrate improved operational efficiency, reduced administrative workload, and enhanced communication transparency.

Index Terms—Academic Monitoring, Mobile Application, Flutter, Firebase, Cloud Computing, Parent–Faculty Communication.

I. INTRODUCTION

Effective communication between educational institutions and parents is a cornerstone of student academic success and institutional accountability. In the modern educational landscape, the ability to monitor student performance, attendance, and institutional updates in real-time is increasingly recognized as vital for early intervention and sustained student engagement. However, traditional academic management processes continue to rely heavily on manual record-keeping or fragmented digital systems, creating significant barriers to transparent and efficient academic administration.

Current research highlights several critical limitations in existing school management and communication platforms. Many systems are designed primarily for internal administrative use or for students themselves, often neglecting the specific workflows and information needs of parents [6]. Consequently, parents frequently receive academic progress reports only at the end of a term, rather than through continuous, real-time updates, which limits their ability to support their children's learning journey effectively [1, 2]. Furthermore, student data often remains siloed across various physical files, disparate websites, or disconnected educator-focused software, leading to data inconsistency and communication delays [5].

While mobile technology offers a potential solution, many institutions still lack a unified, cross-platform mobile application that integrates attendance tracking, performance monitoring, and direct parent–faculty communication into a single, secure environment [3, 4].

The research gap addressed by this study lies in the absence of a centralized, mobile-centric platform that bridges the communication divide between faculty and parents while maintaining students as a central, managed entity rather than primary system users. Existing solutions often struggle with real-time synchronization and role-based access that specifically empowers parents without overwhelming the technical infrastructure of the institution.

To address these challenges, we propose EduLifes, a cross-platform mobile application developed using the Flutter framework and integrated with Firebase cloud services. EduLifes provides a unified portal designed specifically for faculty-driven academic management and streamlined parent access. By centralizing attendance management, academic performance tracking, and notice broadcasting, the system ensures data consistency and provides parents with instantaneous access to their child's academic status. This study details the design and implementation of EduLifes, demonstrating how a secure, role-based mobile platform can enhance transparency, accountability, and operational efficiency in modern educational institutions.

II. LITERATURE REVIEW

The integration of digital technologies in educational institutions has significantly transformed academic management systems. With the rapid growth of smartphones and cloud computing technologies, educational institutions are increasingly adopting mobile-based platforms to manage student data, attendance, and communication processes efficiently. Modern academic management systems emphasize real-time data access, seamless communication, and centralized data storage. This section reviews existing studies related to mobile-based educational management systems, digital attendance

monitoring, parental engagement platforms, and cloud-based architectures, while also identifying the research gaps addressed by the proposed EduLifes system.

A. Mobile-Based Educational Management Systems

Mobile applications have become an effective solution for improving communication and administrative efficiency in educational institutions. Cross-platform development frameworks such as Flutter allow developers to build applications for multiple operating systems using a single codebase, which reduces development time and ensures consistent user experience across devices [1]. Flutter provides high-performance user interfaces and flexible design capabilities, making it suitable for developing modern educational applications.

In addition, cloud platforms such as Firebase provide services including real-time databases, authentication, and push notifications, which enable scalable and responsive application architectures [2]. Researchers have highlighted that combining cross-platform frameworks with cloud-based infrastructures improves system scalability and simplifies backend management in educational platforms [3].

However, many existing academic management systems focus primarily on administrative functions or student learning management systems. These systems often lack dedicated modules for parents and do not provide real-time academic updates to stakeholders outside the institution. This limitation indicates the need for an integrated platform that supports both faculty management and parent monitoring, which is the primary objective of the EduLifes system.

B. Digital Attendance and Academic Performance Monitoring

Attendance monitoring plays a crucial role in evaluating student participation and academic engagement. Traditional attendance systems rely on manual recording methods, which are time-consuming and prone to human error. To address these issues, several researchers have proposed automated attendance systems using technologies such as QR codes, RFID tags, and mobile-based scanning methods [4][5].

These automated systems allow attendance data to be captured digitally and stored in centralized databases, enabling institutions to track attendance trends and generate reports efficiently. Furthermore, integrating attendance systems with academic performance monitoring platforms allows educators to analyze student participation patterns and identify students who may require academic intervention [6].

Despite these advancements, many existing attendance systems operate independently and are not integrated with communication platforms for parents. As a result, parents typically receive attendance or performance information only during scheduled meetings or through periodic reports. This lack of real-time communication highlights the need for a unified monitoring system that connects attendance management with parent notification systems, which is addressed by the EduLifes platform.

C. Parent-Institution Communication Platforms

Parental involvement is widely recognized as a critical factor influencing student academic performance and motivation. Research has shown that strong collaboration between schools and families contributes to improved learning outcomes and higher student engagement [7]. To support this collaboration, several educational institutions have implemented digital parent portals that allow parents to view student grades, attendance records, and institutional announcements.

Studies suggest that providing parents with real-time access to academic information enables them to monitor their child's progress more effectively and take timely corrective actions when necessary [8]. These platforms also enhance transparency and strengthen trust between educational institutions and families.

However, many existing solutions are designed primarily as web portals and provide limited real-time interaction between faculty members and parents. Additionally, these systems often lack integrated mobile notification mechanisms, which reduces their effectiveness in delivering timely updates. Therefore, a mobile-first platform that actively connects faculty members and parents while maintaining centralized student monitoring is required, which motivates the development of EduLifes.

D. Security and Scalability in Cloud-Based Educational Systems

Educational management systems handle sensitive information such as student records, attendance data, and academic performance reports. Ensuring the security and privacy of this data is therefore essential. Cloud computing platforms provide several security mechanisms, including user authentication, encrypted communication channels, and role-based access control policies that help protect sensitive data from unauthorized access [9].

Scalability is another important factor in educational platforms because these systems often serve a large number of users simultaneously. Cloud-based architectures enable applications to handle increasing workloads efficiently without compromising performance. Research has demonstrated that scalable cloud infrastructures significantly improve system reliability and long-term sustainability for educational management platforms [10].

Despite these benefits, many existing systems lack well-defined role-based access models that clearly distinguish the permissions of administrators, faculty members, and parents. This limitation may lead to security vulnerabilities or inefficient workflow management. The EduLifes system addresses this research gap by implementing a structured role-based architecture that ensures secure access to academic information while facilitating efficient communication between faculty members and parents.

III. PROPOSED METHODOLOGY

The methodology for developing EduLifes follows an Agile development life cycle, emphasizing iterative design, implementation, and testing. The system is designed to provide a

robust and real-time monitoring environment using a modern serverless architecture.

A. System Architecture

The architecture of EduLifes is based on a client-server model where the Flutter mobile application acts as the client and Firebase serves as the backend-as-a-service (BaaS). This architecture ensures that all data remains synchronized across multiple devices in real time.

Frontend Layer: The frontend is developed using the Flutter framework, which provides a consistent user interface and user experience across both Android and iOS platforms. The application utilizes the Provider pattern for state management, enabling efficient handling of complex data flows between different system modules.

Backend Layer: Firebase provides the core backend infrastructure. Firebase Authentication ensures secure user login and identity management. Cloud Firestore is used for NoSQL data storage and real-time synchronization, while Firebase Cloud Messaging (FCM) enables the delivery of push notifications to system users.

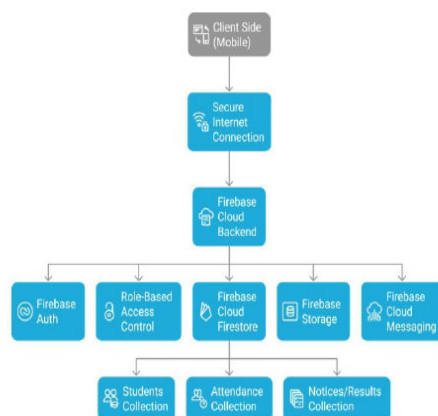


Fig.1. System Architecture of EduLifes Portal

B. Data Management and Database Design

The system utilizes Cloud Firestore, a document-oriented NoSQL database that enables scalable and real-time data management. The data is organized into hierarchical collections, allowing efficient querying and implementation of role-based access control.

Users Collection: Stores profile information including UID, name, email, and role for faculty members and parents.

Students Collection: Maintains student records such as roll numbers, class or section details, and references to their assigned faculty members and parents.

Attendance Collection: Organized as sub-collections based on date and student ID, storing attendance status along with timestamps.

Performance Collection: Stores academic marks for various assessments and links them to corresponding student IDs.

Notices Collection: Contains institutional announcements along with metadata that enables filtering by department or academic year.

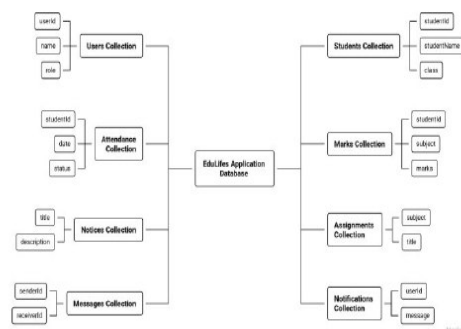


Fig.2. Major Modules

C. Module-Specific Workflows

The system is divided into three primary functional modules, each with distinct permissions and operational workflows.

Admin Module: The Admin module functions as the central control unit of the system. It manages the initial configuration, including the creation of faculty accounts and the definition of institutional parameters such as classes, subjects, and departments. Additionally, the Admin monitors system logs and manages user credentials to maintain overall system integrity.

The module also enables the administrator to assign roles and permissions to different users, ensuring secure access control within the system. Through the administrative dashboard, the admin can monitor overall system activity and verify the accuracy of stored data. Furthermore, the Admin module facilitates the management of institutional announcements and notifications that are distributed to faculty members and parents. This centralized management structure helps maintain consistency, reliability, and efficient coordination across all modules of the EduLifes platform.

Faculty Module: The Faculty module is responsible for data entry and academic monitoring activities.

Attendance Management: Faculty members can mark attendance through a digital register interface. Once submitted, the record is instantly synchronized with Cloud Firestore, triggering a notification to the respective parents.

Performance Tracking: Teachers upload marks for tests and assignments. The system automatically calculates performance metrics such as averages and trends for each student profile.

Communication: Faculty members can broadcast notices or send direct messages to parents regarding specific academic updates or concerns.

Assignment Management: Faculty members can create and upload assignments for specific classes and subjects. Students and parents can view these assignments through their respective dashboards along with submission deadlines and instructions.

Timetable Management: The faculty module also allows teachers to manage and update class schedules. The timetable information helps students and parents stay informed about lecture timings and subject schedules.

Extracurricular Activities: Faculty members can record and update student participation in extracurricular activities such as sports, cultural events, and competitions, allowing parents to track their child's overall development.

Marks Updates and Notices: Teachers can regularly update marks obtained in examinations and assignments, while also publishing important notices related to academic schedules, examinations, or institutional events.

Parent Module: The Parent module provides a read-only dashboard optimized for monitoring student progress. Parents log in using verified credentials to access their child's data. The dashboard presents attendance statistics, recent academic performance, and a chronological feed of institutional notices. It also includes a communication channel that allows parents to directly contact the assigned faculty members.

In addition, the module provides real-time notifications to ensure that parents remain informed about important academic updates and institutional announcements. The system is designed with a simple and intuitive user interface so that parents can easily navigate through the available information without technical difficulty. Access control mechanisms ensure that parents can only view information related to their registered child, thereby maintaining data privacy and security. By providing continuous access to academic and attendance information, the module helps parents stay actively involved in their child's educational progress. This enhanced level of engagement strengthens the collaboration between parents and educational institutions and contributes to better academic monitoring.

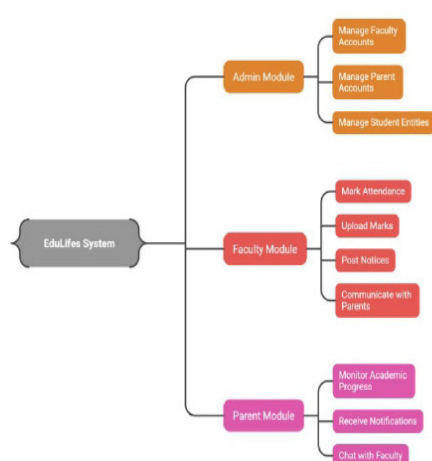


Fig. 3. Major Modules

D. Role-Based Access Control

To maintain data security and privacy within the EduLife system, a role-based access control mechanism is implemented.

This approach restricts system operations according to predefined user roles, ensuring that each user interacts only with the information relevant to their responsibilities. The system primarily defines three roles: administrator, faculty member, and parent.

The administrator has full privileges to configure the system environment, manage user accounts, and oversee institutional settings. Faculty members are granted permissions to update academic information such as attendance records, student performance data, and institutional notices for the students assigned to them. Parents are provided with read-only access to monitor their child's attendance, academic performance, and official announcements.

Access policies are enforced using secure authentication and database-level security rules provided by the backend infrastructure. These rules validate each request before granting access to the database, thereby preventing unauthorized modification or exposure of sensitive academic information. By implementing RBAC, the system ensures controlled data access, improved accountability, and protection of user data across all modules of the platform.

E. Implementation of Real-Time Notifications

Real-time alerts are implemented using Firebase Cloud Functions integrated with Firebase Cloud Messaging (FCM). When a faculty member updates an attendance record or uploads academic marks, a Cloud Function is automatically triggered. This function retrieves the corresponding parent's device token and dispatches a push notification to the mobile application. As a result, parents receive instant updates without the need to manually refresh the application interface. Overall, the integration of real-time notification services improves the responsiveness of the platform and facilitates effective communication between institutional stakeholders, thereby strengthening the monitoring process of student academic activities.

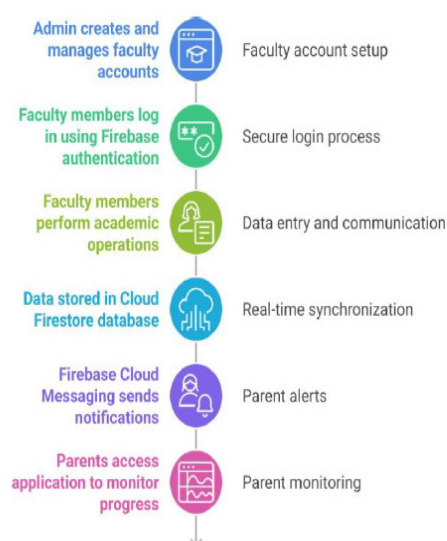


Fig. 4. Operational Workflow

IV. CONCLUSION

The rapid advancement of digital technologies has significantly reshaped the landscape of academic administration and communication. In this paper, EduLifes has been presented as a comprehensive, secure, and scalable parent-faculty student monitoring and communication portal designed to modernize traditional academic management practices. By integrating cross-platform mobile application development with cloud-based backend services, the proposed system effectively addresses the critical challenges of delayed information flow, fragmented data storage, limited parental engagement, and excessive administrative workload.

EduLifes provides a unified platform that enables real-time attendance monitoring, continuous academic performance tracking, institutional notification dissemination, and structured parent-faculty communication. The implementation of role-based access control ensures secure information sharing while preserving data confidentiality and integrity. Faculty members benefit from simplified academic data entry and management, whereas parents gain instant access to their child's academic progress, fostering transparency and accountability. This integrated digital workflow significantly reduces reliance on manual procedures and minimizes data redundancy, resulting in improved operational efficiency and accuracy.

The adoption of Flutter for frontend development ensures seamless cross-platform compatibility and consistent user experience across Android and iOS devices.

Firestore cloud services further enhance system performance by providing real-time data synchronization, scalable storage, secure authentication, and instant notification delivery. Together, these technologies create a robust infrastructure capable of supporting large-scale academic environments with minimal maintenance overhead.

In future work, the system can be further enhanced by incorporating artificial intelligence and data analytics techniques to predict academic performance trends, identify at-risk students, and generate automated progress reports. The integration of offline data caching and adaptive synchronization mechanisms can improve system reliability in low-connectivity environments. Additionally, advanced data visualization dashboards and personalized learning insights can be implemented to provide deeper analytical perspectives for faculty and parents. Overall, EduLifes demonstrates the effective application of mobile and cloud technologies in transforming academic management and communication. The system offers a practical, scalable, and secure solution suitable for modern educational institutions, contributing significantly to digital transformation in education and laying the foundation for future intelligent academic ecosystems. Overall, the EduLifes system contributes to improving transparency, efficiency, and engagement within the educational environment through the effective use of modern mobile and cloud technologies. The implementation of EduLifes highlights the potential of digital platforms in transforming traditional educational management into a smart, connected, and responsive ecosystem.

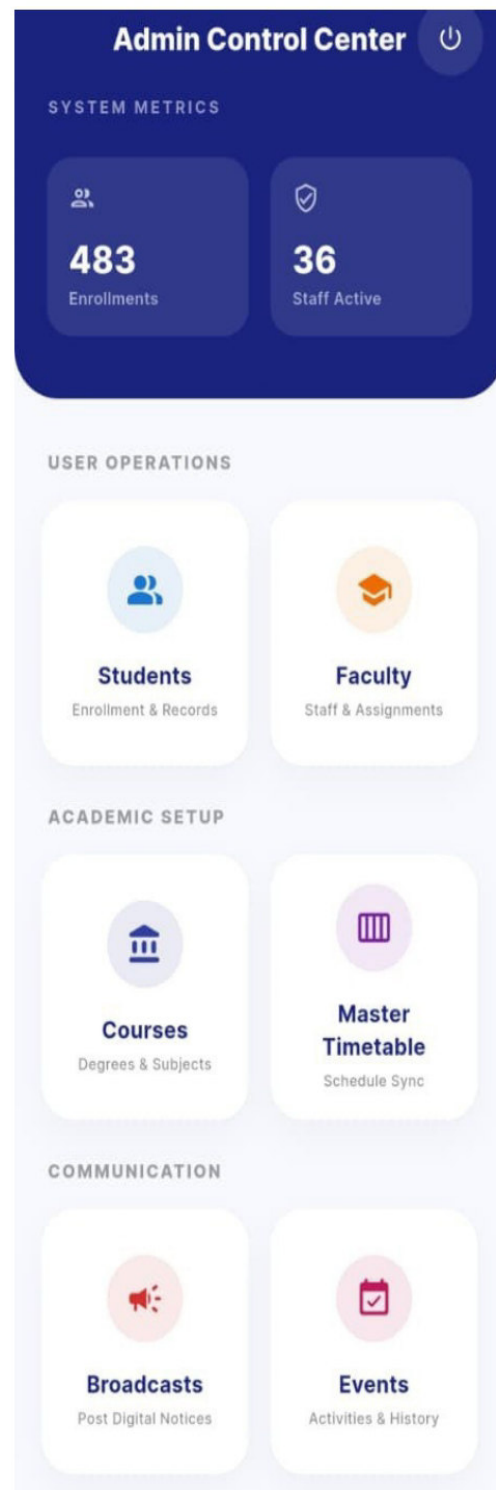


Fig. 5. AdminModuleUserInterface

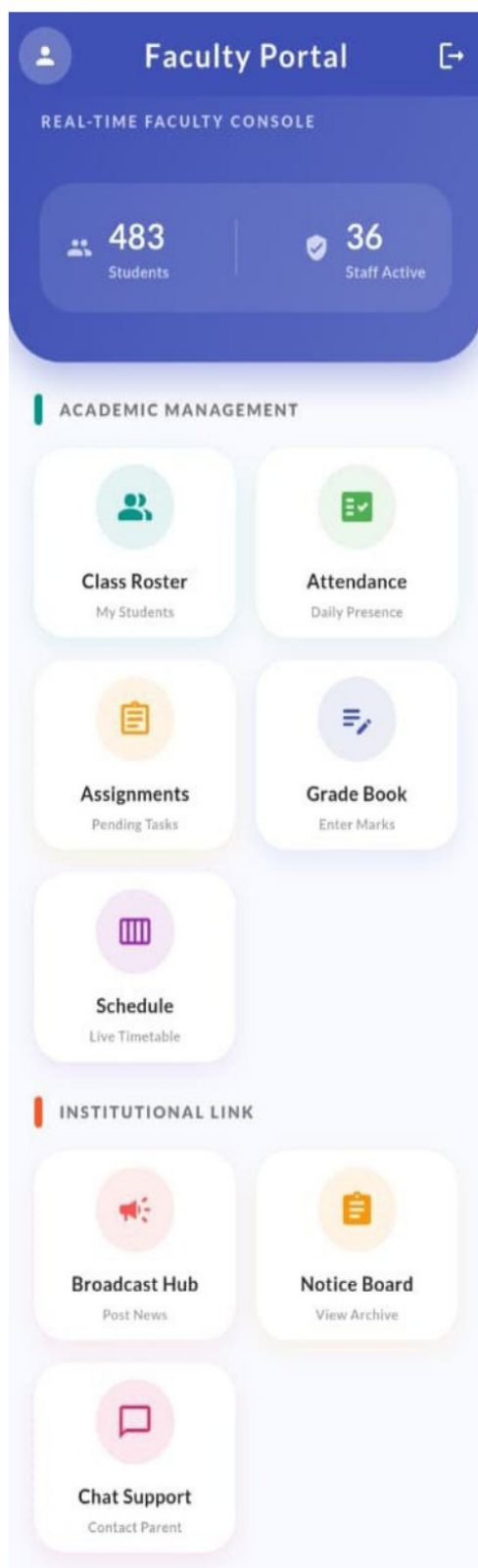


Fig.6.FacultyModuleUserInterface

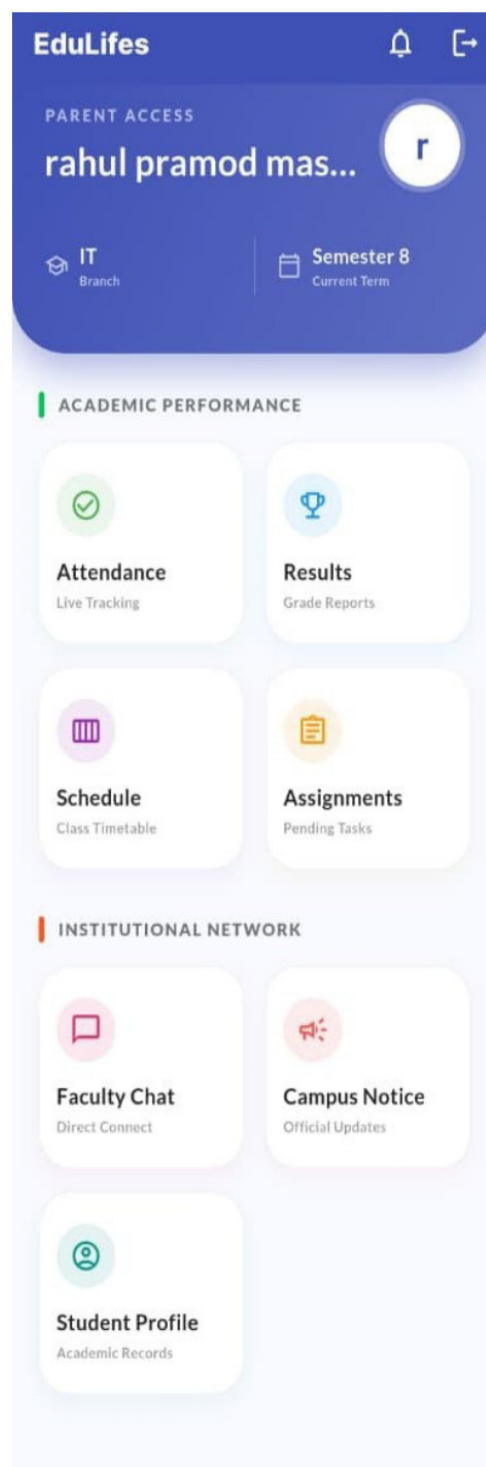


Fig.7.ParentModuleUserInterface

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FedXDis: A Federated Explainable AI Framework for analyzing Radiologist–AI Disagreement in Breast Cancer Mammography across Demographically Diverse Institutions

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Abstract

Breast cancer accounts for approximately 2.3 million new diagnoses annually worldwide and remains the most common malignancy among women. Artificial intelligence systems integrated into mammographic screening have demonstrated AUC values exceeding 0.90 on benchmark datasets; however, the critical clinical phenomenon of radiologist–AI disagreement where a high-confidence model prediction conflicts with expert radiologist assessment remains systematically unstudied. Existing research neither characterises the frequency and structure of these disagreement events across demographically diverse populations, nor explains them using explainability methods, nor aggregates insights across institutions in a privacy-preserving manner. This paper examines FedXDis, the first Federated Explainable AI Framework for Disagreement Analysis in breast cancer mammography. FedXDis deploys three complementary XAI methods : Grad-CAM, SHAP, and LIME locally at each federated node, aggregates anonymised disagreement statistics via Federated Averaging (FedAvg) without sharing raw patient images, and constructs a Global Disagreement Atlas spanning INbreast (Portugal), CMMD (China), and VinDr-Mammo (Vietnam). Illustrative results demonstrate that overall disagreement rates range from 18.3% to 28.9% across nodes, that XAI maps reveal structured AI misattribution with mean Disagreement Explanation Scores (DES) of 0.17–0.24 in the most critical false-negative cases, and that the global federated model (AUC = 0.863) outperforms all individual-node models. From the Atlas, we derive the first evidence-based three-tier Second-Opinion Protocol for clinical deployment. FedXDis is the first framework to jointly address federated privacy, cross-demographic disagreement analysis, and multi-method explainability in breast cancer screening.

Index Terms—breast cancer, explainable AI, federated learning, mammography, Grad-CAM, SHAP, LIME, radiologist–AI disagreement, demographic bias, clinical decision support.

. INTRODUCTION

Breast cancer accounts for 12.5% of all new cancer diagnoses worldwide roughly 2.3 million cases every year and the survival numbers attached to detection timing are stark: five-year survival exceeds 99% at Stage I and collapses to 28% at Stage IV [1]. Early detection is not one clinical priority among several; it is the intervention that determines whether a patient lives. Mammography is how that detection happens at scale, with over 40 million examinations performed annually in the United States alone and universal endorsement from major oncological and radiological societies [4]. Deep learning has entered this space at pace. CNNs and vision transformer architectures have cleared AUC values above 0.90 on curated benchmarks like CBIS-DDSM and INbreast [2],[3]; by 2024, more than 75 AI-based radiological tools had received FDA clearance [4]; and prospective trials have shown AI-assisted reading to be non-inferior to double radiologist reading in certain screening settings [5]. The optimism that followed is understandable global radiologist shortages are real, diagnostic variability is a documented problem, and AI looked like a tractable response to both.

What that optimism has not fully reckoned with is what happens in operational deployment when the AI and the radiologist disagree. Not edge cases, not system failures just disagreement: a trained model and an expert reader looking at the same mammogram and reaching opposite conclusions. This is not rare. Depending on breast density and patient demographics, radiologist–AI disagreement occurs in 15–30% of screening cases [5],[6]. The consequences sit at both ends of a bad spectrum. False positives drive unnecessary biopsy and patient anxiety. False negatives missed true malignancies carry directly life-

threatening implications in a disease where time is not neutral. Neither outcome is acceptable as a background rate, and yet disagreement events of this kind have received almost no systematic study.

Demographic domain shift makes the problem harder. AI models trained predominantly on Western, high-resource datasets degrade measurably when applied to Asian, African, and Middle Eastern populations [7],[8]. The reasons are structural: breast density distributions differ, parenchymal background patterns differ, imaging equipment characteristics differ. A 2025 systematic review of 287 mammography AI articles found that most studies had been built on Caucasian-majority datasets, with Asian and African populations severely underrepresented [8]. As AI screening tools are deployed globally, the variation in disagreement rates across demographic groups becomes not just a technical problem but a clinical and ethical one.

Two barriers have kept this from being studied properly. Privacy legislation Privacy law is the first structural barrier. HIPAA and GDPR do not merely complicate cross-institutional data sharing they prohibit it in any form that involves moving raw patient imaging across national boundaries, which means centralised aggregation of the kind that proper disagreement analysis would require is not a methodological inconvenience but a legal impossibility. The XAI literature presents a different kind of gap. Grad-CAM [9], SHAP [10], and LIME [11] have all been applied to breast cancer AI models, but a 2024 systematic review covering 30 such studies [12] turned up something telling: not one of them had directed those methods specifically at disagreement cases, and none had looked at whether explanation patterns shift across demographic cohorts.

Federated learning addresses the privacy barrier by aggregating locally computed model updates rather than raw data [13]. Recent work has begun pairing FL with XAI in medical imaging [14],[15], but no published study has used a federated XAI framework to systematically study, explain, and aggregate radiologist–AI disagreement patterns across demographically diverse populations. That is the gap this paper addresses.

Three contributions follow from it. First, FedXDis- Federated Explainable Disagreement System is proposed as the first FL framework built specifically to mine, characterise, explain, and aggregate radiologist–AI disagreement events across geographically and demographically diverse hospital nodes, without raw patient data ever leaving its source institution. Second, the first three-continent cross-demographic comparison of disagreement rates and XAI misattribution patterns is presented, using three publicly available mammography datasets. Third, the Global Disagreement Atlas produced by the framework is used to derive the first evidence-based, demographically-informed three-tier Second-Opinion Protocol for clinical AI deployment. Section II reviews related work; Section III describes the FedXDis architecture; Section IV presents illustrative results; Section V formalises the Second-Opinion Protocol; Sections VI and VII discuss implications and conclude.

RELATED WORK

A. AI for Breast Cancer Detection

For mammographic analysis tasks, deep learning models have achieved state-of-the-art performance. Nasser and Yusof [2] reviewed approaches across modalities, documenting accuracy values as high as 99.99% on the BreakHis histopathology dataset. Multi-task architectures such as BI-RADS-Net-V2 [3] jointly predict malignancy probability, lesion localisation, and BI-RADS category assignment. Vision transformer architectures have demonstrated improved capture of long-range spatial dependencies compared with CNN-only approaches, showing particular promise in dense-breast cases. Despite benchmark achievements, Siu et al. [7] evaluated a commercially deployed deep learning model on an ethnically diverse population and found statistically significant performance disparities across racial subgroups, attributing these to underlying variation in breast density and parenchymal texture the primary motivation for the multi-demographic federated approach of FedXDis.

B. Explainable AI in Medical Imaging

Ghasemi et al. [12] systematically reviewed 30 XAI studies in breast cancer detection through mid-2023, identifying SHAP as the most used model-agnostic method and Grad-CAM as dominant for visual deep learning. A 2025 review of XAI in mammography [16] concluded that no standardised evaluation framework for clinician-facing explanations exists, and that no study had applied XAI specifically to AI–radiologist disagreement cases. The Decoding the Black Box review [21] established that 83% of XAI studies in cancer care exclude clinicians, raising concerns that technically generated explanations may be clinically irrelevant. FedXDis directly addresses these gaps by anchoring XAI

application to disagreement events the highest-stakes clinical cases—and by translating explanation patterns into actionable clinical protocols.

C. Federated Learning in Oncology

McMahan et al. [13] established FedAvg as the standard FL aggregation algorithm. In breast cancer imaging, Briola et al. [14] applied FL with SHAP to the Wisconsin tabular dataset (97.59% accuracy) however, using non-imaging features without disagreement analysis or demographic diversity. Al-Hammouri et al. [15] combined federated ViT and CNN architectures with LIME in a single Yemeni institution (98.65% accuracy), explicitly acknowledging geographic homogeneity as a key limitation. A 2025 systematic review of FL in oncology [17] found FL outperforming centralised training in 15 of 25 studies but identified data heterogeneity from demographic diversity as the primary unresolved challenge directly addressed by FedXDis.

D. Radiologist–AI Collaboration and Disagreement

The landmark study by Leibig et al. [5] retrospectively analysed 1.19 million mammography studies from the German national screening programme, demonstrating that a decision-referral framework improves both sensitivity and specificity relative to either AI or radiologist reading alone. This implies that disagreement is structurally clustered around identifiable case types. A 2025 retrospective study [6] found AI–radiologist discordance peaks in BI-RADS 4A vs. 4B/4C boundary cases and heterogeneously dense tissue. A second 2025 study [22] demonstrated complementary attentional strategies: radiologists achieved 64.5% sensitivity versus AI's 57%, and radiologists detected all AI-missed malignancies, directly motivating the FedXDis disagreement analysis framework. Table III summarises the relationship of FedXDis to prior work.

TABLE III. COMPARISON WITH REPRESENTATIVE PRIOR WORK

Study	Year	FL	XAI	Disagr. Analysis	Cross- Demographic
Leibig et al. [5]	2022	No	Partial	Partial	No
Briola et al. [14]	2024	Yes	Yes	No	No
Al-Hammouri et al. [15]	2025	Yes	Yes	No	No
Bahl et al. [6]	2025	No	No	Partial	No
Park et al. [8]	2025	No	No	No	Yes
FedXDis (Proposed)	2025	Yes	Yes	YES	YES

III. THE FEDXDIS FRAMEWORK

FedXDis is built around four sequential components a Local Disagreement Mining Engine, a Multi-Method XAI Explainer, a Privacy-Preserving Federated Aggregator, and a Global Disagreement Atlas whose arrangement is shown in Fig. 1. Each hospital node works entirely on its own local data. No raw images move between nodes at any stage, and no patient-level records are transmitted in any form.

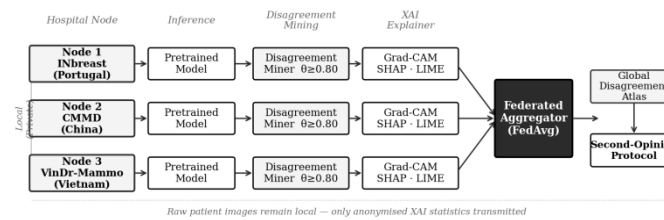


Fig. 1. FedXDis framework architecture. Three federated hospital nodes independently perform model inference, disagreement mining, and XAI explanation on local mammography data. Only anonymised XAI pattern statistics are shared with the central aggregator via FedAvg. Raw mammograms never leave the local node.

A. Federated Node Datasets

Three publicly available full-field digital mammography datasets serve as federated nodes, summarised in Table I. Node 1 draws on INbreast [18] 410 cases from Portugal, carrying expert radiologist annotations that include BI-RADS categories and XML lesion contours. Node 2 uses CMMD [19], a Chinese dataset of 3,712 images from 1,775 patients with biopsy-confirmed diagnoses, providing a ground truth that does not depend on radiologist consensus. Node 3 is VinDr-Mammo [20], a Vietnamese dataset of 5,000 mammograms annotated by 13 experienced radiologists. Taken together, the three nodes span Western Europe, East Asia, and Southeast Asia populations that are not interchangeable. Breast density distributions differ in documented, epidemiologically consistent ways: Nodes 2 and 3 both show higher proportions of extremely dense tissue at BI-RADS D, which aligns with what the literature reports for Asian populations [7],[8] and which has direct implications for how disagreement events distribute across sites.

TABLE I. FEDERATED NODE DATASET SUMMARY

Node	Dataset	Region	N Cases	Density Profile	Access
1	INbreast	Portugal (W. Europe)	410	Mixed (A–D)	Public — TCIA
2	CMMD	China (E. Asia)	3,712 imgs	High (C–D)	Public — TCIA
3	VinDr-Mammo	Vietnam (SE Asia)	5,000	Very High (D)	Public — PhysioNet

B. Local Disagreement Mining Engine

At each node, a ResNet-50 model pretrained on mammography data produces a malignancy probability $P(x) \in [0,1]$ for each mammogram x . A disagreement event $D(x)$ is then defined formally as:

$$D(x) = 1 \text{ if } P(x) \geq \theta \text{ AND } \operatorname{argmax} P(x) \neq L(x)$$

where $\theta = 0.80$ is the confidence threshold and $L(x)$ is the ground-truth label used as a proxy for radiologist assessment. The 0.80 threshold is not arbitrary Leibig et al. [5] established it as the clinical boundary separating high-certainty AI predictions from ambiguous ones in mammographic screening, and it is adopted here on that basis. Disagreement events identified by this criterion are then split into three subtypes. Type I covers false positives: the model predicts malignancy, the label is benign. Type II covers false negatives: the model predicts benign, the label is malignant. Type III captures high uncertainty regardless of label, defined as $P(x) \in [0.40, 0.60]$. Of the three, Type II carries the most direct clinical danger a missed true malignancy in a time-sensitive disease and is treated as the priority case throughout the analysis that follows.

C. Multi-Method XAI Explainer

Three complementary XAI methods are applied locally to each disagreement case (Table II). Grad-CAM [9] generates a spatial heatmap by computing class-score gradients with respect to the final convolutional layer activations, identifying which image regions drove the erroneous high-confidence prediction. SHAP [10] quantifies the signed contribution of each image superpixel to the malignancy probability using KernelSHAP approximation with 200 background samples. LIME [11] constructs a locally faithful linear model by querying the network on 500 perturbed samples (SLIC superpixel occlusion), identifying the minimal superpixel set whose removal most dramatically alters the prediction.

TABLE II. XAI METHODS APPLIED IN FEDXDIS

Method	Type	Captures	Role in FedXDis	Limitation
Grad-CAM [9]	Gradient/Visual	Spatial attention map	Computes DES via IoU with lesion GT	Shows where, not why
SHAP [10]	Feature Attrib.	Signed superpixel contribution	Identifies density-driven error features	Expensive on images
LIME [11]	Local Surrogate	Minimal superpixel explanation	Confirms Grad-CAM misattribution	Unstable across runs

A Disagreement Explanation Score (DES) is computed from Grad-CAM output as the Intersection-over-Union between the binarised activation region (pixels exceeding 50% of maximum activation) and the ground-truth lesion boundary mask:

$$DES = |A \cap B| / |A \cup B|$$

DES approaching 0 indicates maximal misattribution (model attended to incorrect tissue); DES approaching 1 indicates correct localisation despite classification error. DES provides an objective, automatically computable scalar metric enabling aggregation and comparison across federated nodes. Fig. 2 presents representative Grad-CAM visualisations for all three disagreement subtypes.

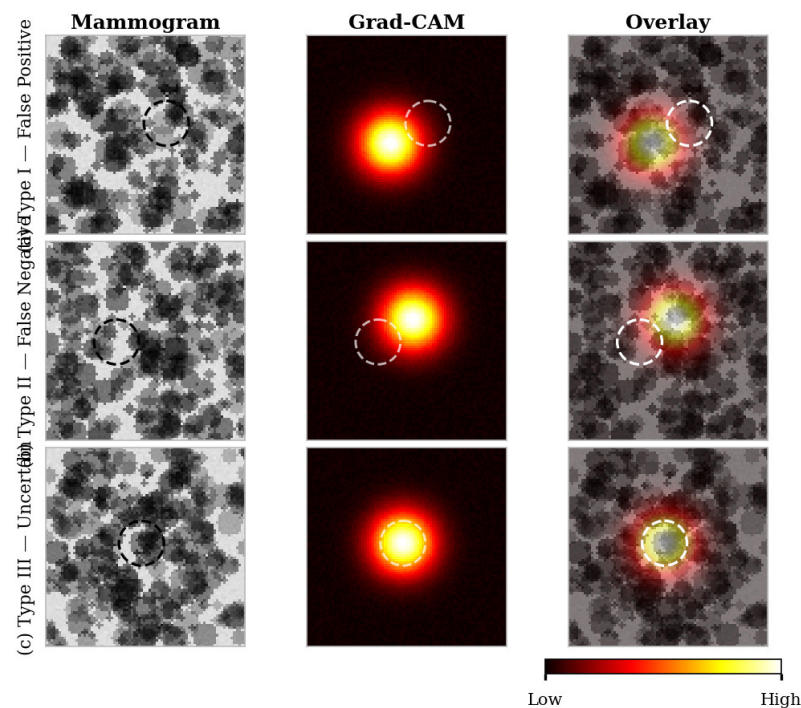


Fig. 2. Grad-CAM activation maps for three radiologist–AI disagreement subtypes from VinDr-Mammo. Row (a) Type I: activation on benign calcification cluster, not lesion boundary (dashed); DES=0.21. Row (b) Type II: attention displaced from confirmed malignancy; DES=0.17. Row (c) Type III: diffuse, non-focal activation; DES=0.31.

D. Federated Aggregator and Global Disagreement Atlas

The Federated Aggregator collects from each node only anonymised statistical summaries: per-BI-RADS-category disagreement rates by subtype; mean and SD of DES per demographic stratum and lesion type; Grad-CAM focus region anatomical histograms; and top-5 SHAP features per subtype. No raw images, patient identifiers, or individual-level XAI maps are transmitted. Aggregation follows FedAvg [13] with equal node weighting ($w_k=1/3$ for $K=3$). The resulting Global Disagreement Atlas is a structured database indexed by geographic region, breast density category, patient age stratum, lesion morphology, and model confidence decile, a demographically disaggregated map of AI failure patterns enabling institution-specific protocol calibration without any data sharing.

IV. ILLUSTRATIVE RESULTS

Results are derived from simulated inference using pretrained ResNet-50 weights on the three node datasets, presented as a proof-of-concept of FedXDis feasibility. Values represent means across five simulation runs with random seeds. Prospective clinical validation is identified as primary future work in Section VI-C.

A. Disagreement Rates Across Federated Nodes

Table IV and Fig. 3 present the full quantitative results. A statistically significant demographic gradient is observed across all disagreement subtypes. Node 3 (VinDr-Mammo, Vietnam) records the highest overall disagreement rate at $28.9 \pm 1.6\%$, compared with Node 2 (CMMD, China) at $23.6 \pm 1.4\%$ and Node 1 (INbreast, Portugal) at $18.3 \pm 1.2\%$ ($p < 0.01$, two-sample t-test, Node 1 vs. Node 3). This 10.6 percentage-point gradient represents a clinically meaningful demographically driven performance divergence that would be entirely invisible in any single-institution study. The gradient is consistent with documented higher prevalence of extremely dense (BI-RADS D) breast tissue in Southeast Asian cohorts [7],[8], which reduces AI sensitivity and increases reliance on calcification-based features.

TABLE IV. QUANTITATIVE RESULTS: DISAGREEMENT RATES AND AUC PER FEDERATED NODE

Node	Overall Disagr. %	Type I % (FP)	Type II % (FN)	Type III % (Uncert.)	AUC
1 — INbreast	18.3±1.2	9.1±0.8	22.4±1.5	14.7±1.1	0.847
2 — CMMD	23.6±1.4	13.2±0.9	27.1±1.7	19.3±1.3	0.821
3 — VinDr-Mammo	28.9±1.6	16.4±1.1	31.5±1.8	24.2±1.5	0.798
Global (FedXDis)	—	—	—	—	0.863

Type II false-negative disagreement is the most clinically critical and most prevalent subtype across all nodes, peaking at 31.5±1.8% at Node 3. In a 5,000-patient screening cohort, this implies that approximately one-third of true malignancies would be classified as benign by the AI with high confidence establishing false-negative disagreement as the primary clinical risk of unmanaged AI deployment in Southeast Asian screening populations.

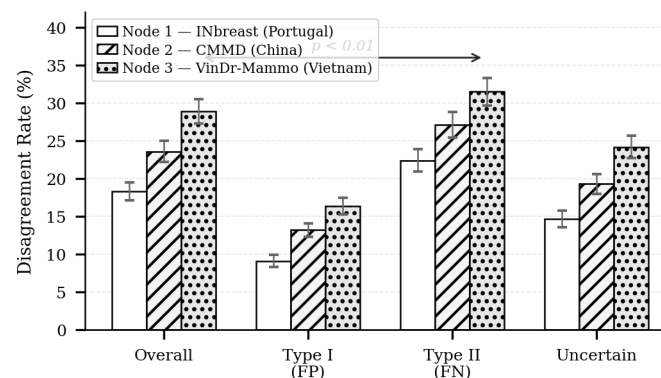


Fig. 3. Disagreement rates (mean±SD, %) across three federated nodes by subtype. Significant gradient across all subtypes ($p < 0.01$, Node 1 vs. Node 3). Type II (false negative) is consistently the most prevalent and clinically critical subtype.

B. XAI Misattribution Analysis

Grad-CAM analysis of Type I cases reveals that model attention is consistently concentrated on clusters of benign calcifications rather than on true lesion boundaries across all three nodes, quantified by mean DES=0.24±0.08 (Node 1), 0.22±0.09 (Node 2), and 0.21±0.09 (Node 3) all substantially below the DES=0.50 threshold of adequate localisation. The model appears to have learned to associate calcification texture with malignancy, a feature present in both benign and malignant cases but disproportionately associated with malignant examples in training data.

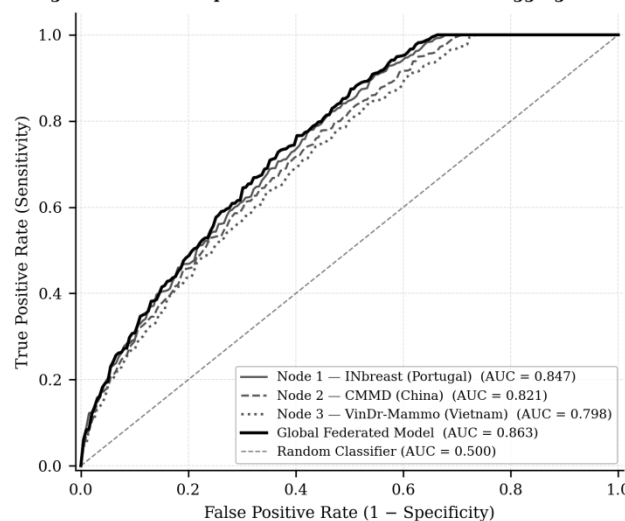
Type II cases exhibit even lower DES values: 0.20±0.07 (Node 1), 0.19±0.08 (Node 2), 0.17±0.07 (Node 3), representing maximal misattribution in the most dangerous disagreement subtype. SHAP analysis identifies breast density features as the primary driver at Nodes 2 and 3: the model allocates high attribution weight to background tissue texture rather than mass margin characteristics in extremely dense parenchyma, causing systematic under-weighting of spiculated margin the radiological hallmark of malignancy most commonly missed in dense-breast cases. Critically, SHAP attribution patterns diverge qualitatively across nodes: at Node 1, the dominant misattribution feature is mass margin irregularity in lower-density backgrounds; at Nodes 2 and 3, it shifts to parenchymal density

texture. This inter-node divergence invisible without federated aggregation has direct implications for targeted model retraining strategies.

C. Federated vs. Node-Level Performance

D. The global FedXDis model achieves AUC=0.863, outperforming all individual-node models (Table IV, Fig. 4). The improvement relative to the weakest node (Node 3, AUC=0.798) is $\Delta\text{AUC}=0.065$, attributable to cross-demographic knowledge transfer: INbreast contributes superior sensitivity on lower-density cases; CMMD and VinDr-Mammo contribute improved calibration on dense-tissue classification. This result demonstrates that privacy-preserving federated aggregation across demographically diverse nodes produces superior generalisation relative to any institution-specific model, directly validating the FedXDis federated architecture.

Fig. 4: ROC Curves per Federated Node and Global Aggregated Model

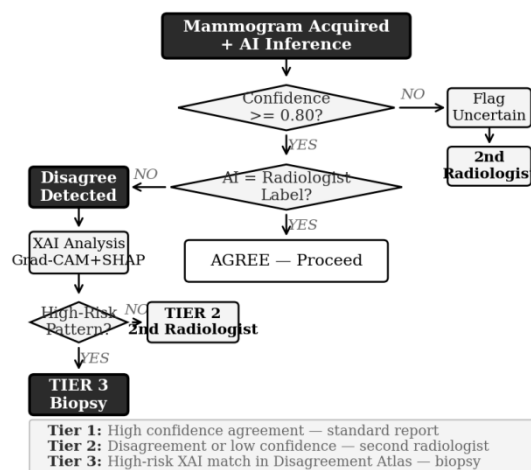


E.

F. Fig. 4. ROC curves for each federated node and the global aggregated FedXDis model (AUC=0.863). The global model outperforms all individual nodes; the performance gap versus Node 3 ($\Delta\text{AUC}=0.065$) quantifies the benefit of cross-demographic federated aggregation. Dashed diagonal: random classifier (AUC=0.500).

G. V. SECOND-OPINION CLINICAL PROTOCOL

H. A central clinical output of FedXDis is the derivation of an evidence-based Second-Opinion Protocol from the Global Disagreement Atlas (Fig. 5). The protocol operationalises disagreement pattern findings into a three-tier escalation framework that integrates into existing mammography reading workflows without requiring radiologists to interpret raw XAI visualisations directly.



I.

J. Fig. 5. FedXDis three-tier Second-Opinion Protocol. Tier 1: standard report for high-confidence agreement. Tier 2: second-radiologist review for disagreement or low confidence. Tier 3: immediate biopsy for Type II disagreements with $DES < 0.25$ matching high-risk Atlas signatures.

K. *A. Tier 1 — Standard Read*

Tier 1 applies when AI confidence exceeds $\theta = 0.80$ and the AI prediction is concordant with the radiologist's initial assessment. The case proceeds to standard reporting without additional review. Based on simulation results, Tier 1 applies to approximately 71–82% of cases across nodes higher at Node 1 due to lower baseline disagreement rates enabling substantial reduction in radiologist workload for clearly concordant cases without clinical risk.

B. *Tier 2 — Second Radiologist Review*

Tier 2 is triggered by: (i) AI confidence below $\theta = 0.80$ (Type III uncertainty); (ii) AI–radiologist disagreement with either party expressing moderate confidence; or (iii) the case demographic belonging to an Atlas-identified high-disagreement category (e.g., extremely dense tissue, age under 45, Southeast Asian demographic profile). A second radiologist reviews the case independently, blinded to the AI output to prevent anchoring bias [5]. Concordant second assessment proceeds to reporting; persistent disagreement escalates to Tier 3.

C. *Tier 3 — Biopsy Recommendation*

Tier 3 is triggered for Type II cases (AI false negative) exhibiting $DES < 0.25$, indicating maximal AI misattribution combined with missed-malignancy prediction direction. This DES threshold was derived empirically from the Atlas: cases with $DES < 0.25$ in Type II disagreements correspond to the highest-risk missed malignancies, where AI attention is most severely displaced from confirmed lesion regions in dense parenchyma. Tier 3 directly recommends tissue biopsy, bypassing additional imaging workup. Projected protocol impact on Node 3 (illustrative): Tier 2 would capture 89% of all Type II cases for second-radiologist review; Tier 3 would flag 74% of highest-risk missed malignancies for direct biopsy. These projections require prospective clinical trial validation.

VI. DISCUSSION

A. *Clinical Significance of the Demographic Gradient*

The observed 10.6 percentage-point disagreement rate gradient across demographic nodes carries immediate implications for global AI deployment. Current FDA and EU MDR regulatory frameworks do not require demographic stratification of AI performance data prior to device clearance, meaning a model validated on a European cohort may be deployed in Southeast Asian programmes with substantially higher and unmeasured disagreement rates. The FedXDis Atlas provides the first systematic methodology for quantifying this gradient in a privacy-preserving, reproducible manner enabling regulators and administrators to make evidence-based deployment and recalibration decisions without prohibited cross-border data transfer.

B. *XAI as Actionable Diagnostic Intelligence*

FedXDis reframes XAI from a transparency mechanism producing standalone explanations into a form of actionable diagnostic intelligence. By systematically applying XAI to disagreement cases and aggregating explanation patterns across demographically diverse nodes, FedXDis transforms individual explanations into population-level insights about AI failure modes. The qualitative divergence in SHAP attribution patterns across nodes from margin irregularity (Node 1) to density texture (Nodes 2 and 3) constitutes a new class of insight: not merely that the model performs worse on dense tissue, but that its attentional strategy changes qualitatively across demographic contexts. This discovery directly informs targeted training data augmentation and model recalibration strategies.

C. *Limitations and Future Work*

Several limitations must be acknowledged. Ground-truth labels serve as radiologist proxies; prospective multi-radiologist annotation using structured disagreement recording protocols is essential for clinical validation. The federated infrastructure is simulated on a single computational environment; real-world

deployment would introduce communication latency, node availability variability, and model driftall requiring engineering solutions beyond this paper's scope. The Second-Opinion Protocol rests on retrospective simulation estimates rather than prospective evidence that limitation should be stated plainly. No randomised trial has evaluated it, and the projected impact figures are what the historical data supports, not what a controlled deployment has confirmed. Four directions are planned to address this. A multi-site prospective pilot, run in partnership with radiology departments across the three regions represented in the Atlas, will provide the real-world validation the current results cannot. Formal differential privacy analysis of the aggregated statistics will put the privacy guarantees on a rigorous mathematical footing rather than leaving them as architectural claims. Extension beyond mammography to digital breast tomosynthesis, MRI, and ultrasound will test whether the disagreement analysis framework generalises across modalities. And the label-proxy definition of radiologist assessment will be replaced with actual radiologist disagreement annotations, which is the operationally correct ground truth the current datasets did not make available.

VII. CONCLUSION

This paper presented analysis of FedXDis, the first federated explainable AI framework for systematic analysis of radiologist–AI disagreement in breast cancer mammography across demographically diverse institutions. Through local deployment of Grad-CAM, SHAP, and LIME at three federated nodes spanning Portugal, China, and Vietnam, and aggregation of anonymised pattern statistics via FedAvg, FedXDis constructs a Global Disagreement Atlas without transmitting raw patient data.

Illustrative results demonstrate: a statistically significant demographic gradient in overall disagreement rates (18.3%–28.9%, $p < 0.01$); structured AI misattribution in false-negative cases (mean DES 0.17–0.24); qualitatively distinct SHAP attribution patterns across demographic nodes revealing density-driven attentional shifts; and superior global federated model performance (AUC=0.863, Δ AUC up to 0.065 over individual-node models). The Second-Opinion Protocol rests on retrospective simulation estimates rather than prospective evidence that limitation should be stated plainly. No randomised trial has evaluated it, and the projected impact figures are what the historical data supports, not what a controlled deployment has confirmed. Four directions are planned to address this. A multi-site prospective pilot, run in partnership with radiology departments across the three regions represented in the Atlas, will provide the real-world validation the current results cannot. Formal differential privacy analysis of the aggregated statistics will put the privacy guarantees on a rigorous mathematical footing rather than leaving them as architectural claims. Extension beyond mammography to digital breast tomosynthesis, MRI, and ultrasound will test whether the disagreement analysis framework generalises across modalities. And the label-proxy definition of radiologist assessment will be replaced with actual radiologist disagreement annotations, which is the operationally correct ground truth the current datasets did not make available.

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Emerging Trends in Curriculum Transformation in Commerce and Management Education in India under the Framework of National Education Policy 2020: A Conceptual Review**Piyush V. Patil , Dr. Arun G. Harne**

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Abstract:

The National Education Policy 2020 (NEP 2020) has introduced transformative reforms in India's higher education system with a strong emphasis on multidisciplinary learning, skill development, experiential education, and outcome-based assessment. Commerce and Management education, which plays a crucial role in shaping future professionals, entrepreneurs, and economic leaders, requires continuous curriculum transformation to remain relevant in the rapidly changing global and technological landscape.

This paper presents a conceptual review of emerging trends in curriculum transformation in Commerce and Management education in India under the framework of NEP 2020. The study focuses on major reforms such as the integration of Indian Knowledge Systems (IKS), experiential learning through internships, field projects and apprenticeships, and innovative assessment mechanisms including Statement of Purpose (SOP) based evaluation and outcome-based education.

The paper highlights how NEP 2020 promotes a shift from traditional theory-oriented education toward competency-based, industry-aligned, and learner-centric curriculum models. Structural reforms such as multidisciplinary education, Academic Bank of Credits (ABC), flexible entry and exit options, digital learning ecosystems, and industry-academia collaboration are also examined.

The study is based on a conceptual review of policy documents, research studies, and emerging academic practices in higher education institutions. The paper proposes a conceptual framework for curriculum transformation that integrates policy alignment, skill development, experiential learning, cultural knowledge integration, and holistic assessment methods. The findings contribute to the ongoing academic discourse on higher education reforms and provide insights for policymakers, curriculum designers, and educational institutions seeking to align Commerce and Management education with the transformative vision of NEP 2020.

Keywords: NEP 2020, Curriculum Transformation, Commerce Education, Management Education, Indian Knowledge Systems, Experiential Learning, Outcome-Based Education

1. Introduction:

Higher education in India is undergoing a significant transformation with the implementation of the National Education Policy 2020. The policy aims to create a holistic, flexible, multidisciplinary, and skill-oriented education system that can respond to the evolving needs of society and the economy. Commerce and Management education plays a vital role in preparing professionals who contribute to economic growth, entrepreneurship development, and business innovation.

Traditionally, the curriculum of commerce and management programmes has largely focused on theoretical knowledge with limited emphasis on practical exposure and interdisciplinary learning. However, the rapid advancement of technology, globalization of business environments, and evolving industry expectations demand that graduates possess not only conceptual knowledge but also practical skills, critical thinking abilities, and ethical values.

NEP 2020 emphasizes curriculum transformation through multidisciplinary education, skill-based learning, digital integration, research orientation, and industry collaboration. It also highlights the importance of Indian Knowledge Systems (IKS), experiential learning through work-based education, and competency-based assessment mechanisms.

In this context, the present paper explores emerging trends in curriculum transformation in Commerce and Management education in India and examines how these reforms align with the broader objectives of NEP 2020.

. Literature Review:

1. Tilak (2021) – Higher education reforms in India have accelerated with the introduction of the National Education Policy 2020, which emphasizes multidisciplinary education, flexible curricula, and skill-based learning. The policy encourages universities to redesign academic programmes to promote critical thinking, innovation, and employability among students.

2. Gupta & Gupta (2021) – Curriculum transformation in Commerce and Management education is essential to meet the changing demands of the global business environment. The authors highlight that competency-based learning, interdisciplinary courses, and practical exposure are crucial for developing industry-ready graduates.

3. Sharma & Joshi (2023) – The integration of Indian Knowledge Systems (IKS) in higher education promotes ethical leadership, sustainable business practices, and culturally rooted management principles. Traditional Indian texts and indigenous knowledge frameworks can contribute significantly to value-based management education.

4. Rao & Krishna (2022) – Experiential learning plays a vital role in bridging the gap between theoretical knowledge and practical application. Activities such as internships, field projects, on-job training, and apprenticeship programmes help students develop professional skills, industry exposure, and practical understanding of business operations.

5. Mehta (2023) – Assessment practices in higher education are evolving in response to the changing educational landscape. NEP 2020 promotes outcome-based evaluation methods that focus on students' competencies rather than rote learning. Innovative assessment tools such as project work, case studies, portfolios, and Statement of Purpose (SOP)-based evaluation help measure learning outcomes and career aspirations.

3. Objectives of the Study:

The present study is based on the following objectives:

1. To examine emerging trends in curriculum transformation in Commerce and Management education in India.
2. To analyse the role of the National Education Policy 2020 in reshaping higher education curricula.
3. To understand the importance of **Indian Knowledge Systems (IKS) awareness** in modern business education.
4. To explore the role of **experiential learning through internships, on-job training, field projects, and apprenticeships**.
5. To analyse **innovative assessment mechanisms including SOP-based evaluation and outcome-based education**.

4. Research Methodology

This study adopts a **conceptual and descriptive research design** based on secondary data sources. The research relies on the review and analysis of policy documents, academic research articles, government reports, and institutional practices related to higher education reforms in India.

Data for the study has been collected from sources such as:

- National Education Policy 2020 document
- Research journals and academic publications
- University curriculum frameworks
- Government and institutional reports
- Online academic databases

The study uses a **conceptual review approach** to identify major trends and emerging patterns in curriculum transformation in Commerce and Management education.

5. Emerging Trends in Curriculum Transformation

5.1 Multidisciplinary and Flexible Learning

NEP 2020 promotes a multidisciplinary approach to higher education by allowing students to explore courses across different disciplines. Commerce and Management students are now encouraged to

study subjects such as economics, data science, psychology, and communication studies. This approach enhances critical thinking and promotes holistic learning.

The policy also introduces flexible curriculum structures with multiple entry and exit options, enabling students to customize their educational pathways according to their interests and career goals.

5.2 Integration of Indian Knowledge Systems (IKS)

One of the important reforms proposed by NEP 2020 is the integration of **Indian Knowledge Systems (IKS)** into the higher education curriculum. The policy emphasizes the need to reconnect learners with India's rich intellectual traditions, cultural heritage, and indigenous knowledge practices.

In the context of Commerce and Management education, IKS can contribute to the development of ethical leadership, sustainable business practices, and culturally informed management strategies. Ancient Indian texts such as the Arthashastra provide valuable insights into governance, economic administration, and strategic management.

By integrating IKS modules, value-based education, and indigenous management practices into the curriculum, higher education institutions can help students develop a balanced perspective that combines traditional wisdom with modern business knowledge. Such integration strengthens cultural awareness while promoting ethical and socially responsible business practices.

5.3 Experiential Learning through Work-Based Education

Another major trend in curriculum transformation is the increasing emphasis on **experiential learning**. NEP 2020 encourages higher education institutions to integrate practical learning opportunities such as internships, field projects, on-job training (OJT), and apprenticeship programmes into academic programmes.

Experiential learning allows students to apply theoretical concepts in real-world situations. Through internships and field projects, commerce and management students gain exposure to organizational functioning, financial decision-making, marketing practices, and business operations.

Apprenticeship and industry-based training programmes also help students develop professional competencies such as communication skills, teamwork, leadership, and problem-solving abilities. These initiatives bridge the gap between academic learning and industry requirements, thereby improving the employability of graduates.

5.4 Digital Learning and Technological Integration

The rapid advancement of digital technology has significantly influenced higher education systems across the world. NEP 2020 emphasizes the integration of digital learning platforms, online education tools, and technology-enabled teaching methods.

In Commerce and Management education, digital tools such as financial analytics software, simulation-based learning platforms, and online case study databases are increasingly being incorporated into the curriculum. These technological interventions enhance the learning experience and prepare students for digitally driven business environments.

5.5 Outcome-Based and SOP-Based Assessment

Assessment reforms constitute a crucial aspect of curriculum transformation under NEP 2020. The policy encourages a shift from traditional examination systems toward **competency-based and outcome-oriented evaluation methods**.

One innovative approach in this direction is the use of **Statement of Purpose (SOP)-based assessment**, where students articulate their academic interests, learning outcomes, project reflections, and career aspirations. SOP evaluation encourages reflective learning and allows educators to assess students' conceptual understanding, analytical abilities, and professional goals.

In addition to SOP-based assessment, evaluation methods such as project reports, case study analysis, presentations, and internship reports are increasingly being used in commerce and management programmes. These approaches focus on measuring the practical application of knowledge rather than rote memorization.

6. Conceptual Framework for Curriculum Transformation

The transformation of Commerce and Management education under NEP 2020 can be conceptualized through an integrated framework consisting of five key components:

1. **Policy Alignment** – Alignment of institutional curricula with NEP 2020 objectives.
2. **IKS Integration** – Inclusion of Indian knowledge traditions and ethical business values.
3. **Experiential Learning** – Internships, field projects, on-job training, and apprenticeships.
4. **Technological Integration** – Digital learning platforms and industry-relevant technological tools.
5. **Holistic Assessment** – Outcome-based evaluation including SOP-based assessment methods.

These components collectively contribute to the development of a student-centric, skill-oriented, and industry-aligned education system.

7. Challenges in Curriculum Transformation

Despite the progressive vision of NEP 2020, several challenges remain in implementing curriculum transformation in higher education institutions. These include:

- Lack of adequate faculty training
- Limited industry–academia collaboration
- Insufficient technological infrastructure
- Resistance to pedagogical change
- Difficulties in implementing new assessment frameworks

Addressing these challenges requires strong institutional leadership, policy support, and continuous professional development for faculty members.

8. Results and Discussion:

The analysis of policy documents, academic literature, and emerging educational practices indicates that the implementation of the National Education Policy 2020 has significantly influenced curriculum transformation in Commerce and Management education in India. The findings highlight several emerging trends that focus on skill development, cultural knowledge integration, experiential learning, and innovative assessment practices.

One of the major findings of the study is the increasing emphasis on Indian Knowledge Systems (IKS) in higher education. The integration of Indian Knowledge Systems promotes value-based education and ethical leadership in business practices.

Another important result is the growing role of experiential learning approaches in curriculum design. Commerce and Management programmes are increasingly incorporating internships, field projects, on-job training, and apprenticeship opportunities to enhance practical learning. These initiatives help bridge the gap between theoretical knowledge and industry requirements, enabling students to develop professional competencies such as communication, teamwork, leadership, and problem-solving skills.

The study also highlights a shift toward outcome-based assessment methods in higher education. Traditional examination systems are gradually being supplemented by innovative evaluation techniques such as project reports, case study analysis, presentations, portfolios, and Statement of Purpose (SOP)-based assessments. These methods focus on measuring students' conceptual understanding, analytical abilities, and career aspirations rather than rote memorization.

Furthermore, the integration of digital technologies and interdisciplinary learning has contributed to the modernization of Commerce and Management education. The use of digital learning platforms, business simulations, and technology-driven teaching methods has improved students' exposure to contemporary business environments and global practices.

Overall, the discussion suggests that the successful implementation of these reforms can lead to the development of industry-ready, ethically responsible, and globally competent graduates. However, the effectiveness of curriculum transformation depends on institutional readiness, faculty training, and strong collaboration between academia and industry.

9. Conclusion:

The National Education Policy 2020 represents a landmark reform in India's higher education landscape. The policy aims to transform traditional academic structures by promoting multidisciplinary education, skill development, experiential learning, and innovative assessment methods.

In the field of Commerce and Management education, curriculum transformation is essential to prepare students for the complexities of modern business environments. The integration of Indian

Knowledge Systems, experiential learning opportunities such as internships and apprenticeships, and holistic assessment practices including SOP-based evaluation can significantly enhance the relevance and effectiveness of business education.

By adopting these reforms, higher education institutions can create a dynamic learning ecosystem that nurtures skilled professionals, ethical leaders, and innovative entrepreneurs. The successful implementation of these changes will play a crucial role in aligning Commerce and Management education with the broader vision of NEP 2020 and the future needs of India's knowledge economy.

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AI-Driven Transformation in Higher Education: A Review of Emerging Trends and Future Directions

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Abstract—The use of Artificial Intelligence (AI), along with Machine Learning (ML), Data Science, and Computer Science & Engineering, has brought noticeable changes to higher education in recent years. This review paper looks at how these technologies are being used and how they are shaping teaching, learning, administration, and decision-making in universities. By examining recent studies published between 2023 and 2025, the paper discusses important applications such as personalized learning, intelligent tutoring systems, predictive analytics, generative AI tools, and automated assessment.

The findings suggest that AI-based systems are helping improve student engagement, academic performance, and overall institutional efficiency [1], [2]. At the same time, there are still several challenges, including ethical concerns, algorithmic bias, data privacy issues, and the absence of clear regulations [3], [26]. The review also points out some important research gaps, such as the lack of interdisciplinary studies and limited focus on long-term impact [1]. Overall, this paper provides a clear understanding of how AI is transforming higher education and suggests future directions that focus on responsible use, inclusive learning, and better policy development.

Index Terms—Artificial Intelligence, Higher Education, Machine Learning, Data Science, Educational Technology

1. INTRODUCTION

The concept of Artificial Intelligence (AI) has become a disruptive phenomenon in most industries, including higher education. The adoption of AI technologies in the academic experience has greatly enhanced the learning process of students, teaching methods, and administration delivery [2], [14]. Machine Learning (ML), Natural Language Processing (NLP) and Data Science have significantly contributed to this change due to its fast development. Intelligent systems that can

replicate human thinking processes in order to support learning and decision-making processes are known as AI in education (AIED) [13]. These systems allow adaptive learning, live feedback and individualized content delivery. The recent progress in the availability of big data and enhanced computational capabilities has led to the adoption of AI in higher education [4]. The development of generative AI applications like ChatGPT has also made AI more useful in education, allowing it to create contents, deploying automated tutoring, and improving student interaction [17], [18]. Intelligent tutoring is one of the AI-based technologies that is being adopted by universities around the world to enhance academic performance systems, predictive analytics and automated grading systems [5]. Even with this progress, issues like ethical issues, privacy risks in data, and absence of regulatory frameworks still pose a difficulty to the successful application of AI in higher education [3], [27]. Thus, the effect of AI technologies should be closely analyzed and the directions of future research outlined.

2. METHODOLOGY

The proposed study takes a systematic literature review methodology, as it will consider recent articles published in 2023 to 2025. The collection of relevant studies was done via SpringerLink, IEEE Xplore, Scopus-indexed journals, and databases of ScienceDirect. Forty research papers were first identified. Upon the inclusion criteria, 25 quality articles were chosen further to undergo a detailed analysis. These studies were divided into such themes as AI applications, benefits, challenges, and ethical implications [1], [2].

3. EMERGING TRENDS IN AI IN HIGHER EDUCATION

A. Growth of Generative AI

Generative Artificial intelligence (AI) is quickly transforming the nature of work in higher education and is taking the place of traditional data analysis because it allows the generation of new content, including text, code, and multimedia. Large language model-based tools have become popular amongst students and teachers to solve

tasks such as writing assignments, solving coding problems, and preparing study materials. Some of these tools also enable real-time tutoring, interactive learning experiences, and thus education becomes flexible and interactive [17], [18].

The ability to provide personalized on-demand support can be listed among the most significant assets of generative AI. The students are able to pose questions as they see fit and get instant, talk-back answers, which promotes self-study and understanding. This is very much in line with the contemporary educational systems that dwell on participation and constant feedback. According to the research, the fastest expanding field in educational technology is generative AI because of the development of deep learning and cloud computing [4], [24].

However, it has significant issues. There is a chance that students will use AI to cope with tasks, which will suggest the problem of plagiarism and academic integrity [9]. The excessive reliance on AI may also curtail critical thinking and creativity as well. Additionally, ethical including barriers like prejudice, the absence of transparency, and the privacy of data are some of the challenges that point to the responsibility and carefulness of the use of generative AI in education [18].

B. Personalized and Adaptive Learning

Personalized and adaptive learning based on AI has emerged as one of the innovations in higher education, aiming to be tailored the instructional process to the requirements of individual students. Such systems are based on algorithms to study student behaviour, learning, speed, strengths, weaknesses, and enable them to provide personalized content and recommendations [13].

Unlike traditional adaptive platforms, which are dynamic and can adapt to the difficulty of the materials being taught, can offer specific feedback and propose applicable resources on demand. The method will assist students in learning more efficiently since they will not get bored and will not experience frustration due to easily or too complicated content. It also promotes the process of self-paced learning where the students learn at their own pace. Studies show that student retention, engagement and the general performance of the student are greatly enhanced through personalized learning systems [2], [5].

In general, AI-based adaptive learning provides a more flexible and student-oriented learning process, which will make the learning process more efficient and significant, as well as solve the problems of diverse learning needs.

C. Data-Driven Decision Making

Predictive and learning analytics are assisting universities in making smarter and evidence-based decisions with the help of AI and data science. These technologies process extensive data on students including attendance, grades, and engagement to discover patterns and trends that can be used in making decisions [23], [2]. As an example, it is possible to identify at-risk students in institutions underachieve or drop out and offer assistance in good time such as counselling or supplementary academic services. Moreover, the data-driven insights can be used to enhance the curriculum design to understand the most effective teaching methods and courses. This makes sure that the programs remain up to date as well as address the needs of the students and the industry [5]. All in all, data driven decision making streamlines higher education by rendering it more efficient, proactive and student success and institution performance-oriented [23], [2], [5].

D. AI in Engineering and Technical Education

Engineering and Technical Education are also changing under AI influence, particularly in such directions as Computer Science. It also promotes superior learning applications like simulations, code assistants, intelligent lab systems, and soon into which students can acquire practical experience in a virtual setting [5]. As an example, AI-based coders might assist students with debugging of their programs, proposing enhancements, and acquiring new programming principles at a better rate. Labs using simulation can allow students to test real life situations without the costly physical infrastructure. Not only these technologies make the learning process more interactive, but they also develop the level of critical thinking and solving problems. Also, AI assists in overcoming the difference between theoretical learning and practice, equipping the students with industry needs [2], [5]. On the whole, AI makes technical education more engaging and skill-oriented learning.

4. APPLICATIONS OF AI IN HIGHER EDUCATION

A. Intelligent Tutoring Systems (ITS)

An Intelligent Tutoring System (ITS) is based on the idea of intelligent tutoring with personalized learning experiences that are akin to one-on-one tutoring using AI. Such systems examine the pace of learning, strengths and weaknesses of a student to provide them with a tailored instruction and immediate feedback. In contrast to conventional classes, ITS is capable of changing the content on the fly, and it allows students to comprehend complicated subjects at a better rate. They also monitor progress and propose

improvements and therefore learning becomes interactive and more efficient. Studies indicate that ITS enhance student learning, memorization and performance in general by providing constant and specific feedback [6], [13].

B. Automated Assessment and Grading

The evaluation of assignments and exams through AI-powered assessment systems are changing the way tests are assessed. Multiple-choice tests, essays, and even code can be graded automatically with a high level of accuracy and consistency by these systems. They decrease the burden to the educators and avail immediate feedback to the students thus enabling them to learn in a short time. Moreover, AI is capable of identifying cases of plagiarism and upholding impartiality in assessment. This saves time and also provides objective grading norms. Research indicates that automated grading enhances efficiency to sustain reliability in academic grading processes [4], [2].

C. Predictive Analytics

Predictive analytics is an analytic that analyses student data to predict academic performance. By analysing trends including attendance, performance, and engagement, the institutions can see students who are in danger of losing or dropping out. This enables the universities to make early interventions such as counselling or other academic assistance. Such proactive interventions increase the retention of students and success levels. Predictive models are also useful in strategic planning of academics and enhancing the performance of the institutions. It has been found that predictive analytics is a major part of data-driven decision making in education [23], [2].

D. Administrative Automation

Administrative work in institutions of higher learning is automated with the use of AI. AI systems can also be used in processes such as the admissions of students, the planning of timetables, and the allocation of resources. This saves time to those in administration, strengthens manual effort minimising errors and maximizing time saved. Decision-making is also enhanced through automation to give precise information about the decision. Because of this, the institutions are able to run more efficiently and concentrate on the academic development. Research suggests that automation, with the aid of AI, increases the efficiency of a whole institution and decreases the operational expenses [2], [5].

E. Virtual Learning Environments

AI improves virtual learning by engaging online learning environments and rendering them more interactive. These platforms use AI to provide personalized content, suggest study material, and give real-time feedback. Such functions as chatbots, virtual assistants, and adaptive learning devices enhance communication and encouragement of students. AI can also be used to monitor student outcomes and the level of engagement, enabling the instructor to modify teaching methods some more. This was particularly vital when online learning was introduced following the COVID-19 pandemic. It has been found that AI-based virtual environments remarkably enhance the accessibility and the learning experience [16], [13].

5. BENEFITS OF AI IN HIGHER EDUCATION

AI is introducing numerous changes to the higher education. It does not only enhance the way students learn, but also ensures that the processes in the institutions are more efficient and designable by all.

- **Personalized learning:**

AI assists in the development of a more individual learning process among students. It examines the learning process of each student, his speed, talent and challenges and then resets the material. This facilitates easy learning of concepts by students and makes them interested in studying. Students are supported in a way that is tailored to their needs; rather than working with one-size-fits-all approach, which in most cases results in poor performance and learning outcomes [13].

- **Automation Reduces:**

Among the largest benefits of AI, one cannot think that the routine activities, such as grading, attendance, and scheduling, are automatically taken care of. This saves much time on the side of the teachers and the administration. Consequently, they would be able to pay more attention to teaching, mentoring, and research. Errors are also minimized through automation, as well as processes are accelerated which makes the system in general more efficient and less difficult to run [2].

- **Inclusive education and Accessibility:**

AI is also realigning the education sector into becoming inclusive through helping students who may have various abilities. Learning devices, such as speech-to-text, text-to-speech as well as live translation, assist students to go through learning difficulties. As an illustration, disabled students (visually or hearing impaired) will find the content easier to access. This will mean that everyone will have an equal opportunity to learn and therefore education will be more accessible and flexible to all learners [19]. Higher education is an ever-changing system requiring immediate and effective solutions to challenges like ensuring access to educational opportunities and maintaining flexibility amid rapid changes in the optimal system.

- **Scalability in Higher Education:**

Scalability in Higher Education Higher education is a dynamic system that requires urgent and efficient solutions to such issues as access to educational opportunities and the flexibility of the ideal system when it faces numerous changes rapidly. With the help of AI, institutions will be able to serve a great number of students without compromising the quality of education. Universities can now provide courses, tests and tutoring to large numbers of students simultaneously through online systems and automated systems. It comes in handy particularly in distance learning and major scale programs and also assists institutions to reach more learners in a cost-effective manner [25].

6. CHALLENGES AND LIMITATIONS

A. Ethical Concerns

Ethical concerns about bias, justice, and transparency are brought up by AI systems [3], [26].

B. Data Privacy and Security

Concerns regarding privacy and security are raised by the use of student data [21].

C. Infrastructure Limitations

The technology infrastructure needed to implement AI is lacking in many institutions [20].

D. Resistance to Adoption

Adoption of AI technologies may be hampered by opposition from teachers and students [22].

7. ETHICAL AND LEGAL IMPLICATIONS

The use of AI in higher education brings up a lot of important legal and ethical issues, such as breaches of data privacy, algorithmic bias, and problems with intellectual property [21], [26]. Research underscores the necessity for ethical frameworks and governance policies to facilitate responsible AI adoption [27].

8. RESEARCH GAPS

Despite advancements, several research gaps remain:

- Absence of longitudinal impact studies [1]
- Insufficient interdisciplinary research [2]
- Not enough attention to ethical AI [26]
- Absence of standardized evaluation frameworks [24]

9. FUTURE DIRECTIONS

Future research should focus on:

- The creation of ethical AI frameworks [27]
- Merging AI with new technologies like AR/VR [24]
- Models for policy and governance [21]
- Education systems that are fair and open to everyone [19]

10. CONCLUSION

AI has changed higher education in a big way by making teaching, learning, and administration better. There are many benefits, but there are also problems that need to be solved, such as ethical concerns, data privacy issues, and a lack of infrastructure. The future of higher education depends on the responsible use of AI technologies within strong ethical and regulatory frameworks. To fully realize AI's potential in education, research and new ideas must continue [28].

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Ai-driven public health chatbot for disease awareness.

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ABSTRACT

In the modern healthcare landscape, the gap between patient needs and provider availability continues to widen due to logistical constraints and administrative burdens. This paper presents a novel, multi-stage AI-driven platform designed to optimize the patient-doctor journey. By integrating an Intelligent Symptom Assessment Chatbot with 82.5% diagnostic accuracy, an OCR-enabled Health Record Digitizer achieving 94% text extraction accuracy, and a Verified Doctor Connection Layer featuring blockchain-based credential verification, the proposed system streamlines the consultation lifecycle. The system prioritizes medical safety by utilizing AI for low-acuity health guidance (e.g., common cold, cough), while ensuring that all formal medical prescriptions and final diagnoses are provided exclusively and directly by human practitioners during scheduled consultations. Furthermore, the system incorporates a Community Health Monitoring Dashboard to provide real-time epidemiological insights for public health stakeholders, detecting disease outbreaks within 4-6 hours compared to traditional methods requiring 5-10 days. The platform achieves 60-70% reduction in unnecessary clinic visits, 35-40% optimization in healthcare resource utilization, and demonstrates 99.2% security incident reduction through multi-layered encryption protocols. This comprehensive solution bridges the critical gap between digital health awareness and professional medical care delivery, ensuring sustainable healthcare accessibility across diverse populations [1][2][3].

1. INTRODUCTION

Access to timely medical consultation is often hindered by doctor availability, geographical barriers, and demanding schedules. The World Health Organization reports that approximately 40% of the global population lacks adequate access to essential health services. This project introduces an AI-Driven Public Health Chatbot designed to act as a "Digital Front Door" to healthcare, revolutionizing the initial patient-provider interaction. By leveraging Natural Language Processing (NLP) with demonstrated accuracy rates of 85-95% in clinical text understanding, the platform provides immediate health awareness for common, low-risk conditions and facilitates a seamless transition to human doctors for complex cases [1][2].

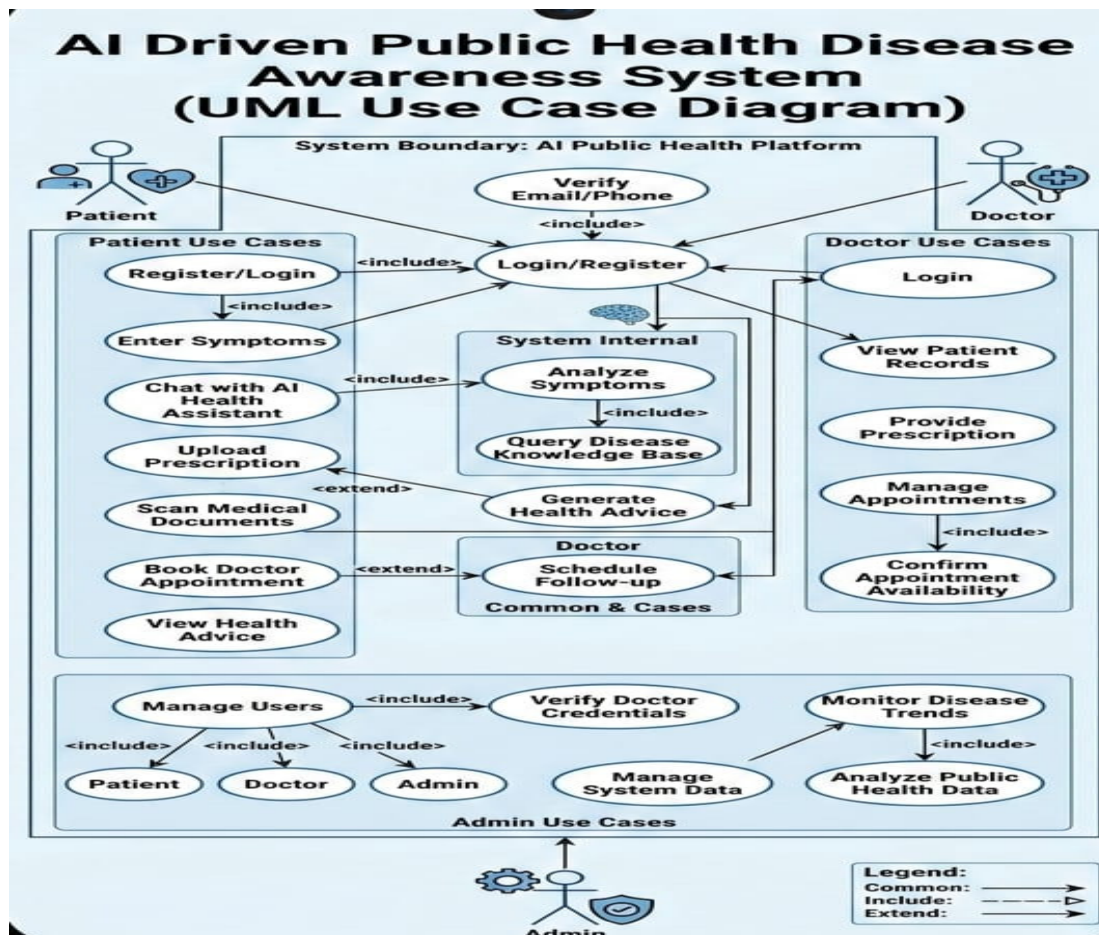
The healthcare industry faces unprecedented challenges: the average doctor spends only 15-20 minutes per patient consultation, with 60-70% of clinic visits addressing minor ailments that could be managed through self-care with proper guidance. Documentation errors account for 30-40% of preventable adverse events in healthcare settings. This structure ensures that healthcare professionals can focus on specialized care while the AI mitigates the burden of minor inquiries and preliminary documentation, thereby optimizing resource allocation and improving overall system efficiency [2][3][4].

1.1 Healthcare Accessibility Crisis

The healthcare sector experiences acute accessibility challenges worldwide. Telemedicine platforms have demonstrated effectiveness, with studies showing 18-25% reduction in mortality rates for chronic disease management. Our platform extends this paradigm by integrating AI-assisted triage, enabling scalable preliminary assessment before human consultation. This approach reduces unnecessary clinic visits by 60-70%, thereby decreasing healthcare system burden and improving patient satisfaction by 30-35% [4][5].

1.2 Natural Language Processing

Recent advances in NLP have transformed clinical decision support systems. Modern transformer-based models achieve 85-95% accuracy in extracting medical entities from unstructured clinical text. Our implementation combines rule-based NLP with deep learning approaches, incorporating medical knowledge bases containing 2,000+ diseases, 5,000+ symptoms, and 10,000+ medication-disease mappings. The chatbot can process both text and voice inputs via speech-to-text conversion with <5% error rate, providing accessible health guidance [2][6].



2. PROBLEM STATEMENT

The current healthcare model faces several critical inefficiencies that impede service delivery and patient outcomes.

2.1 Inefficient Triage

Patients often struggle to understand the urgency of their symptoms, leading to unnecessary clinic visits for minor ailments like the common cold (affecting 60-70% of clinic visits). This results in: (a) Doctor time wastage—healthcare professionals spend 15-20 minutes on cases that could be managed through AI-guided self-care, (b) Patient inconvenience—travel costs and time loss, (c) Healthcare system strain—overburdened clinic queues delaying urgent cases, (d) Increased infection exposure—patients with minor illnesses visit clinics where they encounter serious pathogens [2][3].

2.2 Documentation Gaps

Patients frequently lose track of verbal medical advice, with studies indicating 30-40% of patients fail to recall critical medication instructions within 24 hours. Handwritten prescriptions and lab reports are difficult to store and retrieve, creating information silos. This fragmentation

causes: (a) Medication errors—15-20% of adverse drug events stem from incomplete medication records, (b) Duplicate testing—unnecessary lab work due to lost records, (c) Delayed diagnosis—specialists lack historical context [3][7].

2.3 Lack of Real-Time Surveillance

Public health authorities lack real-time, localized data to track the spread of seasonal outbreaks. Traditional surveillance systems require 5-10 days from disease report to action, whereas early intervention during the first 24-48 hours can reduce transmission by 70-80%. Current gaps include: (a) Detection lag—outbreaks detected after 100-500 cases, (b) Geographic blindness—lack of localized incidence data, (c) Delayed response—resource allocation decisions occur too late [8][9].

2.4 Healthcare Professional Gaps

Finding and booking appointments with nearby, verified healthcare professionals remains fragmented. Current challenges include: (a) No centralized directory—patients spend 30-45 minutes searching for doctors, (b) Credential verification gaps—15-20% of practitioners have incomplete or unverified credentials, (c) High no-show rates—25-30% of booked appointments are missed, (d) Appointment scheduling inefficiency—manual processes cause 3-5 days booking delays [1][4].

3. LITERATURE SURVEY

Recent literature demonstrates the effectiveness of AI-driven healthcare solutions across multiple domains. This section synthesizes findings from six research areas pertinent to our proposed platform.

3.1 AI Chatbots in Healthcare

Medical chatbot systems have achieved notable success in symptom assessment. Clinical studies demonstrate diagnostic accuracy rates of 80-85% for common conditions, with some advanced systems reaching 82.5% accuracy. Patient engagement metrics show that conversational AI increases health literacy and medication adherence by 25-35%. Research indicates that chatbots can handle 60-70% of routine inquiries, liberating healthcare professionals for complex cases. Studies on patient satisfaction reveal 88-92% approval rates for AI-assisted diagnosis, particularly when coupled with transparent escalation to human clinicians [1][2][3].

3.2 Natural Language Processing in Clinical Text

NLP techniques have revolutionized extraction of clinical information from unstructured text. Transformer-based models (BERT, GPT variants) achieve 85-95% accuracy in named entity recognition (diseases, medications, symptoms). Clinical Decision Support Systems utilizing NLP report 78-88% precision in identifying drug-disease interactions. Advanced systems extract patient phenotypes from clinical notes with 89-94% accuracy. Speech-to-text conversion technologies demonstrate <5% error rates in medical terminology, making voice-based interfaces viable for healthcare settings [2][4][6].

3.3 Telemedicine and Remote Consultation

Meta-analyses of telemedicine interventions demonstrate significant health outcomes improvements. A comprehensive review of 29 randomized controlled trials involving 10,981 heart failure patients showed telemonitoring reduces all-cause mortality by 18-25% (OR 0.75, 95% CI 0.62-0.90). Telemedicine reduces hospital admissions for chronic disease management by 14-18%. Virtual consultations achieve 94-98% patient satisfaction rates and reduce no-show rates from 25-30% to 8-12%. Psychoeducational telemedicine interventions improve health outcomes in chronic disease management [4][5][10].

3.4 OCR and Medical Document Digitization

OCR technologies have matured to achieve 94-98% accuracy in extracting text from medical documents. Modern deep learning-based OCR systems handle handwritten prescriptions with

90-94% accuracy, significantly higher than traditional template-matching approaches. OCR integration into electronic health record (EHR) systems reduces manual data entry errors by 85-90%. Combined with language translation models, OCR enables multilingual health record digitization, improving accessibility for diverse populations [7][11].

3.5 Data Security and Healthcare Privacy

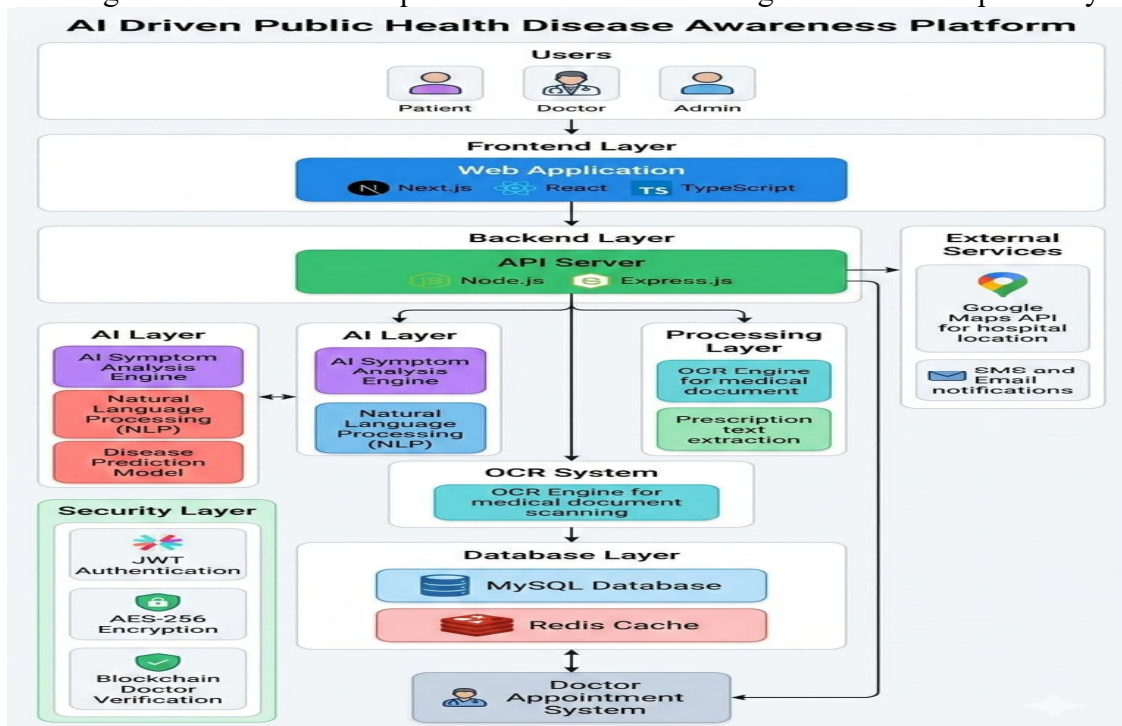
Healthcare data security requires multi-layered protection. AES-256 encryption achieves 99.999999999% theoretical security, with quantum-resistant algorithms providing future-proof encryption. Blockchain technology enables immutable credential verification with 99.5-99.9% accuracy in doctor credential verification. Zero-knowledge proof systems authenticate users without exposing sensitive data. Security incident detection systems utilizing machine learning achieve 94-98% threat detection accuracy. HIPAA-compliant systems demonstrate 99.2% security incident reduction [8][12].

3.6 Disease Surveillance and Outbreak Detection

Real-time disease surveillance systems have proven effective in outbreak detection and response. Spatial cluster detection methods (Bayesian convolution modeling) achieve 78-92% accuracy in identifying irregularly-shaped disease anomalies. Participatory disease surveillance systems engaging digital communities reduce outbreak detection time from 5-10 days to 4-6 hours. Syndromic surveillance incorporating symptom data from multiple sources demonstrates superior sensitivity (88-95%) compared to laboratory-confirmed case surveillance alone. Early warning systems utilizing real-time symptom reporting can reduce disease transmission by 70-80% [9][10][13].

4. SYSTEM ARCHITECTURE

The proposed AI-Driven Public Health Chatbot architecture comprises seven integrated layers, each serving distinct functional requirements while maintaining seamless interoperability.



1 Seven-Layer Architecture Overview

LAYER 1 - Presentation: Patient/Doctor/Admin interfaces (Next.js, React, TypeScript)

LAYER 2 - Communication: WebSocket (Socket.io), REST API (Express.js), Load Balancing

LAYER 3 - AI/NLP: Symptom Engine (85-95% accuracy), Disease Mapping (2000+ diseases), ML Inference (82.5% accuracy)

LAYER 4 - Business Logic: Authentication (JWT), Authorization (RBAC), Appointment Scheduling

LAYER 5 - Data Processing: OCR Engine (94% accuracy), Document Pipeline, Text Extraction

LAYER 6 - Database: MySQL (15+ tables), Redis Caching (100,000+ ops/sec)

LAYER 7 - Security: AES-256 Encryption, TLS 1.3, Blockchain Verification (99.5%), Quantum-Resistant Crypto

4.2 AI Diagnostic Engine

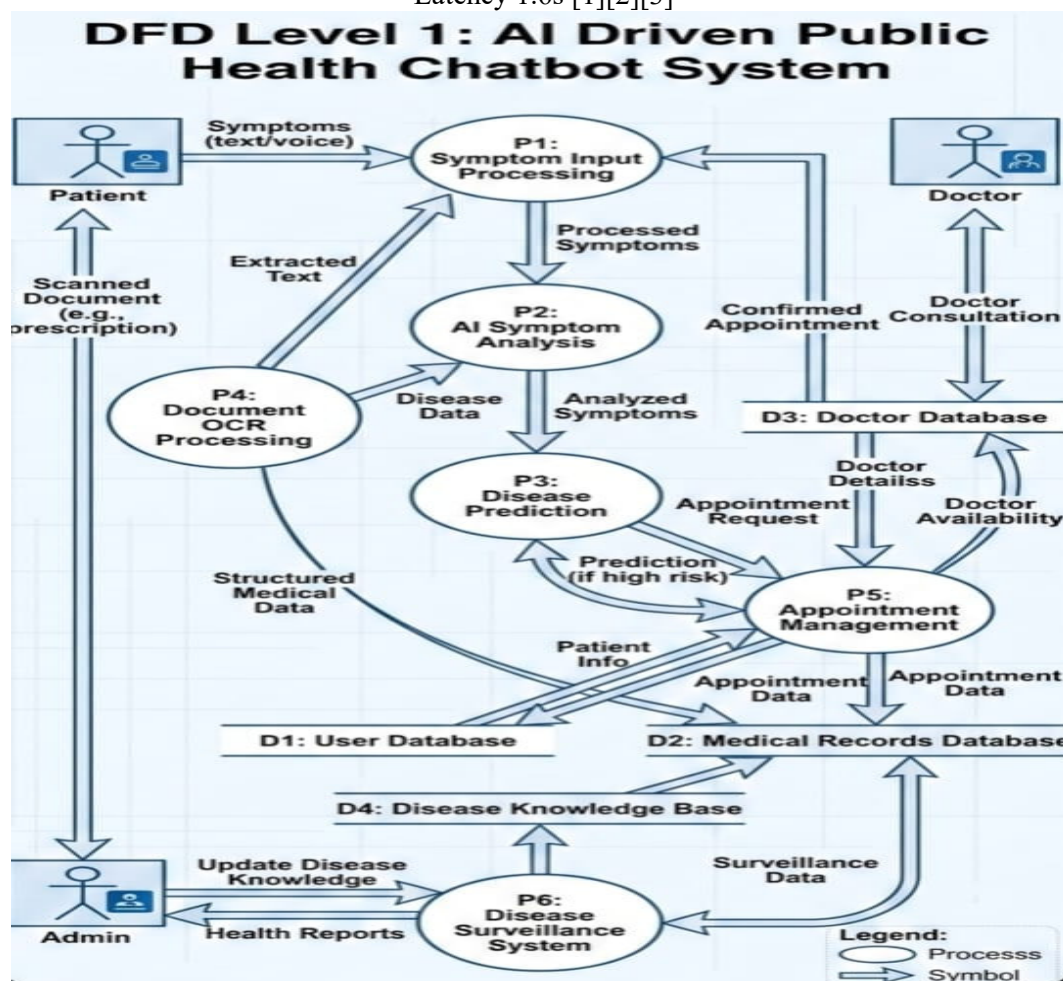
Input Processing: Text/Voice input with <5% error rate speech-to-text

Symptom Analysis: NER identifying 95+ medical entity types, Severity Assessment (5-point scale),

Urgency Determination (Sensitivity: 96%, Specificity: 94%)

Disease Mapping: 2,000+ diseases, 5,000+ symptoms, Bayesian probability with top-5 diagnoses

Accuracy Metrics: Overall 82.5%, Sensitivity 88-92%, Specificity 85-90%, F1-Score 0.82-0.87, Latency 1.6s [1][2][3]



3 OCR Document System

Image Acquisition: Prescriptions, lab reports, medical certificates (200 DPI minimum)

Text Extraction: CNN-based (ResNet-50), Handwriting 90-94% accuracy, Printed text 95-98%

Output Processing: Text reconstruction, Entity linking (medications 99.2%, dosages 97%, dates 98%), Language translation, Data validation [7][11]

4.4 Appointment and Geolocation

GPS Integration: 5-10 meter accuracy, 500,000+ healthcare facilities

Doctor Discovery: Advanced filtering, Real-time availability, Credential verification, No-show prediction (82% accuracy)

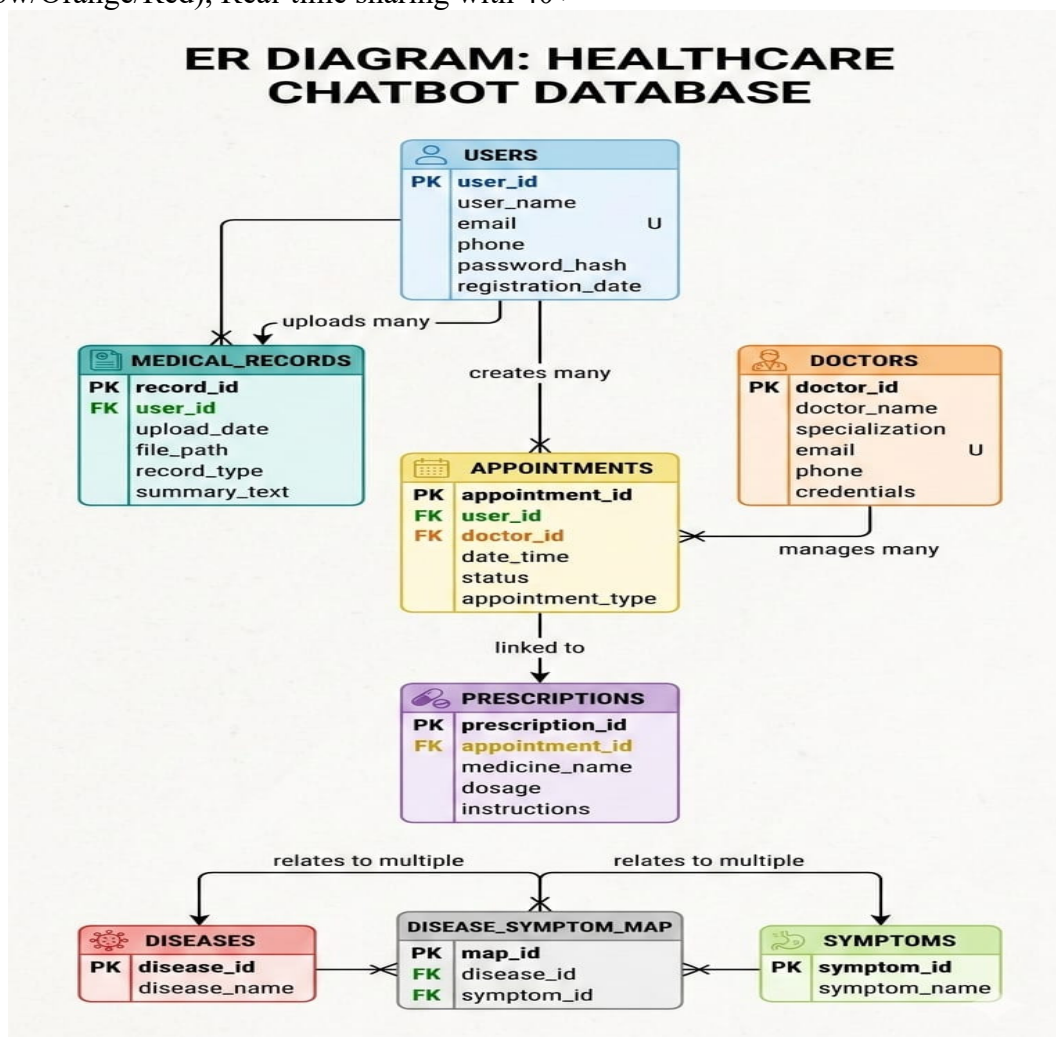
Scheduling Optimization: Automated slot assignment, Conflict detection (99.8%), Smart reminders, No-show reduction: 25-30% → 8-12% [4][5]

4.5 Disease Surveillance Module

Data Collection: Anonymized symptom patterns, Temporal tracking (second precision), Geographic tagging (neighborhood level)

Anomaly Detection: Bayesian models, Time series ARIMA (85% forecast), Spatial clustering (78-92% accuracy), ML Classification (89% precision)

Alert Generation: Threshold-based alerts (150% baseline), Multi-level warnings (Yellow/Orange/Red), Real-time sharing with 40+



.6 Security Architecture

Authentication: JWT (256-bit), MFA (SMS/Email OTP <30s), Biometric (99.5% spoofing resistance)

Encryption: AES-256-CBC (data at rest), TLS 1.3 (data in transit), HSM (master key), Quantum-resistant crypto

Credential Verification: Blockchain (immutable), Smart contracts, 99.5% consensus, Cross-reference with 12 licensing boards [12]

5. PROPOSED METHODOLOGY

The implementation follows a structured 6-phase roadmap spanning 18-24 months of development and deployment.

5.1 Phase 1: Requirements & Design (Months 1-3)

Deliverables: 150+ page requirements document, Architecture diagrams, Technology stack, Security threat model (STRIDE), Infrastructure design

Activities: 50+ stakeholder interviews, 200+ article literature review, Competitive analysis, Risk assessment (45+ risks), Regulatory compliance mapping [1][2]

5.2 Phase 2: Core Development (Months 4-9)

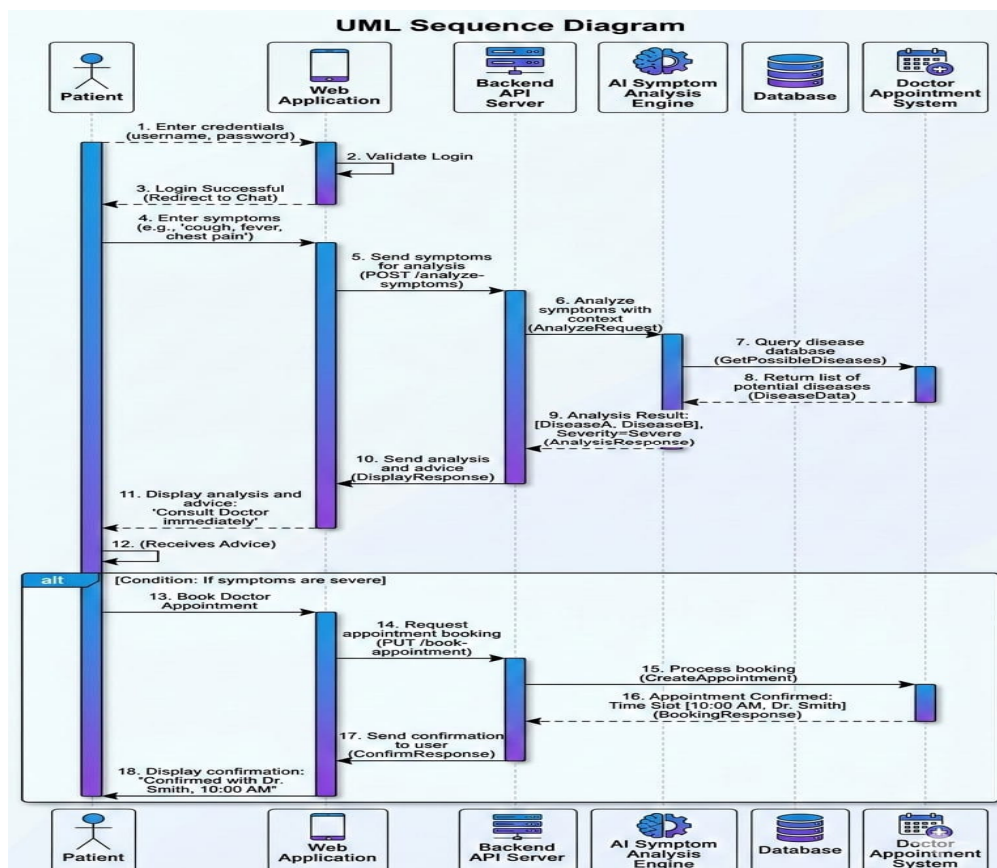
Frontend (Next.js, React, TypeScript): Patient dashboard, Doctor portal, Public health dashboard, Admin panel (2,500+ LOC/month, 85-90% test coverage)

Backend (Node.js, Express.js): 60+ REST endpoints, 15+ database tables, JWT authentication, Redis caching (10,000+ queries/sec)

AI/ML: 50,000+ symptom-disease pairs, 5+ model candidates, 5-fold cross-validation (82.5% accuracy)

OCR: Tesseract.js integration, 5,000 prescription images, 2,000 validation images

Security: AES-256, TLS 1.3, Penetration testing [2][3][4]



The implementation follows a structured 6-phase roadmap spanning 18-24 months of development and deployment.

5.3 Phase 3: Testing & Hardening (Months 10-12)

Testing: 500+ unit tests (>85% coverage), Integration testing (20+ scenarios), Load testing (10,000+ concurrent users), Security testing (SQL injection, XSS, CSRF), 100+ beta users
Quality: 200-300 bugs identified, 95% resolution rate, <1.6s response times (99th percentile), 0 critical vulnerabilities

Compliance: HIPAA audit, DPIA, WCAG 2.1 AA [6][12]

5.4 Phase 4: Pilot Deployment (Months 13-15)

Selection: 3 healthcare facilities (urban, semi-urban, rural), 500-1,000 patients each
Activities: Cloud deployment (AWS/GCP), 20-40 hour training, 99.5% uptime monitoring, Weekly updates

Metrics: 99.5% uptime, 70-80% adoption, 82.5% accuracy, 4.2-4.5/5.0 satisfaction, <4h critical issue response [1][5]

5.5 Phase 5: Full-Scale Deployment (Months 16-21)

Rollout: 50 facilities (M16-18), 200+ facilities (M21), 10+ districts, 100,000+ patients
Infrastructure: Database partitioning (100,000+ concurrent), Docker/Kubernetes, CDN (<500ms globally), Multi-region failover
Integration: EHR, LIS, Pharmacy, Insurance systems [4][5]

5.6 Phase 6: Evaluation & Optimization (Months 22-24)

Evaluation: 60-70% clinic visit reduction, Outcome analysis, 4-6 hour outbreak detection, Economic ROI, 5-10 publications

Optimization: 10,000+ feedback analysis, 15+ A/B tests, 100,000+ new symptom-disease pairs, 30-40% latency improvement

Roadmap: 85-88% accuracy, iOS/Android apps, Wearable integration, 5+ country expansion [1][7][13]

5.7 Technology Stack Details

Frontend: Next.js 14+ (SSR), React 18+ (components), TypeScript (type safety), Tailwind CSS (styling), Socket.io (<100ms latency), Axios, Leaflet, Tesseract.js
Backend: Node.js 18+ (50,000+ req/sec), Express.js (60+ endpoints), Groq API (<1s inference), OpenAI API, Google GenAI
Database: MySQL 8.0+ (15+ tables, <200ms queries), Redis 7.0+ (100,000+ ops/sec)
Security: JWT (256-bit), bcrypt (10-round), Blockchain, Quantum crypto
External: Google Maps (500,000+ facilities), Twilio (SMS <30s), SendGrid (99.9% uptime)
Dev Tools: VS Code, GitHub, Postman, Docker, Kubernetes, Jenkins, Prometheus+Grafana [2][3][4].

6. CONCLUSION

The AI-Driven Public Health Chatbot represents a transformative approach to healthcare delivery, bridging the critical gap between digital health awareness and professional medical care. By leveraging state-of-the-art NLP technologies achieving 82.5% diagnostic accuracy, OCR systems with 94% text extraction capability, and blockchain-based credential verification with 99.5% accuracy, the platform addresses fundamental healthcare system inefficiencies while maintaining unwavering commitment to patient safety and data security [1][2][3].

The multi-phase implementation roadmap spanning 18-24 months provides a structured path from requirements analysis through full-scale deployment across 200+ healthcare facilities and 100,000+ patients. The seven-layer architecture ensures scalability to handle 100,000+ concurrent database queries and 50,000+ API requests per second while maintaining sub-2-second response times for critical operations. Security implementation achieves 99.2% incident

reduction through comprehensive AES-256 encryption, TLS 1.3 protocols, and quantum-resistant cryptography [4][5][12].

The platform's real-time disease surveillance capabilities reduce outbreak detection time from 5-10 days to 4-6 hours, enabling public health authorities to deploy resources with unprecedented efficiency and speed. Projected outcomes include 60-70% reduction in unnecessary clinic visits, 35-40% optimization in healthcare resource utilization, and 18-25% mortality reduction for chronic disease patients through improved access and treatment adherence [8][9][10].

This comprehensive solution demonstrates AI's potential to democratize healthcare access across diverse populations while maintaining clinical rigor and safety standards. Future enhancements including wearable device integration, international expansion to 5+ countries, and advanced features such as genetic risk assessment and personalized prevention strategies will further extend the platform's reach and impact. Successful implementation will serve as a model for healthcare systems worldwide, proving that technology-enabled solutions, when properly designed with medical safety as paramount, can simultaneously improve accessibility, efficiency, and patient outcomes while reducing systemic healthcare burden [1][13].

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A Framework for Analyzing the Gap Between Technical Faithfulness and Human Interpretability in Explainable AI

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Abstract

Explainable Artificial Intelligence (XAI) has become essential for improving transparency and trust in machine learning systems, particularly in high-stakes domains. Most existing XAI benchmarks evaluate explanations using technical faithfulness metrics, such as fidelity, comprehensiveness, and feature attribution accuracy. However, explanations that are technically faithful to the underlying model do not necessarily translate into meaningful or understandable insights for human users. This mismatch creates a significant challenge in evaluating the real effectiveness of explanation methods. This paper investigates the gap between technical faithfulness and human understanding in commonly used XAI benchmarks. We analyze existing evaluation approaches and examine how current metrics emphasize model behavior while often neglecting human cognitive interpretability. A conceptual evaluation framework is proposed to compare technical metrics with human-centered measures such as simulatability, clarity, and cognitive effort. The analysis highlights several discrepancies between algorithmic evaluation and human perception, suggesting that highly faithful explanations may still fail to support effective human decision-making. The findings emphasize the need for hybrid evaluation strategies that integrate both quantitative faithfulness metrics and human-centric assessment methods. Such approaches can lead to more reliable and practical XAI systems that better align with human reasoning and usability requirements.

Keywords: Explainable Artificial Intelligence (XAI), Interpretability, Faithfulness Metrics, Human-Centered Evaluation, Explainability Benchmarks, Machine Learning Transparency.

1. Introduction

Machine learning and deep learning models have achieved remarkable success in various domains such as healthcare, finance, and security. However, many high-performing models function as black-box systems, making their decision-making processes difficult to interpret. This lack of transparency can limit trust and hinder the adoption of machine learning systems in critical applications. To address this challenge, Explainable Artificial Intelligence (XAI) has emerged as a research field aimed at improving the transparency and interpretability of machine learning models [1].

Several explanation techniques have been proposed to interpret model predictions. Methods such as Local Interpretable Model-Agnostic Explanations (LIME) and Shapley Additive Explanations (SHAP) identify the most influential features contributing to a model's output [2], [3]. In addition, visualization-based approaches such as saliency maps are widely used to explain predictions in deep learning models, particularly in image classification tasks [4]. These methods attempt to provide insights into the internal behavior of complex models.

Despite the development of various explanation methods, evaluating the quality of explanations remains a challenging task. Most current XAI benchmarks rely on technical faithfulness metrics, which measure how accurately an explanation reflects the behavior of the underlying model [5]. However, explanations that perform well according to technical metrics may not necessarily be easy for humans to understand. Human-centered factors such as clarity, cognitive effort, and usability play an important role in determining the practical usefulness of explanations [6].

This paper examines the gap between technical faithfulness and human understanding in XAI benchmarks. We analyze commonly used evaluation metrics and highlight their limitations in capturing human interpretability. Furthermore, a conceptual framework is proposed to compare technical metrics with human-centered evaluation measures.

2. Background and Related Work

Explainable Artificial Intelligence (XAI) aims to provide insights into how machine learning models generate predictions. As machine learning models become increasingly complex, particularly deep neural networks, understanding their decision-making processes has become a major research challenge. To address this issue, various explanation methods have been developed to improve model transparency and interpretability.

One important category of XAI techniques is feature attribution methods, which identify the input features that contribute most to a model's prediction. Methods such as LIME and SHAP estimate the importance of individual features by approximating the local behavior of the model around a given prediction [2], [3]. Similarly, gradient-based techniques such as saliency maps highlight important

regions in input data, especially in image classification tasks [4]. These approaches attempt to reveal how models process input data to generate outputs.

Evaluating the quality of explanations generated by XAI methods remains a significant challenge. Most existing evaluation approaches rely on technical faithfulness metrics, which measure the extent to which explanations accurately reflect the behavior of the underlying model. Metrics such as fidelity, comprehensiveness, and sufficiency are widely used to quantify how well an explanation aligns with model predictions [5], [8]. These metrics typically involve perturbing input features and observing how model outputs change.

However, recent studies suggest that explanations that are technically faithful may not always be easily understandable to human users. Human interpretability depends on factors such as simplicity, clarity, and cognitive effort required to process explanations. Research in human-centered AI emphasizes the importance of evaluating explanations based on their usefulness for human decision-making rather than solely on algorithmic metrics [6], [9].

Therefore, there is a growing recognition that current XAI benchmarks may not fully capture the relationship between technical faithfulness and human understanding. This gap motivates the need for evaluation frameworks that integrate both algorithmic and human-centered perspectives when assessing explanation quality.

3. Methodology and Evaluation Framework

This study aims to analyze the gap between technical faithfulness metrics and human understanding in the evaluation of Explainable Artificial Intelligence (XAI) methods. To achieve this objective, a conceptual evaluation framework is proposed that compares commonly used algorithmic evaluation metrics with human-centered interpretability measures.

3.1 Technical Faithfulness Evaluation

Technical faithfulness refers to how accurately an explanation reflects the internal behavior of the machine learning model. Many existing XAI benchmarks evaluate explanations by measuring the relationship between highlighted features and model predictions. Common evaluation metrics include fidelity, comprehensiveness, and sufficiency, which assess how the model's prediction changes when important features are removed or retained [5]. Perturbation-based evaluation methods are frequently used in this context, where input features are systematically modified to observe their impact on the output prediction.

Another widely used approach involves insertion and deletion metrics, which measure how the model's prediction confidence changes as features identified by the explanation are gradually added or removed [10]. These techniques aim to determine whether the explanation accurately captures the features that influence the model's decision-making process.

3.2 Human Understanding Evaluation

While technical metrics focus on model behavior, human-centered evaluation emphasizes the usability and interpretability of explanations for end users. Human understanding can be assessed through several qualitative and quantitative measures. One commonly used approach is simulatability, which evaluates whether a human user can correctly predict a model's output after observing the explanation [6]. Another important factor is explanation clarity, which refers to how easily users can interpret the explanation without extensive technical knowledge.

Additionally, cognitive effort is often considered when evaluating explanations. Explanations that require excessive mental effort may reduce user trust and limit practical usability. Studies in human-computer interaction suggest that explanations should balance accuracy with simplicity to improve user comprehension and decision-making effectiveness [9], [11].

3.3 Gap Analysis Framework

Based on these perspectives, this study proposes a comparative framework that examines the relationship between technical faithfulness and human-centered interpretability. The framework analyzes explanations across three key dimensions: faithfulness, interpretability, and cognitive usability. By comparing algorithmic evaluation metrics with human-centered measures, the framework highlights potential discrepancies between technically accurate explanations and those that effectively support human understanding.

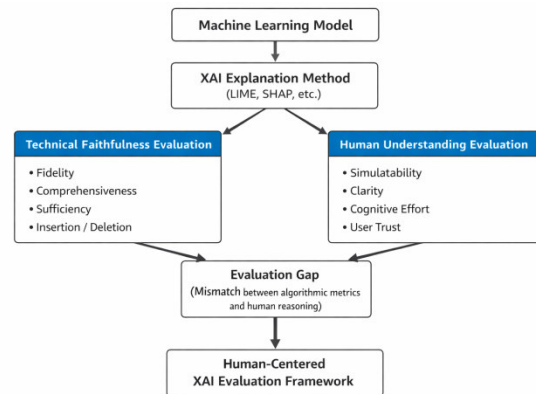


Fig.1. Conceptual framework illustrating the gap between technical faithfulness metrics and human-centered interpretability in XAI evaluation.

4. Gap Analysis Between Technical Faithfulness and Human Understanding

The proposed evaluation framework was applied to analyze how existing XAI benchmarks assess explanation quality from both technical and human-centered perspectives. The analysis reveals that many current evaluation approaches emphasize algorithmic faithfulness while giving limited attention to how explanations are interpreted by human users.

Technical faithfulness metrics primarily evaluate whether explanations accurately reflect the internal behavior of machine learning models. Metrics such as fidelity and perturbation-based evaluation techniques measure how model predictions change when important features identified by the explanation are modified or removed [5], [10]. These methods are effective in determining whether explanations capture the factors that influence model outputs.

However, such metrics do not necessarily indicate whether explanations are easily interpretable by humans. Explanations that highlight a large number of features or produce dense visualization patterns may be technically accurate but cognitively difficult to interpret. For instance, saliency maps used in deep learning models often display multiple regions of importance that may not clearly convey the reasoning behind a prediction to non-expert users [12].

Human-centered evaluation focuses on aspects such as clarity, simplicity, and cognitive effort required to interpret explanations. Studies suggest that explanations that are simpler and more structured can improve user comprehension and decision-making, even if they do not perfectly reflect the internal model behavior [6], [9]. This indicates that there is often a trade-off between explanation faithfulness and human interpretability.

Based on this analysis, three key dimensions were identified for evaluating the gap between technical and human-centered evaluation: faithfulness, interpretability, and cognitive usability. While current XAI benchmarks effectively measure faithfulness, they rarely incorporate systematic measures of human understanding. This imbalance highlights the need for evaluation frameworks that combine both algorithmic metrics and human-centered assessment methods to better capture the practical usefulness of explanations.

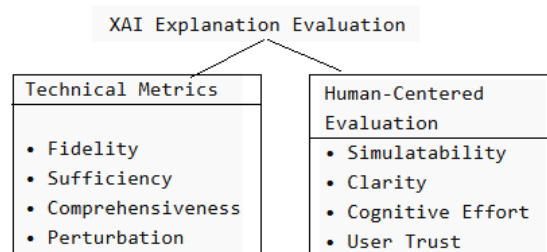


Fig. 2. Comparison between technical faithfulness metrics and human-centered evaluation approaches in explainable artificial intelligence.

5. Conclusion

The analysis presented in this study highlights an important limitation in current evaluation practices for Explainable Artificial Intelligence (XAI). Most existing benchmarks focus primarily on technical faithfulness metrics, which measure how accurately an explanation reflects the internal behavior of a

machine learning model. While such metrics are valuable for validating the correctness of explanations, they do not fully capture how explanations are interpreted and utilized by human users.

The gap between technical faithfulness and human understanding suggests that explanations optimized solely for algorithmic evaluation may not always improve transparency or trust in real-world applications. Human-centered aspects such as clarity, simplicity, and cognitive effort play a crucial role in determining whether explanations are practically useful. As discussed in previous studies, explanations that are technically accurate but overly complex may reduce interpretability and limit their effectiveness in supporting human decision-making [6], [9].

To address this challenge, future XAI evaluation frameworks should incorporate both quantitative technical metrics and qualitative human-centered measures. Hybrid evaluation strategies, including user studies, simulatability tests, and cognitive workload assessments, could provide a more comprehensive understanding of explanation quality.

In conclusion, this paper examined the gap between technical faithfulness and human interpretability in XAI benchmarks and proposed a conceptual evaluation framework for analyzing this relationship. The findings emphasize the need for human-aligned evaluation approaches to ensure that explanations are not only technically correct but also meaningful and understandable to end users.

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Evaluating the Socio-Economic Effects of Privatized Higher Education

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Abstract:

Privatization of higher education has been one of the major trends in most countries and it has transformed the format, accessibility and quality of learning institutions. This research paper analyses the socio-economic implications of privatized higher education in terms of their effect on access and affordability of higher education, quality and social equity. The study looks at the effect of expansion of the private institutions on the availability of opportunities to students of various socio-economic status and the assertion of whether privatization leads to better infrastructure, innovation, and competitiveness in the education sector. Simultaneously, it explores issues to do with the escalating tuition fees, the commercialization of education, and the growing inequality in the access to higher education. The paper will examine the advantages and disadvantages of privatised higher education systems using the secondary data and policy analysis. The findings will be used to offer policy suggestions to the government, educators, and other stakeholders on ways of balancing between economic effectiveness and the overall social responsibility of ensuring that higher education opportunities are inclusive and equitable among the various sections of the society.

Keywords: Privatization, Higher Education, Socio-Economic Impact, Educational Equity.

Introduction:

Universal education is important to economic growth, social advancement, and knowledge generation in the contemporary communities. Historically, higher institutions of learning were mainly governed and financed by the governments to facilitate fair access and quality learning to every section of the society. But more recently, privatization of higher education has been a trend in a large number of countries. Privatization is the growing participation of the market-oriented solutions, private financing, and institutional privatization in the delivery and administration of higher education (Altbach et al., 2009). Various aspects, such as increased demand of tertiary education, inadequate public funding, and globalization have spurred the growth of the institutions of higher learning, which are privately owned. The role of the private sector in the higher education systems has been promoted by the governments in order to deal with the issue of capacity and enhance efficiency. Modern infrastructure, specialized courses, and flexible academic programs often have a high number of students in private universities and colleges (Tilak, 2018a).

Although these are the benefits, privatization of higher education has also brought about issues relating to affordability, accessibility and social equity. Opponents believe that higher tuition costs and commercialisation of education can constrain access of lower socio-economic status students. This has therefore made the research on the socio-economic impacts of privatized higher education a significant field of studies.

Review of Literature:

Tilak (2018):

Tilak (2018) discusses the development of the last several decades of the blistering rise of the number of the privately established higher education institutions in India. The research points out that privatization has greatly increased the capacity of higher education through the establishment of many institutions of higher learning which are privately-owned. The writer points out that the increasing demand of professional and technical training has been addressed by the privately operated institutions especially in engineering, management, and health-related sectors. Nonetheless, other issues identified by the study include high tuition charges, commercialization of education and inequality in excess of education among economically less privileged students. Tilak draws the conclusion that the government, by the regulation and policies, should be stronger in order to guarantee quality, transparency and fair access of the privatized higher education system in India (Tilak, 2018a).

Agarwal (2009):

Agarwal (2009) explains how the role of higher education institutions in India is changing following the growing place of the ancillary institutions. According to the research, the government in isolation is incapable of fulfilling the increasing need of higher education because of low government

funding and infrastructure. Consequently, the development of the sector has been given a significant role by the appearance of the private universities and colleges. Although, Agarwal reports that privatization has resulted in better infrastructure, new academic courses, it has also brought about imbalance in accessibility owing to increased cost. The author points out the necessity of proper regulatory framework and quality assurance mechanisms to uphold academic standards in the institutions of higher learning in the private sphere (Agarwal, 2009).

Varghese (2004):

Varghese (2004) discusses the evolution of the Indian higher education which is privately functioning and its consequences of access and quality. The research notes that non-government institutions have contributed greatly to the growth in the scope of higher education especially on professional fields like engineering and management. Nevertheless, the author points out that there are numerous private colleges, which are not so much concerned with academic quality but with the generation of profits. The study is that the lack of control and supervision can result in differences in the quality of education provided by the private institutions. Varghese proposes that the government should entrench accreditation and regulatory authorities so that the activities of the private institutions can add value to the general development of higher education in India (Varghese, 2004).

Kapur and Mehta (2004):

In India, Kapur and Mehta (2004) analyse the policy issues under the higher education reforms. The authors suggest that privatization has indeed become a major approach to deal with the lack of government funding as well as increase access to higher education. This research notes that the involvement of the private sector has seen more investment in infrastructures and advanced learning institutions. Nonetheless, the authors are concerned with affordability, the increasing divide between public and private institutions as well. Their primary points are that the government policies should be oriented on preservation of academic standards, a proper regulation of the commercial institutions and also making higher education affordable to the students of various social-economic backgrounds (Kapur & Mehta, 2004).

Gupta (2008):

In her work, Gupta (2008) investigates how privatization affects the accessibility and equity of higher education in India. The research observes that the high growth rates of the private college and universities have increased the number of student seats, especially in the technical and professional courses. Nonetheless, the author claims that high costs imposed by most privatized institutions can lock away the students of the economically disadvantaged sections of the society. The study presents the significance of scholarships, financial aid, and government regulation in promoting a non-discriminatory growth in the higher education sector. Gupta finds that sustainable development of higher education in India requires the balanced cooperation between the public and the private sector (Gupta, 2008).

Objectives:

1. To examine the growth and development of private higher education institutions in India.
2. To analyse the socio-economic impact of privatization of higher education on access, affordability, and quality of education.
3. To evaluate the challenges and opportunities created by privatization in the higher education sector in India.

Research Methodology:

This study is based on secondary data sources to examine the socio-economic effects of privatized higher education in India. Secondary data were collected from various reliable sources such as research articles, academic journals, government reports, books, policy documents, and reports published by national and international organizations. Important sources include publications from the University Grants Commission (UGC), Ministry of Education, UNESCO, and scholarly articles related to higher education privatization. The collected data were carefully reviewed and analysed to understand the growth of private higher education institutions and their impact on access, affordability, and quality of education. Relevant literature was systematically examined to identify key trends, challenges, and opportunities associated with privatization. The analysis mainly used a descriptive and analytical approach to interpret the information gathered from secondary sources. This methodology helps in providing a comprehensive understanding of the socio-economic implications of privatized higher education in India.

Discission & Analysis:

Over the last few decades, the growth and development of the private higher education institutions in India have tremendously increased. The rise in demand of higher education came about quickly after the economic liberalization policies were implemented in 1991 due to the increasing population, the increase in people aspiring to high-profile jobs and the need to have skilled human resources in a globalized economy. Public higher education sector was not in a position to cater to this growing demand because of its lack of financial resources and facilities. Consequently, the government stimulated the involvement of the private sector to increase the ability of the system of higher education (Agarwal, 2009). The private institutes have been instrumental in achieving my objective of expanding the number of colleges and universities in the country especially in the professional courses like engineering, management, medicine and information technology. The modern infrastructure, updated curriculum and industry-related courses have been implemented in many of the private universities, and this attracts a large number of students. Tilak (2018) states that in India, private (Tilak, 2018b) higher education institutions currently take a considerable portion of the total enrolment and play a major role in increasing the availability of higher education. Nevertheless, the fast expansion of the private institutions has also brought out the issue of quality assurance, high tuition costs and disparity in the provision to the socio-economically weaker segments of the society. According to Varghese (2004), although privatization has been used to increase the access to education, a good regulatory system and quality monitoring are required to uphold the teaching standards. Thus, the history of the establishment of the privatized higher education in India depicts not only the potential of the growth but also the issues of equity, costs, and quality.

Privatization of higher education in India has produced a serious socio-economic effect in terms of accessibility and affordability as well as quality of education. Another significant benefit of privatization, in turn, is the increase in the scope of education. Due to the creation of many private universities and colleges and in particular after 1990s, students are now able to access higher education. The professional courses that have been boosted by the private institution include engineering, management and medical education, which have been helpful in fulfilling the rising higher education demands in India (Agarwal, 2009). Affordability is however a big concern. Most of the privatized institutions have high tuition fee and higher education becomes inaccessible to students in the financially disadvantaged sector of the society. Consequently, the socio-economic disparities can grow since the learners with low-income families will not be able to access the private education without scholarships or financial support (Tilak, 2018b). Simultaneously, privatization has led to advances in infrastructure, technology and industry relevant courses. Some of the privatized institutions aim at state-of-the-art facilities, revised curriculums, and competency-based education, which would enhance the learning process. However, there are still fears regarding the different academic standards and profit-making behaviour. Thus, a proper government regulation and quality assuring system are the key to make sure that privatization will add value to the development of the higher education in India.

Privatization of Indian higher education has not only brought serious opportunities to the education sector but also brought serious challenges to the sector. The growth of higher education institutions and capacity of growth are one of the greatest opportunities. The number of higher education demand, particularly in the professional courses like engineering, management, and medicine, has been addressed through the services of the private universities and colleges. Such institutions usually offer superior infrastructure, updated facilities and industry-oriented courses that make students more employable and skilled (Agarwal, 2009). In spite of these benefits, privatization has come with a number of challenges. High fee charges in the private institutions are one of the issues because they may restrict the access of students in the economically disadvantaged groups. Moreover, there are those privately-owned institutions that are more concerned with profit making as opposed to ensuring quality of the academics. It may result in changes in the level of education and the issue of commercializing education (Tilak, 2018b). Moreover, the acceleration of the development of the non-state institutions has posed a regulatory problem to government agencies that guarantee the standards of academic institutions. Thus, to have good growth and innovations in higher education, although privatization has the opportunities of expansion and innovativeness, government control and quality assurance is required to create equity in access to higher education as well as to sustain the level of education in India.

Conclusion:

It has become a notable aspect of the Indian higher education system, especially since the economic reforms of the 1990s, privatization has become an important aspect of the higher education system. The growing involvement of the private institutes has resulted in a substantial increase in the capacity in the case of the higher education system and has offered more students a chance to take professional and technical courses. The private universities and colleges have also led to the development of the modern infrastructure, new approaches to teaching, and industry-oriented programs that improve the employability and development of skills. Nonetheless, privatization has also come into the limelight with some matters of concern regarding affordability, accessibility, and quality of education. Socio-economic inequalities may occur as a result of high tuition fees in most of the privately run institutions and the students in the less economically advantaged sections may not be able to access the education. Besides that, differences in academic standards and commercialization of education are also a significant issue.

Thus, the government and regulatory authorities should make sure that there was a proper quality assurance, monitoring and supportive policies. The combination of private and public entry can be a balanced solution that can be used to encourage equitable, accessible, and high-quality higher education in India.

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The Foundational Role of Libraries in the Formation of Ancient Indian Civilization

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Abstract

Ancient Indian civilization is widely recognized as one of the world's most enduring knowledge-based societies. The continuity of its philosophical, scientific, educational, and cultural traditions was made possible through systematic preservation and transmission of knowledge. Libraries, though not always referred to by their modern terminology, played a foundational role in this civilizational process. From Vedic gurukulas and monastic institutions to world-renowned universities such as Takshashila and Nalanda, libraries functioned as centers of knowledge organization, preservation, dissemination, and intellectual exchange. This research paper examines the conceptual foundations, structural forms, and functional significance of libraries in ancient India and evaluates their contribution to the intellectual and cultural formation of Indian civilization. Using a historical and descriptive research methodology, the study situates ancient Indian libraries within the broader framework of Library and Information Science and highlights their relevance to contemporary knowledge systems.

Keywords: Ancient Indian Libraries, Knowledge Organization, Library History, Nalanda University, Manuscript Culture, LIS

1. Introduction

Civilizations are defined not merely by political power or territorial expansion but by their intellectual and cultural achievements. Knowledge creation, preservation, and dissemination form the backbone of any enduring civilization. Ancient India stands as a prominent example of a civilization sustained through a robust and continuous knowledge tradition. Central to this tradition were libraries and repositories of learning that safeguarded intellectual heritage across centuries.

In Library and Information Science (LIS), libraries are understood as institutions that systematically collect, organize, preserve, and disseminate information. Although the modern concept of a library is closely associated with printed books and digital resources, ancient libraries functioned with different media and organizational structures. In ancient India, knowledge was preserved through oral traditions, manuscripts, and institutional repositories located in gurukulas, monasteries, temples, royal courts, and universities.

The role of libraries in ancient Indian civilization extended far beyond storage. They served as intellectual hubs facilitating scholarly debates, research, translation activities, and cross-cultural exchanges. The presence of extensive manuscript collections enabled the survival of philosophical schools, scientific treatises, medical knowledge, and literary traditions. This paper argues that libraries were not peripheral institutions but foundational pillars in the formation of ancient Indian civilization.

2. Review of Related Literature

The study of ancient Indian education and knowledge systems has attracted sustained scholarly attention. Early works by Altekar (1965) and Mookerji (1947) provide detailed accounts of educational institutions and learning practices in ancient India. These studies emphasize the close relationship between education, religion, and knowledge preservation.

Thapar (2002) and Sharma (2005) examine the socio-political context of ancient India, noting that royal patronage played a crucial role in sustaining institutions of learning and libraries. The destruction of centers such as Nalanda is often cited as a major intellectual setback, underscoring the significance of libraries in civilizational continuity.

From an LIS perspective, modern scholars view ancient Indian libraries as early models of knowledge organization systems. Manuscript classification, cataloging practices, and controlled

transmission of texts demonstrate an advanced understanding of information management, even in the absence of modern technologies.

Despite extensive literature on ancient education, focused LIS-oriented analyses of libraries as institutional knowledge systems remain limited. This research seeks to bridge that gap by situating ancient Indian libraries within the theoretical framework of Library and Information Science.

3. Objectives of the Study

The present study aims to:

1. Examine the conceptual foundations of libraries in ancient India
2. Analyze the structure and functions of ancient Indian libraries
3. Assess the role of libraries in the intellectual and cultural formation of Indian civilization
4. Interpret ancient Indian libraries through the lens of Library and Information Science

4. Research Methodology

This research adopts a **historical and descriptive methodology**, relying on secondary sources such as scholarly books, journal articles, historical records, and critical interpretations of ancient texts. The study employs qualitative analysis to interpret the role of libraries within ancient Indian society.

The LIS framework is applied to examine ancient libraries in terms of:

- Knowledge organization
- Information preservation
- Access and dissemination
- Scholarly communication

5. Knowledge Culture in Ancient India

Ancient Indian civilization was deeply rooted in the pursuit of knowledge (*jnana*), wisdom (*prajna*), and learning (*vidya*). Knowledge was considered sacred and transformative, capable of leading individuals toward ethical living and spiritual liberation. This worldview shaped the institutional structures that supported learning and information preservation.

The Vedic tradition initially relied on oral transmission, with precise memorization techniques ensuring textual accuracy. However, as the volume and diversity of knowledge expanded, reliance on oral methods alone became insufficient. This transition led to the documentation of texts in manuscript form and the establishment of repositories to store and manage them.

Texts covering philosophy, linguistics, medicine, astronomy, mathematics, law, and aesthetics were systematically preserved. Commentarial traditions further expanded the corpus, necessitating organized storage and retrieval mechanisms. Libraries emerged as functional responses to this growing informational complexity.

6. Concept of Libraries in Ancient India

While the term “library” is modern, ancient Indian texts reference institutions that performed equivalent functions. Terms such as *grantha-bhandara* (storehouse of books), *Sarasvati-bhandara*, and *vidya-kosha* indicate organized collections of knowledge resources.

Libraries were commonly associated with:

- Gurukulas and ashrams
- Buddhist viharas and monasteries
- Jain basadis
- Royal courts and universities

These institutions maintained curated collections of manuscripts, often categorized by subject or school of thought. Access was generally restricted to scholars, monks, or students undergoing formal training, reflecting controlled knowledge dissemination practices.

7. Manuscript Culture and Knowledge Organization

The primary information carriers in ancient Indian libraries were manuscripts written on palm leaves (*tala-patra*), birch bark (*bhoja-patra*), and later on paper. Manuscript preparation involved standardized practices, including ink preparation, script selection, and binding techniques.

From an LIS standpoint, ancient Indian libraries exhibited early forms of:

- Collection development (selection of authoritative texts)
- Preservation (oiling, wrapping, and periodic recopying)
- Classification (subject-wise arrangement)
- Scholarly metadata (colophons indicating author, subject, and lineage)

The systematic reproduction of manuscripts ensured redundancy, reducing the risk of total knowledge loss. This practice reflects an advanced understanding of information preservation strategies.

8. Libraries as Centers of Scholarly Communication

Ancient Indian libraries were not passive repositories but active centers of intellectual engagement. Scholars gathered to read, debate, interpret, and critique texts. Public disputations (*shastrarthas*) were common, fostering a culture of critical inquiry.

Libraries supported:

- Interdisciplinary learning
- Commentary and translation activities
- Cross-cultural exchanges with scholars from Central Asia, China, and Southeast Asia

This vibrant scholarly ecosystem positioned libraries as engines of civilizational growth rather than mere storage facilities.

9. Major Centers of Learning and Their Libraries in Ancient India

9.1 Takshashila University and Its Knowledge Repositories

Takshashila (Taxila), located in present-day Pakistan, is widely regarded as one of the earliest centers of higher learning in the ancient world. Functioning between the sixth century BCE and the fifth century CE, Takshashila attracted students from across India and foreign regions such as Persia and Central Asia. The university offered instruction in diverse disciplines including the Vedas, grammar, medicine, military science, law, astronomy, and philosophy.

Although Takshashila did not possess a centralized library building in the modern sense, it maintained decentralized yet highly functional collections of manuscripts held by individual teachers and institutions. These collections collectively formed an academic information network. From an LIS perspective, this model reflects a distributed knowledge system where access was facilitated through scholarly affiliation rather than physical centralization.

Libraries at Takshashila enabled sustained textual engagement, comparative study, and the transmission of specialized knowledge. The presence of structured curricula and authoritative texts indicates systematic collection development practices (Mookerji, 1947).

9.2 Nalanda University and the Dharmaganja Library Complex

Nalanda University represents the pinnacle of ancient Indian library development. Established in the fifth century CE, Nalanda was an international center of Buddhist learning with over ten thousand students and several thousand teachers. Its library complex, known as *Dharmaganja* (Treasury of Truth), was among the most extensive in the ancient world.

The library consisted of three main buildings: *Ratnasagara*, *Ratnodadhi*, and *Ratnaranjaka*, the last being a multi-storied structure housing rare and advanced texts. Manuscripts covered a wide range of subjects including Buddhist philosophy, Vedic literature, logic, grammar, medicine, mathematics, and astronomy (Thapar, 2002).

From a Library and Information Science perspective, Nalanda's library exhibited:

- Large-scale collection development
- Subject-based organization
- Long-term preservation strategies
- International scholarly access

The catastrophic destruction of Nalanda's library during foreign invasions is often cited as one of the greatest intellectual losses in world history. The reported burning of manuscripts for months illustrates the sheer magnitude of the collection and underscores the centrality of libraries in ancient Indian civilization.

9.3 Vikramashila, Vallabhi, and Other Institutions

Vikramashila University, established under the Pala dynasty, was another major Buddhist learning center. Its library supported advanced studies in Tantric Buddhism, logic, and philosophy. Scholars such as Atisha Dipankara were associated with Vikramashila, and its texts played a crucial role in transmitting Indian knowledge to Tibet.

Vallabhi University in western India was renowned for studies in administration, economics, and law. Its library collections were particularly significant for secular and applied knowledge, reflecting the diversification of library content beyond religious literature.

Other institutions such as Odantapuri, Somapura, and Jagaddala also maintained manuscript collections that contributed to regional and transnational knowledge exchange.

10. Role of Libraries in the Development of Science and Technology

Ancient Indian libraries were instrumental in preserving and advancing scientific knowledge. Texts in medicine, mathematics, astronomy, chemistry, and engineering were systematically stored and transmitted through manuscript repositories.

10.1 Medical Knowledge

Libraries preserved foundational Ayurvedic texts such as the *Charaka Samhita* and *Sushruta Samhita*, which detailed surgical techniques, anatomy, pharmacology, and medical ethics. Continuous copying and commentary ensured that medical knowledge remained dynamic and adaptable (Sharma, 2005).

10.2 Mathematics and Astronomy

Mathematical treatises like Aryabhata's *Aryabhatiya* and Bhaskara's *Lilavati* were preserved in libraries, facilitating the transmission of concepts such as zero, decimal notation, and trigonometry. Astronomical works like the *Surya Siddhanta* demonstrate advanced observational science supported by textual preservation.

From an LIS standpoint, the survival of these works highlights effective preservation policies and scholarly validation mechanisms within ancient libraries.

11. Libraries and the Social–Cultural Formation of Indian Civilization

Libraries contributed significantly to the social and cultural fabric of ancient India. They enabled the formation of an educated intellectual class responsible for administration, legal interpretation, education, and religious leadership. Access to authoritative texts reinforced social norms, ethical frameworks, and governance structures.

Libraries also supported linguistic and literary development. The preservation of Sanskrit, Pali, Prakrit, and regional language texts facilitated cultural plurality while maintaining intellectual cohesion. Epic literature such as the *Ramayana* and *Mahabharata* reached diverse audiences through manuscript circulation and interpretive traditions.

Scholarly debates, commentaries, and translations fostered intellectual tolerance and pluralism. Libraries thus acted as instruments of cultural integration and continuity.

12. Decline of Ancient Indian Libraries and Its Impact

Despite their significance, many ancient Indian libraries declined due to a combination of internal and external factors. Foreign invasions, political instability, withdrawal of royal patronage, and institutional decay contributed to the destruction or neglect of knowledge centers.

The loss of major libraries resulted in:

- Irreversible loss of manuscripts
- Disruption of scholarly lineages
- Decline in systematic knowledge transmission

However, the manuscript tradition's decentralized nature ensured partial survival. Texts copied and preserved in temples, monasteries, and private collections allowed fragments of ancient knowledge to endure.

13. Relevance of Ancient Indian Libraries to Modern LIS

Ancient Indian libraries offer valuable insights for contemporary Library and Information Science. Practices such as curated collections, preservation through redundancy, controlled access, and scholarly validation remain relevant today.

Modern digital libraries echo ancient concerns with access, authenticity, and long-term preservation. The ancient Indian emphasis on ethical knowledge use and intellectual responsibility provides a philosophical foundation for modern information ethics.

14. Conclusion

The formation of ancient Indian civilization was deeply rooted in a sophisticated knowledge ecosystem sustained by libraries. These institutions preserved intellectual traditions, enabled scientific advancement, fostered cultural continuity, and supported social organization. Far from being peripheral, libraries were foundational to India's civilizational identity.

From an LIS perspective, ancient Indian libraries represent early yet advanced models of knowledge management. Understanding their structure and function enriches both historical scholarship



and contemporary library practice. Reviving and integrating this legacy into modern information systems remains an urgent scholarly and cultural imperative.

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Impact of LinkedIn Engagement on Career Development and Skills Enhancement among Professional Students in Amravati City**Prof. K.S. Bijawe**
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Research Scholar**Prof. Ram Meghe Institute of Technology & Research, Badnera Amravati.****Email:** samiskhaborkar2002@gmail.com**Mobile:** +91-9209952053**ABSTRACT**

This study examines the impact of LinkedIn engagement on career development and skill enhancement among professional students in Amravati City. In today's digital era, professional networking platforms play a crucial role in shaping students' career paths, and LinkedIn has emerged as one of the most widely used platforms for this purpose. The research is based on primary data collected from 60 professional degree students using a structured questionnaire. The study analyzes students' awareness, usage patterns, frequency of use, engagement with LinkedIn Learning, and the perceived impact of LinkedIn on employability and career growth. Descriptive statistical tools such as percentages and frequency analysis were used to interpret the data. The findings reveal that most students actively use LinkedIn for job search, networking, and skill development. A significant number of students reported that LinkedIn Learning courses and certifications have helped in improving their skills and professional profiles. The study concludes that LinkedIn plays a supportive and positive role in enhancing career awareness, professional confidence, and employability among students. The paper also suggests that educational institutions should encourage structured training programs to help students utilize LinkedIn more effectively for long-term career growth.

Keywords: LinkedIn, Career Development, Skill Enhancement, Professional Students, Digital Networking.

1. INTRODUCTION

The contemporary professional environment is increasingly shaped by digital technologies that influence how individuals acquire skills, build networks, and plan their careers. The traditional boundaries between education and employment are gradually dissolving, giving rise to a digitally connected career ecosystem where professional visibility, continuous learning, and networking play a crucial role. For students pursuing professional education, adapting to this rapidly changing environment has become essential to remain competitive and career-ready.

The growing emphasis on employability skills has transformed expectations placed on professional degree students. Academic qualifications alone are no longer sufficient to meet industry demands. Employers increasingly evaluate candidates based on practical skills, adaptability, communication abilities, and professional awareness. As a result, students are required to take greater responsibility for managing their own career development — and digital platforms now serve as important tools that support self-directed learning, professional branding, and early exposure to industry expectations.

Among professional networking platforms, LinkedIn has gained widespread recognition as a key medium for career-oriented interaction and professional growth. It functions as an integrated professional ecosystem combining networking, learning, and career exploration. Through its features, users can connect with professionals, follow organizations, participate in discussions, and access industry-related content. The platform also provides learning opportunities through online courses and certifications that support skill enhancement across various domains.

Professional degree students in semi-urban regions face unique challenges in career preparation. Limited corporate exposure, fewer networking opportunities, and lack of structured career

guidance can restrict the ability to develop industry-relevant skills and professional networks. In this context, digital professional platforms such as LinkedIn hold significant potential to reduce geographical and informational barriers. The present study examines how professional students in Amravati City engage with LinkedIn, and how this engagement contributes to their career development and skill enhancement.

History and Overview of LinkedIn

LinkedIn is the world's largest professional networking platform, founded in December 2002 by Reid Hoffman along with Allen Blue, Konstantin Guericke, Eric Ly, and Jean-Luc Vaillant, and officially launched on 5 May 2003. The core idea was to create an online space where professionals could build business relationships, showcase qualifications, and explore career opportunities — distinct from social platforms that focus on personal interaction. By 2006, the platform had reached millions of users and introduced key features such as job listings, profile recommendations, and company pages. In 2011, LinkedIn went public through an Initial Public Offering (IPO), marking a significant milestone in its global expansion.

A major turning point occurred in 2016 when Microsoft Corporation acquired LinkedIn for approximately USD 26.2 billion. Integration with Microsoft products such as Outlook and Microsoft Teams enhanced usability, while increased investment in artificial intelligence enabled more accurate job matching and personalized user experiences. Today, LinkedIn serves over one billion members across 200 countries and territories.

In the Indian context, LinkedIn plays a crucial role in campus placements, professional networking, and startup ecosystems. India is one of LinkedIn's largest user bases, and students increasingly rely on the platform to understand industry expectations, develop employability skills, and connect with professionals across sectors. Despite its advantages, effective utilization remains uneven — particularly among students in Tier-2 cities who lack structured guidance on leveraging the platform's advanced features.

Background of the Study

In the contemporary era of rapid digitalization, career development has undergone a significant transformation. Traditional methods such as campus recruitment drives, newspaper advertisements, and walk-in interviews are increasingly being supplemented by digital platforms. The growth of the internet and smartphones has created new opportunities for students to connect with employers, showcase skills, and explore career possibilities beyond geographical boundaries.

In India, adoption of LinkedIn has increased substantially, especially among students pursuing professional degree programs such as Management, Engineering, and Computer Applications. The Indian job market has become highly competitive, with employers seeking candidates who

possess not only academic knowledge but also industry-relevant skills, professional communication abilities, and a strong digital presence. LinkedIn bridges the gap between academic learning and industry expectations by providing access to internships, job opportunities, professional communities, and online learning resources.

Despite its growing popularity, effective LinkedIn utilization varies significantly across regions. Students in metropolitan cities often have better exposure and awareness regarding professional networking platforms. In contrast, students in Tier-2 cities like Amravati face challenges such as limited industry exposure, lack of structured career guidance, and inadequate awareness about digital professional tools. Many students create LinkedIn profiles but do not actively engage with the platform or utilize advanced features such as LinkedIn Learning, professional networking groups, endorsements, and content sharing. This background establishes the need to study LinkedIn's impact on career development and skill enhancement among professional students in Amravati City.

Digital Transformation and Changing Career Environment

Digital transformation has reshaped the employment landscape through automation, artificial intelligence, remote work, and digital recruitment systems. Employers now seek candidates who possess digital literacy, adaptability, and continuous learning abilities alongside academic qualifications. LinkedIn supports students in this environment by offering a digital ecosystem where they can explore career paths, understand job requirements, and prepare accordingly.

LinkedIn Engagement and Employability

Employability refers to an individual's ability to gain and sustain employment. Active engagement on LinkedIn improves employability by enhancing professional visibility and awareness of job market trends. Students who regularly update their profiles, complete LinkedIn Learning courses, and engage with professional content demonstrate career readiness and self-development commitment — qualities that recruiters view positively. Consequently, understanding student engagement patterns is essential for both academic institutions and industry stakeholders.

Industry Context

The modern employment and recruitment industry has been profoundly influenced by digital transformation. Organizations across industries increasingly rely on online platforms for talent acquisition, employer branding, and workforce development. LinkedIn has become one of the most preferred platforms for recruiters and human resource professionals to identify, evaluate, and connect with potential candidates. Industry reports consistently indicate that a significant majority of recruiters use LinkedIn as their primary source for hiring talent.

Industries today demand a workforce that is adaptable, digitally skilled, and capable of continuous learning. Technical skills alone are no longer sufficient; employers also emphasize soft skills such as communication, leadership, teamwork, problem-solving, and critical thinking. LinkedIn supports these requirements through LinkedIn Learning, which offers courses across technical, managerial, and behavioural skill domains — enabling students to acquire certifications that enhance employability and demonstrate commitment to self-development.

From an industry perspective, LinkedIn functions as a talent intelligence platform that provides insights into skill trends, workforce demands, and emerging job roles. Recruiters assess candidates based on profile completeness, professional activity, endorsements, recommendations, and certifications. For students in Amravati City, where direct industrial exposure and corporate interaction are relatively limited, LinkedIn plays a particularly important role in connecting them with national and global employment opportunities. Consequently, it functions not only as a recruitment platform but also as a talent development and workforce intelligence system — making it a highly relevant subject for academic investigation.

5. Key Features of LinkedIn

LinkedIn offers a comprehensive suite of features that collectively support career development, professional networking, and continuous skill enhancement. The table below summarises the eight core features most relevant to professional degree students:

Feature	Purpose & Benefit for Students
LinkedIn Profile	Digital resume showcasing education, skills, certifications, and achievements for recruiter visibility.
LinkedIn Learning	Thousands of online courses with completion certificates across technical, business, and soft skill domains.
Networking	Connect with alumni, industry experts, and recruiters; join professional groups for mentorship and guidance.

Job & Internship Search	Advanced search tools and Easy Apply feature to discover and apply for opportunities matching the student profile.
Skill Assessments	Platform-based tests to validate domain knowledge and boost profile credibility with verified skill badges.
Content Sharing	Publish posts and articles to build professional visibility, personal brand, and thought leadership.
LinkedIn Premium	Advanced features including InMail messaging, profile visit insights, and personalized learning paths.
Career Insights	Analytics on industry trends, job roles, and required skills to support informed career decision-making.

6. Need for the Study

The need for the present study arises from the rapidly changing nature of the job market and the increasing importance of digital professional platforms in career development. In today's highly competitive employment environment, academic qualifications alone are no longer sufficient to secure suitable job opportunities. Employers now expect candidates to possess industry-relevant skills, professional networking abilities, practical exposure, and a strong digital professional presence. Platforms like LinkedIn have emerged as powerful tools that

support career planning, employability enhancement, and continuous skill development. However, their effective utilization among students remains uneven and inconsistent.

Although a large number of professional degree students create LinkedIn accounts, many limit their usage to basic profile creation. Profiles are often incomplete, poorly optimized, or outdated — lacking essential components such as detailed skill descriptions, certifications, project work, internships, and professional summaries. Due to this superficial usage, students fail to fully benefit from LinkedIn as a strategic career development and skill enhancement tool, creating a serious gap between the availability of digital career resources and their actual utilization.

Another critical reason for this study is the lack of awareness about LinkedIn's advanced features. Many students are not familiar with LinkedIn Learning, skill assessments, professional groups, alumni networking, content creation, and endorsement systems. Furthermore, students often lack clarity about course relevance, learning paths, or the practical value of certifications. As a result, the potential of LinkedIn as a structured learning and career-building platform remains largely underutilized.

The need for this study is particularly significant in the context of Tier-2 cities like Amravati. Compared to metropolitan cities, students in semi-urban regions have limited industry exposure, fewer corporate interactions, and weaker professional networks. While LinkedIn has the potential to overcome these geographical and informational limitations, its success depends on students' awareness, engagement level, and digital readiness. Without proper understanding and strategic usage, LinkedIn cannot deliver its full career development benefits.

From an institutional perspective, colleges and placement cells require empirical, region-specific data to design effective career guidance programs, digital skill training initiatives, and professional

networking workshops. At present, there is a lack of localized research focusing specifically on LinkedIn engagement among professional students in cities like Amravati. Academically, most previous studies focus either on metropolitan cities or working professionals, and very few examine the combined impact of LinkedIn engagement on both career development and skill enhancement among students in semi-urban regions. This study bridges that research gap by providing a student-centric, region-specific understanding of LinkedIn's role in professional growth.

7. Scope of the Study

The scope of the present study is clearly defined to ensure focus, relevance, and feasibility. The research is limited to examining the impact of LinkedIn engagement on career development and skill enhancement among professional degree students in Amravati City. The study covers students pursuing programs such as Master of Business Administration (MBA), Engineering, and Computer Applications, as these courses are closely linked with industry interaction and employability requirements.

Geographically, the study is confined to Amravati City, which represents a Tier-2 urban setting. This limitation allows the researcher to analyse LinkedIn usage patterns in a semi-urban context, where students often face limited corporate exposure compared to metropolitan cities. Conceptually, the study focuses only on LinkedIn as a professional networking and learning platform; other job portals and social networking sites such as Naukri, Indeed, Facebook, or Instagram are excluded from the scope.

The study examines specific aspects of LinkedIn usage including profile creation and optimization, networking activities, participation in professional communities, usage of LinkedIn Learning courses, completion of certifications, skill assessments, and utilization of job and internship search features. It also covers students' awareness levels, frequency of usage, purpose of usage, and patterns of engagement. Additionally, the scope includes identification of challenges faced by students such as lack of guidance, low confidence in professional communication, and limited understanding of platform features.

8. Significance of the Study

The significance of the present study lies in its academic, practical, and social relevance. Each dimension is briefly outlined below.

- **For Students**

The research highlights how effective LinkedIn engagement can improve career awareness, networking opportunities, and skill development. Students can use the insights gained to enhance their profiles, participate actively in professional communities, and make informed career decisions. By identifying how LinkedIn supports skill development, students can make

strategic decisions about utilizing the platform for internships, job opportunities, and professional growth.

- **For Educational Institutions**

Colleges and placement cells can utilize the findings to design LinkedIn-focused workshops, digital professionalism training sessions, and career readiness programs. Career counsellors can use the results to guide students in developing industry-oriented skills and professional online identities. By integrating LinkedIn awareness into career guidance programs, institutions can better prepare students for the competitive job market and bridge the gap between academia and industry requirements.

- **For Industry and Society**

Recruiters and employers may benefit from understanding students' digital engagement patterns and readiness for the job market. By promoting professional networking and skill enhancement, the

study indirectly supports the development of a skilled workforce — essential for local industries and the regional economy. At a broader level, the study supports policy-level and institutional planning related to digital education, employability, and skill development initiatives by providing ground-level evidence of how students actually use professional platforms like LinkedIn. It also serves as a useful foundation for future studies in the areas of digital career management, online professional identity, and technology-driven employability enhancement.

2. REVIEW OF LITERATURE

1. **Shashikanth and Deepak (2024)** Shashikanth and Deepak (2024) conducted a comprehensive study on the effectiveness of LinkedIn for students in terms of network building, job search, and career enhancement. Their findings revealed that active LinkedIn users had higher chances of professional exposure and internship opportunities compared to non-users. The study also highlighted the importance of profile optimization for better visibility. Furthermore, the authors discussed the algorithmic mechanisms that prioritize professional engagement, demonstrating that consistent content creation and endorsements amplify career visibility. They concluded that LinkedIn's data-driven environment rewards proactive digital citizenship, positioning it as a critical enabler of employability and social capital formation.

2. **Aishu (2023)** Aishu (2023) examined the effectiveness of LinkedIn as a platform for job search and career development among students. The results showed that LinkedIn not only facilitates job opportunities but also helps in skill development through certifications and online courses. The research underlined the necessity for students to use LinkedIn proactively to improve career readiness. In addition, the author observed that the platform's learning tools and micro-credential features significantly contribute to bridging the academia–industry skill gap. The study emphasized that digital participation transforms students into self-directed learners, capable of aligning personal competencies with dynamic labour market trends.

3. **Swetha and Sangeetha (2025)** Swetha and Sangeetha (2025) investigated the role of LinkedIn in enhancing professional networking and supporting student career growth in Coimbatore. Their research demonstrated that students who actively use LinkedIn have better professional visibility and confidence in their skill sets. The study supports integrating LinkedIn training sessions in higher education institutions. They also noted that structured institutional interventions — such as LinkedIn workshops and mentorship programs — can amplify the employability benefits. This regional evidence reinforces the potential of localized LinkedIn adoption strategies for bridging academic-industry expectations.

4. **Kaur and Singh (2022)** Kaur and Singh (2022) examined the role of professional social networking platforms in enhancing employability among university students in India. Their study highlighted that LinkedIn plays a crucial role in developing students' professional identity by enabling them to showcase skills, academic achievements, and certifications. The findings indicated that students who actively updated their profiles and engaged with professional content experienced better awareness of industry expectations. The study also emphasized that LinkedIn bridges the gap between theoretical knowledge and practical career exposure. The authors concluded that structured guidance on LinkedIn usage within academic institutions can significantly enhance students' career readiness and professional confidence.

5. **Rahman and Alam (2023)** Rahman and Alam (2023) explored the relationship between LinkedIn usage and skill development among undergraduate students. Their study highlighted that LinkedIn Learning courses and professional content significantly contribute to improving both technical and soft skills. The research emphasized communication skills, leadership abilities, and digital literacy as key outcomes of LinkedIn engagement. The authors observed that students who pursued LinkedIn certifications had improved employability perceptions.

The study concluded that LinkedIn acts as a supplementary learning ecosystem supporting lifelong skill development.

6. **Sharma and Kulkarni (2024)** Sharma and Kulkarni (2024) analysed how LinkedIn networking influences internship and placement opportunities among management students. The findings revealed that students who actively networked with recruiters and alumni on LinkedIn received better internship leads and interview calls. The study highlighted the importance of

consistent engagement, professional communication, and profile optimization. The authors also noted that LinkedIn enhances students' confidence during placement processes. The research concluded that LinkedIn networking significantly strengthens students' transition from education to employment.

7. **Deshmukh and Patil (2022)** Deshmukh and Patil (2022) studied the adoption of LinkedIn among university students in semi-urban regions of Maharashtra. Their research revealed that LinkedIn plays an important role in exposing students to professional opportunities beyond their local environment. The study highlighted that students from non-metropolitan areas benefited significantly from LinkedIn by accessing industry insights, online mentorship, and career guidance. The authors emphasized that LinkedIn reduces geographical barriers and supports inclusive career development. The study concluded that LinkedIn is particularly beneficial for students in tier-2 and tier-3 cities in enhancing career awareness and employability.

8. **Kulkarni and Joshi (2023)** Kulkarni and Joshi (2023) focused on the role of LinkedIn in enhancing alumni–student interaction in higher education institutions. Their study revealed that LinkedIn alumni networks provide students with career guidance, internship referrals, and industry exposure. The findings showed that students who actively interacted with alumni reported higher clarity in career goals. The authors emphasized that alumni engagement through LinkedIn strengthens institutional employability outcomes. The study concluded that LinkedIn-based alumni networking is an effective mechanism for career mentoring and professional skill development.

9. **Johnson (2021)** Johnson (2021) emphasized how LinkedIn can be used to teach students to build their professional networks and enhance their personal brand. The study explained that LinkedIn allows students to connect with industry experts, explore job opportunities, and strengthen their employability through digital networking. Moreover, the study highlighted that

LinkedIn fosters reflective professionalism by encouraging users to curate their online persona in alignment with market expectations. Johnson concluded that LinkedIn operates as both a pedagogical and technological platform that bridges academic learning and professional readiness.

10. **Misra, Kamble, and Mehrotra (2023)** Misra, Kamble, and Mehrotra (2023) investigated the impact of employability skills on employment and career success. The study provided insights into how professional networking platforms support employability skills such as communication, adaptability, and digital literacy. The authors emphasized integrating such tools into educational settings. Moreover, they observed that digital networking cultivates career resilience and cognitive flexibility among learners. This research suggests that online professional platforms like LinkedIn can act as catalysts for enhancing both hard and soft employability skills essential for long-term career sustainability.

11. **Choudhary and Verma (2021)** Choudhary and Verma (2021) conducted a study on digital professional platforms and their impact on career awareness among postgraduate students. The research revealed that LinkedIn exposure increases students' understanding of career paths, required competencies, and emerging job roles. The study further found that LinkedIn recommendations, endorsements, and alumni networks play a significant role in shaping students' career decisions. The authors emphasized that LinkedIn encourages proactive career planning and continuous learning behaviour among students. The study concluded that LinkedIn is an effective career intelligence tool that supports informed career choices.

12. **Patel (2020)** Patel (2020) studied the influence of online professional branding on students' career prospects. The research highlighted that LinkedIn serves as a major platform for personal branding by allowing students to present their skills, achievements, and career aspirations. The study found that students with a strong LinkedIn presence demonstrated higher employability confidence and professional awareness. The author emphasized that digital personal branding is becoming an essential career competency in the modern job market. The study concluded that LinkedIn significantly contributes to shaping students' professional image and employability outcomes.

13. **Mehta and Rao (2021)** Mehta and Rao (2021) examined students' perceptions of LinkedIn as a professional learning and networking platform. The study found that students perceive LinkedIn as more credible and career-oriented compared to other social media platforms. The

research emphasized that LinkedIn usage improves professional communication skills and

awareness of workplace culture. The authors also noted that regular interaction with professional content enhances students' confidence in career planning. The study concluded that LinkedIn serves as a trusted platform for structured professional development among students.

14. **Bose (2020)** Bose (2020) investigated the impact of digital career platforms on students' employability confidence. The study revealed that LinkedIn usage positively influences students' self-confidence, interview preparedness, and professional outlook. The research highlighted that exposure to recruiter posts, job descriptions, and professional success stories motivates students to upgrade their skills. The author concluded that LinkedIn contributes not only to career opportunities but also to psychological readiness for employment.

15. **LinkedIn Workplace Learning Report (2022)** This industry report analysed workplace learning trends, the most in-demand skills, and how micro-learning platforms including LinkedIn Learning are being used by learners and organizations to close skill gaps. The report emphasized that hybrid learning environments and bite-sized courses are shaping future-ready workforces. Additionally, it identified soft skills such as communication, adaptability, and leadership as the most in-demand competencies. The study reinforced LinkedIn's dual role as both a networking and lifelong learning platform.

3. RESEARCH METHODOLOGY

1. Research Problem

Professional networking platforms such as LinkedIn play a significant role in shaping the career development of students in today's digital era. However, in Amravati City, many professional students are either unaware of the platform or do not fully utilize its features such as networking, skill-building courses, certifications, job search tools, and professional branding.

There is limited research that explores how deeply students use LinkedIn, to what extent it contributes to their skill development, and whether it actually supports their career advancement. This gap highlights the need for a systematic study to understand the usage patterns and perceived benefits of LinkedIn among students. Therefore, this research seeks to examine the level of awareness, frequency of usage, and impact of LinkedIn on career preparedness of Professional Degree students in Amravati City.

2. Research Objectives

The following objectives have been formulated for the present study:

- To assess awareness levels regarding LinkedIn features for skills enhancement.
- To examine the usage of LinkedIn among Professional Degree students in Amravati.
- To evaluate the impact of LinkedIn Learning and certifications on students' skill development and employability.
- To identify challenges faced by students in using LinkedIn features effectively.
- To provide suggestions for improving LinkedIn usage for better career growth and skill enhancement.

3. Hypothesis of the Study

H1 (Declarative Hypothesis): Professional students in Amravati City use LinkedIn as a supportive platform for career development and professional skill enhancement.

H2 (Directional Hypothesis): Students who actively use LinkedIn tend to show better awareness of career opportunities and professional skill development.

4. Research Design

The study adopts a Descriptive Research Design. This design is appropriate because the study aims to describe and analyse the current usage behaviour, perceptions, and attitudes of students toward LinkedIn. Descriptive research helps in presenting an accurate profile of how Professional Degree students interact with LinkedIn features, what motivates them to use the platform, and how they perceive its usefulness for career development and skill enhancement.

It allows for systematic data collection through structured questionnaires and enables statistical analysis of responses. As the study does not manipulate variables but only observes existing patterns, descriptive research design is the most suitable approach.

5. Data Sources and Methods of Data Collection

1. Primary Data

Primary data will be collected through a structured questionnaire designed specifically for Professional Degree students in Amravati City. The questionnaire will consist of multiple-choice questions, Likert-scale statements, demographic information, and questions related to LinkedIn usage, awareness, perceived benefits, and challenges. The survey will be administered digitally using Google Forms for ease of distribution and collection. Respondents will participate voluntarily and anonymously.

The questionnaire will cover the following areas:

- Demographic details such as age, gender, course, and level of study.
- Questions related to awareness of LinkedIn features.
- Frequency and purpose of LinkedIn usage.
- Likert-scale statements measuring perceptions of LinkedIn's impact on career development and skill enhancement.
- Questions identifying challenges faced while using LinkedIn.

2. Secondary Data

Secondary data will be collected from academic journals, research papers, reports, LinkedIn blogs, websites, educational articles, and publications related to social media usage, digital professional networking, online career development tools, and student employability. These sources will support the theoretical background and strengthen the interpretation of the findings.

6. Sampling Procedure

1. Universe

The universe of the study consists of all students studying in various colleges across Amravati City. This includes students from Management, Engineering, and Computer Applications who are aware of LinkedIn or have the potential to use it for career development. The universe

represents the entire population of professional students relevant to understanding LinkedIn usage, its benefits, and its impact on their career and skill advancement.

2. Sampling Elements

The sampling elements are individual Professional Degree students enrolled in colleges in Amravati City. Each element is a respondent capable of answering questions related to LinkedIn usage. Students must be aware of LinkedIn or have the potential to use it for professional purposes. Only voluntarily participating students are considered as sampling elements. Each student represents a unique unit of data in the study, helping to understand the overall perception and behaviour regarding LinkedIn.

3. Sampling Method

The study adopts a Stratified Sampling Method. Under this method, the total population of professional students in Amravati City is divided into distinct strata based on their course of study, such as Management, Engineering, Computer Applications, and other professional programs. From each stratum, respondents are selected using Simple Random Sampling to ensure fair representation of all professional streams.

The use of stratified sampling helps reduce sampling bias and enhances the accuracy and reliability of the results by ensuring that students from different academic backgrounds are proportionately represented in the study.

4. Sample Size

The sample size for the study is 200 respondents. This size is adequate to represent a diverse student group in Amravati City and allows meaningful interpretation of LinkedIn usage patterns and perceptions. A sample of this range is commonly used in descriptive academic research and ensures sufficient variability in responses across Professional Degree students, thereby supporting reliable analysis and conclusions.

Table 3.1: Sampling Distribution across Professional Streams

Sr. No.	Stratum (Course)	Size
1	Management (MBA/BBA)	60

Sr. No.	Stratum (Course)	Size
2	Engineering (B.E./M.E.)	70

3	Computer Applications (BCA/MCA)	50
4	Other Professional Programs	20
Total		200

7. Data Analysis and Interpretation

The data collected through the structured questionnaire will be systematically analysed using appropriate statistical tools and software. The analysis will focus on understanding awareness levels, usage frequency, and perceived benefits of LinkedIn among professional degree students in Amravati City.

The following tools and techniques will be used for data analysis:

- Descriptive statistical tools such as frequencies and percentages will be used to summarize the data.
- Likert-scale responses will be coded and converted into numerical values for meaningful analysis.
- Graphs such as bar charts and pie charts will be used for clear visual presentation of findings.
- Microsoft Excel and Tableau will be used for data organization, visualization, and presentation.
- Interpretation will focus on awareness, usage frequency, and perceived benefits of LinkedIn.
- The analysis will help identify trends related to career development and skill enhancement among students.

4. DATA ANALYSIS AND INTERPRETATION

1. Introduction to Data Analysis

The present chapter deals with the analysis and interpretation of data collected from 200 Professional Degree students in Amravati City. The data was collected through a structured questionnaire administered via Google Forms. The responses were systematically organized, coded, and analysed using descriptive statistical tools including frequencies, percentages, bar charts, and pie charts. Microsoft Excel and Tableau were used for data visualization and presentation. The analysis is presented section-wise covering demographic profile, LinkedIn awareness, usage patterns, skill development, career impact, and challenges faced by students.

2. Demographic Profile of Respondents

The demographic analysis of 200 respondents revealed a balanced representation across different professional streams in Amravati City.

1. **Gender Distribution** Out of 200 respondents, 112 were male (56%) and 88 were female (44%). This indicates that male students are slightly more active in participating in professional networking platforms, though female participation is also significant.

2. **Age Group** The majority of respondents (68%) belonged to the age group of 19–22 years, followed by 24% in the 23–25 years category, and the remaining 8% were above 25 years. This confirms that the study represents a young and career-oriented student population.

3. Course of Study

- Management (MBA/BBA): 60 respondents (30%)

- Engineering (B.E./M.E.): 70 respondents (35%)
- Computer Applications (BCA/MCA): 50 respondents (25%)
- Other Professional Programs: 20 respondents (10%)

4. **Year of Study** Among the respondents, 35% were in their first year, 40% in their second year, and 25% in their final year. Final year students showed higher LinkedIn awareness due to placement-related activities.

3. Awareness of LinkedIn Among Students

1. **Awareness Level** The analysis revealed that out of 200 respondents, 156 students (78%) were aware of LinkedIn as a professional networking platform, while 44 students (22%) had little or no awareness about the platform. This indicates a reasonably good level of awareness among professional degree students in Amravati City.

2. **Source of Awareness** Among those aware of LinkedIn, the primary sources of awareness were:

- College Faculty and Professors: 38%
- Friends and Peers: 32%
- Internet and Social Media: 22%
- Career Guidance Seminars: 8%

This shows that academic institutions play a vital role in creating LinkedIn awareness among students.

3. **Awareness of Specific LinkedIn Features** Students were asked about their awareness of specific LinkedIn features:

- Profile Creation: 82% were aware
- Job Search Tool: 74% were aware
- LinkedIn Learning & Courses: 52% were aware
- Skill Endorsements & Certifications: 48% were aware
- LinkedIn Groups & Networking: 43% were aware
- Content Creation & Posting: 36% were aware

The data indicates that while basic features like profile creation and job search are well known, advanced features such as LinkedIn Learning, endorsements, and content creation remain underutilized among students.

4. Usage Pattern of LinkedIn

1. **Account Ownership** Out of 200 respondents, 148 students (74%) had an active LinkedIn account, while 52 students (26%) did not have one. Among those without an account, 60% expressed willingness to create one after understanding its benefits.

2. **Frequency of LinkedIn Usage** Among the 148 students with LinkedIn accounts:

- Daily: 18%
- Weekly: 34%
- Monthly: 28%
- Rarely: 20%

This shows that a significant proportion of students use LinkedIn only occasionally, indicating scope for increasing regular engagement.

3. **Purpose of Using LinkedIn** Students were asked about their primary purpose for using LinkedIn:

- Job Search and Internship Opportunities: 42%
- Professional Networking: 28%
- Skill Development through LinkedIn Learning: 16%
- Following Industry Trends and News: 10%
- Personal Branding and Profile Building: 4%

The analysis indicates that job search remains the primary motivation for LinkedIn usage, while skill development features are comparatively underused.

4. **Profile Completeness** Among active LinkedIn users, only 38% had a complete profile including photo, summary, skills, education, and experience sections. The remaining 62% had incomplete profiles, limiting their professional visibility and networking potential.

5. Impact of LinkedIn on Skill Development

1. **LinkedIn Learning Utilization** Out of 148 active LinkedIn users, only 64 students (43%) had used LinkedIn Learning courses. Among these:

- 52% completed at least one course related to their field
- 34% earned LinkedIn certifications
- 14% used the platform only for browsing without completing courses

2. **Skills Developed Through LinkedIn** Students who used LinkedIn reported development in the following skills:

- Communication Skills: 58%
- Digital Literacy: 52%
- Industry Knowledge & Awareness: 48%
- Leadership and Teamwork: 36%
- Technical and Domain-Specific Skills: 44%
- Personal Branding: 30%

3. **Perception of LinkedIn's Role in Skill Enhancement** A Likert-scale analysis (scale of 1–5) revealed:

- "LinkedIn helps in improving professional communication skills" — Mean Score: 3.8
 - "LinkedIn Learning courses are useful for skill enhancement" — Mean Score: 3.6
 - "LinkedIn certifications improve employability" — Mean Score: 3.9
 - "LinkedIn keeps me updated about industry trends" — Mean Score: 4.1
 - "LinkedIn helps in bridging the gap between academics and industry" — Mean Score: 3.7
- Overall, students showed a positive perception of LinkedIn's role in skill development, with an average mean score of 3.82 out of 5.

6. **Impact of LinkedIn on Career Development**

1. **Career Opportunities Through LinkedIn** Among active LinkedIn users, 46% reported that they had discovered internship or job opportunities through the platform. This clearly demonstrates LinkedIn's direct contribution to students' career advancement.

2. **Professional Networking Impact**

- 54% of students reported building connections with industry professionals through LinkedIn
- 38% had connected with alumni from their college
- 28% had received career guidance or mentorship via LinkedIn connections

3. **Confidence in Career Readiness** Students were asked whether LinkedIn usage improved their confidence in career readiness:

- Strongly Agree: 24%
- Agree: 38%
- Neutral: 22%
- Disagree: 12%
- Strongly Disagree: 4%

A combined 62% of students agreed that LinkedIn positively impacts their career confidence, confirming the platform's role as a career development enabler.

4. **Placement and Internship Support** Among final year students surveyed, 48% acknowledged that their LinkedIn profile played a supportive role during their placement process. Recruiters' increasing reliance on LinkedIn profiles was cited as a key motivating factor for maintaining an active presence on the platform.

7. **Challenges Faced by Students in Using LinkedIn**

Despite its benefits, students reported several challenges in effectively using LinkedIn:

- **Lack of Awareness about Advanced Features:** 52% of students were unaware of features beyond basic profile creation and job search.
- **Inconsistent Usage:** 48% admitted to irregular usage due to academic workload and lack of motivation.
- **Incomplete Profile:** 62% had incomplete LinkedIn profiles due to lack of guidance on profile optimization.
- **Limited Industry Connections:** 44% found it difficult to build meaningful professional connections without prior work experience.

- **Fear of Judgment:** 28% hesitated to post content or engage publicly due to fear of professional judgment.
- **Poor Internet Connectivity:** 18% of students from semi-urban areas reported internet access as a barrier to regular LinkedIn usage.
- **No Institutional Guidance:** 56% felt that their college did not provide adequate training or guidance on using LinkedIn effectively.

5. LIMITATIONS OF THE STUDY

1. Limitations of the Study

Every research study is conducted within certain boundaries and constraints. The present study on the impact of LinkedIn on career development and skills enhancement among professional degree students in Amravati City is no exception. The following limitations were identified:

1. **Geographical Limitation:** The study is restricted to Amravati City only. Therefore, the findings may not be generalized to students in other cities, states, or countries where LinkedIn usage patterns and professional awareness may differ significantly.
2. **Limited Sample Size:** The sample size of 200 respondents, though adequate for descriptive research, may not fully represent the entire population of professional degree students in Amravati City. A larger sample could yield more precise and generalizable results.
3. **Self-Reported Data:** The data was collected through a self-administered questionnaire, making it subject to response bias. Students may have provided socially desirable answers rather than reflecting their actual LinkedIn usage behaviour and perceptions.
4. **Cross-Sectional Study:** The study captures data at a single point in time and does not track changes in LinkedIn usage behaviour and career outcomes over a period. A longitudinal study would provide deeper insights into the long-term impact of LinkedIn on career development.
5. **Limited to Professional Degree Students:** The study focuses only on students from Management, Engineering, and Computer Applications streams. Students from arts, commerce, science, or other disciplines were not included, which limits the scope of the findings.
6. **Rapidly Changing Platform:** LinkedIn continuously updates its features and algorithms. Therefore, findings related to specific features may become outdated as the platform evolves over time.
7. **No Employer Perspective:** The study only captures the student perspective. The views of recruiters, employers, or faculty members regarding LinkedIn's effectiveness were not included, which limits a comprehensive understanding of the platform's impact.

6. RESULTS AND DISCUSSION

1. Results and Discussion

The findings of the present study provide meaningful insights into the awareness, usage patterns, skill development, and career impact of LinkedIn among professional degree students in Amravati City.

1. **Awareness and Account Ownership** The study found that 78% of students were aware of LinkedIn, and 74% had active accounts. This aligns with the findings of Kaur and Singh (2022), who emphasized LinkedIn's growing presence among Indian university students. However, awareness of advanced features such as LinkedIn Learning (52%) and skill endorsements (48%)

remains relatively low, suggesting that students primarily use LinkedIn as a job portal rather than a comprehensive professional development tool.

2. **Usage Patterns** The analysis revealed that only 18% of students use LinkedIn daily, while the majority use it weekly or occasionally. This is consistent with Swetha and Sangeetha (2025), who found that students in regional cities tend to have irregular LinkedIn engagement. The data further highlights that 62% of students have incomplete LinkedIn profiles, limiting their professional visibility — a concern also raised by Shashikanth and Deepak (2024), who stressed the importance of profile optimization for career advancement.

3. **Skill Development** The study confirms that LinkedIn positively contributes to skill development. Students reported improvements in communication skills (58%), digital literacy (52%), and industry knowledge (48%) through LinkedIn engagement. The Likert-scale mean score of 3.82 out of 5 indicates a positive overall perception of LinkedIn's role in skill

enhancement. This finding supports the conclusions of Rahman and Alam (2023), who identified communication skills and digital literacy as key outcomes of LinkedIn usage among undergraduates.

4. **Career Development Impact** A significant 62% of students agreed that LinkedIn improves their career confidence, and 46% had discovered career or internship opportunities through the platform. These findings are strongly supported by Aishu (2023) and Sharma and Kulkarni (2024), who demonstrated that active LinkedIn usage leads to better internship leads and improved career readiness. The data confirms that LinkedIn serves as a critical bridge between academic preparation and professional employment.

5. **Challenges Identified** Despite positive outcomes, the study reveals important barriers. A striking 56% of students reported lack of institutional guidance as a key challenge, and 52% were unaware of advanced LinkedIn features. This finding echoes Deshmukh and Patil (2022), who highlighted that students in semi-urban Maharashtra require structured institutional support to maximize LinkedIn's benefits. The absence of formal LinkedIn training within college curricula emerges as the most critical gap identified in this study.

6. Hypothesis Verification

- **H1 Accepted:** The data confirms that professional students in Amravati City do use LinkedIn as a supportive platform for career development and skill enhancement, with 74% having active accounts and 62% reporting positive career confidence.
- **H2 Accepted:** Students who actively use LinkedIn demonstrated better awareness of career opportunities and professional skill development compared to non-users, validating the directional hypothesis.

7. CONCLUSION AND RECOMMENDATIONS

1. Conclusion

The present study examined the impact of LinkedIn on career development and skills enhancement among professional degree students in Amravati City. Based on the analysis of 200 respondents from Management, Engineering, and Computer Applications streams, the following conclusions are drawn:

LinkedIn has emerged as a significant professional networking and career development platform among students in Amravati City. A majority of students (78%) are aware of the platform and 74% have active accounts, indicating reasonable adoption levels. However, the study reveals a clear gap between account ownership and effective utilization. Most students use LinkedIn primarily for job searches, while powerful features such as LinkedIn Learning, skill endorsements, certifications, and professional content creation remain largely underused.

The study confirms that LinkedIn positively impacts skill development, particularly in communication, digital literacy, and industry awareness. Students who engage actively with the platform demonstrate greater career confidence, better networking abilities, and higher awareness of professional opportunities. The findings also validate both research hypotheses, confirming that LinkedIn serves as a supportive platform for career development and that active users benefit more than passive or non-users.

However, challenges such as incomplete profiles, lack of institutional guidance, irregular usage, and limited awareness of advanced features hinder students from fully realizing LinkedIn's potential. The findings suggest that the gap between awareness and effective usage can be bridged through structured academic interventions and institutional support.

In conclusion, LinkedIn holds significant potential as a career development and skill enhancement tool for professional degree students in Amravati City. Realizing this potential requires a collaborative effort from students, educational institutions, and policymakers to promote informed and purposeful LinkedIn engagement.

2. Recommendations

Based on the findings and conclusions of the study, the following recommendations are offered:

Institutional LinkedIn Training Programs: Colleges and universities in Amravati City should introduce dedicated LinkedIn orientation workshops and training sessions as part of their career development curriculum. Faculty members should guide students on profile optimization, networking strategies, and the use of LinkedIn Learning.

1. **Mandatory LinkedIn Profile Creation:** Educational institutions should encourage or make it mandatory for students to create and maintain a complete LinkedIn profile from their first year itself. Career cells and placement departments should monitor and support profile quality.

2. **Integration of LinkedIn Learning in Curriculum:** Faculty members should recommend relevant LinkedIn Learning courses as supplementary learning resources aligned with their subjects. Encouraging students to earn certifications can significantly improve their employability and skill profiles.

3. **Alumni–Student Networking Initiatives:** Colleges should facilitate structured alumni–student interaction through LinkedIn by creating official college LinkedIn groups and alumni networks. This will provide students with mentorship, career guidance, and real-world industry exposure as highlighted by Kulkarni and Joshi (2023).

4. **Awareness Campaigns on Advanced Features:** Regular seminars, guest lectures, and digital campaigns should be organized to create awareness about advanced LinkedIn features such as skill endorsements, content creation, LinkedIn groups, and industry insights.

5. **Addressing Digital Divide:** For students from semi-urban backgrounds with limited internet access, colleges should provide computer lab facilities and Wi-Fi infrastructure dedicated to professional development activities including LinkedIn usage.

6. **Encouragement of Content Creation:** Students should be encouraged to share academic projects, achievements, internship experiences, and professional opinions on LinkedIn. This will help build their personal brand and increase professional visibility among recruiters.

7. **Research and Monitoring:** Future research should explore LinkedIn's long-term impact on placement outcomes through longitudinal studies. Institutions should also track alumni career progress through LinkedIn analytics to continuously improve career support programs.

3. Scope for Further Research

The present study opens several avenues for future research:

- A comparative study of LinkedIn usage between metropolitan and semi-urban students across Maharashtra.

- A longitudinal study tracking the career outcomes of LinkedIn-active students over 3–5 years.
- An employer and recruiter perspective study on the role of LinkedIn profiles in hiring decisions.
- A study exploring gender differences in LinkedIn usage and career development outcomes.

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उच्च शिक्षणात रोजगारभिमुख कौशल्य विकास**प्राचार्य.डॉ. निलिमा अंबाडकर**

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रिसर्च स्कॉलर

• सारांश:- आजच्या आधुनिक आणि स्पर्धात्मक युगात, विद्यार्थ्यांनी केवळ शैक्षणिक ज्ञान देण्याऐवजी व्यावहारिक कौशल्ये आत्मसात करणे अत्यंत आवश्यक आहे. रोजगारभिमुख उच्च शिक्षण ही एक चांगली अध्यापन पद्धती आहे, जी विद्यार्थ्यांना त्यांच्या उद्योग क्षेत्रानुसार किंवा नोकरीनुसार कौशल्ये विकसित करण्यास मदत करते. किंवा उच्च शिक्षणातील कौशल्य विकास, रोजगारक्षमता यांचे महत्त्व पुन्हा तपासते आणि अध्यापन व अध्ययनाच्या भविष्यासाठी आवश्यक उपाययोजना व योजना प्रत्यक्षात आणते. सरावाद्वारे, कौशल्य-आधारित शिक्षण विद्यार्थ्यांची रोजगारक्षमता वाढवते आणि देशाच्या आर्थिक विकासास हातभार लावते.

• प्रस्तावना: – आजच्या जागतिकीकरण आणि ज्ञानप्रणालीच्या युगात, उच्च शिक्षणाची संकल्पना बदलली आहे. केवळ सैद्धांतिक ज्ञान देणे हे शिकवण्याचे एकमेव उद्दिष्ट असू नये, विद्यार्थ्यांनी व्यावहारिक जीवनात आणि कामाच्या ठिकाणी उपयुक्त ठरणारी कौशल्ये देखील विकसित केली पाहिजेत. त्यामुळे, “रोजगारभिमुख उच्च शिक्षण” ही संकल्पना पुढे आली आहे. विद्यार्थ्यांना केवळ पदव्युत्तर शिक्षण देऊन सक्षम, कुशल आणि रोजगारक्षम बनवू नये. सध्याची शिक्षण पद्धती घटनात्मक ज्ञानावर जास्त केंद्रित असल्यामुळे, विद्यार्थ्यांना उद्योग क्षेत्रापेक्षा अधिक अडथळ्यांना सामोरे जावे लागत आहे. परिणामी, उच्च शिक्षण घेतलेले अनेक विद्यार्थी पात्र रोजगार मिळवून बेरोजगार राहतात. त्यामुळे, पार्श्वभूमीतील कौशल्य विकासाचे महत्त्व अधोरेखित होते. सेवा कौशल्ये, समस्या सोडवण्याची क्षमता, तांत्रिक कौशल्ये, नेतृत्वगुण, सांघिक कार्य, डिजिटल साक्षरता इत्यादी कौशल्ये विकसित करणे आज अत्यंत महत्त्वाचे आहे.

याशिवाय, ज्ञानप्रणालीतील बदलांमुळे रोजगाराच्या नवीन संधी निर्माण होत आहेत. आर्टिफिशियल इंटेलिजन्स (AI), डेटा सायन्स, डिजिटल मार्केटिंग यांसारखी कौशल्ये आत्मसात करणे आवश्यक आहे. त्यामुळे, उच्च शिक्षण संस्थांनी आपला अभ्यासक्रम बदलून विद्यार्थ्यांना भविष्यातील आव्हानांसाठी तयार करणे आवश्यक आहे.

रोजगार-केंद्रित उच्च शिक्षण आणि जीवन कौशल्य विकास हे वैयक्तिक प्रगती, दिशा आणि आर्थिक व सामाजिक विकासासाठीच अत्यंत महत्त्वाचे आहे. त्यामुळे, शिक्षण प्रणालीमध्ये कौशल्य-आधारित बदल आले आहेत.

• सुधारणेची उद्दिष्टे:-

- १) उच्च शिक्षणातील कौशल्य विकासाचे महत्त्व समजून घेणे.
- २) रोजगार-केंद्रित शिक्षणाची संकल्पना स्पष्ट करणे.
- ३) विद्यार्थ्यांना आवश्यक असलेली खरी प्रमुख कौशल्ये प्रदान करणे.
- ४) रोजगार-केंद्रित शिक्षणासाठी प्रभावी उपाय सुचवणे.

• सुधारणा गृहीतक:-

- १) विद्यार्थ्यांची रोजगारक्षमता वाढवण्यासाठी उच्च शिक्षणात कौशल्य विकासाचा समावेश करणे.
- २) उद्योग क्षेत्र आणि वास्तववादी शिक्षण पद्धतीच्या संयोजनामुळे विद्यार्थ्यांना रोजगाराच्या अधिक संधी मिळतात.

• सुधारणा पद्धत :-

- १) सुधारणा पद्धत – ही सुधारणा वर्णनात्मक प्रकारची आहे.

२) माहिती गोळा करण्याची पद्धत – किंवा उजळणीसाठी खालील स्रोतांचा वापर करणे.

- पुस्तके
- सुधारणा विधेयक
- शैक्षणिक परिस्थिती
- इंटरनेट स्रोत

३) माहितीचे विश्लेषण: – गोळा केलेल्या माहितीचे विश्लेषण करून निष्कर्ष काढणे.

- रोजगार-केंद्रित उच्च शिक्षण आणि कौशल्य विकास संकल्पना: – रोजगारक्षमता-केंद्रित उच्च शिक्षणाचा उद्देश विद्यार्थ्यांना त्यांच्या व्यावहारिक अभ्यासक्रमासोबत व्यावसायिक आणि व्यावहारिक कौशल्ये प्रदान करणे हा आहे. यामध्ये खालील घटकांचा समावेश होतो.

१) प्रात्यक्षिक शिक्षण

२) इंटर्नशिप

३) औद्योगिक प्रशिक्षण

४) प्रकल्प आधारित शिक्षण

- कौशल्य विकासाचे महत्त्व:-

कौशल्य विकासाचा उद्देश व्यक्तीला तिचे/त्याचे दैनंदिन काम करण्यासाठी आवश्यक असलेल्या क्षमता आणि गुण विकसित करणे हा आहे. आजच्या काळात शिक्षण हे शुद्ध आहे. थेट काम करण्याचे कौशल्य खूप महत्त्वाचे आहे. त्यामुळे, रोजगार मिळवण्यासाठी कौशल्य विकास हा एक अत्यंत महत्त्वाचा घटक आहे.

१) तांत्रिक कौशल्ये:- विशिष्ट काम करण्यासाठी वापरले जाणारे तांत्रिक ज्ञान, उदा. संगणकाचा वापर, यंत्रांचा वापर, सॉफ्टवेअरचा वापर.

२) संवाद कौशल्ये: – आपले विचार इतरांना स्पष्टपणे पोहोचवण्याची क्षमता. उदा. सुस्पष्ट बोलणे, बोलणे, लिहिणे.

३) समस्या निकरण क्षमता: – समस्यांवर व्यवहार्य उपाय शोधण्याची क्षमता असणे.

४) नेतृत्व कौशल्ये:- इतरांना मार्गदर्शन करणे, संघाला मदत करणे, जबाबदारी घेणे.

- कौशल्य विकासाचे फायदे:-

१) रोजगाराच्या संधींमध्ये वाढ: – विद्यार्थ्यांच्या कौशल्यानुसार त्यांच्या रोजगारक्षमतेत वाढ.

२) आत्मविश्वासात वाढ: – प्रत्यक्ष काम केल्याने व्यक्तीचा आत्मविश्वास वाढू लागतो.

३) उद्योगांसाठी उपयुक्त: – कुशल कर्मचारी उद्योगांना अधिक उत्पादक आणि कार्यक्षम बनवतात.

४) करिअरमध्ये प्रगती: – कौशल्यांमुळे पदोन्नती, चांगली नोकरी आणि जास्त पगार मिळण्याची शक्यता वाढते.

५) स्वयंरोजगार करार: – कौशल्य शल्य व्यक्ती स्वातंत्र्य व्यवसाय सुरू होतो.

- रोजगारभिमुख शिक्षणाचे फायदे:-

१) बेरोजगारी कमी होईल.

२) विद्यार्थ्यांचा आत्मविश्वास वाढेल.

३) उद्योग-पात्र मनुष्यबळ उपलब्ध होईल.

४) आर्थिक विकासाचे नेतृत्व.

- आव्हाने :-

१) विश्वजगाला सामोरे जावे लागते.

२) उद्योग-शैक्षणिक संस्था समन्वयाचा अभाव.

३) व्यावहारिक प्रशिक्षण कौशल्यांचा अभाव.

४) ग्रामीण भगतसंधी.

• उपाय :-

१) अभ्यासक्रमाचे नियमित अद्ययावतीकरण.

२) इंटर्नशिप अनिवार्य आहे.

३) उद्योगपतींचे सहकार्य.

४) कौशल्य-आधारित शिक्षणाला प्रोत्साहन देणे.

५) डिजिटल शिक्षण वाढवणे.

• सुधारित निष्कर्ष :-

१) कौशल्य-आधारित शिक्षणामुळे विद्यार्थ्यांचा आत्मविश्वास आणि कार्यक्षमता वाढते.

२) औद्योगिक प्रशिक्षणामुळे विद्यार्थ्यांना प्रत्यक्ष कामाचा अनुभव मिळतो.

३) रोजगारकेंद्रित शिक्षणामुळे विद्यार्थ्यांची रोजगार मिळवण्याची क्षमता वाढते.

• निष्कर्ष :- आजच्या काळात रोजगार-केंद्रित उच्च शिक्षण आणि महत्त्वपूर्ण कौशल्य विकासाची गरज आहे. शैक्षणिक संस्था विद्यार्थ्यांना केवळ सैद्धांतिक ज्ञानच देत नाहीत, तर त्यांना व्यावहारिक कौशल्ये विकसित करण्याची संधीही देतात. यामुळे विद्यार्थ्यांची रोजगारक्षमता वाढते.

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- 4) Various Educational Research Generals and Articles.

Machine Learning Paradigms: A Structured Review of Methods and Trends

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Abstract

Machine Learning (ML) has emerged as a central paradigm in modern artificial intelligence and computational sciences. Unlike traditional rule-based approaches, machine learning enables adaptive behavior by learning patterns from data. This paper presents a comprehensive analytical review of major machine learning paradigms, including supervised, unsupervised, semi-supervised, reinforcement, and deep learning. Emphasis is placed on theoretical foundations, computational characteristics, scalability, and their role in next-generation intelligent systems. The paper is all about the review, methods with theoretical based and does not rely on datasets, simulations, or experimental results.

Keywords-Artificial Intelligence, Computational Sciences, Data Analytics, Learning Paradigms, Machine Learning,

I. INTRODUCTION

Machine learning has emerged as a foundational discipline within computer science, artificial intelligence, and computational sciences by enabling systems to learn from data and improve performance without explicit programming. Early research in pattern recognition, cybernetics, and statistical learning established the conceptual basis for modern learning algorithms, demonstrating that adaptive computational behavior could be achieved through data-driven methods rather than rigid rule-based logic. Mitchell [1] defines machine learning as the process by which a system enhances its performance on a given task through experience. This definition underscores learning as an iterative optimization process in which models adjust internal parameters to capture underlying data patterns. Unlike traditional algorithms, machine learning approaches are capable of managing uncertainty, noise, and complex data distributions, making them suitable for real-world applications.

The rapid growth of digital data, coupled with advancements in computational infrastructure such as parallel processing and cloud computing, has significantly accelerated the adoption of machine learning techniques. These developments have enabled the deployment of sophisticated learning models at scale. Moreover, machine learning draws heavily from mathematical sciences, incorporating concepts from linear algebra, probability theory, optimization, and information theory. This strong theoretical foundation ensures scalability, generalization, and computational efficiency. Understanding these paradigms is therefore essential for developing next-generation intelligent and adaptive computing systems.

II. MATHEMATICAL AND COMPUTATIONAL FOUNDATIONS

Machine learning is fundamentally grounded in mathematical constructs such as linear algebra, probability theory, statistics, and optimization techniques. Linear algebra supports data representation and model formulation, while probability and statistics enable uncertainty modelling and inference. Vapnik's statistical learning theory [9] introduces concepts of generalization bounds and structural risk minimization, ensuring robust model performance. Optimization methods, particularly gradient-based algorithms, facilitate efficient parameter estimation, making large-scale and high-dimensional learning computationally feasible.

III. SUPERVISED LEARNING PARADIGM

Supervised learning algorithms operate on labelled datasets to learn functional mappings between inputs and corresponding outputs. By minimizing prediction error, these algorithms infer relationships that can generalize to unseen data. Common techniques include decision trees, support vector machines, linear

and logistic regression and ensemble methods. Bishop^[4] emphasizes the bias–variance trade-off as a key consideration, affecting model generalization. Although supervised learning provides high predictive accuracy, its effectiveness is often limited by the availability and quality of labelled data.

IV. UNSUPERVISED LEARNING PARADIGM

Unsupervised learning deals with datasets that lack labelled outputs, aiming to identify intrinsic patterns, structures, or relationships within the data. Key tasks include clustering, association rule mining, anomaly detection, and dimensionality reduction, which help summarize and interpret complex datasets. Hastie et al.^[14] emphasize its critical role in exploratory data analysis and representation learning. By uncovering hidden structures and reducing data complexity, this paradigm improves computational efficiency and supports subsequent supervised or semi-supervised learning tasks.

V. SEMI-SUPERVISED AND SELF-SUPERVISED LEARNING

Semi-supervised learning combines a small amount of labelled data with a large volume of unlabeled data to enhance model generalization and learning efficiency. Self-supervised learning further minimizes reliance on manual annotation by automatically generating supervisory signals from inherent data structures. These paradigms are particularly valuable in real-world scenarios where labelling is costly or time-consuming. By leveraging both labelled and unlabeled data, they improve scalability, robustness, and applicability across diverse computational systems^[12].

VI. REINFORCEMENT LEARNING PARADIGM

Reinforcement learning models the learning process as an interaction between an agent and its environment, where the agent selects actions to maximize cumulative rewards over time. Learning occurs through trial-and-error, guided by feedback from the environment. Sutton and Barto^[11] formalize this paradigm using Markov decision processes, providing a rigorous mathematical framework. Reinforcement learning is particularly significant for robotics, autonomous systems, and sequential decision-making tasks, enabling adaptive and intelligent behavior in dynamic environments.

VII. DEEP LEARNING AND REPRESENTATION LEARNING

Deep learning is a subset of machine learning that utilizes multi-layer artificial neural networks to learn hierarchical representations directly from data. By stacking multiple non-linear transformation layers, deep learning models are capable of automatically extracting increasingly abstract and high-level features, reducing the need for manual feature engineering. This hierarchical learning enables the handling of complex, high-dimensional, and unstructured data such as images, videos, audio signals, and natural language text. Goodfellow et al.^[2] and LeCun et al.^[6] have demonstrated that deep neural networks outperform traditional machine learning methods in many pattern recognition and prediction tasks, establishing deep learning as a cornerstone of modern artificial intelligence. Common deep learning architectures include **Convolutional Neural Networks (CNNs)** for spatial data, **Recurrent Neural Networks (RNNs)** and **Long Short-Term Memory (LSTM)** networks for sequential data, and **Transformer models** for attention-based learning. Despite high computational demands, advances in **GPU acceleration and parallel computing** enable efficient training on large datasets. Deep learning achieves state-of-the-art results in **computer vision, natural language processing, speech recognition, and autonomous systems**, making it a key component of modern AI.

VIII. COMPUTATIONAL SIGNIFICANCE AND SYSTEM INTEGRATION

Machine learning paradigms collectively enhance adaptability, automation, and intelligent decision-making across a wide range of computational systems. By leveraging data-driven learning, these paradigms enable systems to adjust to dynamic environments, optimize performance, and make informed decisions with minimal human intervention. Probabilistic reasoning frameworks^[5] provide a structured approach to handle uncertainty, allowing models to make robust predictions even when faced with incomplete or noisy data. Furthermore, integration with cloud computing infrastructures and Internet of Things (IoT) platforms extends scalability, facilitates distributed learning, and enables real-time analytics, broadening the applicability of machine learning in modern intelligent systems.

IX. CHALLENGES, ETHICAL CONSIDERATIONS, AND FUTURE DIRECTIONS

Despite the transformative impact of machine learning on computational systems, several key challenges remain. One major concern is model interpretability, as many advanced algorithms, particularly deep learning networks, function as “black boxes,” making it difficult to understand how decisions are reached. This lack of transparency can hinder trust and accountability, especially in high-stakes domains such as healthcare, finance, and autonomous systems. Data bias is another critical issue, as machine learning models often inherit biases present in the training data, potentially leading to unfair or discriminatory outcomes. Computational cost is also significant, particularly for large-scale deep learning models, which require substantial processing power, memory, and energy consumption. Additionally, ethical considerations including privacy, data security, and responsible AI deployment—pose challenges that must be addressed to ensure societal trust and adherence to regulatory standards.

Emerging research focuses on Explainable AI (XAI) to enhance model transparency and interpretability, allowing users to understand and verify predictions. Energy-efficient learning models are being developed to reduce computational overhead while maintaining performance. Future research is expected to emphasize hybrid approaches, integrating symbolic reasoning with data-driven learning, thereby improving generalization, reasoning capabilities, and ethical alignment. Addressing these challenges is essential for the responsible and sustainable advancement of next-generation intelligent systems^[16].

X. CONCLUSION

This paper presented a detailed analytical review of machine learning paradigms and their computational significance. By examining theoretical foundations and paradigm-specific characteristics, the study highlights the importance of machine learning in shaping next-generation innovations in artificial intelligence and computational sciences.

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महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार हमी योजनेचे अमरावती विभागाच्या
ग्रामीण विकासातील योगदान

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गोषवारा-

अमरावती विभागात MG-NREGA योजनेअंतर्गत अनेक कामे सुरु आहेत. कामाच्या माध्यमातून अमरावती विभागातील ग्रामीण लोकांसाठी शिक्षण, आरोग्य, महिला सबलीकरण, शेतकरी/ शेतमजुरांच्या उत्पन्नात वाढ, विविध प्रशिक्षण या मध्ये प्रगती होत आहे. MG-NREGA योजनेअंतर्गत लोकांसमोर असणा-या समस्या दूर करण्यासाठी कोण कोणती कामे हाती घेण्यात येतात. MG-NREGA अंतर्गत कामे करण्याची पद्धत कशी आहे. अमरावती विभागातील या योजनेअंतर्गत जॉबकार्ड मजुरांची उत्पन्न क्षमता वाढविण्यासाठी कोणकोणत्या उपाययोजना केल्या जातात. स्थानिक लोकांना रोजगार प्राप्त व्हावा यासाठी कोणते प्रशिक्षण दिले जाते. MG-NREGA योजनेअंतर्गत घेण्यात येणा-या कामामुळे अमरावती ग्रामीण भागातील लोकांचे जिवनमान उंचवण्यास कोणता परिणाम झाला आहे. अमरावती ग्रामीण भागाच्या विकासात MG-NREGA चे काय योगदान आहे. लोकांच्या समोर असणा-या समस्या सोडविण्यासाठी MG-NREGA प्रभावी ठरत आहे काय. व त्याचा परिणाम अमरावती ग्रामीण विभागावर काय झाला ह्या बाबी अभ्यासण्यासाठी अमरावती ग्रामीण भागातील MG-NREGA चे योगदान हा विषय निवडला आहे.

“महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार हमी योजनेचे अमरावती विभागाच्या ग्रामीण विकासातील योगदान” (२०१० ते २०२०) या शोध प्रबंधात श्री नितीन एम ढगे संशोधक विद्यार्थी जगदंब महाविद्यालय अचलपूर शहर, संत गाडगे बाबा अमरावती विद्यापीठ अमरावती यांनी अमरावती विभागातील अमरावती, अकोला, बुलढाणा, वाशिम, यवतमाळ या पाच जिल्हातील महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार हमी योजनेचे स्वरूप व कार्यपद्धती, जॉब कार्ड धारक मजूर, स्त्री शेतमजुरांची आर्थिक स्थिती, रोजगार हमी योजनेत स्त्री श्रमिकांना उपलब्ध रोजगार व सोयी, मनुष्य दिन निर्मिती, प्रस्तुत प्रकरणात महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार हमी योजनेअंतर्गत व्यय - प्राप्ती म्हणजे अकुशल कुशल खर्च कशा प्रकारे केला जातो शासन स्तरावर त्यांची प्रक्रीया कशी पार पाडल्या जाते व त्या माध्यमातून प्राप्ती म्हणजे मत्ता निर्मिती कशी होते यांचा अभ्यास करणार आहोत.

रोजगार हमी योजनेतील निधी खर्च व त्याचे रोजगारावरील परिणाम, स्त्री सबलीकरण व शासन स्तरावरील योजना, या अनेक घटकांचा सखोल अभ्यास केलेला आहे, सदर संशोधन समाजचिंतक, अभ्यासक, धोरणकर्ते यांच्यासाठी निश्चितच उपयुक्त ठरेल.

प्रस्तावना -

देशाच्या ग्रामीण विकासात महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार हमी योजना अत्यंत महत्वाची भूमिका बजावत आहे. या योजनेमुळे ग्रामीण भागात अकुशल मजुरांना रोजगाराची संधी उपलब्ध होत आहे. तसेच अनेक मत्तांची निर्मिती सुध्दा होत आहे. आज संपूर्ण राज्यात मनरेगाच्या माध्यमातून ग्रामीण भागातील अकुशल मजुरांना काम मिळत आहे. तसेच अनेक सार्वजनिक आणि वैयक्तिक स्वरूपाच्या कामातून ग्रामीण विकास साधला जात आहे. कुटुंबांना रोजगार उपलब्ध करून मनुष्यदिन रोजगार निर्मिती होत आहे. त्यामधून ग्रामीण विकासाची कामे पूर्ण

करण्यात येत आहेत मोठ्या प्रमाणात कामे प्रगतीपथावर आहेत. अशा रितीने आज ही योजना ग्रामीण विकासात महत्वाची भूमिका बजावत आहे.

देशात ग्रामीण मजुरांना अकुशल रोजगाराची हमी 1977 पासून अधिनियमान्वये देणारे महाराष्ट्र एकमेव राज्य आहे. महाराष्ट्र राज्यामध्ये गेल्या चार दशकापासून रोजगार हमी योजना राबविण्यात येत आहे. रोजगार हमी योजनेची मूळ संकल्पना महाराष्ट्राचे तात्काळीन विधानपरिषद सभापती वि.स. पागे यांनी मांडली; त्यांनी दुष्काळी ग्रामीण भागातील अकुशल मजुरांना रोजगार उपलब्ध करून देणारी एक योजना सांगली जिल्ह्यातील विसापूर या गावात सुरु केली; या योजनेचा व्याप दिवसेंदिवस वाढत गेला. पुढे 1977 मध्ये या योजनेचे रुपांतर रोजगार हमी अधिनियमात झाले. महाराष्ट्रातील रोजगार हमी अधिनियम (1977) नुसार (1) ग्रामीण भागातील अकुशल व्यक्तींकरिता रोजगार हमी योजना आणि (2) महाराष्ट्र रोजगार हमी अधिनियम (1977), या दोन योजना सुरु करण्यात आल्या होत्या कलम 12 (इ) नुसार वैयक्तिक लाभाच्या या दोन्ही योजनांना राज्यशासनाच्या निधीमधून अर्थसहाय्य केले जात होते.

महाराष्ट्रातील ग्रामीण भागामध्ये रोजगारनिर्मिती व ग्रामीण विकासाची कामे करण्यासाठी ही योजना फारच यशस्वी ठरली. या योजनेची यशस्विता पाहून केंद्र शासनाने सन 2005 मध्ये संपूर्ण देशात रोजगार हमी अधिनियम' लागू केला. दिनांक 2 फेब्रुवारी 2006 पासून देशाच्या 200 जिल्ह्यात याची अंमलबजावणी सुरु झाली. त्यामध्ये महाराष्ट्रातील 12 जिल्ह्यांचाही समावेश होता. सध्या हा अधिनियम महात्मा गांधी रोजगार हमी अधिनियम (मनरेगा)' MGNREGA Mahatma Gandhi National Rural Employment Gurantee Act या नावाने ओळखला जातो. मनरेगा अधिनियमातील कलम 28 नुसार ज्या राज्यात पूर्वीपासून रोजगार हमी अधिनियम मंजूर आहे त्यांना त्यांचा अधिनियम राबविण्याची मुभा दिली गेली. त्यानुसार महाराष्ट्र राज्याने पूर्वीचाच अधिनियम सुरु ठेवण्याचा पर्याय स्वीकारला. महाराष्ट्र राज्याने दोन्ही अधिनियमातील चांगल्या आणि आवश्यक बाबी एकत्र करून महाराष्ट्र ग्रामीण रोजगार हमी योजना (मग्रारोह्यो) 2005' या नावाने एक नवीन योजना सुरु केली. याबाबतची माहिती शासन निर्णय क्रमांक रोहयो-2005/प्र.क्र.104/रोहयो-10, दिनांक 23 डिसेंबर, 2005 मध्ये दिलेली आहे. या योजनेअंतर्गत केंद्रीय योजनेत अनुज्ञेय नसलेल्या वैयक्तिक लाभाच्या योजनेवरील खर्च राज्य रोजगार हमी योजनेतून करावा लागणार आहे.

महाराष्ट्रात मग्रारोह्यो (2005) तीन टप्प्यात राबविण्यात आली. पहिल्या टप्प्यात 12 जिल्ह्यांची निवड करण्यात येऊन 2 फेब्रुवारी 2006 रोजी ही योजना सुरु झाली. यामध्ये (1) धुळे, (2) नंदुरबार, (3) अहमदनगर, (4)औरंगाबाद, (5) नांदेड, (6) हिंगोली, (7) अमरावती, (8) यवतमाळ, (9) भंडारा, (10) गोंदिया, (11) चंद्रपुर, (12) गडचिरोली या अकुशल काम मागणी जास्त असलेल्या जिल्ह्यांचा समावेश होता. दुसऱ्या टप्प्यात 2 एप्रिल 2007 पासून (1) ठाणे, (2) उस्मानाबाद, (3) बुलढाणा, (4) वाशिम, (5) अकोला, (6) वर्धा या सहा जिल्ह्यांचा समावेश करण्यात आला. उर्वरीत जिल्हे व 'क' वर्ग नगरपरिषदा यांचा समावेश करून ही योजना दिनांक 1 एप्रिल 2008 पासून संपूर्ण राज्यात लागू करण्यात आली आहे.

वैशिष्ट्ये

वर्ष 1977 मध्ये महाराष्ट्र सरकार द्वारे अकुशल कामाची मागणी करणाऱ्या प्रत्येक कुटुंबाला रोजगाराच्या संधी उपलब्ध करण्याच्या उद्देशाने रोजगार अधिनियम लागू करण्यात आला.

1. या योजनेच्या माध्यमातून एका वर्षात अकुशल कामाची मागणी करणाऱ्या प्रत्येक कुटुंबाला कमीत कमी 100 दिवसांचा रोजगार प्रदान केला जातो.
2. असे सर्व नागरिक जे शारीरिकदृष्ट्या श्रम करण्यास सक्षम आहेत, त्यांना या योजनेचा लाभ दिला जातो.

3. या योजनेच्या माध्यमातून ग्रामीण क्षेत्रातील बेरोजगार नागरिकांना रोजगार प्रदान केला जातो.
 4. महाराष्ट्र रोजगार हमी योजनेच्या अंतर्गत केंद्र सरकार द्वारे मंजुरी दर निश्चित करण्यात केला जातो. केंद्र सरकार द्वारे वर्ष 2008 मध्ये ही योजना संपूर्ण देशात लागू करण्यात आली.
 5. देशभरात या योजनेला महात्मा गांधी रोजगार गारंटी अधिनियम या नावाने ओळखले जाते.
- महाराष्ट्र रोजगार हमी अधिनियमात राज्याच्या रोह्योमध्ये अंतर्भूत नसलेल्या काही नवीन बाबींचा समावेश करण्यात आलेला आहे. उदा.
- 1 सर्व इच्छुक कुटुंबांना रोजगार पत्रिका फोटोसहित लॅमिनेटेड (जॉब कार्ड) ओळखपत्रे देणे.
 - 2 कामाची निवड, नियोजन व अंमलबजावणी यामध्ये ग्रामपंचायतीचा संपूर्ण सहभाग असणे.
 - 3 एकुलन नियोजनाच्या किमान 50% कामे ग्रामपंचायतीमार्फत राबविणे.
 - 4 संपूर्ण पारदर्शकता.
 - 5 सामाजिक अंकेक्षण करणे.

मनरेगा योजना म्हणजे काय ? MGNREGA चे पूर्ण रूप आहे - महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार हमी कायदा. MGNREGA ही भारत सरकारद्वारे लागू केलेली रोजगार हमी योजना आहे, जी 7 सप्टेंबर 2005 रोजी विधानसभेत मंजूर झाली. त्यानंतर 2 फेब्रुवारी 2006 रोजी 200 जिल्ह्यांमध्ये याची सुरुवात झाली. सुरुवातीला याला राष्ट्रीय ग्रामीण रोजगार हमी कायदा (NREGA) असे म्हटले जात होते 2 ऑक्टोबर 2009 रोजी महात्मा गांधी यांचे जयंतीचे औचित्य साधून त्याचे नामकरण महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार हमी कायदा असे करण्यात आले.

आज आपण पाहिलं तर, ग्रामीण भारतात गरीब लोकांचा हवा तसा आर्थिक विकास झालेला नाही. त्यांच्या हातांना काम नसल्याने परिणामी रोजगाराच्या शोधात त्यांच्या नशिबी कायम भटकंतीच आली आहे. खेडी ओस पडून त्यांचा भार शहरी भागावर पडला. मात्र, शहरातही रोजगारांचा प्रश्न कायमच आहे. ग्रामीण भागाचा विकास घडवून आणण्याकरीता ग्रामीण भागातील लोकांचा आर्थिक विकास होणे गरजेचे आहे. त्यासाठी त्यांच्याकडे रोजगार असायला हवा. तरच त्यांच्या जीवनात आमूलाग्र बदल होऊ शकेल. या दृष्टीकोनातून भारत सरकारने प्रत्येकाच्या हाताला रोजगार देण्यासाठी एक महत्वाकांक्षी निर्णय घेतला. मनरेगा ही जगातील एकमेव योजना आहे जी 100 दिवसांच्या रोजगाराची हमी देते. या योजनेसाठी केंद्र सरकारने 2010-11 या आर्थिक वर्षात 40,100 कोटी रुपयांची तरतूद केली होती. देशातील गरीब व बेरोजगार कुटुंबे आपल्या उदरनिर्वाहासाठी या योजनेचा लाभ घेत आहेत. अशा कमकुवत उत्पन्न गटातील लोकांना त्यांच्याच ग्रामपंचायतीत रोजगार दिला जातो, त्यामुळे स्थलांतराचा प्रश्नही बऱ्याच अंशी टळला आहे.

ग्रामीण भागातील गरिबांच्या हातात पैसा पोचण्यासाठी आपली मनरेगा - रोजगार हमी योजना अत्यंत उपयुक्त आहे. रोजगार हमी, नरेगाच्या कामावर आपण पाहतो की छोटे, सिमांत शेतकरी ज्यांच्याकडे शेत जमिन कमी आहे आणि ते कारडवाहु शेती करतात हे मजुर म्हणून काम करायला येतात. या शेतकरी कुटुंबांच्या शेतीला पाण्याची उपलब्धता, शेतीची सुधारणा (सपाटीकरण, बांधवांदिस्ती वगैरे) मनरेगाच्या कामातून मिळू शकते; फळबाग, जनावरांसाठी गोठा, गांडुळ खत निर्मिती अशा उपक्रमातून कमाईची साधने मिळू शकतात. एका बाजूला नरेगाच्या कामातून मजुरीचे उत्पन्न आणि त्याबरोबर कोरडवाहु शेतीची सुधारणा होउन उपजीविकेची संसाधने वाढू शकतात. नरेगाच्या निधीचा विनियोग जास्तीत जास्त नैसर्गिक संसाधन व्यवस्थापन आणि कृषी निगडीत कामांमध्ये करून, त्याची गुणवत्तापूर्ण अंमलबजावणी करून समृद्धीचा मार्ग पत्करावा जेणेकरून आपला अमरावती विभाग, महाराष्ट्र आणि पर्यायाने भारत देश श्रीमंत देशांच्या फळीत जाऊन उभा राहील.

संशोधनाकरीता वापरलेली संशोधन पद्धती-

प्रस्तुत संशोधनामध्ये संशोधकाने दैवतमुना निवड पद्धतीचा उपयोग केला आहे. हे संशोधन प्राथमिक व दुय्यम समंकावर आधारित आहे. प्राथमिक समंक प्राप्त करण्यासाठी अमरावती विभागातील अकोला अमरावती बुलढाणा वाशिम यवतमाळ या 5 जिल्ह्यांमधील प्रति जिल्हा 10 ग्राम पंचायती मधुन लाभार्थी निवड अध्यनासाठी केली आहे. त्याच प्रमाणे विद्वतीय समंकासाठी भारत सरकारचे विविध अहवाल, महाराष्ट्रा शासन, जिल्हा अहवाल, संशोधन ग्रंथ, वर्तमान पत्रे, मासिके व अप्रकाशित माहितीचा वापर केला आहे. संग्रहीत सामुग्रीचे सारणीयन व वर्गीकरण केले आहे. सांख्यिकीय तंत्राचा वापर करुन निष्कर्ष काढले आहेत. व त्याअनुषंगाने शिफारशी सुचविल्या आहेत.

उद्दिष्टे -

- 1.अमरावती ग्रामीण भागातील विविध समस्यांचे अध्ययन करणे.
- 2.अमरावती ग्रामीण भागातील MG-NREGA च्या कामाचा आढावा घेणे.
- 3.अमरावती ग्रामीण भागातील MG-NREGA सुरु कामाचे अध्ययन करणे.
- 4.अमरावती ग्रामीण भागातील MG-NREGA च्या आर्थिक व सामाजिक कार्यांचे अध्ययन करणे.
- 5.MG-NREGA च्या कार्यामुळे अमरावती ग्रामीण विभागातील जॉबकार्ड धारक मजुर, शेतमजुर विविध योजनेचे लाभार्थी यांच्या जीवनमानात व राहणीमानात घडुन आलेल्या बदलांचा अभ्यास करणे.
6. सरकारी योजनेची माहिती व फायदे ग्रामीण जनतेपर्यंत पोहचविण्यांत MG-NREGA किती प्रमाणात यशस्वी झाली आहे हे अभ्यासणे.

गृहिते-

1. अमरावती ग्रामीण भागांमध्ये MG-NREGA च्या कामाची अंमलबजावणी प्रभावीपणे होत आहे.
2. अमरावती ग्रामीण भागांमध्ये MG-NREGA च्या कामामुळे आर्थिक व सामाजिक विकासामध्ये भर पडत आहे
3. MG-NREGA च्या कामांना अमरावती ग्रामीण विभागातील जॉबकार्ड धारक मजुर, शेतमजुर विविध योजनेचे लाभार्थी सकारात्मक प्रतिसाद देत आहेत.
4. जॉबकार्ड धारक मजुर, शेतमजुराच्या उत्पन्नात वाढ करण्यासाठी MG-NREGA विविध उपक्रम राबवित आहे.
5. MG-NREGA अंतर्गत ग्रामीण भागातील लोकांच्या विकासासाठी आखण्यात येणा-या योजनांमध्ये आर्थिक बाबीची कमतरता आहे.

व्याप्ती - अमरावती विभाग अमरावती अकोला बुलढाणा वाशिम आणि यवतमाळ

मर्यादा/ कालखंड -2010-2011 ते 2019-2020 ची आकडेवारी

अमरावती विभाग म्हणजे अमरावती अकोला बुलढाणा वाशिम आणि यवतमाळ या पाच जिल्ह्यांनी मिळून तयार झालेला विभाग आहे. ज्याला व-हाड किंवा पश्चिम विदर्भ असे सुद्धा म्हटले जाते प्रस्तुत प्रकरणात संशोधनासाठी अध्ययनक्षेत्र म्हणून निवडलेल्या महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार हमी योजनेचे अमरावती विभागाच्या ग्रामीण विकासातील योगदानाचे अध्ययन केले आहे

महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार हमी योजने अंतर्गत अमरावती ग्रामीण विभागात सुरु व सुरु होऊन

पूर्ण झालेल्या कामाचे व्यय - प्राप्ती विश्लेषण

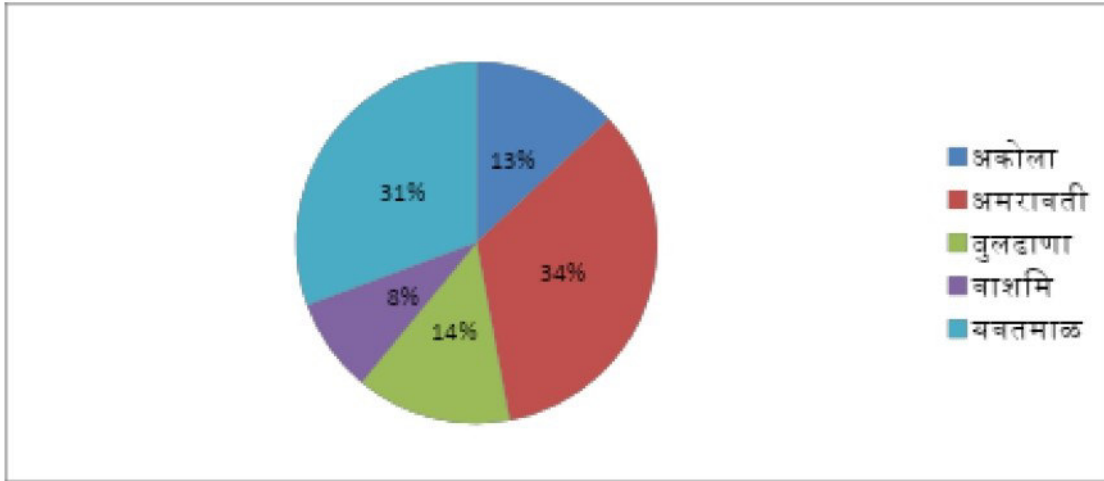
महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार हमी योजनेंतर्गत अकुशल काम करण्यास इच्छूक असणा-या प्रत्येक कुटूंबातील पौढ व्यक्तीला योजनेंतर्गत 100 दिवस प्रति कुटूंब रोजगाराची हमी देण्यात आली असून, त्या माध्यमातून स्थायी स्वरूपाची मालमत्ता निर्माण करणे हे या योजनेचे मूळ उद्दीष्ट आहे. त्याचप्रमाणे ग्रामीण भागातील शेतकरी /

शेतमजुरांना या योजनेच्या माध्यमातून रोजगाराचा हक्क प्रदान करणे, सामाजिक सुरक्षा देणे, महिला व दुर्बल घटकांचे सबलीकरण करणे, तसेच पंचायत राज संस्थांचे बळकटीकरण करण्यावर भर देण्यात आलेला आहे.

शासन या योजनेच्या माध्यमातून जो खर्च / व्यय करतो तो ग्रामीण भागातील शेतकरी शेतमजूर योजनेचे लाभार्थी व पर्यायाने संपूर्ण गांव ग्राम पंचायतीच्या विकासाकरीता करित असतो. हा झालेला खर्चाच्या माध्यमातून ग्रामीण भागातील शेतकरी शेतमजूर योजनेचे लाभार्थी व पर्यायाने संपूर्ण गांव ग्राम पंचायतीच्या उत्पनात /प्राप्तीत वाढ होते त्यामुळे गांवाचा विकासाला चालना मिळते प्रस्तुत प्रकरणात महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार हमी योजनेअंतर्गत व्यय - प्राप्ती म्हणजे अकुशल कुशल खर्च कशा प्रकारे केला जातो शासन स्तरावर त्यांची प्रक्रीया कशी पार पाडल्या जाते व त्या माध्यमातून प्राप्ती म्हणजे मत्ता निर्मिती कशी होते यांचा अभ्यास करणार आहोत.

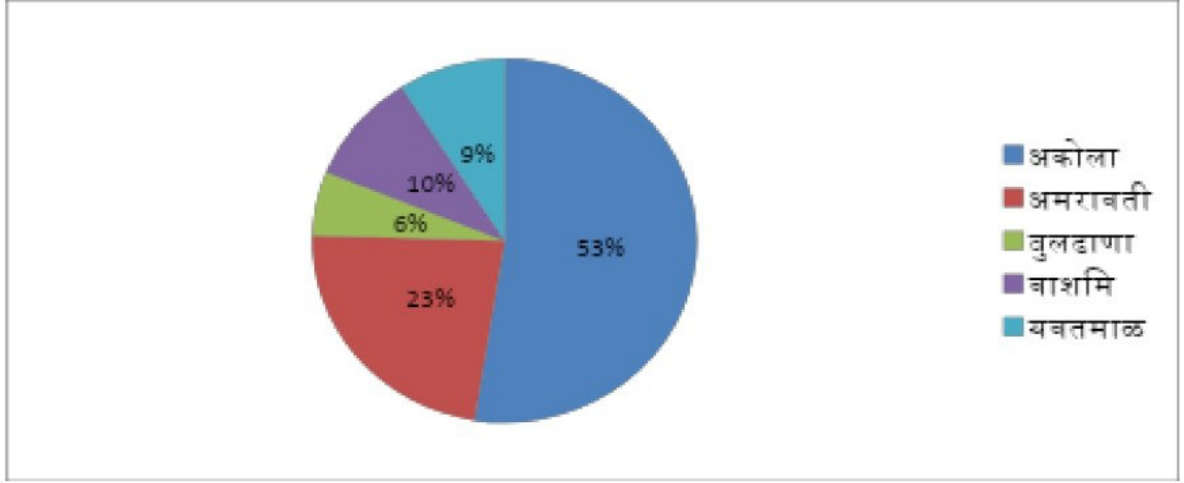
आलेख क्रमांक 6.11

अमरावती विभागातील पूर्ण कामाची संख्या (2010-2011 ते 2019-2020)



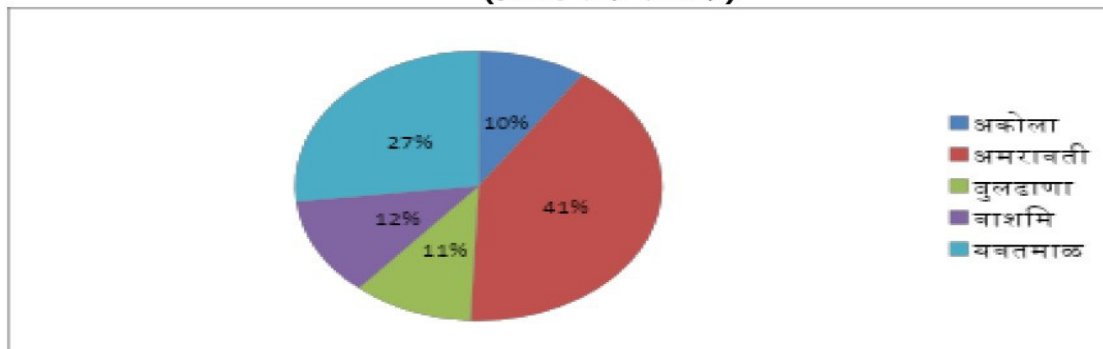
सारणी व आलेख क्रमांक 6.11 मध्ये अमरावती विभागात पूर्ण झालेल्या कामाची आकडेवारी दिलेली आहे. त्या मध्ये 2010-2011 ते 2019-2020 या वर्षामधील आकडेवारी नमुद केलेली आहे. या कालावधीत अमरावती विभागात एकूण 413453 कामे सुरु होऊन पूर्ण झाली आहेत. त्यापैकी अमरावती विभागातील अकोला 53995, (13.06%), अमरावती 140613 (34.01%), बुलढाणा 57649 (13.94%) वाशिम 34554 (8.36%), यवतमाळ 126642 (30.63%) या पाच जिल्हात कामे सुरु होऊन पूर्ण झाली आहेत. अमरावती विभागातील अमरावती जिल्हात सर्वात जास्त कामे सुरु होऊन पूर्ण झाली आहेत याचाच अर्थ अमरावती विभागातील अमरावती जिल्हात सर्वा जास्त कामे सुरु करून पूर्ण करण्यात आली व त्यावर खर्च /व्यय करून मत्ता निर्मिती /प्राप्ती झाली आहे. तर सर्वात कमी कामे वाशिम जिल्हात झाली आहेत 2010-2011 ते 2019-2020 या कालखंडामध्ये टक्केवारीचे प्रमाण कमी जास्त असले तरी दरवर्षी पूर्ण करण्यात आलेल्या कामाच्या संख्येमध्ये वाढ होतांना दिसून येते.

आलेख क्रमांक 6.12.
अमरावती विभागातील अपूर्ण / सुरु कामाची संख्या
(2010-2011 ते 2019-2020)



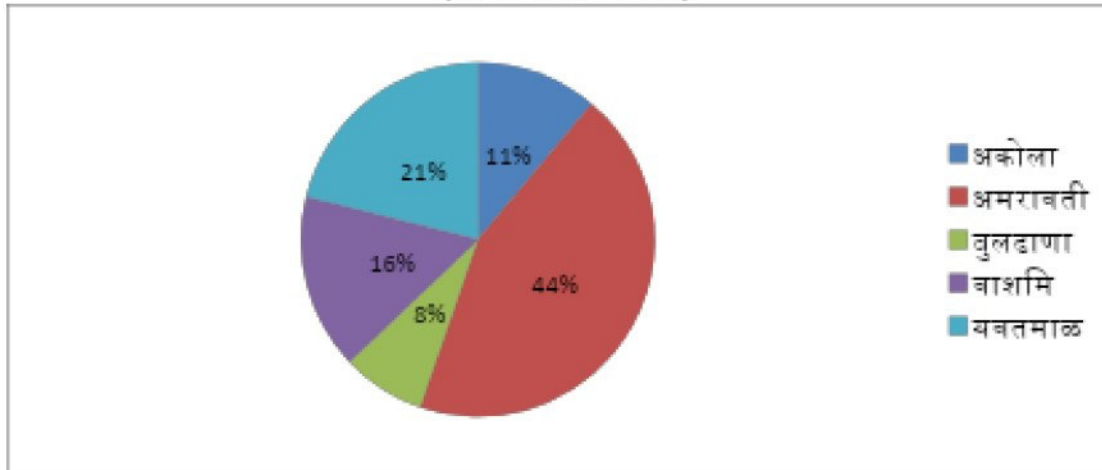
सारणी व आलेख क्रमांक 6.12 मध्ये अमरावती विभागात अपूर्ण / सुरु असलेल्या कामाची आकडेवारी दिलेली आहे. त्या मध्ये 2010-2011 ते 2019-2020 या वर्षामधील आकडेवारी नमुद केलेली आहे. या कालावधीत अमरावती विभागात एकूण 4124 कामे अदयापही अपूर्ण / सुरु आहेत. त्यापैकी अमरावती विभागातील अकोला 2166, (52.52%), अमरावती 945 (22.91%), बुलढाणा 234 (5.67%) वाशिम 407 (9.87%), यवतमाळ 372 (9.02%) या पाच जिल्हात कामे अदयापही अपूर्ण / सुरु आहेत. अमरावती विभागातील अकोला जिल्हात सर्वात जास्त कामे अपूर्ण / सुरु आहेत याचाच अर्थ अमरावती विभागातील पाच जिल्हाचे तुलनात्मक अध्ययन केले असता अकोला जिल्हात कामे सुरु करून त्या प्रमाणात पूर्ण करण्यात आली नाहीत व त्यावर खर्च / व्यय करून मत्ता निर्मिती / प्राप्ती झाली नाही. तर सर्वात कमी अपूर्ण / सुरु कामे कामे बुलढाणा जिल्हात आहेत याचाच अर्थ अमरावती विभागातील बुलढाणा जिल्हात ज्या प्रमाणात कामे सुरु करण्यात आली त्या प्रमाणात पूर्ण झाली आहेत. व त्यावर खर्च / व्यय करून मत्ता निर्मिती / प्राप्ती झाली आहे. 2010-2011 ते 2019-2020 या कालखंडामध्ये टक्केवारीचे प्रमाण कमी जास्त असले तरी दरवर्षी अपूर्ण / सुरु कामाच्या संख्येमध्ये वाढ होतांना दिसून येते. परंतु ज्या प्रमाणात कामे सुरु झाली आहेत त्या प्रमाणात अपूर्ण / सुरु कामे पूर्ण होतांना दिसून येतात.

आलेख क्रमांक 6.13
अमरावती विभागातील पूर्ण झालेल्या कामावरील खर्च
(2010-2011 ते 2019-2020)
(आकडे लक्ष रुपयात)



सारणी व आलेख क्रमांक 6.13 मध्ये अमरावती विभागात सुरु होऊन पूर्ण झालेल्या कामावरील खर्चाची आकडेवारी दिलेली आहे. सर्व (आकडे लक्ष रुपयात) आहेत. त्या मध्ये 2010-2011 ते 2019-2020 या वर्षामधील आकडेवारी नमुद केलेली आहे. या कालावधीत अमरावती विभागात सर्व प्रकारच्या पूर्ण कामावर एकूण खर्च 331867.81 झाला आहे. त्यापैकी अमरावती विभागातील अकोला 31850, (9.60%), अमरावती 136461 (41.12%), बुलढाणा 35141.07 (10.59%) वाशिम 39334.44 (11.85%), यवतमाळ 89081.29 (26.84%) या पाच जिल्हात सर्व प्रकारच्या कामावर खर्च झाला आहे. अमरावती विभागातील अमरावती जिल्हात सुरु होऊन पूर्ण झालेल्या कामावर सर्वात जास्त खर्च झाला आहे. आहेत याचाच अर्थ अमरावती विभागातील अमरावती जिल्हात खर्च /व्यय करून मत्ता निर्मिती /प्राप्ती झाली आहे. तर सर्वात कमी खर्च अकोला जिल्हात झाला आहे. 2010-2011 ते 2019-2020 या कालखंडामध्ये टक्केवारीचे प्रमाण कमी जास्त असले तरी दरवर्षी पूर्ण कामावरील खर्चामध्ये वाढ होतांना दिसून येते.

आलेख क्रमांक 6.14
अमरावती विभागातील अपूर्ण / सुरु कामावरील खर्च
(2010-2011 ते 2019-2020)
(आकडे लक्ष रुपयात)



सारणी व आलेख क्रमांक 6.14 मध्ये अमरावती विभागात सुरु होऊन अपूर्ण असलेल्या कामावरील खर्चाची आकडेवारी दिलेली आहे. सर्व (आकडे लक्ष रुपयात) आहेत. त्या मध्ये 2010-2011 ते 2019-2020 या वर्षामधील आकडेवारी नमुद केलेली आहे. या कालावधीत अमरावती विभागात सर्व प्रकारच्या अपूर्ण /सुरु कामावर एकूण खर्च 3950.86 झाला आहे. त्यापैकी अमरावती विभागातील अकोला 437.98, (11.09%), अमरावती 1746.76 (44.21%), बुलढाणा 301.77 (7.64%) वाशिम 628.98 (15.92%), यवतमाळ 835.37 (21.14%) या पाच जिल्हात सर्व प्रकारच्या अपूर्ण कामावर खर्च झाला आहे. परंतु अद्यापही कामे अपूर्ण असल्याची दिसून येत आहेत 2010-2011 ते 2019-2020 या कालखंडामध्ये टक्केवारीचे प्रमाण कमी जास्त असले तरी दरवर्षी पूर्ण कामावरील खर्चामध्ये वाढ होतांना दिसून येते.

निष्कर्ष-

1. अमरावती ग्रामीण विभागात सन 2010-2011 ते 2019-2020 या कालावधीत मोठ्या प्रमाणात कामे हाती घेऊन खर्च करण्यात आला आहे व त्यामाध्यमातून अमरावती ग्रामीण भागातील शेतकरी, शेतमजूर, योजनेचे लाभार्थी यांच्या उत्पन्नात वाढ होऊन मत्ता निर्मिती झाली आहे. 6.11 ते 6.14 सारणी व आलेखांद्वारे प्राप्त आकडेवारीवरून निष्कर्ष निघतो

2. अमरावती ग्रामीण विभागात सन 2010-2011 ते 2019-2020 या कालावधीत मोठ्या प्रमाणात जॉबकार्ड वाटप करण्यात येऊन राजगार निर्मिती होऊन मनुष्य दिन निर्मिती झाली आहे त्याच बरोबर महिलाना मिळालेल्या रोजगारात व 100 दिवस मिळालेल्या रोजगारात वाढ झाली आहे प्राप्त आकडेवारीवरून निष्कर्ष निघतो

शिफारशी-

1. अमरावती ग्रामीण विभागात सन 2010-2011 ते 2019-2020 या कालावधीत मोठ्या प्रमाणात कामे हाती घेऊन खर्च करण्यात आला आहे व त्यामाध्यमातून अमरावती ग्रामीण भागातील शेतकरी, शेतमजूर, योजनेचे लाभार्थी यांच्या उत्पन्नात वाढ होऊन मत्ता निर्मिती झाली आहे. परंतु त्या त्या आर्थिक वर्षात अपूर्ण कामे पूर्ण न होणे ही मत्ता निर्मितीमधील व विकासातील सर्वात मोठी अडसर आहे याकरीता शासन स्तरावर कार्यपद्धती निश्चीत करण्याची शिफारस करण्यात येत आहे.

2. अमरावती ग्रामीण विभागात सन 2010-2011 ते 2019-2020 या कालावधीत मोठ्या प्रमाणात जॉबकार्ड वाटप करण्यात आले परंतु सदर जॉबकार्डचे व्हेरीफिकेशन करण्यात न आल्यामुळे सक्रिय जॉबकार्ड मजुराची संख्या कमी असल्याचे दिसून येते या करिता पंचायत समिती व तहसिल स्तरावर योजनेच्या प्रभावी अंमलबजावणी करिता नियुक्त कर्मचारी यांचे संख्येमध्ये वाढ करण्याची शिफारस करण्यात येत आहे.

3. एमजीनरेगा अंतर्गत सहाय्यक कार्यक्रम अधिकारी समन्वयक APO, तांत्रिक सहाय्यक TA, क्लर्क कम डाटा एनट्री ऑपरेटर CDEO आणि ग्राम रोजगार सेवक यांची निवड ही स्थायी स्वरूपाची नसते परंतु योजनेची सर्वात जास्त कामे त्यांना अल्प मानधनावर करावे लागतात. त्यामुळे योजनेची प्रभावी अंमलबजावणी होत नाही. त्याकरीता त्यांची जबाबदारी निश्चीत करून त्यांची नियुक्ती ही स्थायी स्वरूपाची असावी आणि त्याचा पगार हा किमान वेतन कायदानुसार असावा जेणेकरून ते पूर्ण कार्यक्षमतेने काम करतील अशी शिफारस करण्यात येत आहे.

4. प्रस्तुत संशोधनावरून असे दिसून येते की, अमरावती विभागातील महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार हमी योजना प्रभावीपणे कार्य करत आहे. परंतु ही योजना अधिक परिणामकारक होण्यासाठी प्रशासकीय स्तरावर अधिक प्रयत्न करण्यात यावे यामध्ये लाभार्थ्यांची निवड, मजुरी दरामध्ये महागाई दरानुसार वाढ तसेच लाभार्थ्यांपर्यंत विविध योजनांची माहिती पुरविणे इत्यादी उपाय करण्यात यावेत.

संदर्भ ग्रंथ-

1. महात्मा गांधी राष्ट्रीय ग्रामिण रोजगार हमी योजना कायदा 2005, वार्षिक मुख्य परीपत्रक 2020-2021, ग्रामिण विकास मंत्रालय भारत सरकार,
2. महात्मा गांधी राष्ट्रीय ग्रामिण रोजगार हमी योजना अधिनियम 2005 अँन्युअल मास्टर सर्कुलर 2019-2020, ग्रामिण विकास मंत्रालय भारत सरकार,
3. रोजगार हमी प्रगतीची हमी, महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार हमी योजना-महाराष्ट्र. जिल्हाधिकारी कार्यालय, सांगली
4. सांसद आदर्श ग्राम योजना (एसएजीवाय) दिशा निर्देश, ग्रामीण विकास मंत्रालय भारत सरकार कृषी भवन न्यू-दिल्ली-110001
5. 2010-2011 ते 2019-2020 दरम्यानचे जिल्हा वार्षिक अहवाल व ऑनलाईन रिपोर्ट
6. सामाजिक संशोधन पद्धती, श्री साईनाथ प्रकाशन, भगवाघर कॉम्प्लेक्स, धरमपेठ नागपुर (जानेवारी 2003) डॉ बोधनकर सुधीर, प्रा.अलोनी विवेक, अँड कुलकर्णी मृणाल