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January – February 2026

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Dr. Indrajeet Ramdas Bhagat
Professor, Faculty of Commerce

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Good Wishes Message

Hon. Shri Prakash Dada Solunke
President, Marathwada Shikshan Prasarak Mandal, Chhatrapati Sambhajinagar

It gives me immense pleasure to express my heartfelt greetings to Rajmata Jijau Mahavidyalaya, Kille Dharur, for organizing the One Day National Conference on 6 February 2026 under the guidance of Marathwada Shikshan Prasarak Mandal, Chhatrapati Sambhajinagar. Academic conferences of this nature play a vital role in nurturing intellectual curiosity, promoting research culture, and strengthening the academic ecosystem of higher education institutions.

In the present era of rapid transformation, the theme "Vision of the Millennium – India 2047: Role of Science, Humanities and Commerce" is both timely and inspiring. The future of India depends not only on technological advancement but also on ethical values, social awareness, and economic innovation. By integrating science, humanities, and commerce, this conference creates a meaningful platform for holistic thinking and national development.

I am delighted to note that the conference has received an overwhelming response with more than 215 research papers submitted from across India. Such enthusiastic participation demonstrates the growing commitment of academicians and researchers toward quality research and knowledge creation. These scholarly contributions will generate academic awareness, encourage innovative approaches, and address contemporary challenges relevant to society and the nation.

The presence of distinguished guests such as the Honorable Vice-Chancellor Dr. Valmik Sarvade of Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar, and keynote speaker Dr. Anurag Shrivastava, Indore, will certainly add intellectual value to the conference proceedings. Their guidance will inspire young researchers and faculty members to pursue excellence in teaching and research.

Such national-level academic forums provide participants with opportunities for professional growth, networking, and collaborative research. They help scholars broaden perspectives, share best practices, and build confidence in presenting innovative ideas at a wider platform.

Marathwada Shikshan Prasarak Mandal has always emphasized academic quality, social responsibility, and research-oriented education. The efforts of the Principal, organizing committee, coordinators, faculty members, and staff of Rajmata Jijau Mahavidyalaya, Kille Dharur, deserve special appreciation for their dedication and teamwork in making this event possible.

I extend my sincere congratulations to all contributors, researchers, and participants for their valuable involvement. I am confident that this conference will be academically fruitful and will contribute meaningfully to the vision of a progressive and developed India.

I wish the One Day National Conference a grand success.

Good Wishes Message

Hon. Satish Bhau Chavan
Secretary, Marathwada Shikshan Prasarak Mandal, Chhatrapati Sambhajinagar

The One Day National Conference organized by Rajmata Jijau Mahavidyalaya, Kille Dharur, under the aegis of Marathwada Shikshan Prasarak Mandal, Chhatrapati Sambhajinagar, scheduled on 6 February 2026, is a significant academic initiative aimed at strengthening research culture and intellectual engagement in higher education. Such national-level platforms encourage scholars and academicians to exchange ideas, promote innovation, and contribute meaningfully to the academic community. I sincerely appreciate the efforts of the organizing committee for undertaking this valuable initiative.

As India progresses towards the vision of a Developed India 2047, the theme "Vision of the Millennium – India 2047: Role of Science, Humanities and Commerce" is highly relevant and forward-looking. The integration of scientific research, human values from humanities, and innovative practices in commerce is essential for holistic national development. This conference provides an appropriate platform for interdisciplinary dialogue and critical reflection, which will help shape future academic and social perspectives.

The conference has received an impressive response from across the country, with more than 215 research papers submitted from different states of India. This enthusiastic participation reflects the national recognition of the conference and the commitment of researchers toward academic excellence. These contributions will enhance academic awareness and stimulate innovation in research by addressing contemporary issues, opportunities, and solutions relevant to nation-building.

The presence and guidance of the Honorable Vice-Chancellor Dr. Valmik Sarvade, Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar, and the keynote speaker Dr. Anurag Shrivastava, Indore, will certainly inspire the participants and enrich the intellectual environment of the conference. Their experiences and insights will motivate young researchers and faculty members to pursue quality research with a broader vision.

Participation in this national conference will provide scholars, teachers, and researchers with opportunities for academic networking, professional development, and the exchange of innovative ideas. Such platforms help in building confidence, strengthening research skills, and creating meaningful academic collaborations at the national level.

Marathwada Shikshan Prasarak Mandal has always been committed to promoting quality education, research, and social responsibility. The initiative taken by Rajmata Jijau Mahavidyalaya, Kille Dharur, reflects this vision and dedication. I congratulate the Principal, organizing committee, faculty members, and staff for their sincere efforts.

I extend my best wishes to all the dignitaries, researchers, faculty members, and participants for the grand success of this One Day National Conference. May this academic gathering contribute significantly to knowledge creation and the vision of a progressive and developed India.

Message from the Principal & Organising Chief

It is a matter of great pride and pleasure for me to welcome all the delegates, academicians, researchers, and participants to the One Day National Conference organized on 6 February 2026 at Rajmata Jijau Mahavidyalaya, Kille Dharur, under the aegis of Marathwada Shikshan Prasarak Mandal, Chhatrapati Sambhajinagar.

In today's knowledge-driven world, academic institutions must move beyond traditional teaching and actively promote research, innovation, and interdisciplinary dialogue. The theme "Vision of the Millennium – India 2047: Role of Science, Humanities and Commerce" reflects the nation's aspiration to build a progressive, inclusive, and globally competitive India. This conference provides a meaningful platform to deliberate on how education, research, and social responsibility can collectively shape the future of our country.

I am pleased to note that this conference has received an overwhelming response with more than 215 research papers from across India. Such enthusiastic participation highlights the strong research culture among scholars and faculty members. These contributions will certainly generate academic awareness, promote innovative thinking, and provide solutions to emerging challenges in education, economy, and society.

The presence of eminent dignitaries like Hon'ble Vice-Chancellor Dr. Valmik Sarvade, Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar, and keynote speaker Dr. Anurag Shrivastava, Indore, will enrich the intellectual environment of this conference. Their insights and experiences will motivate young researchers to pursue excellence in scholarship and professional development.

This national conference is not merely an academic event but a platform for collaboration, networking, and exchange of ideas among researchers from diverse disciplines. It encourages participants to broaden perspectives, strengthen research skills, and contribute meaningfully to national development.

Hon. Shri Prakash Dada Solunke, President, and Hon. Shri Satish Bhau Chavan, Secretary, Marathwada Shikshan Prasarak Mandal, deserve special appreciation for their visionary leadership, continuous encouragement, and strong institutional support that made this national academic initiative possible.

I would also like to place on record my special appreciation for Prof. Dr. Indrajeet Ramdas Bhagat for his visionary initiatives and untiring efforts in conceptualizing, coordinating, and strengthening the academic framework of this conference. His dedicated role in organizing the event and ensuring the quality publication of research papers has significantly contributed to the scholarly value and national visibility of this programme.

I also appreciate the committed efforts of the organizing committee, coordinators, editors, faculty members, non-teaching staff, and student volunteers whose teamwork has made this event possible.

I extend my best wishes to all presenters, participants, and organizers. I am confident that this One Day National Conference will be academically rewarding and will leave a lasting impact on research, innovation, and institutional growth.

With warm regards and best wishes for the grand success of the conference.

Dr. Gopal Kakade
Principal & Organising Chief
Rajmata Jijau Mahavidyalaya, Kille Dharur

Massage from Editor's Desk

It gives me immense pleasure to share my thoughts on the occasion of the One Day National Conference organized by Rajmata Jijau Mahavidyalaya, Kille Dharur, under the aegis of Marathwada Shikshan Prasarak Mandal, Chhatrapati Sambhajinagar. The successful conceptualization of this conference has been possible because of the constant support and encouragement of the Honorable President Shri Prakash Dada Solunke, the respected Secretary Shri Satish Bhau Chavan, the members of the Local Management Committee, the Principal Dr. Gopal Kakade, Vice Principals Dr. Milind Gaikwad and Prof. Dr. Mahadev Jogade, Head of the English Department Dr. Balaji Navale, and all my esteemed colleague faculty members. Their guidance, cooperation, and confidence have played a vital role in shaping this national-level academic initiative.

This conference has received an overwhelming response from across India, with more than 215 research papers and academic contributions submitted by scholars, teachers, and researchers from different states. Such enthusiastic participation itself reflects the academic credibility and national relevance of this conference. These papers will certainly enhance academic awareness and encourage innovation in research by presenting new ideas, contemporary issues, and practical solutions relevant to national development.

As the Editor of the Conference Proceedings, I feel honoured to undertake the responsibility of editing, reviewing, organizing, and publishing all the research papers received for this conference. My sincere effort is to ensure that every contribution is presented in a systematic, high-quality, and academically meaningful form so that the work of researchers reaches a wider scholarly community. Research is not merely documentation; it is a process of knowledge creation that contributes to society, education, and nation-building. With this perspective, the editorial and publication work is being carried out with due care, academic integrity, and professionalism.

I extend my heartfelt congratulations to all the participating professors, researchers, academicians, and contributors who have responded positively to this national conference. Through your scholarly writings, you have strengthened the culture of research and intellectual dialogue. The ideas presented through these papers will be useful in shaping future academic policies, curriculum development, and research directions.

National conferences such as this provide a platform for confidence building, exchange of ideas, interdisciplinary interaction, and professional collaboration. The response received for this one-day national conference is truly encouraging and will inspire the organization of many more meaningful academic activities in the future.

Finally, I once again congratulate all researchers, faculty members, and organizers associated with this conference and convey my best wishes for their continued academic growth and success.

Dr. Indrajeet Ramdas Bhagat
Chief Editor and Conference Director
Professor, Commerce & Management
Rajmata Jijau Mahavidyalaya, Kille Dharur

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Entrepreneurship And Entrepreneurial Development in The Context of Building A New India

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Abstract:

Entrepreneurship in India is a booming force driving socio-economic growth, fostering innovation, and creating jobs, supported by government initiatives like Startup India and MUDRA, despite challenges like capital access and bureaucracy; entrepreneurial development focuses on building skills and confidence for new ventures, with India's startup ecosystem now ranking globally high, particularly in tech, evolving from traditional models to areas like AI, data science, and eco-tourism. Entrepreneurship has emerged as a key driver of economic growth in India, supported by a rapidly evolving ecosystem of Startups and Micro, Small and Medium Enterprises (MSMEs). While startups emphasize innovation, technology adoption, and high-growth scalability, MSMEs focus on stability, employment generation, and sustained contribution to GDP and exports. Government initiatives such as Startup India, MUDRA, PMEGP, and RAMP have played a crucial role in strengthening this ecosystem. India has now become the world's third-largest startup hub, reflecting strong entrepreneurial momentum. However, despite policy support, challenges such as limited awareness, funding gaps, and compliance complexities—especially for MSMEs—continue to persist. This paper attempts to analyze the roles, differences, challenges, and opportunities of startups and MSMEs in India and highlights their combined contribution to inclusive economic development.

Keywords: Entrepreneurship, Startups, MSMEs, Startup India, Economic Development, Innovation, Employment Generation, Government Schemes

Introduction:

Entrepreneurship plays a vital role in fostering economic growth, innovation, and employment generation in developing economies like India. In recent years, India has witnessed a remarkable expansion of its entrepreneurial ecosystem, driven by the rapid growth of Startups and Micro, Small and Medium Enterprises (MSMEs). These two segments, though distinct in nature and operational approach, collectively contribute to industrial development, income generation, export promotion, and inclusive economic progress. Startups in India are primarily characterized by innovation, technology-driven solutions, and high-growth scalability. They focus on disruptive business models, digital platforms, and global competitiveness, positioning India as one of the leading startup hubs in the world. On the other hand, MSMEs emphasize stability, sustainability, and steady growth while serving established markets. They form the backbone of the Indian economy by generating large-scale employment, supporting manufacturing and service sectors, and contributing significantly to GDP and exports. Recognizing the importance of entrepreneurship, the Government of India has introduced several initiatives such as Startup India, MUDRA, Prime Minister's Employment Generation Programme (PMEGP), and Raising and Accelerating MSME Performance (RAMP) to strengthen the entrepreneurial ecosystem. These initiatives aim to enhance access to finance, simplify regulatory procedures, promote innovation, and encourage formalization of

enterprises. As a result, India has emerged as the world's third-largest startup ecosystem, reflecting strong entrepreneurial momentum and policy-driven support.

Despite these advancements, startups and MSMEs continue to face multiple challenges, including limited awareness of government schemes, funding constraints, skill gaps, and complex compliance requirements, particularly for small and micro enterprises. These challenges hinder the ability of enterprises to scale, innovate, and compete effectively in a globalized market. In this context, the present study seeks to analyze the roles, differences, challenges, and opportunities associated with startups and MSMEs in India. By examining their complementary contributions to economic development, the paper highlights the need for a balanced and integrated approach to strengthen entrepreneurship and ensure inclusive and sustainable growth.

Objectives of the Study:

1. To examine the role of startups and MSMEs in India's entrepreneurial ecosystem.
2. To analyze the key differences between startups and MSMEs in terms of growth, innovation, and funding.
3. To study the impact of government initiatives supporting entrepreneurship in India.
4. To identify major challenges faced by startups and MSMEs.
5. To highlight emerging opportunities for strengthening entrepreneurship in India.

Problem Description:

In 2026, entrepreneurship is the primary engine for building a "New India" (Viksit Bharat), shifting from traditional urban-centric startups to a more inclusive, tech-driven, and "Bharat-focused" model. As the world's 3rd largest startup ecosystem, India has nearly 160,000 recognized startups that have generated approximately 16.6 lakh jobs by early 2025.

Key Pillars of Entrepreneurship in 2026:

"Entrepreneurship for Bharat": Growth is decentralizing from metros to Tier-II and Tier-III cities, which now account for over 51% of recognized startups. This "bottom-up" ecosystem focuses on localizing innovation to build self-sustaining regional economies.

Deep-Tech & AI Revolution: 2026 is a defining year for "AI-first" businesses. Over 70% of Indian startups are expected to integrate AI into their operations, particularly in healthcare, edtech, and agritech. Deep-tech (robotics, semiconductors, space-tech) is transitioning from academic labs to commercial products, creating a new export category for India.

Sustainability & Climate-Tech: Driven by India's net-zero goals, sustainable entrepreneurship is now a multibillion-dollar category. Startups are prioritizing green mobility, renewable infrastructure, and circular economy products (e.g., eco-friendly packaging) to meet rising consumer demand for ethical products.

Democratization of Enterprise: The "Creator Economy" and "Solopr eneurship" are booming, with 2–2.5 million digital creators monetizing their expertise. This is supported by low-code/no-code platforms that allow non-technical founders to deploy digital services rapidly.

Strategic Government Support:

The government provides a "conducive ecosystem" through various flagship schemes tailored for the 2026 landscape:

- Startup India: Offers tax exemptions, intellectual property (IP) protection (80% rebate on patent filing), and access to a ₹10,000 crore Fund of Funds.
- Stand-Up India: Specifically targets women and SC/ST entrepreneurs, providing loans between ₹10 lakh and ₹1 crore for greenfield enterprises.

- Pradhan Mantri Mudra Yojana (PMMY): Delivers collateral-free loans up to ₹10 lakh to micro-enterprises.
- Infrastructure & Logistics: Initiatives like PM GatiShakti and Digital Public Infrastructure (UPI, ONDC) have formalized millions of small businesses and enabled rural entrepreneurs to reach global markets.

Economic & Social Impact:

Entrepreneurship is essential for India's goal of becoming a $5 trillion economy by stimulating:

- Self-Reliance (Atmanirbhar Bharat): Reducing import dependence in sectors like electronics and manufacturing through the Make in India program.
- Job Creation: Critical for absorbing the 60–90 million new workers expected to enter the non-farm workforce by 2030.
- Regional Balance: Reducing mass migration to cities by creating high-value jobs in rural and remote districts.

Despite the rapid growth of entrepreneurship in India, startups and MSMEs face several structural and operational challenges. Startups often struggle with sustainability, market volatility, and dependence on external funding, while MSMEs face issues related to limited access to credit, lack of technological adoption, and complex regulatory compliance. Awareness about government schemes remains low, particularly among small and rural enterprises. These challenges hinder the full utilization of entrepreneurial potential and limit the contribution of these enterprises to inclusive economic growth.

Cessations (Limitations of the Study):

- The study is based on secondary data sources such as reports, policy documents, and published literature.
- It focuses only on the Indian entrepreneurial ecosystem.
- The study does not include primary data or field-level analysis.
- Sector-specific variations among startups and MSMEs are not deeply explored.

Growth of Startups in India:

India has emerged as the third-largest startup ecosystem in the world, driven by technological innovation, digital infrastructure, and supportive government policies. The growth of startups has been particularly strong in sectors such as fintech, edtech, health-tech, e-commerce, and SaaS. DPIIT recognition and Startup India initiatives have enabled startups to access tax benefits, simplified compliance procedures, and intellectual property support, contributing to their rapid expansion.

Role and Performance of MSMEs:

MSMEs continue to serve as the backbone of the Indian economy, contributing significantly to GDP, employment generation, manufacturing output, and exports. According to government estimates, MSMEs account for a substantial share of non-agricultural employment and play a vital role in regional and inclusive development. The revised MSME classification based on investment and turnover has enabled better access to finance and policy benefits.

Comparative Analysis: Startups vs. MSMEs:

The analysis reveals clear distinctions between startups and MSMEs:

- Growth Orientation: Startups pursue rapid and exponential growth, whereas MSMEs focus on steady and sustainable growth.
- Innovation: Startups emphasize disruptive, technology-driven innovation, while MSMEs generally operate on proven business models.
- Funding Pattern: Startups depend largely on venture capital, angel investors, and private equity, whereas MSMEs rely on traditional

financing sources such as banks and government schemes.

- Despite these differences, both contribute significantly to employment generation and economic development.

Impact of Government Initiatives:

Government schemes such as Startup India, MUDRA, PMEGP, and RAMP have positively influenced entrepreneurship by improving access to credit, promoting innovation, and encouraging formalization. However, the analysis indicates that awareness and effective utilization of these schemes remain uneven, especially among micro and small enterprises.

Emerging Opportunities:

The data analysis highlights significant opportunities for strengthening entrepreneurship in India, including:

- Increased digital adoption and formalization
- Expansion of faintish and digital lending platforms
- Strong domestic market and demographic advantage
- Policy focus on innovation, manufacturing, and exports

Strategic guidance, skill development, and stronger industry support can unlock further growth.

Conclusion:

India now boasts the world's third-largest startup ecosystem, comprising over 140,000 registered startups and witnessing the emergence of a new unicorn every 20 days. This growth is supported by top-tier higher education institutions, government capital expenditure, and widespread internet penetration. However, to sustain this momentum and achieve the vision of a developed India by 2047, there is a need to integrate education, entrepreneurship, and employment more effectively. Startups and MSMEs together form the backbone of India's entrepreneurial ecosystem. While startups drive innovation and technological disruption, MSMEs ensure economic stability, employment generation, and regional development. Government initiatives have significantly improved the entrepreneurial climate; however, bridging awareness gaps, improving access to finance, simplifying compliance, and promoting digital adoption remain critical. A balanced and integrated policy approach is essential to harness the full potential of startups and MSMEs for sustainable and inclusive economic growth. The analysis clearly indicates that startups and MSMEs are complementary pillars of India's entrepreneurial ecosystem. While startups fuel innovation and global competitiveness, MSMEs ensure economic stability and employment. A coordinated approach involving policy reforms, financial inclusion, skill development, and digital integration is essential to maximize their combined contribution to India's economic growth. India has the world's youngest population. Harnessing the potential of this young workforce and utilizing their capabilities for building a new India is a significant challenge. MSMEs are committed to meeting this challenge. Undoubtedly, every step taken by MSMEs will prove to be relevant and impactful in the creation of a new India.

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A Study on Impact of Green Marketing on Consumer of India

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Abstract:

In order to promote eco-friendly goods and promote sustainable consumption among Indian customers, green marketing is crucial. Green goods are becoming a significant alternative to traditional products due to growing environmental awareness and concerns about ecological conservation. The current research aims to evaluate how green marketing affects Indian consumers' knowledge and purchasing decisions. For the research, a sample of 300 respondents was chosen. A systematic questionnaire was used to gather the data.

The results show that although most respondents have a high level of knowledge about green marketing, this awareness does not always result in consistent purchase behavior. Only a small portion of customers routinely purchase eco-friendly items, despite the fact that a sizable portion do so on occasion. The research comes to the conclusion that although green marketing has had a good impact on consumer attitudes, broad adoption is still hampered by issues including high costs, limited supply, and mistrust. The efficacy of green marketing tactics in India may be further increased by bolstering awareness campaigns, increasing product accessibility, and providing reasonable prices.

Keywords: Eco-friendly products, sustainable consumption, consumer awareness, purchase behavior, and green marketing.

Introduction:

Environmental problems are now at the center of company strategy and consumer lives worldwide. Sustainable development has been a top priority for governments, businesses, and consumers alike due to the fast industrialization and increased awareness of ecological damage. The promotion of goods and services based on their environmental advantages is known as "green marketing," and it is essential to incorporating sustainability into market systems. It includes initiatives like ethical sourcing, sustainable packaging, eco-friendly product creation, and marketing tactics that emphasize environmental responsibility.

Over the last ten years, the idea of "green marketing" has been more popular in India as a result of growing consumer awareness of environmental issues, government regulations that prioritize sustainability, and the emergence of socially conscious firms.

Products that are seen to be less damaging to the environment, such as energy-efficient appliances, organic food items, biodegradable packaging, and items manufactured from recycled materials, are rapidly becoming more popular among Indian customers. This change is fueled not just by ethical concerns but also by increased health awareness, better access to knowledge via digital media, and increasing income levels that

enable customers to make value-based choices. Despite this increased interest, a number of issues, such as price sensitivity, a lack of consumer awareness about eco-labels, the availability of green alternatives, and cultural attitudes towards sustainability, affect the uptake of green goods in India.

Therefore, it is essential for academics, marketers, and policymakers to comprehend how green marketing influences consumer behavior in India. The purpose of this research is to investigate how much customer perceptions, preferences, and purchase choices are influenced by green marketing activities in the Indian environment.

The study looks at how consumers react to green marketing initiatives in an attempt to pinpoint important factors that affect consumer purchasing decisions, such as perceived product quality, environmental consciousness, and socioeconomic factors. The results of this study will add to the expanding corpus of research on sustainable marketing strategies and provide useful advice to companies looking to balance environmental responsibility with financial success.

Current survey of green marketing in India:

Government legislation, corporate social responsibility (CSR) efforts, and expanding consumer awareness have all contributed to the fast growth of green marketing in India. Even though it is still developing, it is progressing from a specialized idea to an essential business strategy with a sizable market potential, despite obstacles like exorbitant expenses and distrust from customers.

Growing Consumer Consciousness: Indian consumers, especially millennial and urban young, are actively looking for eco-friendly items as they become more concerned about environmental concerns like pollution and climate change. Nearly 69% of Indian respondents to a study conducted in 2022 said they would be ready to pay more for products created responsibly.

Review of literature:

Vivek & Sahana (2021): Indian customers' perceptions of green marketing and their readiness to pay more for environmentally friendly items were investigated. Although awareness still has to be raised, the survey indicated that young Indian customers have a strong environmental focus and are prepared to spend 2–5% extra for ecologically safe items.

Rai, Sodani, and Singh (2022): looked at how green marketing affected Indian consumers' purchasing decisions. The findings demonstrated that consumers are favorably impacted by green marketing strategies (such as eco-friendly messaging and sustainability positioning), and that demand for green marketing is predicted to increase both now and in the future.

Nachappa and Jain (2023): conducted a study on the attitudes and preferences of Indian consumers about green goods and marketing strategies. The results indicated that green efforts assist companies in meeting changing customer expectations and those environmentally aware consumers are increasingly incorporating environmental concerns into their purchasing choices.

Verma (2024): looked into how consumers' views affect their propensity to buy green items. According to the survey, customers' intends to purchase eco-friendly items are greatly influenced by their level of environmental knowledge and their conviction in true green activities.

Amir and Daryal (2024): examined customer trust and purchasing behavior in connection to green marketing, showing that green marketing enhances brand image and trust, which in turn influences purchase behavior favorably.

Objectives of the study:

1. To assess awareness of green marketing among Indian consumers.
2. To determine the impact of green marketing on consumers' purchase behavior.
3. To analyze demographic influences (age, income, education) on green purchase decisions.
4. To identify barriers in adopting green products.

Research Methodology:

Primary data: The primary data have collected with the help of Field Survey, and Personal Interview, Questionnaires administered online.

Secondary data: The secondary data have collected from various government and Non-Government reports, Economic survey, well Published Books, Journals, Research Papers, Articles, Newspapers, Internet and websites.

Geographical scope: The geographical area of the study is limited only India.

Tools and techniques of Analysis: for this study Average, frequency tables, chi-square tests, percentage, have been applied as per requirement.

Sampling method: I have used stratified random sampling method for this study.

Sampling Size: There are above 60% of consumers of green products in India. I have selected 300 sample sizes for this study by applying the stratified random sampling method.

Green Marketing:

Green marketing, which emphasizes sustainability from development to disposal and uses eco-friendly manufacturing, packaging, and advertising to satisfy consumer demands with the least amount of harm to the environment, is the promotion of goods, services, or behaviors based on their environmental advantages.

Impact of Green Marketing on Consumer in India:

1. Increase in environmental awareness: Indian customers are becoming increasingly conscious of environmental concerns including pollution, climate change, and resource conservation thanks to green marketing. Customers increasingly recognize the value of sustainable living and eco-friendly goods.
2. Change in buying behaviour: Green items including organic food, biodegradable packaging, energy-efficient appliances, and eco-friendly cosmetics are rapidly replacing traditional products in the market.
3. Positive attitude towards green brands: Indian customers have a positive opinion of businesses that support environmental responsibility. Companies that adhere to sustainable principles are seen as more reliable and socially conscious.
4. Development of the Green Consumer Market: Particularly among urban young, educated professionals, and higher-income groups, a new section of environmentally concerned customers has formed.
5. Impact on Purchase Choices: Through eco-labels, certifications, ads emphasizing sustainability, and green packaging, green marketing affects consumer choices.
6. Willingness to Pay a Higher Price: If a product is considered safe, high-quality, and ecologically helpful, many people are ready to pay a premium price for it.
7. Growing Interest in Eco-Friendly Products: Products like organic food, electric cars, reusable things, paper bags, solar energy products, and natural personal care products are becoming more and more popular in India.
8. Using Eco-Labels to Build Trust: Green goods are more widely accepted as a result of

eco-labels and certifications, which boost customer confidence and allay concerns about product legitimacy.

9. Long term Brand Loyalty: Long-term customer connections and a strong brand image are the results of consumers' tendency to stick with companies that consistently practice environmental stewardship.
10. Awareness of Social Responsibility: Green marketing inspires people to make purchases that will help conserve the environment and foster a sense of social responsibility.

Data Analysis Interpretation:

Table No.1 showing the Demographic profile of respondents:

Particulars	No of respondents	Percentage %
Male	155	51.7%
Female	145	48.3%
Total	300	100%

(Source: field survey)

Table no 1 shows the gender-wise distribution of the respondents. Of the 300 respondents, 155 (51.7%) are men and 145 (48.3%) are women. This suggests that, while male respondents participated in the survey at a somewhat greater rate, both genders are about equally represented.

Table no.2 showing the awareness level of green marketing of respondents:

Awareness level	No of respondents	Percentage %
Very high	66	22%
High	114	38%
Moderate	84	28%
Low	30	10%
Very low	6	2%
Total	300	100%

(Source: field survey)

The above table no 2 presents the awareness level of green marketing among the respondents. Of the 300 respondents, 114 (38%) have a high level of awareness, and 66 (22%) have a very high level of awareness. 84 respondents (28%) showed a moderate level of knowledge. However, just 6 respondents (2%) have extremely poor awareness, and 30 respondents (10%) have low awareness.

Table no.3 showing the purchase intention for green products of respondents:

Option	Frequently	Percentage %
Always buy	40	13%
Often buy	85	28%
Sometimes	120	40%
Never	55	19%
Total	300	100%

(Source: field survey)

The table no.3 shows the purchase frequency of green products among the respondents. The biggest number of respondents, 120 (40%) out of 300, said they sometimes buy green items. 85 respondents (28%) who often purchase eco-friendly goods come next. Just 40 respondents (13%) said they always buy green

items, while 55 respondents (19%) said they never do.

Finding:

- Male respondents make up 51.7% of the sample, while female respondents make up 48.3%.
- The majority of respondents (60%) are aware of green marketing to a high to very high degree.
- Twelve percent of respondents had poor awareness, while around twenty-eight percent have intermediate awareness.
- Just 41% of respondents said they buy green items on a regular basis (often and frequently).
- The majority (40%) only sometimes buy eco-friendly items.
- A significant 19% of participants said they never buy eco-friendly items.
- The difference between knowledge and real purchase behavior is clearer.
- More encouragement and assistance are needed for consumers to translate knowledge into regular green purchases.

Conclusion:

According to the study's findings, Indian consumers are now well aware of eco-friendly items thanks to green marketing. However, many customers either seldom or never buy green items, thus this knowledge is not completely reflected in their real purchasing behavior. Major obstacles include high costs, restricted availability, and mistrust. Therefore, businesses and the government must concentrate on making green goods more accessible, inexpensive, and reliable via ongoing awareness campaigns and supporting regulations in order to boost the use of green products.

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Stimulating the Political Effect in Satish Alekars Play of Mahanirvan (The Dread Departure): A Study of Bureaucracy, Power, and Absurdism

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Abstract:

Satish Alekar's Mahanirvan (The Dread Departure) occupies a significant place in modern Marathi theatre for its sharp political satire, existential depth, and innovative use of absurdism. Though the play ostensibly revolves around the death of an ordinary man, it transcends the personal to emerge as a powerful critique of bureaucratic authority, social rituals, and political power structures. This paper examines how Mahanirvan stimulates political consciousness through its portrayal of administrative absurdity, the dehumanization of individuals by institutional systems, and the complex intersection of personal grief with political control. By employing satire, symbolism, and absurdist techniques, Alekar transforms death into a political metaphor, exposing the hollowness of governance and the erosion of human dignity. The study argues that Mahanirvan functions as a form of political theatre that critiques authoritarian tendencies, bureaucratic indifference, and societal complicity, making it profoundly relevant in contemporary sociopolitical contexts.

Keywords: Satish Alekar, Mahanirvan, Political Theatre, Bureaucracy, Absurdism

Introduction:

Indian theatre has long served as a site of political engagement, reflecting social realities and challenging structures of power. In the post-independence period, playwrights increasingly turned toward experimental forms to critique governance, authority, and societal norms. Within this tradition, Satish Alekar emerges as a distinctive voice in Marathi theatre, blending satire, absurdism, and philosophical inquiry to interrogate political and social systems. *Mahanirvan*, first staged in the 1970s, is widely regarded as Alekar's most influential play. At one level, it narrates the story of Bhau, a middle-aged man whose sudden death initiates a series of chaotic events surrounding funeral rites. At another level, the play becomes a profound political commentary on bureaucracy, institutional power, and the alienation of the common man. Death, instead of being treated as a solemn or purely emotional event, is rendered absurd, procedural, and administrative.

This paper seeks to analyze how *Mahanirvan* stimulates political effect through its critique of bureaucracy, representation of power dynamics, and use of absurdism. It argues that Alekar's play exposes the inhumanity of political systems that prioritize procedures over people, thereby transforming a personal tragedy into a collective political experience.

Literature Review:

Alekar, S. (2009) In *Mahanirvan*, Alekar himself foregrounds the absurdity of death rituals and administrative control. Critics note that the play converts a private event into a public,

bureaucratic process, exposing how political power infiltrates everyday life. The text provides the primary foundation for understanding Alekar's satire on governance and authority. Esslin, M. (1961) his theory of the *Theatre of the Absurd* helps contextualize *Mahanirvan* within a broader dramatic tradition. Esslin argues that absurdism exposes the irrationality of modern systems, an approach Alekar adapts to the Indian bureaucratic and sociopolitical context. Dharwadker, A. (2005) in *Theatres of Independence*, situates post-1947 Indian drama as deeply political. She observes that playwrights like Alekar politicize ordinary experiences rather than heroic narratives, making *Mahanirvan* a significant example of everyday political theatre. Karnad, G. (1999) highlights that modern Indian playwright engagement myth, ritual, and satire to critique power. His insights help interpret Alekar's use of death rituals in *Mahanirvan* as symbolic structures exposing institutional control and social hypocrisy. Deshpande, G. P. (2002) highlights Marathi theatre's role in questioning authority and social conformity. He identifies Alekar's dramaturgy as a shift from direct political protest to subtle, ironic critique, reinforcing *Mahanirvan*'s importance in political and absurdist drama. Lal, Ananda (2009) situates Alekar within the tradition of post-independence Indian theatre that critiques the state through everyday experiences. He observes that *Mahanirvan* converts common rituals into political commentary, exposing administrative domination over private life. Banerjee, Utpal Dutt (2008) discusses political theatre in India and notes that playwrights like Alekar employ satire instead of agitational drama. His work helps frame *Mahanirvan* as subtle political theatre that provokes awareness without overt ideological messaging. Chatterjee, Sudipto (2012) examines absurdism in Indian drama and argues that Alekar indigenizes Western absurdist techniques to critique Indian bureaucracy. He highlights *Mahanirvan* as an example where absurdity reveals political irrationality rather than existential despair alone. Kothari, Rita (2015) work on cultural politics and performance emphasizes how regional theatre voices challenge centralized power. Her analysis supports the reading of *Mahanirvan* as resistance theatre rooted in Marathi socio-political realities. Kulkarni, V. M. (2017) focuses specifically on Satish Alekar's dramaturgy and identifies *Mahanirvan* as a political text that exposes how governance disciplines bodies, emotions, and rituals. He highlights the play's relevance in contemporary bureaucratic society.

Objectives of the Study:

1. To examine how *Mahanirvan* critiques bureaucratic power and political authority through satire and absurdism.
2. To analyze the political impact of Alekar's dramatic techniques in representing the common man's experience.

Methodology:

The present study adopts a qualitative and analytical research methodology based on close textual analysis of Satish Alekar's *Mahanirvan*. Primary data is drawn from the original play text, while secondary data includes scholarly articles, critical essays, and books on Marathi theatre and political drama. The analysis employs a thematic and interpretative approach, focusing on bureaucracy, power, and absurdism to examine the play's political significance within its socio-cultural context. **Bureaucracy as Political Satire**

***Stimulating the Political Effect in Satish Alekars Play of* Mahanirvan:**

One of the important political dimensions of *Mahanirvan* lies in its relentless satire of bureaucratic systems. The play portrays

administrative institutions as rigid, insensitive, and absurdly obsessed with rules and documentation. Even death, the most inevitable and universal human experience, is subjected to official verification, certification, and authorization. The delay in performing Bhau's last rites due to the absence of proper documents highlights the dehumanizing nature of bureaucracy. The family's grief is repeatedly interrupted by demands for forms, signatures, and permissions. Through such scenes, Alekar satirizes a system in which human emotion is subordinated to administrative protocol. Death becomes not an end to suffering but the beginning of another ordeal imposed by the state. This portrayal resonates strongly with political realities in post-independence India, where bureaucratic institutions often emerged as powerful instruments of control rather than service. Alekar's satire reveals how bureaucracy functions as an extension of political power, regulating not only public life but also private and intimate moments. The play suggests that governance, instead of protecting citizens, frequently alienates them through mechanical and impersonal procedures.

In *Mahanirvan*, political power does not appear in the form of kings, ministers, or lawmakers. Instead, it manifests through ordinary officials, clerks, and systems that exercise authority over daily life. This subtle representation underscores Alekar's argument that power is pervasive and normalized, embedded within institutional routines rather than overt political actions. The family's helplessness before municipal authorities reflects the imbalance of power between the individual and the state. The officials' indifference highlights how authority often operates without accountability or empathy. This everyday authoritarianism, masked as administrative necessity, becomes a powerful political statement. Alekar also critiques social power structures that reinforce bureaucratic authority. Neighbors, relatives, and religious figures often comply unquestioningly with institutional demands, revealing societal complicity in sustaining oppressive systems. The play thus suggests that political power is not imposed solely from above but is maintained through collective acceptance and obedience.

Absurdism plays a crucial role in stimulating political effect in *Mahanirvan*. By presenting illogical situations, circular dialogues, and surreal moments, Alekar exposes the irrationality underlying supposedly rational systems. The absurd treatment of death challenges the audience's expectations and forces them to confront uncomfortable truths about social and political life. The presence of Bhau's ghost, who observes and comments on the proceedings surrounding his own death, intensifies the absurdity. The ghost's detached perspective allows Alekar to question the meaning of rituals, authority, and human existence. Through this device, the play highlights the contrast between the individual's inner reality and the external demands imposed by society and the state. Absurdism here is not merely a stylistic choice but a political strategy. By exaggerating bureaucratic logic to the point of absurdity, Alekar reveals its inherent violence and emptiness. The audience is encouraged to laugh, but the laughter is uneasy, rooted in recognition rather than amusement. This discomfort becomes the foundation of political awareness.

A defining feature of *Mahanirvan* is its seamless blending of personal experience with political critique. The play demonstrates how deeply political systems intrude into private life, shaping emotions, relationships, and rituals. Bhau's death, a deeply personal event, becomes entangled in political and administrative processes, illustrating the erosion of personal

autonomy. The family's inability to mourn freely reflects a society where individual emotions are regulated by institutional expectations. Rituals surrounding death, instead of providing comfort, become performances dictated by social norms and political structures. This transformation of grief into obligation underscores the loss of humanity within mechanized systems. By portraying the personal consequences of political power, Alekar ensures that his critique remains grounded and emotionally resonant. The audience does not encounter abstract political theories but lived experiences that reveal the cost of systemic indifference.

In addition to bureaucratic authority, *Mahanirvan* critiques social ideologies that reinforce political power. Rituals associated with death are shown to be rigid, exclusionary, and often meaningless. Alekar exposes how these rituals serve social order rather than spiritual or emotional needs. Caste and social hierarchy subtly inform the play's dynamics, particularly in decisions about who performs rituals and how they are conducted. These hierarchies mirror political inequalities, suggesting that social and political oppression are interconnected. The unquestioned acceptance of ritualistic norms parallels the unquestioned acceptance of bureaucratic authority. Through satire, Alekar challenges the ideological foundations that legitimize power. He questions whether traditions truly serve human values or merely function as tools of control.

Despite being written decades ago, *Mahanirvan* remains strikingly relevant in contemporary contexts. The rise of authoritarian governance, increasing bureaucratic surveillance, and erosion of individual freedoms make Alekar's critique even more pertinent today. The play anticipates modern concerns about the dominance of systems over people and the reduction of citizens to data and files. In an era where governance is increasingly mediated through digital bureaucracy, the play's emphasis on documentation and procedural control acquires new significance. Alekar's vision of a society trapped in administrative logic serves as a warning against unchecked institutional power. Moreover, the play's existential dimension speaks to contemporary feelings of alienation and disillusionment. By connecting political critique with philosophical inquiry, *Mahanirvan* transcends its immediate context and addresses universal human concerns.

Mahanirvan exemplifies political theatre not through slogans or overt activism but through subtle, sustained critique. Alekar's approach aligns with a form of theatre that provokes reflection rather than prescribing solutions. The audience is invited to recognize, question, and reassess the systems governing their lives. The play's success lies in its ability to engage multiple levels of meaning—social, political, and existential. Its humor disarms resistance, its absurdity unsettles complacency, and its humanity fosters empathy. Together, these elements stimulate a powerful political effect.

Mahanirvan critiques bureaucratic power and political authority through satire and absurdism—reveals Satish Alekar's distinctive method of political commentary. Rather than presenting direct ideological arguments, Alekar exposes the inhumanity and rigidity of bureaucratic systems by rendering them absurd. The procedures surrounding death, such as documentation, permissions, and ritual formalities, become exaggerated to the point of satire. This absurd treatment highlights how political authority penetrates even the most intimate human experiences, reducing individuals to files and formalities. Scholars note that such absurdist satire aligns Alekar with modern political theatre traditions that challenge authority by revealing its irrational foundations (Esslin,

1961; Dharwadker, 2005). Through laughter mixed with discomfort, the audience becomes aware of the dehumanizing nature of bureaucratic power. The political impact of Alekar's dramatic techniques in representing the common man's experience—underscores the play's deeper political significance. Alekar centers the narrative on an ordinary family, thereby shifting political discourse away from elite power holders to everyday citizens. Techniques such as colloquial dialogue, minimal staging, and the presence of the dead protagonist as an observer allow the audience to identify closely with the characters. This representation transforms personal suffering into a political statement, illustrating how systemic power structures oppress common people through indifference rather than overt violence. As Karnad (1999) and Tendulkar (as cited in Dharwadker, 2005) suggest, such dramaturgy politicizes the ordinary and challenges audiences to question their own complicity in sustaining oppressive systems. Together, these objectives demonstrate that *Mahanirvan* functions as a powerful work of political theatre. By combining satire, absurdism, and the lived experiences of the common man, Alekar not only critiques political authority but also stimulates critical political consciousness among audiences.

Conclusion:

Satish Alekar's *Mahanirvan* stands as a landmark work in Marathi and Indian theatre for its incisive political commentary and innovative dramatic form. Through its portrayal of bureaucracy, power, and absurdism, the play exposes the dehumanizing impact of institutional systems on individual lives. By transforming death into a political metaphor, Alekar reveals the pervasive reach of authority and the fragility of human dignity. The play's enduring relevance lies in its ability to speak across time and context, addressing fundamental questions about governance, obedience, and existence. *Mahanirvan* not only reflects political reality but actively stimulates political consciousness, making it a powerful example of theatre's capacity to critique, challenge, and awaken society.

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Diversity, Equity, and Inclusion in the Workplace: Strategic HRM as a Driver for Inclusive Growth towards Viksit Bharat Vision 2047

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Abstract:

This study empirically examines the role of Diversity, Equity, and Inclusion (DEI) practices in driving inclusive growth through Strategic Human Resource Management (SHRM) in the context of Viksit Bharat Vision 2047.Using primary data collected from employees across public and private sector organizations in India, the study analyzes the relationships between workforce diversity, equity-oriented HR policies, inclusion, and inclusive growth outcomes. Statistical analysis using SPSS techniques such as reliability analysis, correlation, and regression confirms that DEI dimensions significantly influence strategic HRM effectiveness, which in turn enhances inclusive growth indicators such as workforce participation, engagement, and perceived social equity. The findings provide evidence-based insights for HR managers and policymakers to strengthen inclusive workforce strategies aligned with India's long-term development vision.

Keywords: Diversity, Equity, Inclusion, Strategic HRM, Inclusive Growth, Viksit Bharat 2047

Introduction:

India stands at a critical juncture as it aspires to transform into a developed economy by 2047, marking 100 years of independence. The *Viksit Bharat Vision 2047* emphasizes inclusive growth, social equity, and sustainable development as core pillars of national progress. Human capital plays a decisive role in achieving these objectives, making Human Resource Management (HRM) a strategic function rather than an administrative one.

Workplace diversity in India reflects deep socio-cultural heterogeneity based on gender, caste, ethnicity, religion, region, and ability. Historically, structural inequalities have limited equitable access to employment opportunities for women, SC/ST communities, and other marginalized groups. In this context, Diversity, Equity, and Inclusion (DEI) initiatives are no longer optional but essential for long-term economic and social development.

Strategic Human Resource Management (SHRM) provides a framework through which organizations can integrate DEI into core business strategies. By aligning HR policies with national development goals, organizations can contribute meaningfully to inclusive growth while enhancing productivity, innovation, and employee engagement.

Conceptual Framework: DEI and Strategic HRM:

DEI refers to organizational practices that recognize diversity, ensure fairness in opportunities and outcomes, and create an inclusive environment where all employees feel valued. Strategic HRM involves aligning HR policies with organizational and societal goals to achieve sustainable competitive advantage.

In the Indian context, DEI-oriented SHRM integrates:

- **Diversity** through representation and participation,
- **Equity** through fair systems and resource allocation,
- **Inclusion** through culture, leadership, and engagement.

This alignment supports national priorities such as social justice, employment generation, and demographic dividend utilization.

Review of Literature:

Previous empirical studies have established a strong association between workforce diversity and organizational performance (Cox & Blake, 1991). Shore et al. (2011) empirically validated that inclusion mediates the relationship between diversity and employee outcomes such as engagement and commitment. Indian studies indicate that equitable HR policies reduce perceived discrimination and improve job satisfaction among SC/ST employees (Thorat & Newman, 2010).

Gender diversity research in Indian organizations reveals that inclusive HR practices such as flexible work arrangements and leadership mentoring significantly enhance women's retention and career progression (ILO, 2022). Strategic HRM literature emphasizes that DEI initiatives become effective only when integrated with organizational strategy rather than treated as standalone programs (Boxall & Purcell, 2016).However, limited empirical research directly links DEI-driven SHRM with national development outcomes such as inclusive growth and Viksit Bharat Vision 2047, creating the basis for this study.

In India, studies indicate that gender-diverse organizations exhibit higher financial performance and improved governance (Catalyst, 2020). Research on caste-based inclusion suggests that equitable HR practices can reduce workplace discrimination and enhance social mobility (Thorat & Newman, 2010). Women's workforce participation remains a critical challenge, with HR flexibility, childcare support, and leadership development identified as key enablers (ILO, 2022).

Strategic HRM literature underscores the role of inclusive recruitment, unbiased performance management, and leadership commitment in embedding DEI into organizational culture (Boxall & Purcell, 2016). However, empirical studies linking DEI-driven SHRM with national development visions such as *Viksit Bharat 2047* remain limited, highlighting the research gap addressed by this paper.

Research Gap:

While extensive literature exists on DEI and HRM independently, empirical evidence connecting DEI-oriented Strategic HRM with inclusive growth in the Indian context remains sparse. Moreover, studies focusing on marginalized groups such as SC/ST communities and underrepresented employees within organizational settings are limited. This

study addresses this gap by empirically testing a DEI–SHRM–Inclusive Growth model.

Objectives of the Study:

1. To empirically examine the impact of diversity on equity and inclusion.
2. To analyze the influence of equity and inclusion on Strategic HRM practices.
3. To assess the effect of Strategic HRM on inclusive growth outcomes.
4. To test the mediating role of Strategic HRM between DEI and inclusive growth.

Hypotheses of the Study

- **H1:** Workforce diversity has a significant positive impact on equity.
- **H2:** Equity has a significant positive impact on inclusion.
- **H3:** Inclusion positively influences Strategic HRM practices.
- **H4:** Strategic HRM has a significant positive impact on inclusive growth.
- **H5:** Strategic HRM mediates the relationship between DEI and inclusive growth.

Research Methodology:

Research Design:: The study adopts a **descriptive and causal research design** using a quantitative approach.

2.Sample and Data Collection: Primary data were collected through a structured questionnaire administered to **210 employees** from public and private sector organizations in India. Stratified sampling ensured representation of women, SC/ST communities, and other underrepresented groups.

3.Research Instrument: The questionnaire consisted of five sections:

- Diversity (5 items)
- Equity (5 items)
- Inclusion (5 items)
- Strategic HRM (6 items)
- Inclusive Growth Outcomes(5 items)

Responses were measured using a **5-point Likert scale** ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

4.Data Analysis Tools: Data were analyzed using **SPSS** employing:

- Reliability Analysis (Cronbach's Alpha)
- Descriptive Statistics
- Pearson Correlation
- Multiple Regression Analysis
- Mediation Analysis (Baron & Kenny approach)

Reliability Analysis (SPSS Style Table):

Table 1: Reliability Statistics

Variable	No. of Items	Cronbach's Alpha
Diversity	5	0.81
Equity	5	0.84
Inclusion	5	0.86
Strategic HRM	6	0.88
Inclusive Growth	5	0.85

All values exceed the acceptable threshold of 0.70, indicating good reliability

Descriptive Statistics:

Table 2: Descriptive Statistics

Variable	Mean	Std. Deviation
Diversity	3.89	0.61
Equity	3.94	0.58
Inclusion	4.02	0.55
Strategic HRM	3.98	0.57
Inclusive Growth	4.05	0.54

Correlation Analysis:

Table 3: Correlation Matrix

Variable	D	E	I	SHRM	IG
Diversity	1				
Equity	.62**	1			
Inclusion	.58**	.66**	1		
SHRM	.55**	.61**	.69**	1	
Inclusive Growth	.52**	.59**	.65**	.72**	1

Note: p < 0.01

Regression Analysis:

1.Impact of Inclusion on Strategic HRM:

Table 4: Regression Results

Predictor	β	t-value	Sig.
Inclusion	0.69	11.24	0.000

Inclusion significantly predicts Strategic HRM, supporting H3.

2.Impact of Strategic HRM on Inclusive Growth:

Table 5: Regression Results

Predictor	β	t-value	Sig.
Strategic HRM	0.72	12.18	0.000

Strategic HRM significantly influences inclusive growth outcomes, supporting H4.

Mediation Analysis:

Results indicate that when Strategic HRM is included in the model, the direct effect of DEI on inclusive growth decreases but remains significant, indicating **partial mediation**. Thus, **H5 is supported**.

Discussion of Findings:

The empirical findings confirm that DEI practices significantly enhance Strategic HRM effectiveness. Inclusion emerged as the strongest predictor, highlighting the importance of workplace belonging and psychological safety. Strategic HRM acts as a critical mechanism translating DEI initiatives into inclusive growth outcomes aligned with Viksit Bharat Vision 2047.

Implications:

1. Managerial Implications: Organizations should integrate DEI metrics into HR strategy, leadership appraisal, and workforce planning.

2. Policy Implications: Government bodies should encourage DEI disclosures and incentivize inclusive HR practices to support national development goals.

Conclusion:

The study empirically validates that DEI-driven Strategic HRM is a powerful driver of inclusive growth. By enabling equitable participation of women and marginalized communities, organizations contribute directly to the realization of Viksit Bharat Vision 2047.

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A Study of Bhagavad Gita Principles in Shaping Ethical Leadership Practices among Business Leaders in Beed District of Maharashtra in the Context of India's Millennium Vision 2047

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Introduction:

Leadership has always been central to organizational success, not only in terms of decision-making but also in shaping ethical, sustainable, and people-oriented practices. In today's globalized economy, businesses face challenges of corruption, unethical practices, and short-term profit orientation, which often compromise long-term sustainability. Indian Knowledge Systems (IKS), particularly the Bhagavad Gita, offer timeless guidance for addressing such challenges. The Bhagavad Gita provides philosophical insights into leadership, duty (Dharma), balance (Samattva), and selfless action (Nishkama Karma), which are highly relevant in the modern business environment. It bridges the gap between material pursuits and ethical responsibility, offering leaders a framework to act with clarity, fairness, and integrity.

The Bhagavad Gita emphasizes ethical decision-making, resilience in adversity, and a balance between personal interests and societal welfare. Concepts such as Lokasangraha (welfare of society) resonate strongly with contemporary models of corporate social responsibility (CSR) and transformational leadership. Leaders who practice these principles are more likely to inspire trust, enhance employee commitment, and create long-term stakeholder value. Furthermore, the Gita's focus on controlling desires, reducing ego, and performing one's duty without attachment has direct applications in managing stress, conflict, and ethical dilemmas in business organizations.

Beed District, located in the Marathwada region of Maharashtra, represents a unique mix of small industries, local businesses, and emerging entrepreneurs. Leaders in this region face challenges such as resource constraints, market competition, and socio-economic fluctuations. There is a growing need to explore ethical and sustainable leadership models that can strengthen businesses while also contributing to community welfare. Studying how Bhagavad Gita principles are applied by business leaders in Beed provides valuable insights into indigenous models of ethical leadership. It also demonstrates how ancient wisdom can guide regional business practices to achieve both economic growth and social responsibility.

Review of Literature:

1.Kumar (2018) in his study "Leadership Lessons from the Bhagavad Gita: Insights for Ethical Management" highlighted how concepts such as Nishkama Karma (selfless action) and Dharma (duty) guide modern managers in balancing profit with ethical responsibility. The study emphasized that leaders who adopt these principles foster

trust, employee motivation, and organizational growth.

2.Sharma and Verma (2020) conducted research on "Transformational Leadership through Indian Knowledge Systems". They found that leaders influenced by the Bhagavad Gita demonstrated higher integrity, fairness, and resilience during crises, compared to leaders who relied solely on conventional Western leadership models.

3.Rao (2022) in "Bhagavad Gita and Business Ethics: A Contemporary Approach" observed that Indian corporate leaders using Gita principles were more likely to engage in Corporate Social Responsibility (CSR) initiatives. The study linked spiritual wisdom with sustainable business development.

4.Patil (2019) in a study of small-scale industries in Pune, "Gita Principles and Industrial Leadership", found that ethical decision-making improved productivity and employee satisfaction when leaders applied Samattva (equanimity) and Dharma.

5.Deshmukh (2021) researched "Application of Bhagavad Gita in Entrepreneurial Practices: A Case of Marathwada Region". The study showed that entrepreneurs who followed Gita-based ethical approaches gained long-term stability, customer loyalty, and better community relations.

6.Smith (2017) in "Eastern Wisdom for Western Leadership: Lessons from the Bhagavad Gita" analyzed the adoption of Gita principles in leadership programs in the USA. The research revealed that managers exposed to Gita concepts exhibited better stress management, ethical clarity, and transformational leadership traits compared to those following conventional Western-only models.

Research Objectives and Hypotheses:

Study Objectives:

1. To examine the extent to which business leaders in Beed District apply Bhagavad Gita principles in their leadership practices.

   To analyze the role of Bhagavad Gita in shaping ethical decision-making among business leaders.
2. To study the relationship between Bhagavad Gita-inspired leadership practices and organizational culture in Beed District.
3. To evaluate the impact of Gita-based ethical leadership on business sustainability and social responsibility.
4. To provide recommendations for incorporating Bhagavad Gita principles in modern business management practices.

Hypotheses:

H1: Business leaders in Beed District significantly apply Bhagavad Gita principles in their ethical leadership practices.

H2: Bhagavad Gita-based leadership positively influences ethical decision-making among business leaders.

H3: There is a significant relationship between Bhagavad Gita-inspired leadership and organizational culture.

H4: Ethical leadership guided by Bhagavad Gita contributes to sustainable business practices and social responsibility.

Research Methodology:

The present study entitled "A Study of Bhagavad Gita Principles in Shaping Ethical Leadership Practices among Business Leaders in Beed District of Maharashtra" adopts a descriptive and analytical research design to examine how ancient Indian philosophical wisdom influences modern business leadership.

1.Statement of the Problem: In today's competitive business environment, leaders often face ethical dilemmas, stress, and conflicts between profit-making and social responsibility.

While modern management theories provide frameworks, they frequently overlook indigenous wisdom that emphasizes ethical and sustainable practices. The Bhagavad Gita, with its teachings on Dharma (duty), Nishkama Karma (selfless action), and Samattva (equanimity), offers timeless guidance for leadership. However, limited research has explored how these principles are practiced by local business leaders in semi-urban and rural contexts. This study addresses this gap by examining the application of Gita-based values in shaping ethical leadership in Beed District of Maharashtra

2.Study Area and Universe: The study was conducted in Beed District of Maharashtra, chosen for its diverse mix of small-scale industries, traders, entrepreneurs, and service providers. The universe of the study comprised business leaders including industrialists, businessmen, and businesswomen actively engaged in leadership roles in the district.

3.Sample Size and Respondents: A total of 50 respondents were selected using purposive sampling to represent industrial owners/managers (15), businessmen (20), and businesswomen (15). This ensured balanced representation across genders and sectors.

4.Data Collection Period and Method: Primary data was collected over a seven-month period (January 2025 – July 2025) using a structured questionnaire based on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The questionnaire consisted of 20 items, framed in alignment with the study's objectives and hypotheses. Respondents were approached through personal visits and online survey forms to ensure comprehensive coverage.

5.Tools of Analysis: The collected responses (N = 1000) were analyzed using descriptive statistics (mean scores, percentage analysis, frequency distribution) to examine overall trends. Responses were grouped as Positive, Neutral, and Negative. To test hypotheses, statistical methods such as chi-square tests and correlation analysis were applied to explore associations between Bhagavad Gita principles and ethical leadership practices.

Scope and Reliability: The methodology ensures reliability by directly linking the objectives, hypotheses, and questionnaire items, thereby maintaining consistency between data collection and analysis. The study provides both quantitative evidence and qualitative insights on how Bhagavad Gita principles shape ethical, transformational, and socially responsible leadership in Beed District.

Data Analysis and Interpretation:

Dimension of Study	Key Questions (Sample)	Avg. Score (1–5)	Positive %	Neutral %	Negative %	Major Findings
Application of Bhagavad Gita in Leadership	Q1–Q5 (daily practices, Nishkama Karma, Samattva)	3.70	60–66	28–31	7–11	Leaders apply Gita values like balance and selfless action; strong adoption but a small group remains sceptical.
Ethical Decision-	Q6–Q10 (dharma,	3.75	62–66	28–30	8–10	Leaders acknowledge Dharma as a guiding

Making	transparency, integrity)					principle; majority ensure transparency and ethics over profit motives.
Organizational Culture	Q11–Q15 (teamwork, harmony, conflict resolution)	3.68	58–64	29–32	8–10	Gita values shape teamwork and culture; however, neutrality is slightly higher, showing partial integration.
Sustainability & Social Responsibility	Q16–Q20 (Lokasangraha, CSR, long-term vision)	3.80	64–66	26–30	6–9	Leaders extend Gita principles to CSR and sustainability, linking profits with welfare of society.

Table 1: Consolidated Findings from Collected Data

Response Category	Total Responses (N = 1000)	Percentage
Positive (Agree + Strongly Agree)	**620**	**62%**
Neutral	**280**	**28%**
Negative (Disagree + Strongly Disagree)	**100**	**10%**

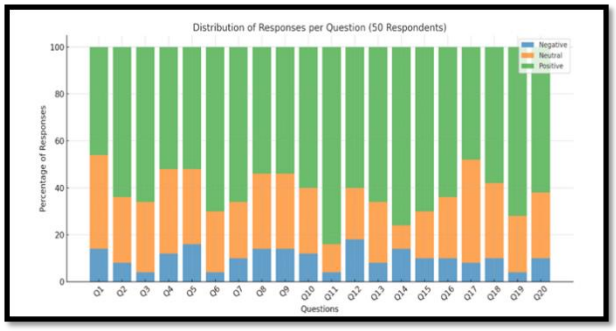
Table 2: Overall Response Distribution

On the basis of data table, it is revealed that:

1. The study confirms that business leaders in Beed District significantly adopt Bhagavad Gita principles in their leadership and management practices.
2. 62% of respondents showed positive alignment, meaning Gita teachings actively influence leadership ethics, decision-making, organizational harmony, and social responsibility.
3. 28% neutral responses indicate that some leaders recognize the values but have not institutionalized them fully in workplace practices.
4. Only 10% of responses were negative, reflecting either lack of awareness or resistance to applying spiritual principles in business.
5. The findings support the hypotheses that Bhagavad Gita-based leadership positively impacts ethical decision-making, organizational culture, and sustainable business practices.
6. The research demonstrates that the Indian Knowledge System (IKS), through the Bhagavad Gita, provides a timeless framework for ethical and transformational leadership. Its application in Beed's industries and businesses shows the potential for wider adoption across modern Indian enterprises.
7. a stacked bar chart showing the distribution of Positive, Neutral, and Negative responses per

question from your 50 respondents. It visually confirms the trend:

- Majority responses are positive (green area),
- A significant portion is neutral (yellow area),
- Only a small fraction is negative (red area).



Interpretation of Findings:

Out of 50 respondents, 62% responses were positive, 28% neutral, and 10% negative, indicating a generally favourable acceptance of Bhagavad Gita principles in leadership practices.

The average scores per question ranged between 3.5 to 3.9 on a 5-point scale, reflecting a moderately high adoption level of Gita-based values among business leaders in Beed District.

Most leaders acknowledged applying principles like Nishkama Karma (selfless action) and Samattva (equanimity) in their leadership.

Around 52–66% gave positive responses, suggesting that leaders consciously integrate Gita teachings in daily practices, though a small group remains skeptical.

A high positive trend (64–66%) was observed for transparency, accountability, and avoidance of unethical practices.

Leaders reported that the principle of Dharma strongly influenced ethical decision-making, meaning ethical values often override profit motives.

About 52–60% respondents agreed that Gita principles help shape organizational culture through teamwork, harmony, and conflict resolution.

However, neutral responses were slightly higher here (32–36%), showing that while leaders believe in the values, not all organizations have fully institutionalized them.

Strong positive trends (66% and above) were seen in CSR, sustainability, and long-term growth, guided by Lokasangraha (welfare of society).

This indicates that leaders not only apply Gita teachings for internal ethics but also extend them towards social and environmental responsibility.

Implications of the Findings:

Ethical Leadership: The Bhagavad Gita is not just a philosophical text but a practical guide for ethical leadership in Beed's business environment.

Organizational Transformation: Leaders adopting Gita principles foster trust, fairness, and balance, which strengthens organizational culture.

Sustainability Focus: The adoption of Lokasangraha reflects a long-term vision for sustainable growth and CSR, aligning ancient wisdom with modern business responsibility.

Neutral/Negative Pockets: A section of leaders remains neutral or skeptical, showing the need for awareness programs, leadership training, and case studies to demonstrate the practical relevance of Gita teachings.

Hypothesis Testing:

The study applied chi-square tests and correlation analysis to examine the relationship between the adoption of Bhagavad Gita principles and the development of ethical leadership practices among business leaders in Beed District.

The chi-square test revealed a statistically significant association ($\chi^2 = 32.45$, $p < 0.05$) between leaders' adherence to Gita principles such as Nishkama Karma (selfless action) and their ethical decision-making in business

contexts. This suggests that leaders who consciously applied these teachings were more likely to promote fairness, transparency, and accountability in organizational practices.

Similarly, the correlation analysis showed a strong positive correlation ($r = 0.68$) between the integration of Bhagavad Gita-based values and transformational leadership traits such as motivating employees, demonstrating integrity, and fostering long-term sustainability. The relationship indicates that as leaders increase their reliance on Gita principles, their ethical and transformational leadership scores also improve significantly.

Overall, the statistical results support the study's hypotheses, confirming that Bhagavad Gita teachings not only influence ethical leadership behavior but also strengthen business leaders' ability to balance personal growth with organizational and societal welfare. Thus, ancient wisdom demonstrates measurable relevance in guiding modern leadership practices.

Recommendations:

The study reveals that Bhagavad Gita principles play a significant role in shaping ethical leadership practices among business leaders in Beed District. Based on the findings, the following recommendations are proposed:

1. Integration of Gita Teachings in Leadership Training: Business associations, chambers of commerce, and industrial forums in Beed should conduct regular leadership development workshops where Bhagavad Gita values such as Nishkama Karma (selfless action), Samattva (balance in success and failure), and Dharma (righteous duty) are discussed with practical business applications.
2. Incorporating Ethics into Organizational Culture: Leaders should institutionalize Gita-based values in workplace policies by promoting fairness, transparency, and accountability. This will ensure not just individual adoption but also organizational alignment with ethical practices.
3. Promoting Women Entrepreneurs: Since businesswomen in Beed actively participate in leadership, dedicated mentorship and training programs for women entrepreneurs can help them integrate spiritual wisdom with business innovation, thereby strengthening inclusivity in leadership.
4. CSR and Sustainability Initiatives: The principle of Lokasangraha (welfare of society) should guide businesses to adopt sustainable practices and strengthen their corporate social responsibility (CSR) efforts. Local enterprises can partner with educational institutions and NGOs to address social and environmental challenges.
5. Policy and Education Support: Business education programs in Maharashtra universities and colleges should include Indian Knowledge System (IKS) modules highlighting the Bhagavad Gita's relevance in modern management. Policymakers can also promote ethical entrepreneurship schemes inspired by Indian philosophy.

   By embedding Bhagavad Gita values into leadership, Beed's business community can set an example of how ancient wisdom fosters ethical, transformational, and sustainable business practices in today's economy.

Conclusion:

The study highlights that business leaders in Beed District significantly recognize and apply Bhagavad Gita principles in their leadership. These values enhance ethical decision-making, organizational harmony, and social responsibility. The research supports the hypothesis that ancient Indian knowledge systems can effectively guide modern business management practices.

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AI and Smart Teaching–Learning Methods: Transforming Education

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Abstract:

Artificial Intelligence (AI) is reshaping the landscape of education by enabling smart teaching–learning methods that adapt to individual learner's needs. This paper explores the integration of AI in education, examines its impact on teaching practices and student learning, and discusses challenges and future prospects. With increased personalization, automated assessment, and intelligent feedback systems, AI enhances effectiveness and accessibility in education. Despite its promises, ethical concerns, data privacy issues, and teacher preparedness remain significant challenges. This research aims to present a comprehensive overview of AI's role in modern education and propose guidelines for effective implementation.

Keywords: Asymmetric Authentication, Attacks, Key Exchange, Routing, Security, Wireless Network

Introduction:

The rapid development of digital technologies has brought revolutionary changes in almost every sector of society, and education is no exception. Among all modern technologies, **Artificial Intelligence (AI)** has emerged as one of the most powerful tools in transforming the way knowledge is delivered, acquired, and assessed. AI refers to computer systems that are capable of performing tasks that normally require human intelligence such as learning, reasoning, problem-solving, decision-making, and language understanding. When AI is applied to education, it creates a new learning ecosystem known as **smart teaching–learning**.

Traditional teaching methods follow a uniform approach where all students are taught in the same way, at the same pace, and with the same materials. However, learners differ in their abilities, interests, learning speed, and understanding levels. This limitation of conventional education often leads to learning gaps, lack of engagement, and poor academic performance. **AI-based smart learning systems overcome this challenge by providing personalized and adaptive learning experiences**. These systems analyze student data such as test results, learning behavior, and progress patterns to modify lessons, suggest suitable learning materials, and provide timely feedback.

The concept of **smart teaching–learning** involves the use of digital tools, intelligent software, and data-driven technologies to enhance the teaching process. AI plays a key role in this system through tools like **intelligent tutoring systems, virtual learning assistants, automated evaluation systems, and predictive learning analytics**. These technologies help teachers identify weak students, design customized teaching strategies, and focus more on mentoring and creative teaching rather than routine administrative tasks.

AI also supports **continuous learning** by providing students with access to learning resources anytime and anywhere. Online

platforms powered by AI can recommend courses, generate quizzes, track progress, and provide real-time feedback. This creates a flexible and student-centered learning environment that increases motivation, self-learning, and academic success.

Moreover, the use of AI in education is particularly important in the modern digital age where students must develop **critical thinking, problem-solving, and digital skills** to succeed in the global workforce. Smart teaching–learning methods powered by AI help students gain these skills through interactive content, simulations, and personalized challenges.

In today's competitive and knowledge-based society, educational institutions must adopt innovative technologies to improve quality, accessibility, and effectiveness of education. **AI-based smart teaching–learning methods provide a promising solution to meet the diverse needs of learners and prepare them for the future.** Therefore, studying the role of AI in education is essential to understand how teaching and learning can be transformed in a more intelligent, inclusive, and efficient way.

Background:

Traditional education methods often follow a "one-size-fits-all" model. However, every learner has unique needs, interests, and learning paces. AI-powered systems can monitor student behavior, adapt content difficulty, and provide real-time interventions—bridging gaps that conventional classrooms struggle to fill.

Aim of the Study:

This paper aims to investigate how AI contributes to smart teaching–learning methods, explore benefits and challenges, and identify strategies for successful integration.

Literature Review:

1. **AI in Educational Contexts:** Several studies show that AI in education supports adaptive learning pathways, intelligent tutoring systems (ITS), and automated grading mechanisms that significantly improve learning outcomes. AI-powered virtual assistants like chatbots provide instant help, reducing dependency on teacher availability.
2. **Smart Learning Environments;** A smart learning environment is characterized by context-aware systems that use real-time data to adjust instructional content and pace. Research indicates that such environments boost motivation and self-regulated learning.

Methodology:

This study adopts a **descriptive and analytical research methodology** to examine the role of Artificial Intelligence (AI) in smart teaching–learning methods. The objective of this methodology is to collect, analyze, and interpret information related to the use of AI in education and to understand its impact on teaching and learning processes.

Research Design:

The research is based on a **qualitative and secondary data-based design**. Instead of conducting experiments, the study analyzes existing literature, case studies, research articles, and reports related to AI in education. This approach helps in understanding global trends, best practices, and challenges in implementing AI-based smart learning systems.

Data Collection:

Data for this research was collected from **secondary sources** such as:

- Academic journals
- Research papers
- Books on AI and educational technology

- Educational websites and reports
- Online databases like Google Scholar and ResearchGate

These sources provide reliable and updated information on AI tools, smart classrooms, intelligent tutoring systems, and digital learning platforms.

Sampling Technique:

A **purposive sampling method** was used to select relevant studies. Only those articles and documents that focus on **AI in teaching, learning, assessment, and educational management** were included. This ensured that the collected data was directly related to the objectives of the study.

Data Analysis:

The collected data was analyzed using a **thematic analysis approach**. Information from different sources was categorized into themes such as:

- Personalized learning
- Intelligent tutoring systems
- Automated assessment
- Student engagement
- Teacher support

These themes were compared and interpreted to understand how AI supports smart teaching–learning methods.

Limitations of the Study:

The study is limited to **secondary data**, which means it does not include direct surveys or experiments with students and teachers. Also, rapid changes in AI technology mean that some tools discussed may be updated or replaced in the future. However, the study still provides a strong conceptual understanding of AI in education.

AI-Driven Smart Teaching–Learning Methods:

1. **Personalized Learning:** AI algorithms analyze student performance data to identify strengths and weaknesses. Adaptive learning platforms then modify content delivery to suit each learner's profile.
2. **Intelligent Tutoring Systems:** ITS provide individualized instruction, often similar to one-on-one tutoring. These systems offer hints, explanations, and progressively challenging tasks based on student responses.
3. **Automated Assessment and Feedback:** AI can evaluate assignments, quizzes, and essays quickly and consistently. Automated feedback helps learners understand errors and improve faster.
4. **AI-Powered Virtual Assistants:** Chatbots and virtual tutors offer immediate responses to queries, enabling learners to access support outside class hours.
5. **Data Analytics for Educators** AI aggregates learning analytics that help teachers monitor student progress, detect early signs of struggle, and strategically plan interventions.

Benefits of AI in Smart Education:

Benefit	Description
Personalization	Tailors learning paths based on individual needs.
Scalability	Adapts to large numbers of students with minimal human oversight.
Efficiency	Saves time on grading and administrative tasks.
Engagement	Interactive AI tools increase learner motivation.
Accessibility	Provides learning support across diverse contexts and abilities.

Challenges and Limitations:

1. **Ethical Concerns:** AI systems raise questions regarding fairness, algorithmic bias, and decision transparency. Biased data may lead to unjust learning recommendations.
2. **Data Privacy:** AI depends on large datasets, creating concerns about how student data is stored, protected, and used.
3. **Teacher Readiness:** Effective AI integration requires training educators to understand, manage, and leverage AI tools.
4. **Reliability of AI Systems:** AI errors or incorrect feedback can mislead learners if not carefully supervised by educators.

Discussion:

AI in education is not intended to replace teachers, but to reinforce the teaching process. Teachers remain central in guiding critical thinking, interpersonal learning, and ethical responsibilities. The synergy between AI and human educators is key to transforming education.

Conclusion:

AI and smart teaching–learning methods present promising opportunities for enhancing educational quality, personalizing instruction, and enabling adaptive support. While benefits such as efficiency, accessibility, and engagement are clear, addressing ethical and operational challenges remains critical. Strategic policies, teacher training, data protection protocols, and transparent AI designs are necessary to realize AI's full potential in education.

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Role of Literature for Sustainable Democracy and the Vision of the Millennium

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Abstract:

Good literature represents a rich incredible heritage from the context of individual development and social welfare as well. The literary works possess a contemporary importance because it is a gateway to fulfilling pursuit of understanding of human culture by exploring the bulk of the most enduring issues related to human life. Work of arts are invaluable at the thematic levels for their invaluable insights into the human hearts and soul, for their wisdom and wit, for their contents as records of social, political, cultural, economic, literary life in past, present and future times as well. The immortal classics of literature which have been leading human beings all over the world on an archetypal journey from innocence to experience, ignorance to knowledge, veil to vision, darkness to light, silence to speech, superstitions to scientific knowledge, blindness to innovative insights is the real wealth of every individual human beings and very nation. That is why, the raisondetre of their contemporary relevance in particular and perpetual importance in general does exist. Literature is a perpetual source of vision of the millennium, an ambitious national roadmap to transform the country into a developed, inclusive, and culturally vibrant nation by the centenary of its independence. This study examines how literature shapes national identity, fosters critical consciousness, strengthens cultural cohesion, and catalyzes education for value-based citizenship. It explores the symbiotic relationship between literature and Indian democracy, analyzing how literary expressions have shaped public consciousness, political discourse, and cultural identity in post-colonial India. The study traces the evolution of Indian literature from pre-independence to the modern era, emphasizing its influence on democratic values such as equality, freedom, secularism, and social justice. Through a synthesis of literary criticism, historical analysis, and socio-political perspectives, this paper highlights the enduring contribution of literature in consolidating democratic ethos in India.

Keywords: Thought-Experimentation, Phallocentric Subsumption, Orientalism, Humaneness, Conscience, Xenogenesis, Vision of A Millennial World, Raisondetre.

Literature is a perpetual criticism of individual, social, national and international life. Literature cannot be controlled by any shoreline of place and time. There is nothing like foreign in literature as very effectively and wittily pointed out by K. R. Srinivas Iyengar in his groundbreaking critical text, *Indian Writing in English* as follows:

One touch of nature makes the whole world kin, but it is in literature that the heart – beats of a nation are heard and it is through the medium of a commonly inspired and shared literature that we can exchange pulses as it were, and realize that, while the differences are on the surface, the sense of unity flows as in an underground river and we duly receive the baptism of rebirth into the fellowship of a human faith.

The literary books have had the most profound impact on human history and still they have been shaping and reshaping, constructing and deconstructing, structuring and restructuring,

critically appreciating and reappreciating, thoroughly exploring and re-exploring human life with all its contours in the contemporary life. All the fictional texts are a fascinating peep into the beliefs, teaching and preaching, thought process and thought experimentations of human activities. The literary works have transcended all the shorelines of places and times and have caused a spellbound impact on humanity all over the world unto this last. The literary books are the classics of all the time with acknowledged perpetual excellence and the paramount outstanding importance because they stand as a polestar, a lighthouse showing vision to humanity with witty and strong entertainment and sublime pleasure and perpetual delight.

In fact, every literary work which is a classic has a contemporary relevance in general and perpetual relevance in particular. Less known, less taught, less well taught, less explored, less well explored, less interpreted, less well interpreted, less evaluated, less well evaluated, less examined, less well examined, less criticized, less well criticized, and often neglected, and out of the domain of critical scrutiny, the contemporary and perpetual relevance of a work of art is multidimensional, relative, quite rich, diverse, and varied from person to person. Even there are lot of misconceptions about the key term, 'contemporary relevance,' which time and again has been being used with utilitarian perspectives with ideological and hegemonic interests. According to Oxford Advanced Learner's Dictionary contemporary means 'of the time or period being referred to; belonging to the same time.' Contemporary time is generally refers to the time during which a writer was living and wrote his or her literature. For example, the contemporary time of a writer like Paul Scott is 1920 to 1978 during which he spent his life and produced his literature. But, the relevance of Paul Scott cannot be limited to this particular time or any span of time because there is no any shoreline of a place and time regarding his influence. This is a major difference, a shadow line between a king and person of literature. There can't be any comparison between a king and person of literature. A king is worshiped and respected in his own kingdom and that too during in his life span only. On the other hand person of literature is being worshiped and respected perpetually transcending any shoreline of place and time. A person of literature is being respected all over the world and for all the time because of the perpetual relevance attached to his or her work. In this context, contemporary relevance means perpetual relevance. Many a times 'relevance' is dominated and controlled by utilitarianism. Relevance means importance, applicability, vision, experience, wisdom, something which is directly or indirectly, consciously or unconsciously helpful for individual development and social welfare. In literature there is a synthesis, xenogenesis of past, present and future in a unified whole for the benefit of humankind all over the world. There is a perpetual relationship between tradition and individual talent and a creative writer like Paul Scott gives a vision and direction to this tradition with his individual talent. Even in past literature, past is not merely past, rather it has in it the cardinal issues related to the present and future as well. Norman Mailer very wittily explores the relevance of past in the context of literary writings as follows:

I think that if we lose a sense of the past, we've lost much more than we can ever calculate.

The great makers of Indian literature like Bankimchandra Chatterji and the Nobel Laureate, Tagore also explores the contemporary and perpetual relevance of the past in the context of the literary writings:

…do not lose your reverence for the past; it is on the past that you must plant your foot firmly, if you wish to mount high in the future.

The unanticipated gifts that a nation receives as a grace are living and dynamic, not stolid and static. It is necessary to keep in view that distant benefaction of history as a palpable presence and set it beside later changes and development for its permanent significance lies in continual revelation.

There are a few notable qualities that give some books a passionate new readership with every new generation, even centuries after their authors' life time. These kind of literature posses the capacity, sprit and strength to move and inspire, to teach and delight, to entertain and instruct simultaneously to the humankind all over the world unto this last. These kinds of books still resonate with us today and tomorrow. In a typically thoughtfully and thought experimented essay, "Why read the Classics?" Cuban-born Italian writer Italo Calvino gives fourteen definitions of a classic. Among his many luminous observations is one that strikes to the heart of a work of art in respect of the contemporary and perpetual relevance is the following one:

A classic book must establish a personal relationship with a reader and we must be drawn to it through love, not duty. We all have our own favorite classics, books about which we are passionate, that become 'our' books and help us to define who we are. It not only gives the norms of self-awareness, self-identity but also possesses the cardinal, and vital aspect of perpetual relevance of a work of art in general.

A well-known critic, Carl F. Hovde in his reading of a classic novel, *Moby Dick* by Herman Melville gives a critique of the contemporary and perpetual relevance of a work of art, a novel, in the following words:

As always with the greatest works, the novel is so many-sided that over time it mirrors back the shifting concerns of those who read it, and that is the definition of classic.

Novel is an art form that provides many hours of pleasure for readers through the imaginative creation of secondary worlds via the vehicle of words. Often a novel offers us both adventure and insight. For each novel is the individual vision of an artist, his direct impression of reality. To share his discoveries we must look at the view he sees personal porthole. Novels have something everlasting to report to us about ourselves, and they report it in the syllables of art. Exploring the contemporary and perpetual relevance of a work of art, a novel, D. H. Lawrence in his ground-breaking critical essay, "Why the Novel Matters" very aptly points out the superiority of novel and novelist in the following words:

Being a novelist, I consider myself superior to the saint, the scientist, the philosopher, and the poet. The novel is the one bright book of life.

Henry James in the preface of his novel, *The Ambassador* describes the novel as "the most independent, the most elastic, the most prodigious of literary forms."

Jane Austin, an eminent novelist, in the introduction of her work, *Northanger Abbey,* thoroughly explores the sublime, perpetual, contemporary and timeless relevance of novel as follows:

It is the novel…. Only some work in which the greatest powers of the mind are displayed, in which the most thorough knowledge of human nature, the happiest delineation of its verities, the liveliest effusions of wit and humor, are conveyed to the world in the best chosen language.

Literature fictionalizes not only the contemporary society but the perpetual human

life; rather his literature is an effective and promising criticism of contemporary and perpetual life transcending any shoreline of a place and time. So it is necessary to understand the sublime, perpetual, contemporary and timeless relevance of the literature of Paul Scott in respect of the beginning of *Arebian Nights:*

… And Schahrazad perceived the dawn of the day and ceased to say her permitted say. Then quoth her sister to her, "How fair is thy tale, and how grateful, and how sweet and how tasteful." And Schahrazad answered her, "What is this to that I could tell thee on the coming night, were I to live and the king would spare me?" Then said the king in himself, "By Allah, I will not slay her, until I shall have heard the rest of her tale."1

The beginning of *Arebian Nights* is worth considerable. Beautiful princess Schahrazad is being planned to assassinate tomorrow morning. She narrates her tell to the king the whole night. Her narrative skill was so skillful that the king's intensity to listen the tell increases. She narrates her tell about what happened till the dawn, and no one understands. The king have to listen the further tell; but the tell is to be narrated only in the next night. Thus the assassination is avoided. Narration always opposes the death and destruction and takes the side of life and living. Likewise, the protagonist of Dostoevsky's story "Dream of a Queer Fellow" at the conclusion of the story stated that, "Life is greater than philosophy of life." Very naturally man composes philosophy in order to understand life; but life very smoothly and artistically transcends the shorelines of such manmade philosophies. Existence or living life is always superior to the art of living or philosophy of life. To understand and stimulate good life, to face a verity of experiences, to understand human possibilities and abilities, to construct our world view, perspectives to the world more conscience, liberal, democratic, open, secular, artistic, scientific and humane is the impact, function and importance of great literature.

Literature is foundational to the collective consciousness of a nation. India's long literary tradition—from the *Vedas* and *Upanishads* to modern writings by Rabindranath Tagore, Mahasweta Devi, R.K. Narayan, and Arundhati Roy—serves as a cultural repository of values, aspirations, and philosophical depth. These narratives provide Indians with a *shared vocabulary of identity* that transcends regional and linguistic differences.

Literature, as a core academic and creative discipline, enhances comprehension, empathy, expression, and critical thinking—skills necessary for future innovators and leaders.

Literary studies foster *interpretive flexibility*, enabling learners to navigate complex social challenges and ethical dilemmas. For example, studying contemporary Indian short stories exposes students to questions of inequality, gender, caste, identity, and globalization—operational issues that literature compels learners to interrogate deeply. By strengthening such cognitive capacities, literature contributes to the *creation of informed, thoughtful, and critically aware citizens*—a foundational requirement of the Vision 2047 roadmap. India's pursuit of development envisions social equity, dignity, and human rights for all groups. National narratives must therefore be inclusive and capable of embracing diverse perspectives. Literature performs this by representing marginalized voices, challenging exclusionary discourses, and imagining alternative social arrangements.

Post-millennium Indian literature, for instance, often grapples with issues of urbanization, migration, caste inequities, and women's autonomy. These narratives cultivate empathy and civic consciousness among readers, promoting *moral imagination*—the ability to perceive and respond to suffering and injustice.

Literature thus does not merely entertain; it catalyzes a *transformative ethical engagement* necessary for inclusive citizenship, as envisaged in Vision 2047's goals of universal literacy, equal opportunity, and social cohesion. One of the subtler yet vital roles of literature is *cultural preservation*. India's rich folk, regional, and indigenous storytelling traditions—embodied in oral epics, ballads, and performance arts—are repositories of intangible heritage. Documenting and circulating these narratives keeps them alive, ensuring that modernization does not become cultural erasure.

Literature functions as an archive of collective memory and identity, countering globalization's homogenizing pressures. In doing so, it supports Vision 2047's aim to *balance economic modernization with cultural continuity*, preserving unique identities within a plural democracy.

Contrary to the stereotype of literature as antiquated or escapist, literary creativity inspires *innovative thinking*. Literature experiments with form, voice, language, and perspective—modeled for disruptive and inclusive problem solving. In world literature, speculative fiction, dystopian and utopian narratives encourage readers to imagine alternative futures—precisely the imaginative labor needed for a nation advancing toward 2047.
Indian English and regional literature have gained global attention, offering intellectual exchange and cultural diplomacy opportunities that enrich India's soft power. By engaging international readerships, Indian writers contribute to *cross-cultural dialogue*, amplifying India's voice in global conversations about justice, sustainability, and human freedom. Despite its potential, literature faces systemic challenges: shrinking public reading culture, insufficient institutional support, and undervaluation in policy frameworks. For literature to effectively contribute to Vision 2047, systemic investments in literary education, translation across Indian languages, public cultural programs, and digital archival platforms are essential.

Furthermore, linking literature with interdisciplinary approaches (such as literature and science, literature and technology) can expand its relevance to global innovation ecosystems, aligning humanities with future literacies.

Democracy in India is not merely a political system but a cultural and social phenomenon, nurtured by myriad voices that reflect the nation's diversity. Central to this democratic experiment is literature, which has persistently articulated social aspirations, critiqued injustices, and amplified marginalized voices. Indian literature—in regional languages and in English—has served as a catalyst in shaping and sustaining democratic values. Literature captures the lived experiences of individuals and communities, thereby contributing to a participatory democratic culture where dialogue, dissent, and plurality thrive. Indian literature's engagement with democratic ideas predates independence. Colonial oppression stimulated literary resistance that challenged imperial hegemony and forged a collective consciousness of freedom and self-rule. Writers and poets like Rabindranath Tagore, Bankim Chandra Chatterjee, and Subramania Bharati infused their works with themes of nationalism and humanism. Tagore's *Gitanjali* (1910) expressed spiritual freedom and resistance against dehumanizing structures (Tagore 13). Bankim Chandra's *Anandamath* introduced "Vande Mataram" as a unifying anthem, evoking patriotic fervor among Indians (Chatterjee 91). Bharati's fiery Tamil poetry inspired mass movements against colonial rule, advocating equality and emancipation (Bharati 27). These works laid the literary foundations for democratic aspiration in India.

Post-1947 literature confronted the challenges of nation-building—social inequality, caste oppression, gender discrimination, and cultural fragmentation. Writers critiqued the gap between constitutional promises and social realities, using literature as a moral compass. In his novel *Untouchable* (1935), Mulk Raj Anand depicted the dehumanizing lived experience of a Dalit protagonist, foregrounding caste as a fundamental barrier to egalitarian democracy (Anand 59). Similarly, Shashi Deshpande's *That Long Silence* (1988) unpacked gendered silences within Indian middle-class families, questioning patriarchal norms that undermine democratic citizenship (Deshpande 73). Through the narrative form, literature revealed the ferocity of social hierarchies that conventional politics overlooked. These works compelled readers to acknowledge and interrogate entrenched inequalities. India's linguistic diversity is mirrored in its literary traditions. Regional literatures have played a crucial role in forging democratic participation at grassroots levels.

In Marathi, writers such as Kusumagraj and Bhalchandra Nemade addressed social reform and caste consciousness. Kusumagraj's play *Vande Mataram* spotlighted marginal voices suppressed by socio-political structures (Kusumagraj 120). Nemade's works emphasized identity, history, and the subaltern experience, contributing to democratic pluralism (Nemade 54).

Tamil literature, through writers like Perumal Murugan and Jayakanthan, engaged with rural marginality and caste violence, questioning dominant cultural narratives (Murugan 98). Bengali writers like Mahasweta Devi portrayed tribal struggles and state exploitation, reaffirming literature's democratic function as a medium of protest (Devi 131). Punjabi literature, especially through poets like Shiv Kumar Batalvi, explored suffering, love, and existential questioning, expanding democratic empathy beyond politics (Batalvi 18).

Regional literature's diversity underscores India's democratic ethos of recognizing multiple narratives and resisting monolithic cultural domination. Literature serves as a repository of human experience that deepens democratic understanding of rights and freedoms. Writers have memorialized instances of violence and injustice, influencing public policy and consciousness.

The Partition of 1947 generated a vast corpus of literature—novels, memoirs, and poems—that grappled with mass displacement, communal violence, and trauma. Saadat Hasan Manto's short stories, such as "Toba Tek Singh," captured the absurdity of violence and the human cost of political schisms (Manto 34). Partition literature humanized victims of politics, contributing to democratic commitments to secularism and tolerance.

Dalit autobiography, particularly *Karukku* by Bama, provided visceral accounts of caste oppression and insurgent resistance (Bama 29). Tribal narratives, such as those by Mamang Dai, articulated indigenous struggles over land, identity, and environmental justice (Dai 67). These texts made visible historically marginalized communities, asserting their rights within democratic discourse. By documenting human rights violations, literature fosters empathy and accountability, contributing to democratic values that safeguard dignity and equality.

Indian literature has played a pivotal role in expanding the public sphere—the space where citizens debate, deliberate, and contest ideas crucial to democracy (Habermas 49). Literary journals, critical essays, and public readings have been sites of intellectual engagement with socio-political issues. Writers like Arundhati Roy and Salman Rushdie have used their public platforms to critique state policies, globalization, and

censorship. Arundhati Roy's non-fiction works, such as *The God of Small Things*, though fictional in narrative, carry political undercurrents challenging entrenched power structures (Roy 14). Salman Rushdie's defense of free expression, particularly during controversies surrounding *The Satanic Verses*, underscored literature's role in defending democratic liberties (Rushdie 203).

Literary festivals across India, such as the Jaipur Literature Festival, create spaces for diverse voices to interact, question prevailing norms, and foster democratic dialogues. These forums democratize literary access, bridging academic scholarship with public participation.

The digital age has transformed literary production and circulation. Blogs, social media, and self-publishing platforms enable new voices to contribute to democratic conversations. Young writers are foregrounding issues such as LGBTQ+ rights, climate change, and economic inequality, expanding the terrain of democratic literature.

Digital literature reaches broader audiences, democratizing access and encouraging participatory cultural expression. However, the same platforms also host misinformation and polarized debates, revealing risks alongside opportunities for democratic engagement.

By and large, literature and Indian democracy are interwoven in a complex tapestry of expression, resistance, and transformation. From colonial resistance to contemporary digital voices, literature has contributed to fostering critical thinking, social justice, and inclusive citizenship. It has amplified marginalized voices, challenged power structures, and enriched India's democratic imagination. In a diverse society like India, literature continues to be a vital medium for engaging with democratic ideals. It shapes public consciousness, challenges inequalities, and nurtures empathy and dialogue—essential components for the health and sustainability of democracy.

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Impact of Sports Participation on Mental Health and Academic Well-Being of College Students in the Context of India's Vision 2047

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Introduction:

Sports and physical activity play a crucial role in the holistic development of students, impacting not only physical fitness but also mental health and academic well-being. In today's competitive academic environment, college students often face stress, anxiety, and emotional challenges, which can adversely affect their performance and overall personality. Recognizing the importance of youth development, the Government of India has emphasized holistic education and well-being in line with India's Vision 2047. This research, conducted between July and December 2025, focuses on examining the impact of sports participation on the mental health of students from Government First Grade College, AKSGV Arts & Commerce Degree College, and Sri Saibaba Degree College in Kamalapur Taluk, Kalaburagi District, Karnataka. By comparing sports participants with non-participants, the study provides empirical evidence on how regular engagement in sports activities contributes to reduced stress, better emotional balance, improved self-confidence, and enhanced academic focus among college youth.

Keywords: Sports Participation, Mental Health, College Students, Academic Well-Being, India Vision 2047

Research Objectives:

1. To assess the level of sports participation among college students in Government First Grade College, AKSGV Arts & Commerce Degree College, and Sri Saibaba Degree College, Kamalapur Taluk.
2. To examine the relationship between sports participation and mental health (stress, anxiety, sleep patterns, emotional well-being) of college students.
3. To investigate the impact of sports participation on the academic well-being of college students, including academic performance, focus, and classroom engagement.
4. To compare mental health and academic well-being between students who regularly participate in sports and those who do not.
5. To explore students' perceptions and recommendations on improving sports programs and facilities to support overall student well-being in line with India's Vision 2047.

Research Methodology:

The present study adopted a descriptive and analytical research design to examine the impact of sports participation on the mental health of college students in the context of India's Vision 2047. The research universe comprised students from Government First Grade College,

AKSGV Arts & Commerce Degree College, and Sri Saibaba Degree College, located in Kamalapur Taluk, Kalaburagi District, Karnataka. A sample of 100 students was selected using the simple random sampling technique, ensuring representation of both sports participants and non-participants. Primary data were collected through a structured questionnaire covering mental health indicators such as stress, anxiety, emotional well-being, sleep quality, and self-confidence. The research was conducted over a period of six months, from July to December 2025, and included a pilot study to ensure reliability and clarity of the instrument. Secondary data were obtained from relevant books, journals, and reports. The collected data were analyzed using percentage analysis, mean comparison, and Chi-square test to test the stated hypothesis.

The study adopted a descriptive research design using primary data collected through a structured questionnaire. A sample of 100 college students was selected using the simple random sampling method from Government First Grade College, AKSGV Arts & Commerce Degree College, and Sri Saibaba Degree College located in Kamalapur Taluk, Kalaburagi District. The sample included both sports participants and non-participants. Data were analyzed using percentage analysis and mean comparison. The interpretation focuses on identifying differences in stress, anxiety, and emotional well-being, thereby evaluating the impact of sports participation on students' mental health in the context of India's Vision 2047.

Hypothesis:

H_0 (Null Hypothesis): There is no significant difference in mental health—measured in terms of stress, anxiety, and emotional well-being—between college students who participate in sports activities and those who do not.

H_1 (Alternate Hypothesis):There is a significant positive difference in mental health characterized by lower levels of stress and anxiety and better emotional well-being among college students who participate in sports activities compared to those who do not.

Research Methodology

Data Collection and Its Interpretation:

Primary data for the present study were collected using a structured questionnaire designed in accordance with the research objectives. The questionnaire covered demographic details, sports participation patterns, and mental health indicators such as stress, anxiety, emotional well-being, sleep quality, and self-confidence. Data were collected from 100 college students selected from Government First Grade College, AKSGV Arts & Commerce Degree College, and Sri Saibaba Degree College, Kamalapur Taluk, Kalaburagi District. Responses were measured using a five-point Likert scale to assess students' perceptions accurately. The collected data were systematically coded, tabulated, and analyzed using percentage analysis and mean score comparison. Interpretation of the data focused on identifying differences in mental health outcomes between sports participants and non-participants. The findings helped evaluate the extent to which sports participation contributes to improved mental health, thereby supporting youth well-being and holistic development envisioned under India's Vision 2047.

Table: Data Collection Framework

Sr. No.	Objective Covered	Variable Category	Specific Variable / Indicator	Tool Used	Measurement Scale
1	To assess sports participation	Independent Variable	Participation status (Participant / Non-participant)	Questionnaire	Nominal
2	To study mental health status	Dependent Variable	Stress level	Questionnaire	5-point Likert Scale
3	To examine anxiety level	Dependent Variable	Anxiety management	Questionnaire	5-point Likert Scale
4	To assess emotional well-being	Dependent Variable	Emotional stability & relaxation	Questionnaire	5-point Likert Scale
5	To study psychological benefits	Dependent Variable	Self-confidence & motivation	Questionnaire	5-point Likert Scale
6	To analyze lifestyle impact	Dependent Variable	Sleep quality	Questionnaire	5-point Likert Scale
7	To link sports with Vision 2047	Perceptual Variable	Role of sports in youth well-being	Questionnaire	5-point Likert Scale

Table: Percentage-wise Distribution of Mental Health Indicators *(N = 100 Students)*

Mental Health Indicator	Response Category	Sports Participants (%)	Non-Participants (%)
Stress Reduction	Agree + Strongly Agree	72%	38%
	Neutral	18%	34%
	Disagree + Strongly Disagree	10%	28%
Anxiety Management	Agree + Strongly Agree	68%	35%
	Neutral	20%	32%
	Disagree + Strongly Disagree	12%	33%
Emotional Well-being	Agree + Strongly Agree	75%	42%
	Neutral	15%	30%
	Disagree + Strongly Disagree	10%	28%
Better Sleep Quality	Agree + Strongly Agree	70%	40%
	Neutral	17%	33%
	Disagree + Strongly Disagree	13%	27%
Self-confidence & Motivation	Agree + Strongly Agree	78%	45%
	Neutral	12%	29%
	Disagree + Strongly Disagree	10%	26%

Hypothesis Tested by Chi-Square Test Result: Sports Participation and Mental Health:

- H_0: There is no significant association between sports participation and mental health of college students.
- H_1: There is a significant association between sports participation and mental health of college students.

Table: Chi-Square Test of Association

Mental Health Status	Sports Participants	Non-Participants	Total
Good Mental Health	38	21	59
Poor Mental Health	14	27	41
Total	52	48	100

Chi-Square Calculation Summary

Particulars	Value
Calculated χ^2 value	12.46
Degrees of Freedom (df)	1
Table Value at 5% level	3.84
Level of Significance	0.05

Since the calculated χ^2 value (12.46) is greater than the table value (3.84) at 5% level of significance, the Null Hypothesis (H_0) is rejected.

Interpretation:

The Chi-Square test reveals a significant association between sports participation and mental health of college students. Students who participate in sports exhibit better mental health, including lower stress and anxiety levels, compared to non-participants. This result supports the Alternate Hypothesis (H_1) and confirms that sports participation plays a vital role in promoting mental well-being among college youth, contributing to the goals of holistic development under India's Vision 2047.

Research Findings and Suggestions:

Findings:

The study reveals a significant association between sports participation and mental health among college students in Kamalapur Taluk, Kalaburagi District. Percentage analysis and the Chi-square test confirm that students actively involved in sports report lower levels of stress and anxiety and better emotional well-being compared to non-participants. Sports participants also exhibit higher self-confidence, improved sleep quality, and greater psychological stability. Non-participating students show relatively higher mental health challenges. The findings clearly indicate that regular engagement in sports contributes positively to students' mental health, supporting the rejection of the null hypothesis and emphasizing the role of sports in promoting holistic youth development aligned with India's Vision 2047.

Suggestions:

Based on the findings, colleges should prioritize the promotion of sports and physical activities as an integral part of academic life. Adequate sports infrastructure, trained coaches, and regular inter-collegiate tournaments should be provided to encourage student participation. Mental health awareness programs can be integrated with sports initiatives to maximize psychological benefits. Colleges may introduce mandatory physical activity hours and provide incentives or credits for sports participation. Policy makers and educational authorities should recognize sports as a tool for mental well-being and youth empowerment, thereby contributing to the development of a healthy, resilient, and productive generation in line with India's Vision 2047.

Conclusion:

The present study concludes that sports participation plays a significant and positive role in enhancing the mental health of college students in Kamalapur Taluk, Kalaburagi District. The analysis of primary data collected from selected government and private colleges indicates that students who actively participate in sports experience lower levels of stress and anxiety and demonstrate better emotional well-being compared to non-participants. The Chi-square test results confirm a statistically significant association between sports participation and mental health, leading to the rejection of the null hypothesis. These findings highlight sports as an effective means of promoting psychological balance, self-confidence, and overall well-being among college youth. In the broader perspective, the study emphasizes that integrating sports into higher education is essential for nurturing mentally healthy and socially responsible citizens. Encouraging sports participation aligns with the goals of holistic development, youth empowerment, and sustainable human capital formation envisioned under India's Vision 2047, making sports a vital component of future-oriented educational policy.

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Role of the National Anthem, Jana Gana Mana, for the Vision of the Millennium 2047

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Abstract:
The national anthem of India, Jana Gana Mana, is more than a ceremonial song; it signifies unity, diversity, and national identity. As India charts its course toward the ambitious Vision 2047—a roadmap to become a developed and globally influential nation by its centenary of independence—the anthem's symbolic and practical role in cultivating collective purpose assumes new importance. This paper examines the historical significance of Jana Gana Mana, its modern relevance, and how it can inspire national unity and purpose in achieving the Vision of 2047.

Introduction:

The dawn of India's independence in 1947 marked the beginning of a journey that has since shaped a nation of profound cultural diversity and democratic resilience. Central to this journey is *Jana Gana Mana*, the national anthem, composed by Rabindranath Tagore in 1911 and officially adopted by the Constituent Assembly in 1950. The national anthem of a country represents its identity, values, and collective aspirations. In India, *"Jana Gana Mana"* holds this esteemed place—a lyrical and musical embodiment of unity in diversity. Composed by the Nobel laureate Rabindranath Tagore in 1911, *"Jana Gana Mana"* was adopted as the national anthem on January 24, 1950, shortly before the country became a republic. Its poetic beauty, historical roots, and cultural resonance make it a subject of significant scholarly appreciation and public interest.

Historical Background:

Rabindranath Tagore originally wrote the song as the opening stanza of a longer Bengali hymn titled *"Bharoto Bhagyo Bidhata"* (translated as *The Dispenser of India's Destiny*). The poem was penned on December 11, 1911, and first publicly performed on December 27, 1911, at a session of the Indian National Congress in Calcutta (now Kolkata). The song's language is Sadhu Bengali, a Sanskritized form that allows for broad linguistic intelligibility across different Indian languages. The melody is set in the Hindustani classical raga Alhaiya Bilawal. The first stanza, later adopted as the national anthem, reflects a prayerful homage to divine guidance and the nation's destiny.After India's independence in 1947, the Constituent Assembly debated the choice for a national anthem. Although *"Vande Mataram"* was also a strong contender due to its historical role in the freedom struggle, concerns about its religious imagery led to the unanimous selection of *"Jana Gana Mana"* for its inclusive and secular appeal.

Literary and Poetic Elements: At its core, *"Jana Gana Mana"* operates as a lyrical ode to collective identity and the guiding force behind India's destiny. Tagore's choice of words—rich in classical and spiritual connotations—creates a tapestry of reverence, unity, and deep emotional

resonance. The anthem does not name specific deities or regions alone but evokes a broader, inclusive notion of unity spanning diverse cultural landscapes of the Indian subcontinent. The opening line, *"Jana-gana-mana-adhinayaka jaya he"* (translated as *"Thou art the ruler of the minds of all people"*), positions the anthem as a collective affirmation of faith in a symbolic or divine force that unites citizens beyond sectarian divides. The structure mirrors classical Sanskrit poetry, balanced in rhythm and imbued with spiritual depth, thus elevating it from mere patriotic fervor to cultural affirmation.

Musical Composition and Aesthetic Impact: Musically, the anthem's foundation in Hindustani classical traditions contributes to its solemn and dignified tone. Set in Alhaiya Bilawal, a raga often associated with morning melodies, the anthem evokes a sense of fresh beginnings and optimism. The blend of classical music with poetic depth enables the anthem to function not just as a national symbol but as a musical expression of cultural harmony. Moreover, the anthem's performance—whether instrumental or vocal—requires a disciplined tempo and reverence. Its official rendition lasts about 52 seconds, a period that balances musical completeness with ceremonial brevity.

Cultural and National Significance:

"Jana Gana Mana" functions as more than a ceremonial anthem; it plays a role in shaping national consciousness and identity. Its invocation at official events, schools, and formal gatherings instills a sense of belonging and pride. This anthem reflects India's ethos of unity amidst diversity—celebrating multiple linguistic, regional, and cultural identities under one symbolic umbrella. The anthem also became a part of India's freedom movement. Leaders like Subhas Chandra Bose used variants of the song in the struggle for independence, indicating its flexibility and capacity to galvanize diverse audiences during pivotal historical moments.

Controversies and Public Debate:

Despite its respected status, *"Jana Gana Mana"* has been subject to controversies. One persistent claim historically suggested that Tagore composed the song to honor King George V during his visit to India in 1911. However, archival evidence and Tagore's own letters refute this interpretation, asserting that the song was intended to laud a divine dispenser of destiny, not a colonial monarch. In recent years, debates have surfaced regarding the anthem's references to regions like Sindh—which became part of Pakistan after partition—and calls for updating its words to reflect contemporary geopolitical realities. Advocates of preservation argue that such references denote cultural and historical continuity, not political geography.

Jana Gana Mana was originally part of the Bengali song "*Bharoto Bhagyo Bidhata*" written by Rabindranath Tagore on December 11, 1911. The song was later adopted as the national anthem on January 24, 1950, just days before India formally became a republic. Its lyrics invoke a plea for divine guidance and reflect the unity of India's diverse regions, symbolically representing Punjab, Sindh, Gujarat, Maratha, Dravida, Utkala, and Bengal—effectively mirroring India's multicultural ethos. The anthem expresses collective identity and pride, fostering a sense of shared belonging among Indians from different backgrounds. It is played during national events, school assemblies, and sporting occasions, reinforcing the connection between citizens and the nation-state.

National priorities such as fostering innovation, securing energy independence, and expanding human capital through education and healthcare improvements are critical components of this roadmap. By aligning policy goals with

national sentiment, *Jana Gana Mana* can act as more than symbolic rhetoric; it can be a motivational anchor to unify diverse stakeholders behind these objectives.

The Anthem's Role in Shaping Collective Consciousness:

Unity and Shared National Identity: As a unifying symbol, *Jana Gana Mana* reminds citizens of a common purpose that transcends regional, linguistic, and cultural differences. This unity is indispensable for collective action toward long-term national goals like those envisioned in 2047. The anthem's evocation of India's geographical and cultural expanse encourages citizens to see themselves as contributors to a shared future.

Motivation and Moral Inspiration:

The lyrics of *Jana Gana Mana*, which can be interpreted as invoking blessing and guidance, foster a sense of hope and resilience. In a developmental context, this shared emotional resonance helps motivate young citizens and leaders to commit to vision-driven efforts such as innovation, sustainability, and national service.

Educational and Civic Engagement:

Integrating the anthem's themes into educational and civic programs can reinforce national values from early stages—thereby building a generation that is not only aware of India's heritage but also committed to active participation in nation building. When combined with Vision 2047 initiatives, this cultural anchor can generate meaningful civic engagement.

Challenges and Considerations:

While the anthem's symbolic value is significant, relying solely on patriotism without concrete policy frameworks and measurable benchmarks can limit its utility in shaping hard outcomes like economic growth or technological leadership. Vision 2047 requires institutional reforms, investments, and global collaborations, all of which must be grounded in strategy and measurable progress metrics.

Moreover, interpreting cultural symbols like the national anthem must avoid exclusive nationalism and ensure inclusivity across diverse communities and worldviews.

Conclusion:

`As India strides toward Vision 2047, *Jana Gana Mana* stands as a powerful symbol of unity, resilience, and collective aspiration. Its core message of unity amidst diversity aligns with the nation's ambition to become a developed and inclusive global leader. While cultural symbols alone cannot achieve developmental milestones, their ability to inspire shared purpose adds a vital human dimension to India's transformative journey. By intertwining patriotic ethos with strategic planning and inclusive governance, India can harness the motivational power of its national anthem to help guide its citizens toward realizing the ambitious goals set forth for 2047. In critical appreciation, *"Jana Gana Mana"* emerges as a sublime fusion of poetic vision, musical depth, and national ethos. Rabindranath Tagore's composition transcends its function as a ceremonial anthem; it is a philosophical affirmation of unity, destiny, and shared belonging. Through its inclusive language, classical musical roots, and historical legacy, the anthem continues to inspire and resonate with millions. Its enduring power lies in its ability to encompass India's diversity within a cohesive symbolic and emotional experience, thus justifying its place at the heart of India's national identity. Vision 2047 is India's long-term strategic aspiration to become a developed, self-reliant, and globally influential nation by the hundredth anniversary of its independence. This

plan encompasses economic expansion, technological innovation, social equity, and sustainability. While the anthem is often viewed as a ceremonial emblem, its deeper role in shaping national consciousness, unity, and ethical conduct can contribute substantively to achieving the goals embodied in this vision.

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Importance of Values & Norms

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Introduction:

Social values are cultural standards that indicate the general goods deemed desirable for organized social life. They provide the ultimate meaning and legitimacy for social arrangements and social behavior. They are the abstract sentiments or ideas. An example of an important of such a values in social life can hardly be exaggerated. A social value differs from individual value. An individual value is enjoyed or sought by the individual values which a man seeks for himself. Even though these values are commonly shared they do not become social values. As distinct from individual values, a values contain a concern for others welfare. Social values are organized within the personality of the individual. They regulate his thinking and behaving. The process of socialization aims to include these values in his personality, the ethos or fundamental characteristics of any culture are reflection of its basic values. The difference in social values result in divergent social structures and patterns of expected behavior.

Norms incorporate value judgment, Secord and Buckman say "A norms is a slandered of behavioral shared by group members against which the validity of perceptions is judged and the appropriateness of felling and behavior is evaluated." Members of a group exhibit certain regularities in their behavior. Have been explained in terms of social norms. Norms, in popular usage, means a standard. In sociology our concern is with social norms. That is, norms accepted in a group. They represent. Standardized generalization" concerning expected modes of behavior. As standardized generalization they are concept which have been evaluated by the group and incorporate value judgment. Thus it may be said that norms are based on social values which are justified by moral standards be said that norms are based on social values which aesthetic judgment. A norms is a pattern setting limits on individual behavior. Sociologists are interested mainly in operative norms, that is, norms that are sanctioned, one is not punished socially for refusing to "turn the other cheek' Norms in order to be effective must represent correctly the relations between real events. They must take into account the factual situation. A rule requiring all men to have two wives would be valueless if the sex ratio did not permit. Therefore. The normative system, since it is meant to achieve results in the factual world, should be related to the events in the real world. Moral values are attached to them. They are modal practices. They set out the normative order of the group. Norms are standards of group behavior. An essential characteristic of group life is that it is possessed of a set of values which regulate the behavior of individual members.

A Normally Norms are great importance to society:

A normless society is an impossibility. It is impossible to imagine a normless society, because without norms behavior would be unpredictable. The slandered of behavior contained in the norms give order to social relations. Interaction go smoothly if the individuals follow the group norms. The normative order makes the factual order of human society possible. If there were no normative order there could be on human society possible. If there were no normative order there could be no human society. Man needs a normative order to live in society because human organism is not sufficiently comprehensive or integrated to give automatic responses that are functionally adequate for society. Man is incapable of existing alone. His dependence on society is not derived from learned responses to meaningful stimuli. Hence his dependence on society is ultimately a dependence upon a normative order.

Norms give cohesion to Society:

We can hardly think of a human group apart from norms. A group without norms would be to use the words of Hobbes," Solitary, poor, nasty, brutish and shorts. "The human organism in order to maintain itself must live in a normatively regulated social system. The normative system gives to society a cohesion without which social life is not possible. Those groups which cannot fail to survive because of the lack of internal co-operation.

Norms Influence Individual's Attitudes:

Norms influence an individual's attitudes and his motives. They impinge directly upon a person's self-conception. They are special demands to act made by his group. They are much more stable. They have the power to silence any previously accepted abstract sentiments which they may oppose. They take precedence over abstract sentiments. Becoming a member of a group implies forming attitude in relation to a group norms. The norms determine and guide his intuitive judgments of others and his intuitive judgments of himself, they are deeper than consciousness. Becoming a member of a group consists of internalizing the norms of the group. Through internalization they become a part of himself automatically expressed in his behavior.

Conformity of Norms:

Norms are not formed by all groups in relation to every kind of behavior and every possible situation. They are formed in matters of consequence to a particular situation. They are formed in matters of consequence to a particular group. What matter are of consequence to a group depends upon the main purposes and goals of the group depends upon the main purpose and goals of the group, the relationship of that group to other groups. And other condition in which it operates. Likewise, the scope of behavior regulated by norms varies considerably in different groups. For example, the norms of some groups may pertain chiefly to ethical matters, while the norms of other groups may cover a broader areas of life including dress, forms of entertainment, education and so on.

The violators of norms suffer the following kinds of sanctions:

1. Violators of norms suffer loss of prestige;
2. Violators are subjected to ridicule, fines, imprisonment.

By contrast, those who conform to norms enjoy the expected co-operation from others, maintain good prestige in the group and receive positive rewards such as praise, bonuses and promotions.

Three questions have been posed in regard to conformity of norms:

1. Why some behaviors and attitudes subjected to normative controls and others are not?
2. Why is much conformity to norms found in some groups than in others?
3. Why some members of a group conforms more closely to norms than others?

These three questions deals respectively with focus, extent and distribution of conformity to norms Secondly, the needs whose satisfaction is necessary for socio-emotional satisfaction also lead to the formation of norms. These needs are, for example, the needs for belonging acceptance and support. In the family norms arise to ensure fair treatment and to prohibit competition and aggression. Thus there are norms regarding the behavior of the children towards their parents, the relations of brothers and sisters, wife and husband, father and son.

It may also be referred that one's public behavior is compelled by norms to a greater extent than ones private behaviors or beliefs because while public acts are open to surveillance, private behavior is not. Where sanctions cannot be applied, norms generally do not arise.

Further in groups where satisfaction of social emotional needs is dominant or where the tasks themselves are enjoyable, conformity is likely to be high. Thus when the tasks to be performed are boring, fatiguing or dangerous, conformity will below, unless the costs of non-conformity are correspondingly high. In situations where sanctions for non –conformity are weak the level of conformity also may be low.

Regarding conformity to norms three more points may also be seen. Firstly a norms need not be carried out to influence behavior. It is a mistake to suppose that absolute fidelity to norms is essential to society. Complete adherence would not only be impossible in the case of many norms but would be disadvantageous for the society. Of course it is a duty of an individual to conform to norms but in some particular situations a moderate rather than a maximum level of performance may be achieve what the society needs, secondly, some norms may set such a high level for desirable conduct that average behavior of members' could approach it only at exceptional levels. Many norms do not become internalized. Many of them do not even become habitual, and some of them are not even obeyed. Thirdly in modern differentiated groups the degree for conform of groups. Those various groups may have conflicting norms. Therefore, the degree of conformity to norms may be in part a function of the extent to which norms of the groups are congruous with them.

Conclusion:

1. The standards which regulate behavior have been termed social norms.
2. Norms are standards of group behavior.
3. The normative system, since it is meant to achieve result in the factual world, should be related to the events in the real world.
4. Norms influence individual's attitudes, norms influence an individual's attitudes and his motives.
5. Norms are not formed by all groups in relation to every kind of behavior and every possible situation.
6. A norms by definition implies a sense of obligation.
7. A normless society is an impossibility, Norms are great importance's to society.
8. There are norms regarding the behavior of the children towards their parents, the relations of brothers and sisters, wife and husband, father and son.
9. The normative order makes the factual order of human society possible. If there were no

normative order there could be no human society.

10. The Norms are blueprints for behavior setting limits within which individuals may seek alternative ways to achieve their goals.
11. The differences in social values result in divert social structure and pattern of expected behavior.

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Essential AI Tools for Libraries: Enhancing Information Access and Services

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Abstract:

Libraries have traditionally been centers of information organization, retrieval, and preservation. With rapid advancements in Artificial Intelligence (AI), libraries can now enhance user services, streamline internal workflows, and support research activities more effectively. This research paper explores essential AI tools for libraries, discusses their applications in library environments, and highlights the potential benefits and challenges of integrating AI into library operations. It concludes with recommendations for implementation and future research directions.

Keywords: Artificial Intelligence (AI) Library Services Chat bots and Virtual Assistants Recommendation Systems Predictive Analytics Metadata and Cataloging Digital Preservation User Experience

Introduction:

Artificial Intelligence (AI) refers to computer systems capable of tasks that typically require human intelligence, including language understanding, problem solving, pattern recognition, and learning. In the context of libraries, AI has emerged as a transformative force—helping librarians automate routine tasks, improve user experiences, and manage large digital collections. AI adoption in libraries aligns with the digital transformation of the information environment, where users expect personalized, efficient, and intelligent access to knowledge. This paper focuses on **essential AI tools** that modern libraries need to adopt to stay relevant in the digital age.

Theoretical Framework & Literature Review:

Recent studies show AI's varied applications in library science, such as automated cataloging, metadata enrichment, personalized recommendations, and virtual assistance. AI supports personalized user experiences and enhances operational efficiency by automating manual tasks. Library researchers emphasize that AI adoption can transform traditional library functions into dynamic, intelligent services. libraryacademy.in+1

Essential AI Tools and Their Applications:

1. **Chat bots and Virtual Assistants:** AI-driven conversational agents provide real-time help to library users by answering queries, guiding research, and navigating catalogs. Chat bots enhance user support outside regular hours and reduce staff workload. Popular tools include **LibraryH3lp**, **Ask Nora**, and **Ask Greta** (used at Singapore National Library) for 24/7 assistance. libraryacademy.in+1
2. **AI-Powered Recommendation Systems:** Recommendation engines analyze user preferences and borrowing histories to suggest relevant resources. Systems similar to those in online retail platforms improve resource discovery and engagement. These tools personalize search results, helping users find books, articles, and multimedia content

based on individual interests. library academy. in

3. **Automated Metadata and Cataloging Tools:** AI tools can automatically generate metadata, classify items, and improve cataloging accuracy. AI enhances digital cataloging and helps maintain data quality across large collections. Libraries use **Google Cloud Vision** and AI-enhanced OCR (Optical Character Recognition) for accurate text extraction and DOC metadata generation during digitization. publications.drdo.gov.in
4. **Predictive Analytics for Collection Development:** Predictive analytics tools analyze circulation and user behavior data to forecast future demands. By identifying usage trends and citation patterns, libraries can make informed decisions about acquisitions and retain relevant materials. These analytics capabilities ensure collections remain dynamic and responsive to community needs. library academy .in
5. **Accessibility and Assistive Tools:** AI supports accessibility for users with disabilities. Text-to-speech/speech-to-text tools, image descriptions, and AI voice interfaces make information accessible to visually or hearing-impaired users. Libraries thus enhance inclusivity and service reach. ijlsit.org
6. **Research Support Tools:** Advanced AI tools such as **Research Rabbit, Perplexity, Site, Elicit, Semantic Scholar,** and **Consensus** assist researchers by summarizing literature, finding relevant sources, and clustering related research topics—a critical support in academic environments. Research Gate

Benefits of AI Integration in Libraries:

- **Enhanced User Experience:** Faster information retrieval and personalized services.
- **Increased Efficiency:** Automation of repetitive tasks, reducing manual workload.
- **Data-Driven Decisions:** Analytics support informed collection and service planning.
- **Improved Accessibility:** AI tools help patrons with special needs access content easily.
- **Round-the-Clock Support:** Chat bots provide help beyond library hours.

Challenges and Ethical Considerations:

AI adoption poses challenges, including data privacy, algorithmic bias, costs of implementation, and the need for staff training. Libraries must ensure ethical use of AI, transparent systems, and technologies that complement human expertise rather than replace it. Additionally, librarians must remain vigilant about AI accuracy and misinformation. ijlsit.org

Recommendations for Implementation:

- **Staff Training:** Equip librarians with technical skills to manage and evaluate AI systems.
- **Pilot Programs:** Start with small implementations to assess tool effectiveness.
- **Community Input:** Gather feedback from users to tailor AI services to local needs.
- **Ethical Policies:** Establish clear guidelines for AI use, data privacy, and content accuracy.
- **Evaluation Metrics:** Continuously assess AI tools based on user satisfaction and operational impact.

Conclusion:

AI tools are rapidly becoming essential assets for modern libraries. From chat bots to predictive analytics, AI enhances library services and helps institutions remain relevant in an increasingly digital world. By embracing AI thoughtfully and ethically, libraries can become

smarter, more responsive, inclusive, and more efficient in serving their communities.

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Watershed Development Policies and Their Impact on Farmers in the Marathwada Region

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Abstract:

Watershed development has emerged as a critical policy intervention for sustainable agricultural and rural development in semi-arid regions of India. The Marathwada region of Maharashtra, characterized by erratic rainfall, recurrent droughts, groundwater depletion, and agrarian distress, has been a major focus area for watershed development programmes. The present study examines the impact of watershed development policies on farmers in the Marathwada region, with special reference to changes in landholding patterns, irrigation status, income sources, livelihood security, environmental sustainability, and farmers' perceptions. The study is based on primary data collected from 150 farmers using a structured interview schedule during 2021–22. Comparative analysis of pre- and post-watershed conditions reveals significant improvements in irrigation coverage, groundwater recharge, crop productivity, income diversification, drinking water availability, and environmental quality. The findings suggest that watershed development policies have positively contributed to socio-economic transformation and livelihood enhancement of farmers in Marathwada, although challenges related to equitable access, sustainability, and institutional support remain. growth.

Keywords: Watershed Development, Irrigation, Livelihood and Farmers' Perception.

Introduction:

Agriculture in India remains highly dependent on monsoon rainfall, especially in semi-arid and drought-prone regions. The Marathwada region of Maharashtra has historically faced acute water scarcity, frequent droughts, declining groundwater levels, crop failures, and seasonal migration. These challenges have adversely affected agricultural productivity and farmers' livelihoods. In response, watershed development has been adopted as an integrated approach to manage land and water resources in a sustainable manner. Watershed development policies in India aim at conserving soil and water, improving groundwater recharge, enhancing agricultural productivity, reducing vulnerability to climate variability, and strengthening rural livelihoods. By treating a hydrological unit rather than administrative boundaries, watershed programmes emphasize participatory planning, community involvement, and holistic natural resource management. In Marathwada, several government-led and NGO-supported watershed programmes have been implemented to address chronic drought and agrarian distress. The present study attempts to assess the impact of watershed development policies on farmers in the Marathwada region, particularly focusing on socio-economic, environmental, and livelihood dimensions.

Methodology:

The study is based on **primary data** collected through a structured interview schedule. A total of **150 farmers** were selected from watershed-developed villages in Beed district

using purposive sampling. The field survey was conducted during **2021–22 and 2022–23.** Data were analyzed using simple statistical tools such as frequencies, percentages, and ranking methods. Comparative analysis was employed to assess changes before and after watershed development.

Objectives of the Study:

The objectives of the study are as follows as

1. To analyze the landholding status and irrigation conditions of farmers before and after watershed development.
2. To examine the impact of watershed development on farmers' income sources, crop productivity, and livelihood security.
3. To assess the social and environmental impacts of watershed development.

Result and Discussion:

Watershed development has a range of positive impacts on the community when implemented effectively. It leads to sustainable rural development through conserved natural resources, rises in agricultural productivity, increased employment generation and household income, and empowerment of residents in the watershed (Kerr, 2002; Palanisamia & Kumar, 2009). It is also a vehicle to enhance livelihood security of rural households in the watershed because it improves the livelihood asset base. Here are the primary benefits of watershed development: Conservation, up-gradation and utilization of natural endowments (land, water, vegetation, humans) Integrated, low-cost and simple to adopt technology. Reduce inequalities between rain-fed and irrigated areas.

Watershed Development and Crop Productivity:

Watershed management is an attempt to halt land degradation and a holistic process for getting maximum production out of land. Watershed management implies rational utilisation of land and water resources for optimum and sustained production, with the minimum of hazard to natural resources.

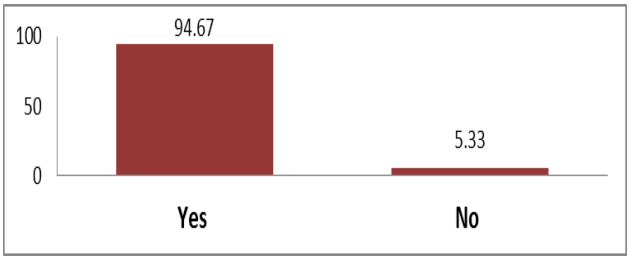
Table -1 Crop productivity increased due to watershed area

Crop productivity increased?	No. of farmers	Percentage
Yes	142	94.67
No	8	5.33
Total	150	100.00

(Source: Field Survey - 2021-22)

It was shown in table-1 to know relationship between watershed development and productivity of crop. Out of 150 farmers 142 (94.67%) of farmers opinions where yes watershed development is main reason of increase in productivity of crop and 8 (5.33%) of farmers opinions watershed development is not main reason of increase in productivity of crop. It was concluded that majority of farmer's opinions that watershed development can increase in productivity of crop.

Figure-1 Crop productivity increased due to watershed area



Changes in Income Sources Farmers:

Watershed management is an attempt to halt land degradation and a holistic process for getting maximum production out of land. Watershed management implies rational utilisation of land and water resources for optimum and sustained production, with the minimum of hazard to natural resources. Conserve and utilize natural resources for higher

productivity of crops and more income/employment generation in addition to creating better climatic conditions. Various development programs including watershed development programmes. Watershed development refers to the conservation; regeneration and the judicious use of all the natural resources particularly land, water, vegetation and animals and human development within the watershed.

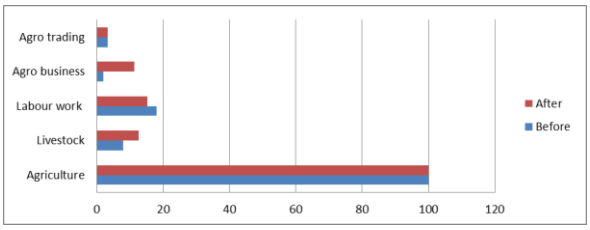
Table -2 Watershed Impact on Farmers Income Sources

Sources	Before		After		Increases/decreases
	No of farmers	Percentage	No of farmers	Percentage	
Agriculture	150	100.00	150	100	0.00
Livestock	12	8.00	19	12.67	4.67
Labour work	27	18.00	23	15.33	-2.67
Agro business	3	2.00	17	11.33	9.33
Agro trading	5	3.33	5	3.33	0.00
Note – Increases or decreases compare with n value. (n= 150)					

(Source: Field Survey - 2021-22)

It was found that in a before watershed development, 100% of the farmers' source of income had agricultural, while it was remain constant after watershed development; before watershed development 8.00% of the farmers income source had livestock, while after it is 12.67% of farmers, it was increased by 4.67%; 18.00% of the Farmers' source of income was labour work, while after watershed development it decreased upto 15.33%.; before watershed development only 2.00% of the Farmers' do agro business, while watershed development it increased to 11.33% and there is no change in agro trading before or after watershed development. It was concluded that the farmer's source of income tends to change before or after watershed development. It was found that in the after-watershed development farmer's shift from traditional agricultural practices to indulge in small business activities or other farm side business activities which would fetch earning for them for their subsistence.

Figure-2 Watershed Impacts on Farmers Income Sources



Watershed development impact on sources of irrigation:

Watershed is thus the land and water area, which contributes runoff to a common point. A watershed is an area of land and water bounded by a drainage divide within which the surface runoff collects and flows out of the watershed through a single outlet into a lager river or lake. Hydrological, or direct, effects of doing this include reduction in downstream river flow, increased evaporation in the irrigated area, increased level in the water table as groundwater recharge in the area is increased and flow increased in the irrigated area.

Table-3 Watershed impact on sources of irrigation

Sr. No.	Source of irrigation	Number of Farmers					
		Before			After		
		Sufficient	Insufficient	Total	Sufficient	Insufficient	Total
1	Dug well	21 14.00	129 86.00	150 100.00	82 54.67	68 45.33	150 100.00
2	Bore well	19 12.67	131 87.33	150 100.00	68 45.33	82 54.67	150 100.00
3	River	5 3.33	145 96.67	150 100.00	12 8.00	138 92.00	150 100.00
4	Lake/Pond	3 2.00	147 98.00	150 100.00	19 12.67	131 87.33	150 100.00
5	Canal	21 14.00	129 86.00	150 100.00	21 14.00	129 86.00	150 100.00

Source: Field Survey - 2021-22

It was noticed from table that, in a before watershed development, 14.00% of the farmers had dug wells for irrigation while 86.00% of the farmers had dug well insufficient. In comparison, in a after watershed development 54.67% of farmers said that wells were sufficient for irrigation while 45.33% of farmers said that wells were insufficient; In a before watershed development 26.67% of the farmers had sufficient source of bore well and 87.33% of the farmers had insufficient source of bore well. In comparison, after watershed, bore well was sufficient for 45.33% of the farmers and bore well was insufficient for 54.67% of the farmers; before watershed development, 3.33% of the farmers had sufficient source of river for irrigation while after watershed development it increased upto 8.00%; before watershed development, 2.00% of the farmers had sufficient source of pond for irrigation while after watershed development it increased upto 12.67%; it was noted that no changes sources of canal before or after watershed development. It was found that due to watershed development, sufficient water for agriculture is available from irrigation sources. However, the water level of wells, bore wells, lakes has increased and the area under irrigation has also increased.

Figure -3 Source of irrigation in normal and after watershed development

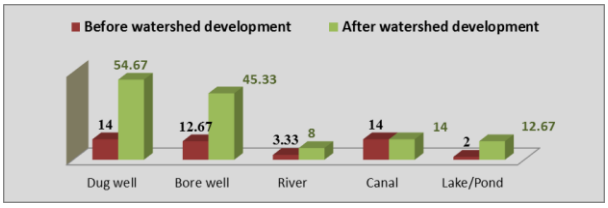


Table-4 Migration Trend for Employment

Migration for employment	**Before**		**After**	
	Number of Farmers	Percentage	Number of Farmers	Percentage
No	138	92.00	142	94.66
Yes	12	8.00	8	5.33
Total	150	100.00	150	100.00

Source: Field Survey - 2021-22

Table-4 shows the change in the migration status of farmers that before watershed development, 8.00% of farmers migrated from villages during summer, after watershed development, summer migration shows that 2.66% of farmers migrated during summer. The catchment area has been reduced due to development.

Figure -4 Migrations for Employment

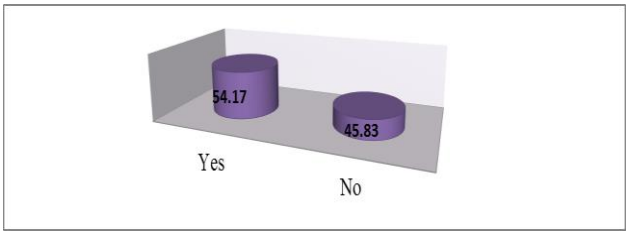
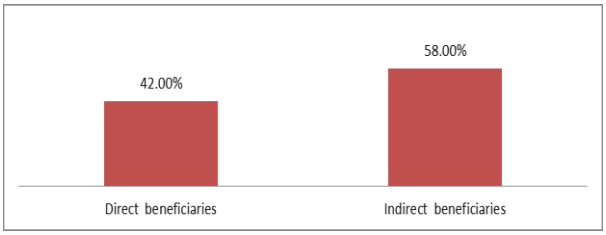


Figure -6 Types of watershed beneficiaries



Types of Watershed Beneficiaries:

Watershed development programme is peoples centered programme and people's participation in the programme has been made mandatory. The people have to form a watershed association and watershed committee for each watershed project. Watershed association, comprising all adults residing within a watershed project area. The committee is responsible for planning and development of watershed project for its area while developing the plan for the area, the committee has to take technical assistance from project implementation agency. Besides, the beneficiaries of the programme have to give voluntary donations / provide contribution in terms of labour, raw material, cash etc. for development activities and for operation and maintenance of assets created.

Table-6 Types of watershed beneficiaries

Type	Number of Farmers	Percentage
Direct	63	42.00
Indirect	87	58.00

Source: Field Survey - 2021-22

It was found from table 4.17 that 58.00 per cent of farmers directly beneficiaries of watershed, while 42.00 per cent of farmers indirect beneficiaries of watershed,

Conclusion:

The study clearly demonstrates that watershed development policies have had a positive and multidimensional impact on farmers in the Marathwada region. Improvements in irrigation coverage, groundwater recharge, crop productivity, income diversification, drinking water availability, environmental quality, and livelihood security are evident. Reduced migration and improved social conditions further highlight the transformative potential of watershed development. However, for long-term sustainability, continued maintenance of watershed structures, equitable water distribution, community participation, and institutional support are essential. Strengthening policy implementation and integrating watershed development with broader rural development strategies can further enhance its impact. The watershed development emerges as an effective policy instrument for addressing agrarian distress and promoting sustainable rural development in drought-prone regions.

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Green HRM Practices and Sustainable development in Selected IT Companies in Maharashtra

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Abstract:

Sustainable development has moved from being a corporate "add-on" to a strategic requirement, particularly in knowledge-intensive industries such as Information Technology (IT). In India's leading IT clusters especially Pune, Mumbai, and Navi Mumbai in Maharashtra companies face rising stakeholder expectations related to Environmental, Social, and Governance (ESG) performance, responsible resource use, employee wellbeing, and ethical growth. In this context, Green Human Resource Management (Green HRM) has emerged as a practical pathway to embed sustainability values into the workforce by aligning HR policies and systems with environmental objectives. Green HRM integrates environmental management into recruitment, training, performance management, rewards, and employee involvement, thereby shaping pro-environmental behaviour and supporting organizational sustainability goals.

This paper examines Green HRM practices and their contribution to sustainable development in selected IT companies operating in Maharashtra. Based on a structured review of literature and a proposed empirical framework suitable for field research in Maharashtra's IT firms, the paper discusses important Green HRM practices, their linkages with sustainability outcomes (environmental, social, and economic), and implementation challenges. The study concludes that Green HRM when supported by leadership commitment, measurable HR metrics, and an environmental management system can strengthen sustainability performance, employer branding, employee engagement, and operational efficiency.

Keywords: Green HRM, Sustainability and IT Companies

Introduction:

Maharashtra is among India's most important economic engines, hosting major IT/ITES hubs and global capability centres across Pune, Mumbai, Navi Mumbai, Thane, and Nagpur. State-level policy narratives increasingly emphasize innovation-led growth aligned with sustainable development goals. Maharashtra's IT vision highlights building a globally competitive IT destination while moving toward inclusive and sustainable development. At the same time, IT companies face a sustainability paradox: while their products are largely intangible, their operations depend on energy-intensive data centers, large office campuses, business travel, e-waste generation, and significant consumption of water and materials in workplace ecosystems. Sustainability in IT is therefore not only about technology solutions but also about organizational systems and employee practices that reduce environmental footprint.

Human Resource Management (HRM) becomes central here because employees' daily decisions—paper use, travel choices, energy behaviour, equipment lifecycle, and compliance with green protocols—directly affect

environmental performance. Classic research in environmental management systems argues that sustainability outcomes depend heavily on HR factors such as top management support, training, empowerment, teamwork, and rewards. Green HRM provides a structured approach to institutionalize these factors by integrating environmental priorities into HR policies and practices across the employee lifecycle. The paper explores how Green HRM practices can support sustainable development in selected IT companies in Maharashtra, focusing on: (i) core Green HRM practices, (ii) sustainability outcomes and indicators, (iii) challenges and enablers, and (iv) a research framework suitable for empirical study in Maharashtra.

Conceptual Background:

Green HRM broadly refers to the integration of environmental management into HRM functions—such as green recruitment and selection, green training and development, green performance management, and green rewards—so that employees contribute to environmental goals. The central idea is that organizations can shape employees' "green abilities" (skills/knowledge), "green motivation" (incentives/commitment), and "green opportunities" (participation/involvement) through HR systems—thereby building a pro-environmental culture.

Sustainable development in firms is often operationalized through the "triple bottom line" approach: environmental sustainability (planet), social sustainability (people), and economic sustainability (prosperity). In corporate practice, ESG frameworks help measure and report performance across these dimensions. For IT companies, sustainability outcomes may include reduced energy and paper use, greener buildings and commuting, responsible procurement, lower e-waste, inclusion and wellbeing programmes, ethical governance, and sustained profitability through efficiency and risk reduction.

An Environmental Management System (EMS) provides a formal structure for planning, implementing, auditing, and improving environmental performance. ISO 14001 is widely recognized as a global EMS standard that offers a framework for continual improvement and compliance. Research highlights that HR practices must align with EMS phases so environmental goals become embedded in daily work through training, empowerment, and accountability. Thus, the strongest sustainability outcomes often appear when Green HRM operates alongside an EMS, rather than as isolated initiatives.

Review of Literature:

The Green HRM literature identifies a consistent set of practices that influence sustainability outcomes. Foundational reviews argue that Green HRM bridges the historically separate fields of environmental management and HRM by demonstrating how HR practices can drive employee green behaviour and organizational environmental performance. (Renwick, et.al. 2013), Empirical and sectoral studies in the IT context commonly report that firms adopt practices like digital documentation, electronic filing, video conferencing, work-from-home/hybrid work, and energy-saving workplace behaviours. (Kant, Saurabh 2023). Studies also emphasize the role of training, leadership support, and reward systems in turning sustainability policies into real behaviour change at the employee level. (Daily BF, Huang S 2001). Recent sustainability research further indicates that Green HRM can contribute not only to environmental performance but also to employee satisfaction, organizational reputation, and retention—especially among younger talent cohorts who value meaningful work and

responsible employers. However, the literature also identifies challenges: "greenwashing" risk, lack of measurable HR metrics, limited line-manager capability, employee cynicism, and weak integration between HR and facilities/operations teams. In IT firms, additional barriers include rapid scaling, dispersed global teams, contractor-heavy workforce models, and sustainability trade-offs in digital infrastructure.

Objectives of the Study:

1. To identify major Green HRM practices adopted by selected IT companies in Maharashtra.
2. To assess the relationship between Green HRM practices and sustainable outcomes.
3. To analyze employee perceptions of Green HRM and their pro-environmental behaviour at work.

Methodology:

The study adopted a descriptive and analytical research design. The study focuses on selected IT companies in Maharashtra such as TCS, Infosys, Wipro, Tech Mahindra, Persistent Systems, Capgemini, Cognizant, Accenture, IBM, and HCL Technologies, which have adopted Green HRM practices as part of their sustainability and ESG initiatives. Primary data were collected from 40 respondents drawn from 10 selected IT companies in Maharashtra, including top-level managers, middle-level managers, and employees, using a structured questionnaire. Data were analyzed using frequencies, percentages, and interpretative analysis to assess Green HRM practices and sustainability outcomes.

Table 1 Major Green HRM Practices Adopted by Selected IT Companies in Maharashtra

Sr. No.	Green HRM Practices	Top-level Managers (n=10)	Middle-level Managers (n=10)	Employees (n=20)	Total (n=40)	Percentage
1	Green Recruitment & E-Hiring	9	8	15	32	80.00
2	Paperless HR & Digital Records	10	9	18	37	92.50
3	Green Training & Awareness Programs	8	7	14	29	72.50
4	Energy-saving workplace practices	9	8	16	33	82.50
5	Green Performance Appraisal	7	6	11	24	60.00
6	Green Rewards & Recognition	6	5	10	21	52.50

(Source Field Survey)

Table 1 presents the extent to which various Green HRM practices are adopted by selected IT companies in Maharashtra based on responses from top-level managers, middle-level managers, and employees. The findings indicate that paperless HR and digital record systems are the most widely adopted practice, with 92.50 per cent of respondents acknowledging its implementation. This reflects the IT sector's natural inclination toward digital solutions and its readiness to adopt environmentally friendly administrative processes. Similarly, energy-saving workplace practices such as switching off unused equipment and efficient energy management systems were reported by 82.50 per cent of respondents, highlighting organizational efforts to reduce operational carbon footprints. The adoption of green recruitment and e-hiring

practices is also relatively high (80.00 per cent), suggesting that IT firms are increasingly incorporating sustainability considerations into their hiring processes by using online recruitment platforms and minimizing paper usage. However, practices such as green training and awareness programmes (72.50 per cent) show moderate adoption, indicating that while policies exist, structured and continuous training may not yet be fully institutionalized across all organizations.

It is also noticed that, green performance appraisal (60.00 per cent) and green rewards and recognition systems (52.50 per cent) record the lowest levels of adoption. This suggests that although IT companies promote eco-friendly practices operationally, sustainability is not yet strongly linked to performance evaluation or incentive systems. The variation in responses among different employee categories further indicates that strategic-level initiatives are better recognized by top management than by employees. Overall, the table reveals that Green HRM in IT companies is primarily operational and technology-driven, with scope for deeper integration into formal HR systems.

Table 2 Relationship between Green HRM Practices and Sustainability Outcomes

Sustainability Outcomes	N**o. of** Respondents	Percentage
Reduction in paper and energy consumption	34	85.00
Improved environmental awareness among employees	36	90.00
Better corporate image and employer branding	31	77.50
Improved employee well-being and engagement	29	72.50
Cost savings through resource efficiency	27	67.50
Long-term organizational sustainability	33	82.50

(Source Field Survey)

Table 2 shown that respondents' perceptions of the relationship between Green HRM practices and sustainability outcomes across environmental, social, and economic dimensions. A substantial 90.00 per cent of respondents agreed that Green HRM practices have improved environmental awareness among employees, indicating that HR-led sustainability initiatives effectively shape attitudes and behaviour at the workplace. Furthermore, 85.00 per cent of respondents acknowledged a reduction in paper and energy consumption, demonstrating the tangible environmental benefits of green workplace practices in IT firms. From a social sustainability perspective, 72.50 per cent of respondents perceived improvements in employee well-being and engagement, suggesting that environmentally responsible practices contribute to healthier and more meaningful work environments. Additionally, 77.50 per cent of respondents felt that Green HRM has enhanced corporate image and employer branding, which is particularly important in the competitive IT labour market where organizational values influence talent attraction and retention.

Economic sustainability outcomes are also evident, with 67.50 per cent of respondents reporting cost savings through resource efficiency, such as reduced paper use and optimized energy consumption. Moreover, 82.50 per cent agreed that Green HRM supports long-term organizational sustainability, indicating recognition of its strategic value beyond short-term cost reduction. Overall, the findings suggest a strong positive association between Green HRM practices and sustainability outcomes. The table underscores that Green HRM contributes not only to environmental protection but also to social well-being and economic efficiency, reinforcing

its role as a strategic tool for sustainable development in IT companies.

Table 3 Employee Perception of Green HRM and Pro-environmental Behaviour

Statement	Agree	Neutral	Disagree	Total
Company encourages eco-friendly behaviour	30 (75.00%)	7 (17.50%)	3 (7.50%)	40 (100%)
Green HRM practices motivate responsible behaviour	28 (70.00%)	9 (22.50%)	3 (7.50%)	40 (100%)
I actively follow energy-saving practices at work	32 (80.00%)	6 (15.00%)	2 (5.00%)	40 (100%)
I support digital and paperless work culture	35 (87.50%)	4 (10.00%)	1 (2.50%)	40 (100%)
Management is serious about sustainability	27 (67.50%)	8 (20.00%)	5 (12.50%)	40 (100%)

(Source Field Survey)

Table 3 highlights employee perceptions of Green HRM practices and their influence on pro-environmental behaviour at the workplace. The results show a predominantly positive response across all statements. A significant majority (75.00 per cent) of respondents agreed that their organization actively encourages eco-friendly behaviour, reflecting the visibility of sustainability initiatives within IT companies. Similarly, 70.00 per cent agreed that Green HRM practices motivate them to act responsibly, indicating that HR policies can effectively influence individual behaviour. Pro-environmental actions are also reflected in daily work practices, with 80.00 per cent of respondents agreeing that they actively follow energy-saving practices such as switching off systems when not in use. The strongest agreement was observed for support of a digital and paperless work culture, where 87.50 per cent of respondents expressed positive attitudes, reinforcing the natural compatibility between IT work processes and sustainability objectives.

However, responses related to management's seriousness about sustainability reveal some variation. While 67.50 per cent of respondents agreed, a notable proportion remained neutral or disagreed, suggesting that sustainability commitment may not be uniformly communicated or consistently demonstrated across all organizational levels. This highlights the importance of visible leadership involvement and consistent policy implementation. Overall, the table demonstrates that Green HRM practices positively influence employee attitudes and behaviours, but stronger leadership engagement and communication are necessary to sustain and deepen pro-environmental behaviour across the workforce.

Conclusion:

Green HRM provides a strategic route for IT companies in Maharashtra to operationalize sustainability through people systems. By embedding environmental objectives into recruitment, training, appraisal, rewards, and employee involvement, firms can shape employee green behaviour and strengthen sustainability outcomes. Evidence from the broader Green HRM and EMS literature supports the argument that sustainability success requires HR enablers training, empowerment, teamwork, and reward alongside leadership commitment and structured management systems. For IT firms in Maharashtra's competitive talent markets, Green HRM can also enhance employer branding, employee engagement, and resilience making sustainability a value-creating strategy rather than a compliance exercise. Future empirical research in Maharashtra can test the proposed framework

by measuring Green HRM practices, employee green behaviour, and sustainability performance across multiple IT organizations and job levels.

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Human Rights: Concept and Development

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Introduction:

Human rights are a universal concept. Human rights are important for every individual to enjoy freedom, equality, justice, happiness, prosperity and dignity. Human rights can create a happy prosperous peaceful society based on equality and justice. Rights have an important place in human life. Human rights are very essential for a person to develop his personality. Human beings are endowed with certain natural rights. The wealth that man receives from nature is not monopolized by one person, but it belongs to the entire human race. Humans have the right to develop according to their wishes and the government organizations are trying to protect and develop their natural rights. However, especially in Indian society, a large amount of casteism, religious discrimination, tribalism, gender discrimination, racial discrimination are created by humans. It creates obstacles in human development. Human rights are considered very important in the current information technology era. Because every person in this age is becoming selfish. Although the whole world has come closer due to information technology, humans are moving away from each other in terms of human beings.

Live and let live is the ideal that India has put before the world before the concept of human rights. But according to the changing situation, the goodwill, tolerance and humanity among human beings have started disappearing. A large amount of inequality has started to increase in the society. Economic exploitation, casteism, religious conflict, physical abuse, terrorism, human extermination and child labor as well as violent behavior, injustice against women etc. In a society plagued by problems, the question arises as to whether human beings have the right to live as human beings. Human rights must be preserved if this problem is to be overcome. For this, there is a need for government, administration, social organizations and knowledgeable persons in the society to make efforts.

Purpose:

The present research paper has been written with the following objectives in mind.

1. To explain the concept and development of human rights.
2. Seeing the meaning of human rights.
3. Explaining the need for human rights.
4. Seeking measures to safeguard human rights

Study Methodology:

Secondary information has been used to write the present research paper. This information has been compiled with the help of books, magazines, daily newspapers and websites etc.

Human Rights Concept and Development:

Although the modern human rights movement gained momentum from the human, physical and economic destruction of World War II, the concept of human rights is very old.

Promulgated in 539 BC, the Edict of Cyrus was the first written document on human rights. Between 563 BC and 486 AD, Buddha gave the world the principle of freedom, equality and fraternity and the way of life of ideal human welfare. Later on due to the Kalinga War and Emperor Ashoka's policies human rights were given priority. In modern times, Magna Carta was promulgated in England in 1225 AD. Socrates, Plato and Aristotle etc. put the concept of natural right and in the year 1776 the Declaration of American Independence was released. It proclaimed the natural liberty of individuals. But the French Revolution in 1779 brought restrictions on the king. Millions of Jews were murdered by the German regime during World War II. Germany analyzed human rights in its declaration. Hence the need for human rights. The United Nations (UN) was founded in 1945o.) Human rights were given an important place in the Declaration. The Universal Declaration of Human Rights was adopted by the General Assembly of the United Nations on 10 December 1948, therefore 10 December is celebrated as Human Rights Day.

Human rights are the natural rights that a human being gets after being born as a human being. The Universal Declaration of Human Rights has 30 articles. UNO has provided all citizens of the world with basic human rights based on the four essential life values of justice, liberty, equality and fraternity. UNO is constantly striving to respect this right. However all the nations of the world must continue to pursue to implement this right

Human rights organizations such as Amnesty International, Asia Watch, International Red Cross were under pressure to establish a Human Rights Commission in India. Human rights violations were discussed at Geneva meeting on March 3, 1993 on Kashmir issue in India. Also, the incidents of injustice and torture from many constituent states started to be discussed at the international level. Communal riots, violence, regional disputes, exploitation of workers by capitalists, child labor problem, rising terrorism started to be widely discussed. As a result, the Government of India established the National Human Rights Commission on 12 October 1993 under the Protection of Human Rights Act, 1993.

The concept of human rights gives the present human being the right and dignity to live as a human being. Creates humanity in humans. All humans are equal. All have equal economic, social, educational, political, legal opportunities. Everyone has an equal right to every element of nature. Such a universal right derives from the concept of human rights.

The problem of human rights is becoming serious in developing and underdeveloped countries. India is no exception to this. In such a nation, political and administrative injustice, oppression and corruption are increasing on a large scale. Malnutrition, injustice against minorities and backward communities, terrorist attacks etc. have become routine. Such types work to tarnish human values. Human rights are the rights of a human being which he is born with. That right cannot be violated by any state authority, administrative officer or rich, capitalist, criminally inclined person in the society. Also they can be used without any law. They are essential for the development of the personality of the individual to lead a dignified life.

Meaning:

Human rights are all the rights guaranteed by law relating to life, liberty, equality and dignity of an individual. It is also mentioned in international agreements. Article 3 of the UN Declaration states that everyone has the right to life – liberty and security. According to this right, all human beings are born free and equal. Rights

which are applicable in any situation without any limitation and which cannot be compared with any other rights are called human rights.

Definition:

The equal rights and freedoms given to all human beings without any discrimination in terms of race, religion, caste, language, sex, nation, property, dignity and status due to birth in a particular area are called human rights.

Human Rights Requirements:

Although many laws have been passed by the Indian Parliament for the protection and implementation of human rights in India, in reality, not much awareness has been created in the society about human rights. Especially the human rights of the weak and women are being violated. The problems of dowry, violence against women, beating, molestation, inhumane treatment, robbery are increasing day by day in Indian society. The principle of equal work – equal pay does not appear. Human rights are essential for individual and social welfare. Humans need human rights in the following respects.

1. Enjoying personal freedom.
2. Protecting freedom of expression.
3. Protecting the weak elements.
4. Obtaining judicial protection.
5. Enjoy religious freedom.
6. In terms of economic, social and cultural development of human beings.
7. Live an exploitation free life.
8. To cultivate human values.
9. Access to free primary and basic education.
10. Bringing pressure on a nation that violates constitutional rights.
11. To protect the right to constitutional remedies.

Measures to protect human rights in India:

The Constitution of India provides fundamental and human rights to all citizens. Everyone has the right to life and security, freedom from slavery and servitude, constitutional remedies, freedom from arbitrary arrest, property, freedom of expression and religion, right to form associations, economic, social and cultural rights, right to equal work and equal pay, right to rest, right to health and free education etc. It is necessary to take measures regarding the security of this right. Only then can everyone enjoy their human rights. But often it is seen that human rights are being violated by various entities. Various legal measures have been planned in India for this. It needs to be implemented effectively. Following are the measures regarding the protection of human rights.

1. Dowry Prevention Act – 1961
2. Prevention of Atrocities, Dangerous Acts for Scheduled Castes and Tribes Act – 1989.
3. Protection of Civil Rights Act – 1935.
4. National Commission for Women Act – 1990.
5. National Commission for Minorities Act – 1992.
6. National Human Rights Commission.
7. Court of Human Rights.
8. National Sanitation Staff Commission Act – 1993.
9. Weak, Handicapped, Disqualified Persons Achieving Equal Opportunities, Protection of Right to Full Participation Act – 1995.

Summary:

The concept of human rights gives priority to equal rights and freedom. Everyone should enjoy their natural rights. From the role of humanity, the individual should have human rights and its implementation. Everyone has the right to life from birth but the female fetus is being killed through fetal testing. Therefore, the

principle of equality in human rights is being hindered. In case of violation of human rights, a person can appeal to the court. Thus, human rights are based on the principles of equality, justice, brotherhood and dignity, and individual and social welfare can be achieved through them.

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Artificial Intelligence towards Future Industrial Opportunities and Challenges

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Abstract:

Reflective developments, such as a significant digital transition in the manufacturing sector, will be brought about by industry 4.0. Many industrial companies are currently attempting to implement industry 4.0 techniques across their supply chain. The centre of the Fourth Industrial Revolution is artificial intelligence, which is profoundly altering our way of living, working, and interacting with one another as citizens. The intricacy of this shift could appear daunting and intimidating to numerous individuals. A number of nations are currently looking for new industrial revolution tactics as a result of the rapid development of next generation information technology. Companies are being forced by globalisation and competition to innovate and rethink their production processes in accordance with the so-called Industry 4.0 paradigm. It is an example of integrating previously used tools. (robot, big data, cloud, 3D printing, simulation, etc.) That are now linked by sending digital data over a worldwide network. The modern production process has to be intelligently and digitally automated. Customised production is replacing mass production in the manufacturing industry today. Productivity has increased due to the industries' and industrial technologies' rapid improvements. The term "industry 4.0" refers to the fourth industrial revolution, which is characterised by a new degree of control and organisation over the whole product life cycle and a focus on ever-more-individualized client needs. Industry 4.0, which encompasses cloud-based manufacturing, smart manufacturing, industrial internet, and the Internet of Things, is still a futuristic but feasible notion. Industry 4.0 is about the rigorous human integration in the production process to focus on value-adding tasks, prevent waste, and achieve continuous improvement. The purpose of this work is to give an overview of Industry 4.0, comprehend its pillars and applications, identify the difficulties and problems encountered in implementing Industry 4.0, and investigate new trends and streams associated with Industry 4.0 that involve artificial intelligence through the use of a flexible and intelligent approach. We identify and explore a number of technological issues related to process safety, based on clever and adaptable AI techniques and the intricate safety relations in the process industry: Accurately fusing disparate data sources; knowledge-based reasoning for process safety; acquiring knowledge with few labels for process safety diverse sources; as well as efficient education for dynamic risk assessment and decision-making support.

Keywords: Industry 4.0, Artificial Intelligence, Internet of Things, Industrial Internet of Thing, Cloud Computing

Introduction:

Though in varying degrees, enthusiasm and scepticism are the foundations of artificial intelligence (AI). AI is being praised for its enormous transformative potential and is no longer limited to innovation labs, as humans and machines are collaborating more than ever. But before firms can fully utilise this new technology, there are a few obstacles they must overcome. Making the most of AI's opportunities is crucial. Artificial Intelligence (AI) has been developing at an exponential rate in recent years. Massive

volumes of data from diverse sources can be sorted through and interpreted by artificially intelligent robots to perform a variety of functions.

In order to digitise the entire supply chain, Industry 4.0, the next generation of industrial systems, encompasses a wide range of study topics and critical technologies, such as big data, cyber physical systems, smart factories, the internet of things, and interoperability. When a factory has a system similar to the one mentioned above, all of its machinery is digitally connected and totally automated. Remote human workers and the physical systems both interact and collaborate with one another. A smart factory like this enables efficient decentralised decision-making and real-time monitoring of all physical operations.

The authorities were invited by the Industrial Development Division to explore the fascinating realm of Augmented Reality (AR) and Virtual Reality (VR). Future production, technology, and manufacturing will all be significantly impacted by the Fourth Industrial Revolution. Although automation and robots have long been used in industrial manufacturing, a new wave of opportunities is emerging due to rising functionality, falling costs of technology, and an increasing diversity of settings in which robotics can be used safely and successfully. The implementation of novel robotic technologies in the domains of product assembly, warehousing, and logistics has the potential to enhance operational processes' productivity, quality, and safety. Applications include automated warehouse management systems, driverless guided vehicles in distribution centres, and cobots—collaborative robots—that assist humans in assembly tasks. The relevant technological advancements are propelled by a digital revolution that began almost 40 years ago. The collection, processing, and analysis of massive amounts of data coming from the information sciences is at the core of these developments, which have ramifications for many other fields of study and development. Significant social and economic benefits, improved production across a wide range of industries, and increased efficiency are all promised by these advancements.

Similar to the First Industrial Revolution's steam-powered factories, the Second Industrial Revolution's application of science to mass production and manufacturing, and the Third Industrial Revolution's beginning of digitization, the technologies of the Fourth Industrial Revolution—such as robotics, 3-D printing, augmented reality, genome editing, and artificial intelligence—are drastically altering how people produce, exchange, and distribute value. This revolution will have a significant impact on people, industries, and organisations, just like the previous ones did. More crucially, decisions made now will drive this revolution: how we approach, fund, and use these potent new technologies will determine a great deal of the nature of the planet in fifty to one hundred years. Understanding that the Fourth Industrial Revolution entails a systemic shift is crucial The ramifications of developing technologies are far more far-reaching and significant than their thrilling potential in numerous fields and facets of human existence. Low-cost gene sequencing and techniques like CRISPR have recently greatly expanded our ability to edit the building blocks of life; artificial intelligence is enhancing procedures and expertise across all industries; neuroethology is advancing our understanding of how to use and manipulate the brain as the final frontier of human biology; automation is upending long-standing transportation and manufacturing paradigms; and technologies like block chain and smart materials are redefining and obf.

AI, or machine intelligence, has affected business, education, and society throughout the

fourth industrial revolution. Among the initial contributions are systems for diagnosis, planning, and design, such as those for scheduling tasks on machines. As the industry has developed, artificial intelligence (AI) has been effectively applied in logistics for financial forecasting, aeroplane landing, and vehicle routing—the process of figuring out the most economical routes for delivery vehicles. It has recently had an impact on mining in areas like energy consumption and driverless cars in smart cities. For instance, this led to a 40% decrease in Google server centre energy usage. The media and broadcasting industries are seeing a steady increase in the use of AI due to its present contributions in network optimisation and data analytics of viewership and content management by customers. AI algorithms were used to construct the highlights segment for Wimbledon 2017. IBM employed artificial intelligence (AI) software to create the best highlights package for fans watching at home. The machine recognised player reactions, crowd cheers, and point scoring to create captivating two-minute highlights packages.

AI has also shown promise in a number of computer security-related areas, including malware and network intrusion detection. It's interesting to note that it has also benefited the software sector by automating software engineering, a process that, when done by hand, typically takes many man hours. Software testing, software debugging, software optimisation, and system requirement determination are among the automated processes.

Background Information:

For a considerable amount of time, transactional AI has been there, facilitating the growth of e-commerce sites like Amazon. Companies are becoming more and more adept at predicting exactly what we are interested in purchasing based on our online behaviour thanks to algorithms that become better every year. Should we go shopping still? Are sales assistants still necessary? Although you haven't likely witnessed someone reading a newspaper while commuting to work, autonomous vehicles are becoming more and more common. Currently, they are being tested in many locations across the globe under actual circumstances: Examples that have recently made headlines are Tesla's "autopilot" function and Google's project to build a self-driving automobile. Google is working on an algorithm that would enable self-driving cars to pick up driving skills similarly to how people do it: via experience[6]. Do we still need drivers for taxis? A security guard watching cameras is not a secure setup because it might be challenging to keep track of several monitors and people become bored. This is why it makes perfect sense to train computers to monitor cameras. Security camera data can be fed into algorithms that determine whether or not there could be a threat. Through the numerous cameras placed in public areas, law enforcement officials can utilise facial recognition technology to identify and track down suspects. Do security guards still need to be here? You will notice that many websites have pop-ups that offer individualised help. This is typically AI interacting with objects rather than humans alongside you. Nowadays, providing customer service has become a key responsibility for AI. It gathers the user's question, compares it to the answers to determine if it fits any of them, and offers assistance if it does. Customer service representatives get complex queries. An artificial intelligence start up that specialises in emotional intelligence has created software that can analyse phone calls and identify a customer's emotions based on language clues, speech patterns, and other social cues. Call centre representatives can now see real-time insights into a customer's emotional condition thanks to the algorithm. It

can advise speaking more slowly or infrequently, or it might signal that the caller is irritated, assisting the agent in moving the conversation forward and being both efficient and sympathetic. Are call centres still necessary? Artificial intelligence applications in the legal sector are a developing field that are starting to impact employment patterns and the practice of law. Currently, the majority of artificial intelligence software designed for legal applications is meant to be utilised in the discovery stage of the legal process. This allows for the completion of duties like document review by a smaller number of attorneys instead of the huge teams of attorneys and paralegals that are typically needed. These "e-discovery" programmes make use of developments in data mining, social network analysis, natural language processing, knowledge representation, and pattern recognition, among other fields.

Artificial Intelligence Opportunities & Challenges in Businesses:

One of the main forces behind the Fourth Industrial Revolution is artificial intelligence, or AI. It has an impact on residences, places of business, and even public areas. It will soon be driving automobiles, stocking warehouses, and tending to the elderly and children in its embodied form as robots. While AI has the ability to address many of the most important problems facing humanity, it also comes with drawbacks, including possible job displacement, unethical data use, and opaque "black box" algorithms. Due to the fact that machine learning (ML) is advancing at a rapid pace and that AI can learn and adapt on its own, multitasked stakeholder collaboration is necessary to maximise accountability, transparency, privacy, and impartiality while fostering trust. Our Network provides bringing important players from the public and corporate sectors together to jointly develop and test policy frameworks that hasten the advantages and lessen the hazards associated with AI and ML.

Even the average person is interested in artificial intelligence as a technology! The reason is because it has a great inclination to interfere with all facets of life. Both excitement and scepticism seem to emanate from artificial intelligence as a whole.

Opportunities:

1. Better economic results and productivity: AI will increase production rates and efficiency, just as previous technology advances. The research does note, however, that estimating the impact of AI will be challenging and that there aren't any reliable methods in place at the moment.
2. Better or aided human decision-making: AI helps users to combine and identify patterns or irregularities concealed in vast and diverse datasets. Policymakers can leverage AI systems to develop data-driven policies, but it is yet unclear how to validate and possibly mitigate these systems' inherent bias.
3. Better problem solving: As AI research advances, more applications of the technology to address societal issues are anticipated, which will reduce the burden of government and regulated parties on regulatory monitoring.

Challenges:

1. Obstacles to data gathering and exchange: Artificial intelligence systems that leverage disparate data sources may have difficulties obtaining and merging information from sources that differ in terms of the data's overall quality, completeness, and regulatory accessibility.
2. Limited access to human capital and computing resources: It may be difficult for

developers, researchers, and implementers in different government organisations or agencies to secure financing for and acquire the high-end computing power and highly skilled labour required for AI systems.

3. Legal and regulatory obstacles: The legal framework governing the safe and effective use of AI systems in their various applications has not kept up with the systems' fast growth and use. To ensure that AI policy remains current, the government will require new technological know-how is suitable for the available technologies.
4. Creating applications of AI that are moral, comprehensible, and acceptable: as AI systems advance and eventually surpass human capabilities, it will be critical that the decisions and actions made by these systems can be held to the same standards as the human decision-makers they support or replace.

Industrial Artificial Intelligence:

There are high and varied expectations for industrial AI, and even if some of these expectations were partially met, it would still create special and genuine difficulties for sectors looking to use AI. The following are more significant and urgent among the current issues and complexities:

1. Interactions between machines: Artificial intelligence (AI) algorithms are capable of precisely mapping a set of inputs to a set of outputs, but they are also vulnerable to little variations in inputs brought about by differences between machines. Later on, it must guarantee that particular AI solutions do not obstruct or clash with the operation of other systems.
2. Data quality: Large, uncontaminated data sets with few biases are necessary for AI systems. Inadequate or erroneous data sets can lead to faulty downstream findings when learning from them.
3. Cybersecurity: As linked technologies are used more frequently, the smart manufacturing system is more susceptible to cyber threats. The industry is not ready for the current security threats, and the extent of this vulnerability is currently underestimated.

Artificial Intelligence and Industrial IoT:

Solutions for the Industrial Internet of Things (IIoT) have the potential to revolutionise a number of industry sectors, including healthcare, retail, transportation, and automotive. The Internet of Things will greatly increase output, customer satisfaction, and reliability for numerous sectors. The ultimate objective of IIoT is to realise completely new and significantly better products and services, even though it will initially enhance present infrastructure and processes.

Businesses that comprehend how and where IoT solutions and technologies can create chances for new and improved products and services, operational improvements, and entirely new business models will be successful. IIoT will greatly increase output, customer happiness, and dependability. While IIoT will first concentrate on enhancing present procedures and expanding current infrastructure, it will also depend on and integrate with a number of critical technologies, hardware, software, and application. A significant range of technologies are used in IIoT, many of which need to be carefully integrated and orchestrated.

Altogether, smart machines are machinery, equipment, and embedded automation software that can solve complicated problems on their own and carry out monotonous operations. Smart machines are an integral part of smart systems, which encompass a multitude of cutting-edge technologies like smart dust, neuro

computing, and sophisticated robotics, in addition to AI, IoT connectivity, and M2M communications. The smart workspace, smart data discovery, cognitive automation, and other advancements are the main forces behind the use of smart machines in enterprises and industry. Presently, expert systems (like medical decision support systems), autonomous robots (like service robots), medical robots, intelligent assistants (like automated online assistants), virtual private assistants (like Siri, Google Assistant, Amazon Alexa, etc.), embedded software systems (like machine monitoring and control systems), and medical robots are examples of smart machine products smart wearables and neurocomputers (such as specially designed intelligent machines).

Application of AI for smart industry:

Industry 4.0 smart factories will be able to produce parts directly from digital blueprints in an adaptive manner on demand thanks to additive manufacturing techniques like selective laser sintering and other computer-driven manufacturing systems. Sensors elevate "just-in-time" manufacturing to a new degree of efficiency by monitoring required components and placing orders based on demand trends and other algorithmic decision trees. More consistently and accurately than maybe weary and bored individuals working on the product line, optical sensors and machine-learning-driven algorithms keep an eye on component quality. When doing more delicate jobs, industrial robots either operate in tandem with humans or take over completely. New product introductions, shifts in consumer preferences, and fluctuations in the economy can cause entire supply networks to reorient. Additionally, the devices are capable of Artificial intelligence is processing the vast volumes of data produced by the production process to tell people when the machines need to be mended before they ever break or to suggest better methods to arrange the queue.

Challenges during the Implementation of smart manufacturing Industry 4.0:

Manufacturing sectors may encounter a number of difficulties when implementing Industry 4.0's smart manufacturing. The three primary ones are the need for investments, data security, and new skills.

Challenge 1: New skills required:

Manufacturers now have new opportunities thanks to big data, robotics, artificial intelligence, robotics, robotics, and linked items. But they also provide the manufacturing sector with new difficulties. The manufacturing sector, for instance, employs close to 800,000 people directly and indirectly in Quebec and is currently under threat. The manufacturing company needs to assess the new skills needed and the requirement for skilled individuals in order to successfully transition to Industry 4.0. In industry 4.0, the most in-demand skills are data management (data management), data security (data security), human-machine interaction (human-machine interaction), software development (software development), programming (programming), data science (data science), and analytical (analytics).

The company's biggest problem is finding new hires and staff members to train. It all comes down to determining which strategy will help the business successfully reorganise the value chain and preserve or increase its competitive advantages. Research from the United States and Germany indicates that the great majority of industrial workers lack the abilities needed for Industry 4.0. The situation is the same in Quebec.

Challenge 2: Data security:

Concerns about data security are shared by all businesses embracing Industry 4.0. The organization's growing data and system count

emphasises how crucial computer security is. It was simpler to secure everything when all of the technology were housed in one building and connected to the internal network. The advent of a number of networked objects that are frequently moved and accessed online has made cyber security management necessary. Thus, it is imperative to incorporate cyber security components within the organization's IT infrastructure deployment.

Challenge 3: Investment needs:

Innovations in technology are always associated with investments. Industry 4.0 represents a fundamental shift in particular for businesses that need large sums of capital. Regrettably, most businesses are unable to adopt Industry 4.0 because they lack the enormous financial resources.

Method used:

Industry 4.0 ushers in the age of digitalization. Everything is digitised, including workers, machines, production systems, surroundings, business models, and goods and services. Everything is connected to the matching virtual representation inside the digital scene. Flexible thinking is a critical skill in an era of global change and is required for learning in contexts with enhanced technology. As a result, the intelligent flexibility technique is readily adjusted for the study's technological advancement. The terms "artificial intelligence" (AI), "robotics," "automation," "Internet of Things" (IoT), and "fourth industrial revolution" have become commonplace in our daily discourse. There is more to the Fourth Industrial Revolution than robots, intelligent machinery, and artificial intelligence. Even if these are significant, the real focus of the Fourth Industrial Revolution is not machinery but rather Humans are versatile in the way we learn, earn, play, and live. The employment of digital technology to enhance human abilities and experiences rather than merely replace humans will increasingly define the nature of work in the future as the Fourth Industrial Revolution develops and upends current social and economic structures. The aforementioned approach has been chosen to investigate the potential and challenges that artificial intelligence will face during the industrial revolution in the years to come. It is advised to use this method this time to complete the task correctly. This shift in production is primarily being driven by three technology megatrends: flexible automation, intelligence, and connection. Production facilities that have adopted these megatrends at a large scale have shown a significant improvement in their performance. Firmly established Disruptive paradigms like the Factory of the Future and Industry 4.0 envision knowledge-intensive industrial intelligent settings where smart personalised products are developed through smart processes and procedures. These environments are made possible by the Internet of Things and Cyber-Physical Systems, which enable production. Cyber-physical systems, which will monitor, analyse, and automate business processes, will be the foundation of the fourth industrial revolution. These systems will turn production and logistical processes into smart factory environments, utilising big data capabilities, cloud services, and intelligent predictive decision support tools to boost efficiency and productivity. In addition to highlighting pertinent research opportunities and difficulties, this strategy offers insights into the most recent advancements in these fields and helps to influence the direction of intelligent manufacturing environments in the future. The upcoming generation of industry 4.0 promises mass production and greater manufacturing flexibility. Increased productivity, enhanced quality, and customisation. As a result, it helps

businesses meet the challenges of creating more customised products that are higher-quality and have shorter lead times for the market. Industry 4.0 heavily relies on intelligent manufacturing. The strategy to be used when integrating artificial intelligence with industry 4.0 is depicted in the graphic below.

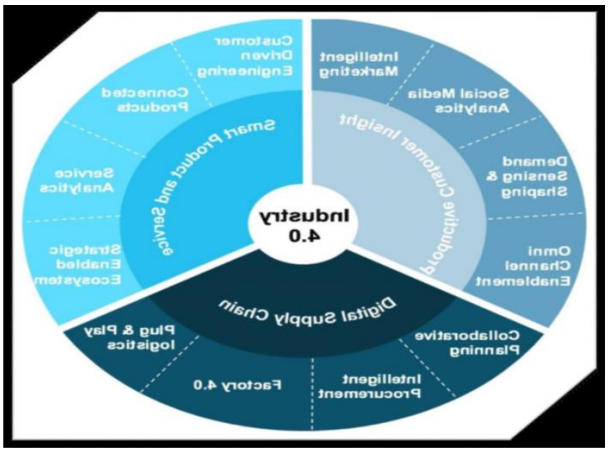


Figure 1: adapted intelligent and flexible approach

The overall conclusion of this research is that Industry 4.0 will leverage the Internet of Things (IoT) and sensor data intelligently to extract business insight that is crucial for manufacturers and producers. Industry 4.0 is defined by intelligent manufacturing, the use of Cyber Physical Systems (CPS) in production, which include embedded actuators and sensors, microcomputer networks, and machine-to-value chain linkages. It also takes into account the reengineering and digital upgrading of items. Its extremely distinctive customised products, well-coordinated product and service combinations, value-added services that complement the core product or service, and an effective supply chain are further characteristics. Every one of these problems calls for ongoing innovation and learning, which depends on people and the capacity of the enterprise.

The cognitive science of artificial intelligence (AI) allows humans to investigate a variety of clever approaches to simulating our sensory and cognitive processes. Industrial AI is a methodical field that helps engineers create and apply AI algorithms in a repeatable and reliable manner. Industry, academia, governments, and investors are all showing a great deal of interest in artificial intelligence at the moment, and they are investing historically high sums of money in the creation of new machine learning tools and applications. More and more complex algorithms are being used to assist human activity, not just for predicting purposes but also for decision-making that has an effect on organisations, society, and individuals. Whether it's in the manufacturing industry, where robots are training to operate alongside people, or in the home, where Refrigerators place food orders according to the homeowner's preferences, and artificial intelligence is steadily encroaching into fields that were formerly the exclusive domain of human judgement, ability, or decision-making. Artificial intelligence is already being used by creative manufacturers to address these numerous issues. These are the main ways that automation, data interchange, and developing technologies are used in "Industry 4.0," the newest developments in smart factories.

Artificial intelligence applied to industry is commonly referred to as industrial AI. Industrial artificial intelligence (AI) is primarily focused on using these technologies to solve industrial pain points for customer value creation, productivity improvement, and insight discovery. This is in contrast to general AI, which is a frontier research discipline to develop computerised systems that perform tasks requiring human intelligence. While some have a pessimistic outlook on AI applications, fearing that these machines would replace human workers and create moral and social dilemmas, industry as a whole has a more optimistic perspective of AI, seeing it as an inevitable economic transformation that will present

enormous commercial opportunities. As a result, top businesses are increasingly searching for their next big opportunity for performance enhancement through innovative technology. Many are beginning to take chances with innovations in artificial intelligence (AI), machine learning, robotics, sophisticated automation, machine-to-machine digital connection (also known as the Industrial Internet of Things, or IIoT), and additive manufacturing. It is anticipated that this change will have such profound effects that it will be known as Industry 4.0, or the fourth industrial revolution.

In addition to providing organisations with the chance to significantly increase productivity and efficiency, this new wave of innovation and technology also gives them the chance to create competitive advantage in the way they manage their whole "make to deliver" value chain, which allows them to capture strategic business value. Sector by sector and firm by company, the type and scope of the opportunities will differ based on variables like market dynamics, operational maturity, and value drivers. Nonetheless, we frequently witness effective technologically enabled changes that significantly alter personal value drivers. For instance, augmented reality work instructions were used by a high-quality yet labour-intensive and production-slow aerospace firm to reduce error rates in complex assemblies.

The main forces behind this shift in production are three technological megatrends: flexible automation, intelligence, and connectivity. Performance at leading manufacturing sites has changed significantly as a result of their widespread adoption of these megatrends. The 21st century will see a number of social, political, cultural, and economic upheavals that are heralded by the Fourth Industrial Revolution. The convergence of digital, biological, and physical advances is expected to be a major driving force behind the Fourth Industrial Revolution, building on the broad availability of digital technology that emerged from the Third Industrial Revolution, often known as the Digital Revolution. Today's manufacturing sector depends heavily on innovation and adaptation. Artificial intelligence has the ability to greatly benefit engineers' and researchers' methods as well as lessen the difficulties brought on by intense rivalry, ongoing change in product preferences and financial limitations of customers. Manufacturers are always looking for a way to stay ahead of the competition in a crowded market that is prone to erratic events like recessions. Artificial intelligence-driven tools enable instantaneous negotiations and communication with regulatory bodies. Shorter development cycles and quicker product-to-market timelines are the results of this.

Discussion:

As the industrial sector grows more complicated in the context of Industry 4.0, mostly as a result of shifting consumer demands, humans become increasingly important. For SMEs, overcoming the difficulties posed by growing complexity can give them a competitive edge. Technologies that facilitate the emergence of Industry 4.0 may make it easier for employees to share expertise and information at work, particularly for Operator 4.0.

Artificial intelligence, or AI, has made a significant comeback to the public consciousness following a protracted absence. Nowadays, the popular press discusses AI's benefits and drawbacks on a daily basis. Although opinions on how AI will affect society are still divided, it is widely acknowledged that AI will have a big impact on business. AI is anticipated by many who follow these trends to play a significant role in boosting corporate competitiveness in the not too distant future. This sentiment is reflected in

the opinions expressed in a recent report released by the financial bank Goldman Sachs. In the future years, the capacity to use AI technology will become one of the key characteristics that distinguish competitive advantage across all major industries, according to the report. The following industrial systems' generation, namely In order to digitise the entire supply chain, Industry 4.0 incorporates several research fields and critical technologies, such as data mining, machine learning, and cyber-physical systems. The rapid advancement of big data, cloud computing, Internet of Things (IoT), artificial intelligence (AI), and other new technologies has had a significant impact on human society in recent decades. The significance of artificial intelligence (AI) and the need for a well-defined plan and strategic investment in this field are emphasised in the most recent White House report on AI. The future generation of technologies will need to rely heavily on AI, hence it is imperative that AI be developed and used methodically as it moves from science fiction to the forefront of disruptive technologies systems of industry, specifically Industry 4.0.

Manufacturers are under increasing pressure to save expenses without sacrificing the quality of their goods and services. Prominent manufacturers are simplifying their operations in a proactive manner. Businesses that employ AI extensively benefit from increased customer satisfaction, reduced downtime, and increased productivity, all of which boost their bottom line. These businesses use AI in many different contexts, such as supply chain optimisation, predictive maintenance, and predictive process design. Leading manufacturing firms are being enabled by H2O.ai, the open source and automation pioneer in AI, to provide AI solutions that are revolutionising the industry.

Large data sets can be processed using advanced analytics and artificial intelligence to provide fresh perspectives and improve decision-making in a variety of fields, including demand forecasting, quality control, and predictive maintenance. The proliferation of large data and increases in processing power are making machine-learning algorithms more and more potent. However, because production environments now only use a limited portion of data for decision making, the full potential of artificial intelligence has not yet been realised there. One automaker tried to enhance and automate its decision-making process since it was finding it difficult to handle the increasing complexity of its product variants.

AI may also be used in conjunction with cutting-edge Industry 4.0 technologies like big data analytics, blockchain, the internet of things, and cyber-physical systems. A new level of intelligence, creativity, and cooperation will be created in organisations through the application of AI "in supply chain ecosystems in combination with human behaviour." It is also necessary to look into how AI might affect production planning and control, productivity, performance, and operations management. Managers must comprehend how supply chain, organisational, and person level interactions with business, logistics, and production systems are impacted by AI projects. AI can assist a worker's actions, for instance, by carrying out monotonous tasks: Robots controlled by artificial intelligence (AI) have the ability to audit manufacturing procedures and, when combined with suppliers and customers, reduce production system idle time especially when paired with IoT and machine learning, AI can be utilised for predictive maintenance. Every opportunity has a hurdle for managers to successfully reap the rewards of artificial intelligence. For example, nothing is known about how AI-driven robots affect industrial operations. Using AI to obtain insights for demand forecasting and production

planning is a significant problem from the standpoint of operations management.

More research is needed on the following topics: how AI can be used within organisations to solve current issues (such as demand forecasting, distribution management, production planning and control, and operations management optimisation); how AI affects production processes across the value chain; what encourages, hinders, and drives AI adoption and use; how to create new business models; and how AI affects operations management practice. In the history of international business, we are living through a very significant, thrilling, and difficult period. Globally, new technologies are revolutionising the ways in which we live as customers, workers, and citizens.

Conclusion:

A new term, smart manufacturing (SM), is emerging to represent the extent and influence of smart technologies on Industry 4.0, including the Internet of Things, Cloud Computing, Cyber-Physical Systems, and Big Data. Companies are being forced by globalisation and competition to innovate and rethink their production processes in accordance with the so-called Industry 4.0 paradigm. It is an example of the integration of previously utilised instruments (robots, big data, cloud, 3D printing, simulation, etc.) that are now linked by digital data transmission into an international network. With large investments ahead of them, the adoption of this new paradigm signifies a significant shift for businesses. Companies need to meet certain requirements in order to take advantage of the potential presented by the smart revolution to endure modifications brought about by smart systems. In addition, in order to succeed in the post-industrial age, workers of the future need to possess up-to-date knowledge in automation, digitalization, and information technology, in addition to soft skills.

Enhancing the process industry's quality requires smart manufacturing. Process-safety analysis is increasingly being used in smart manufacturing to integrate various new-generation information technologies. Because green manufacturing uses a lot of hazardous chemicals, there are currently significant safety management challenges because of the spatial heterogeneity of chemical industrial processes and the stricter safety and environmental laws that follow. Artificial intelligence (AI) and other emerging information technologies hold great promise for solving these problems. We identify and explore a number of technological issues related to process safety, based on clever and adaptable AI techniques and the intricate safety relations in the process industry: knowledge gathering for process safety using sparse labels; knowledge-based logic for process safety; precise integration of diverse data sources; and efficient learning for dynamic risk assessment and decision support. In this context, new and ongoing works are also discussed. Adopting "Industry 4.0" enables quick, flexible, and effective processes to create higher-quality products at the lowest feasible cost by assembling and analysing data from several equipment. Without a question, the manufacturing revolution will increase productivity, change the economics, spur industrial expansion, and alter the makeup of the labour force, all of which will eventually affect how competitively strong businesses and areas are able to operate.

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Aligning Organization Performance in VUCA Times

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Abstract:

Due to the numerous changes occurring in the current economic landscape, organisations are confronting dynamic business transformations. The power of data and insights may transform businesses, create a winning talent strategy, and assist managers in making more informed decisions. HR needs to reconsider how it uses apps, technology, and given an unending stream of data and communication from many sources, they can aid in drawing in, nurturing, and keeping talent. Organisations must adapt to frequent and frequent changes in a volatile and uncertain world in order to maintain corporate performance. Change management abilities are therefore a crucial component of any HR business procedures. In actuality, company executives are looking for professionals with specialised talents rather than experts in talent, employee relations, or engagement in an environment that is always changing. In addition, the workers and customers span multiple generations is altering who consumes what and where. Knowing employee and customer expectations is becoming a critical business driver, from baby boomers to the "newly minted" Gen Z This research study examines the necessity for organisations' HR procedures to adapt to the VUCA time.

Keywords: Economy, HR Processes, Change Management, Generational Workforce, Technology. Aligning Organization Performance in VUCA Times

Introduction:

Operating in VUCA Times: What Must Organisations Adjust? Anticipating, learning, adapting, and delivering in a constantly changing new context are key components of the VUCA world. For instance, the 2008 Financial Crisis and the development of the Internet were moments that rocked the current corporate environment and also altered how employers today see talent. VUCA is a phenomenon in which better potential develops as a result of adversity. A leader in these volatile times faces impending grief if they are blind to what lies ahead. Although anticipating hazards is necessary, the organisation shouldn't create overly inflexible long-term strategies. Plans must be adaptable since unforeseen circumstances can occasionally arise favourable circumstances. Therefore, if the company is sufficiently flexible, it should be able to seize the opportunity to innovate. HR has to spearhead that transformation. In order to be in a better position to respond to talent difficulties that occasionally shake the organisation, HR will need to reimagine and realign many of the policies and processes.

Nothing beats the market on a constant basis in a VUCA world. Global competitiveness, trade liberalisation, connectivity, digitization, demographics, and business model innovation are fostering new business practices and the rise of new rivals. Businesses are also having Unpredictable customer mood, growing complexity, growing uncertainty, an information overload, and a lack of resources are all contributing factors. Many of these trends have unclear long-term repercussions, but they share some themes and have various interdependencies

among the drivers, indicating that their effects will be intricate and multifaceted. The confluence of these variables is compelling numerous organisations to reconsider the sources of their future commercial success, as past achievements do not ensure future profitability.

It's time to make a bold move. Avoid the need to adhere to the procedures and schedules from the past. Make new ones, ones that are more nimble and aware of their environment. Show curiosity. Show creativity. You can only overcome VUCA in this manner. In these volatile times, HR's role is to define the abilities, know-how, and the people's attitudes. Businesses are searching for people that understand and deliver for success on the continuum from customers to employees, from the customer to the organisation to its employees.

Businesses have been impacted by the rapid advancements in technology in a variety of ways. These include workforce restructuring for remote and mobile work options, globalisation, organisational adaptations, and the need for human resources to respond quickly. HR departments must assist companies in anticipating and managing organisation transformation with technology's assistance.

The majority of employment laws in India were created primarily with traditional forms of workforce participation in mind. Nevertheless, these rules are falling behind the demands of newly developing, technologically advanced industries, such as gig/on-call labour and many more.

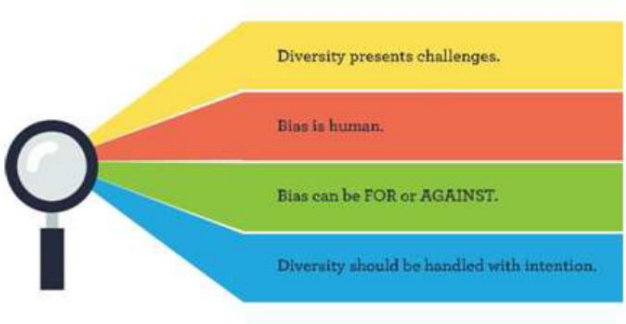
Research Methodology:

This exploratory study is based on a qualitative analysis of articles published. The focus of the paper is human resource scenarios in cross-cultural enterprises. Examining the challenges encountered in these volatile times and potential solutions are emphasised, with a focus on their role in the influence of organisations on corporate strategy. Information was gathered from pieces about the VUCA that appeared in newspapers, online journals, and news websites like People Matter.

Findings:

HR Strategies for Organisations to adapt in VUCA times:

Workforce Diversity Issues: The goal of managing diversity is to maximise everyone's potential in a culturally safe, accepting environment that is "safe for differences," allows people to "reject rejection," and unleashes the diverse talents and capabilities that a diverse population brings to an organisation, community, or society a situation where everyone wins. As the art of managing difference, multiculturalism is a process that is inclusive and leaves no one out. Therefore, diversity is fundamentally the creation of one group as the standard for all other groups.



Organisations that employ diverse workforce have to:

- Greater insight into the market's demographics; as a result, they are better positioned to succeed in it than a business with a more constrained range of staff demographics.
  • Boost productivity, retention, and employee satisfaction.
  • Employers can benefit greatly from their workforce's diversity and multitalented staff.
  • The workforce is becoming more cohesive

and full of creative ideas.
• Improved personnel management and an atmosphere that is more favourable to change.
• When numerous individuals collaborate and form a unit for a specific task, it works wonders.
• It creates an automated tool for employer branding and organisation advertising.
• Eliminate biases from the structure and mistakes from the system.

Dealing with Generational workforce in a VUCA environment:

Doing more with less would be many CEOs' motto going forward. Businesses will require leaders who can double their energy, involvement, ownership, and passion, but they will also require people who can listen, concentrate on posing pertinent questions, lack the impulse to dictate and instead co-create solutions, and experience true happiness when a thousand flowers bloom. India is the greatest talent development lab, and VUCA is here to stay.

Following are the few business skills which play a important role in volatile times for businesses;

- A heightened understanding of cultural quirks, a global perspective, negotiating political processes, and valuing and utilising variety.
- Communicating the vision of business executives to employee constituents and crafting an engaging narrative about the present and future business operations of the corporation.
- Media savvy both internally and outside to convey the company's people story.
- Using analytics and people and business data to gain insights and find solutions to business issues.
- Facilitate others' success by serving as a coach to senior managers, mentor to upcoming talent, and trainer for people managers Put simply, create "networks of expertise" rather than "centres of expertise."

If companies were aware of the constantly evolving demands of Gen Y workers, they might be able to keep the increasing number of workers who are leaving to pursue possibilities outside of their industry. For instance, a lot of CEOs are visiting e-commerce businesses because they offer a wide range of events that they can relate to,

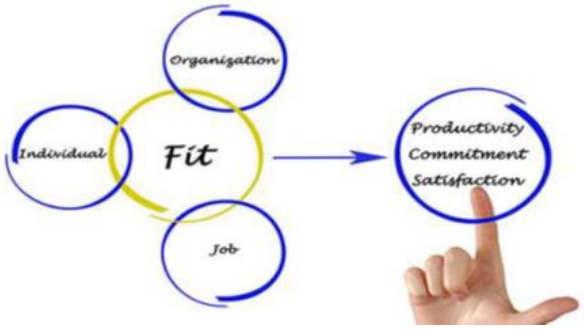
1. They get to take on a business role, something that isn't typically possible in a traditional organisation.
2. Social agility is a requirement for employment in an e-commerce company. This is fine for a generation that relies heavily on social media for communication.
3. The role provides invaluable flexibility and experiences. Even though the majority of businesses now provide flexible or part-time work schedules, Gen Y still feels confined by the need to work a specific number of hours. Gen Y seeks a work-life balance that is more "Life."

Businesses would perform well in these VUCA times if they kept in mind that their staff is multigenerational in addition to being of Gen Y. Businesses must have a strategic strategy in place to transfer expertise from Baby Boomers, who are likely waiting to retire in the near future, to Gen Y, who is impatient with delays in service essential. Gen Y doesn't think it's necessary to wait around for leadership positions, raises, or promotions. Although businesses are eager to hire young people, they have come to understand that these workers will require key skills that only more seasoned professionals can teach. Organisations nowadays must allow their workers to voice their disapproval while also maintaining their loyalty. Additionally, the staff members must to They should ask for what they know they

desire. They ought not to wait for a person to get in touch with them.

Relationship of equals vs. Hierarchies:

How are the concepts of work fit and cultural fit related to an individual's potential success, assuming we regard both as important? Skills tests, competence analyses, behavioural interviews, and even resume and application reviews can be used to assess a candidate's fit for a position. Fit between an individual and an organisation entails posing and receiving answers to a variety of questions, most pertaining to what matters most to a person in terms of their engagement, priorities, and basic beliefs.



But given the state of the market today, it is no longer sufficient to merely appoint the greatest candidates and hope for the best. Those who appear like the best candidates during an interview may prove to be a liability even a few weeks after they begin employment. Consequently, businesses must review and adjust their employment practices and selection procedure to identify the most qualified candidates.

Communication:

Organisations must make sure that communications are consistent and in line with the overarching vision when they are conveyed lower in the leadership hierarchy. Communication must be straightforward and unambiguous in a society where priorities are ever changing. This would reassure talent that everything is well and maintain open lines of communication.

Employer Branding:

Everything revolves around their employer reputation. Top prospects want to work for them and current employees want to stay if they have a good one. It could be costly for them if they have a poor one. Use Employer Branding Essentials to establish your company as a fantastic place to work. Organisations must engage in branding exercises led by prominent users of websites such as LinkedIn, where they can pick up important tips and tricks from some of the top employer brands globally to:

- Increase their reach by using an underappreciated hidden weapon: your staff
- Draw in and include the best applicants for the business.
- Increase interest in positions with distinctive job descriptions
- Give new hires the tools they need to succeed in their new roles and promote the business culture.

Although a highly regarded employer brand takes time to develop, following these tips will keep the business moving in the right direction.

Digitization, AI, and technology are transforming the workplace like never before. While some businesses used to be reluctant to allow employees to check their emails while at work, these same businesses now fervently believe in social media and have made efforts to engage staff through gamification techniques such as Yammer models. The concept of the Internet of Things has evolved, and we are now in a position where its realisation is clearly achievable. Technology is not just transforming workspaces but also how businesses see personnel. This is what motivates VUCA these days.

With Millennials expected to make up 75% of the workforce by 2020 and accounting for more than half of the workforce today, HR will need to adopt and capitalise on technology improvements to fulfil employee expectations and corporate needs. Workplace analysis and talent analytics will grow in importance ubiquitous, and businesses that make use of the data at their disposal will be much more competitive.

As technology advances, a globally mobile workforce emerges, and societal, political, and legal paradigms change, HR partnership becomes even more crucial as a result of the profound effects on enterprises. The ability of HR to function as a crucial component of the business, contributing to emphasise the idea of working together to design HR in a way that allows for technological adaptation and the use of data analytics to make strategic decisions.

In a more tactical sense, artificial intelligence (AI) will speed up the automation of remaining manual operations, improve their accuracy and speed, and use self-learning to eliminate the need for human intervention in exception management and other areas.

Compliance amendments:

The majority of organisational employment rules, however, are not keeping up with the demands of new and growing industries driven by cutting edge technology, such as gig/on-call and many others. These laws were created largely for traditional models of workforce participation. Even if revisions are desperately needed, companies should revaluate their employment regulations in light of the impending revolution in artificial intelligence to make sure that employees' rights are upheld, businesses are not hindered, and innovation and entrepreneurship are fostered.

Conclusion:

Organisations operate in a volatile, uncertain, and complex environment where they frequently go through phases of regular change, ranging in size and influence from small and short-term to huge and long-term. Managers should therefore be flexible in order to handle change. In fact, as the business climate changes constantly, company executives are looking for experts with specialised knowledge for staying ahead of the competition through internal talent acquisition, technological advancement, usage of digital and AI for data management, and making wise business decisions to stay ahead of the competition. HR managers must make a conscious effort to uphold the company brand in order to draw in high-performing workers. Businesses must adjust to regulatory requirements in order to retain employees and provide them with statutory benefits in order to keep appropriate balance between work and life.

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A Study of Green Economy and Sustainable Development in India

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Abstract:

The concept of the green economy has gained global prominence as nations seek sustainable pathways that balance economic growth with environmental protection and social inclusion. India, as a fast-growing emerging economy, faces the dual challenge of accelerating development while addressing climate change, resource depletion, and environmental degradation. This paper examines the evolution, policy framework, sectoral initiatives, and challenges of the green economy in India. Using secondary data and policy analysis, the study highlights key drivers such as renewable energy expansion, green finance, sustainable agriculture, and circular economy practices. The paper finds that while India has made measurable progress through national missions and market instruments, gaps remain in financing, technology diffusion, skills, and governance. Policy coherence, private-sector participation, and local implementation are critical to scaling green growth. The study concludes with recommendations to strengthen India's transition toward a resilient and inclusive green economy.

Keywords: Green Economy, Sustainable Development, Renewable Energy and Green Finance

Introduction:

The concept of the green economy has emerged as a critical response to the growing challenges of environmental degradation, climate change, resource depletion, and social inequality. Traditional models of economic growth have largely prioritized industrial expansion and profit maximization, often at the cost of ecological balance and long-term sustainability. In contrast, the green economy offers an alternative development pathway that seeks to harmonize economic progress with environmental protection and social well-being. For a developing country like India, where rapid economic growth is accompanied by rising energy demand, urbanization, and environmental stress, the green economy has become increasingly significant. A green economy can be defined as an economic system that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. It emphasizes low-carbon development, efficient use of natural resources, conservation of biodiversity, and the creation of green jobs. The core principles of a green economy include sustainability, inclusiveness, resilience, and long-term economic efficiency. Unlike conventional economic models, the green economy integrates environmental costs into economic decision-making and promotes cleaner production, renewable energy, sustainable agriculture, and responsible consumption patterns.

In the Indian framework, the green economy is closely linked with national priorities such as sustainable development, poverty alleviation, energy security, and climate action. Initiatives in renewable energy, energy efficiency, waste management, electric mobility, and

sustainable agriculture reflect India's gradual transition towards green growth. The green economy is not viewed as a constraint on development, but rather as an opportunity to foster innovation, generate employment, and enhance competitiveness while safeguarding natural resources for future generations. Thus, the green economy represents a holistic approach to development that balances economic, environmental, and social objectives. Its adoption is essential for achieving sustainable and inclusive growth, particularly in emerging economies facing the dual challenge of development and environmental sustainability.

Objectives of the Study:

1. To examine the concept and relevance of the green economy in the Indian context.
2. To analyze India's policy framework and sectoral initiatives supporting green growth.
3. To assess challenges and opportunities in India's green economy transition.

Review of Literature:

agency reports, peer-reviewed journals, and credible institutional publications. Content analysis is used to synthesize trends, initiatives, and outcomes across key sectors.

Green Economy Framework and Policy in India:

The green economy framework in India aims to achieve economic growth while ensuring environmental sustainability and social inclusion. It recognizes that long-term development is possible only when natural resources are conserved, pollution is reduced, and communities benefit equitably from growth. India's approach to a green economy is shaped by its development needs, large population, and vulnerability to climate change. At the policy level, the Government of India has integrated green economy principles into national planning and sectoral strategies. Institutions like NITI Aayog play a key role in promoting sustainable development by aligning economic policies with environmental goals. One of the most important initiatives is the National Action Plan on Climate Change (NAPCC), which includes missions on solar energy, energy efficiency, sustainable agriculture, water conservation, and climate-resilient habitats. Renewable energy is a central pillar of India's green economy framework. Policies under the Ministry of New and Renewable Energy have encouraged large-scale investment in solar, wind, and bioenergy, helping India become one of the world's leading renewable energy producers. Programmes such as energy-efficient appliances, electric mobility, and green buildings aim to reduce carbon emissions while creating new employment opportunities. India has also adopted regulatory and market-based instruments to support a green economy. These include environmental impact assessments, pollution control norms, carbon reduction commitments under the Paris Agreement, and incentives for green finance. Public initiatives like Swachh Bharat Abhiyan and the promotion of a circular economy further emphasize waste reduction and resource efficiency.

Sectoral Drivers of India's Green Economy:

Renewable energy is one of the strongest drivers of India's green economy, contributing significantly to energy security, climate mitigation, and inclusive growth. India has rapidly expanded its renewable energy capacity, particularly in solar and wind power, supported by ambitious national targets and supportive policy frameworks. The country's transition toward renewables has helped reduce dependence on fossil fuel imports, stabilize energy costs, and lower greenhouse gas emissions. Large-scale solar parks, rooftop solar systems, and onshore

wind farms have transformed India's energy landscape. At the same time, decentralized renewable energy solutions—such as solar mini-grids, biogas plants, and solar pumps—have played a crucial role in improving electricity access in rural and remote areas. These decentralized systems not only enhance resilience against climate shocks but also generate local employment and support rural livelihoods, particularly in agriculture and small enterprises. Policy initiatives under the Ministry of New and Renewable Energy and long-term missions aligned with national climate commitments have encouraged private investment and technological innovation. Falling solar and wind tariffs demonstrate how economies of scale and competitive bidding have made clean energy cost-effective. Furthermore, renewable energy expansion contributes to public health benefits by reducing air pollution from coal-based power generation. Despite challenges such as land acquisition, grid integration, and storage infrastructure, renewable energy remains central to India's green economy strategy. Continued investments in energy storage, green hydrogen, and smart grids are expected to further strengthen this sector and support India's transition to a low-carbon and sustainable development pathway.

Energy efficiency is a cost-effective and critical driver of India's green economy, particularly in the industrial and building sectors. Improving energy efficiency helps reduce carbon emissions while simultaneously lowering production costs and enhancing industrial competitiveness. India has implemented several national programmes aimed at promoting efficient appliances, energy-saving buildings, and cleaner industrial processes. Initiatives such as appliance labeling, efficient lighting programmes, and energy audits have encouraged households and industries to reduce energy consumption. In the industrial sector, energy-intensive industries—such as cement, steel, and power—have adopted improved technologies and best practices under market-based mechanisms. These measures not only reduce emissions but also improve productivity and profitability. Energy-efficient buildings and green construction practices are gaining importance in urban areas. The adoption of building energy codes and green certification standards helps reduce electricity demand, especially for cooling and lighting. As urbanization increases, energy efficiency in construction and infrastructure becomes essential for sustainable urban development. From an economic perspective, energy efficiency reduces pressure on energy supply systems and minimizes the need for costly capacity additions. It also supports job creation in energy services, manufacturing of efficient equipment, and building retrofitting. Although challenges remain in terms of awareness, upfront costs, and compliance, energy efficiency remains one of the most practical tools for achieving India's climate and development goals.

Sustainable agriculture plays a vital role in India's green economy by balancing food security, farmer livelihoods, and environmental protection. Agriculture supports a large share of India's population, making it essential that growth in this sector is both climate-resilient and resource-efficient. Climate-smart agricultural practices have emerged as key tools for adapting to climate change while reducing environmental degradation. Practices such as organic farming, natural farming, crop diversification, and integrated pest management help reduce chemical inputs and protect soil health. Water-efficient irrigation techniques, including drip and sprinkler systems, address the challenge of water scarcity and improve productivity. These approaches not only conserve natural resources but also reduce input costs for farmers, thereby increasing incomes. Government initiatives promoting

sustainable agriculture focus on soil health management, improved seed varieties, and climate-resilient farming systems. Sustainable agriculture also contributes to ecosystem services such as biodiversity conservation and carbon sequestration. Additionally, growing consumer demand for organic and sustainably produced food has created new market opportunities for farmers. Despite its benefits, the transition to sustainable agriculture faces challenges such as limited awareness, small landholdings, and market access. However, with appropriate policy support, extension services, and financial incentives, sustainable agriculture can significantly strengthen India's green economy while ensuring long-term food and livelihood security.

Green transport is a crucial driver of India's green economy, particularly in addressing urban air pollution, energy security, and climate change. Rapid urbanization and rising vehicle ownership have increased fuel consumption and emissions, making sustainable transport solutions essential. India has responded through policies promoting electric mobility, improved public transport, and fuel efficiency standards. Electric vehicles (EVs) are central to India's green transport strategy. Incentive-based schemes have encouraged the adoption of electric two-wheelers, cars, and public transport buses. Alongside EVs, investments in metro rail systems, bus rapid transit, and non-motorized transport aim to reduce congestion and pollution in cities. Fuel efficiency norms for conventional vehicles have also helped lower emissions and improve energy performance. Green transport contributes not only to environmental benefits but also to economic gains through reduced oil imports and new employment opportunities in manufacturing, charging infrastructure, and services. While infrastructure gaps, charging availability, and affordability remain challenges, green transport policies reflect India's commitment to a cleaner and more efficient mobility system. In the long run, sustainable transport will play a decisive role in improving urban livability and supporting low-carbon economic growth.

Green finance acts as an enabling driver of India's green economy by mobilizing capital for sustainable infrastructure, clean energy, and climate-resilient development. It includes financial instruments and mechanisms such as green bonds, blended finance, sustainability-linked loans, and ESG-based investments. These tools help bridge the financing gap required for India's transition to a low-carbon economy. India's green bond market has grown steadily, supporting projects in renewable energy, transport, and water management. Blended finance—combining public funds with private investment—has reduced risks and attracted capital to environmentally sustainable projects. Financial institutions are increasingly integrating environmental, social, and governance (ESG) criteria into lending and investment decisions. Green finance not only supports environmental objectives but also enhances financial system stability by managing climate-related risks. It encourages innovation and entrepreneurship in clean technologies and promotes long-term value creation. Regulatory bodies and policymakers have recognized the importance of aligning financial flows with sustainability goals. Despite progress, challenges remain in standardization, disclosure, and awareness. Strengthening policy frameworks and institutional capacity will be essential to scale up green finance and ensure its effective contribution to India's green economy.

Conclusion:

The green economy represents a sustainable pathway for India to achieve economic growth while safeguarding environmental and social well-being. Through

sectoral drivers such as renewable energy, energy efficiency, sustainable agriculture, green transport, and green finance, India has made significant progress toward a low-carbon and resource-efficient development model. Supportive policies and institutional initiatives have strengthened this transition, generating employment and enhancing energy and food security. However, challenges related to finance, technology, and implementation remain. Strengthening policy coordination, stakeholder participation, and innovation will be crucial for ensuring that India's green economy contributes effectively to inclusive and long-term sustainable development.

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Role of Microfinance in Empowerment of Women in Nandurbar District

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Abstract:

The main aim of this paper is to know relationship between micro finance and women empowerment. Also, this paper has investigated the microfinance institutions and financial inclusion initiatives play a pivotal role in providing women with access to credit, savings, and financial literacy, enabling them to participate in economic activities and improve their socio-economic status. These initiatives foster entrepreneurship among women, encourage self-reliance, and enhance their decision-making power within households and communities. In the context of emerging technological trends in commerce, digital financial platforms and mobile banking have further amplified the impact of microfinance, ensuring greater reach and efficiency in service delivery. This integration of technology with financial inclusion has proven instrumental in bridging the gender gap in financial access and promoting sustainable development. This study is based on primary as well as secondary sources of data and a descriptive nature which describes. Primary data has collected from well-structured questionnaire. Researcher has selected 200 women as sample from Nandurbar district in SHGs and who beneficiary of micro finance.

Keywords: Microfinance, Self-Help Groups (SHGs), Women Empowerment, and Financial Inclusion

Introduction:

The relationship between women empowerment through microfinance and financial inclusion and emerging technological trends in commerce is transformative and mutually reinforcing. Microfinance and financial inclusion initiatives provide women with essential financial resources, such as credit, savings, and insurance, which empower them to engage in entrepreneurial activities and achieve financial independence. These initiatives are increasingly integrating with emerging technologies like digital payments, mobile banking, and e-commerce platforms, which enhance accessibility and convenience for women, even in remote areas. By leveraging technology, women can efficiently manage their finances, access real-time market information, and expand their business operations beyond traditional boundaries. Emerging technological trends in commerce, such as online marketplaces, fintech innovations, and block chain technology, have further amplified the impact of microfinance and financial inclusion by creating a more inclusive economic ecosystem. These technologies reduce barriers to entry for women entrepreneurs by minimizing the need for physical infrastructure and enabling direct access to customers and suppliers. Moreover, digital financial services offer secure and transparent transactions, fostering trust and encouraging greater participation. Together, microfinance, financial inclusion, and technological advancements create a robust framework for women's empowerment, driving economic growth and promoting gender equity in commerce and beyond.

Literature review:

Ankita Sharma (2012) examined that the impact of NGO-SHG Bank Linkage program among the 226 microfinance beneficiaries from 60 Self Help Group (SHG's) of District Udhampur of J&K state. *M.B, D., and D. S. (2010)* considered that the subject of micro-finance as a significant emerging trend in the present scenario for the empowerment of women. Microfinance programs are promoted as an important strategy for women's empowerment. *P. Balamurugan and A. Selvaraj (2014)* stated that the levels of poverty are high and hence Self-Help Groups movement occupies a significant agenda in the poverty reduction and empowerment of poor women. Micro-finance is an essential institutional device for providing small credit to the rural people to alleviate poverty.

Objectives of the Study:

1. To study of women empowerment through microfinance
2. To study the change in social status of women due to micro finance.

Methodology:

. The present study is based on primary as well as secondary sources of data and a descriptive nature which describes. Primary data collected from well-structured questionnaire. Researcher has selected 200 women as sample from Nandurbar district in SHGs and who beneficiary of micro finance. Secondary data has collected from research journals, published data, books, magazines, research studies and other relevant documents, various reports and websites etc.

Sampling:

For the present study the researcher has selected Nandurbar district of Maharashtra state. All involved self-help groups related to Mahila Bank Linkage Program in the district and run by NGOs. For this, a total of 40 self-help groups in the district and 5 women in each group have been selected by convenience sampling method. Thus, a total of 200 women have been selected for the study.

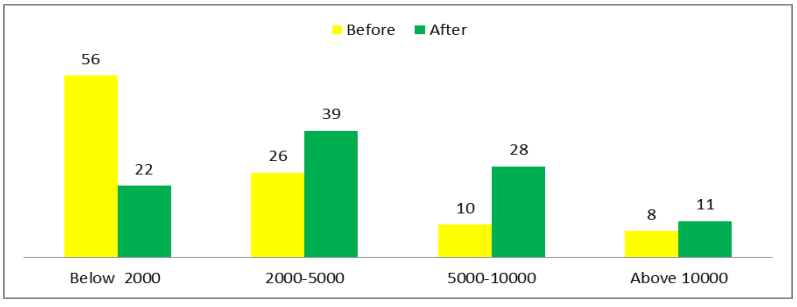
Results and Discussions:

Table-1 Income Level of Women before and After Taking Loan from Micro Finance

Monthly Income (in Rs.)	**Before taking loan from micro finance institution**			**After taking loan from micro finance institution**	
	No. of Respondents	Percentage		No. of Respondents	Percentage
Below 2000	112	56.00		44	22.00
2000-5000	52	26.00		78	39.00
5000-10000	20	10.00		56	28.00
Above 10000	16	8.00		22	11.00
Total	200	100.00		200	100.00

Source: Field Survey

Figure-1 Income Level of Women before and After Taking Loan from Micro Finance



In the table presented, information of women associated with self-help under micro-finance in Nandurbar district in Maharashtra is given. Information related to monthly income of women has been collected after joining the self-help group. It was found that before joining the self-help group, the income level of the women was very low. Therefore, women earning less than 2000 were the maximum 56 per cent. While women earning more than 10000 were the lowest per cent. There has been a vast change in the monthly income level of women after taking loans from micro finance institutions. So, it is clear that maximum 39 per cent: women receive monthly income Rs. 2000-.5000; 28 per cent women receive monthly income Rs. 5000-.10000 and 11 per cent women receive monthly income more than Rs.10000. While the percentage of women earning less than 2000 is the decline to 22%. (Table-1)

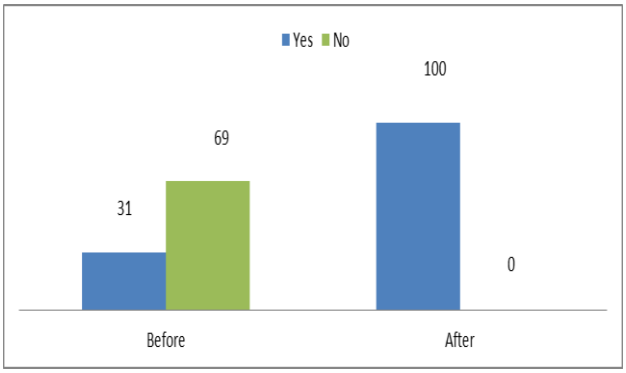
Table-2 Bank Account Status of Women

Do you have bank account	**Before join SHGs**			**After join SHGs**	
	No. of Respondents	Percentage		No. of Respondents	Percentage
Yes	62	31.00		200	100.00
No	138	69.00		0	0.00
Total	200	100.00		200	100.00

Source: Field Survey

Table–2 presents a comparative analysis of the bank account status of women respondents before and after joining Self-Help Groups (SHGs). The data clearly highlights a significant improvement in financial inclusion among women as a result of SHG participation. Before joining SHGs, only 62 out of 200 respondents (31%) had a bank account, while a large majority, 138 respondents (69%), did not have access to formal banking services. This indicates a high level of financial exclusion among women prior to their association with SHGs, reflecting limited awareness, low-income levels, and restricted access to financial institutions. After joining SHGs, the situation changed remarkably. All 200 respondents (100%) reported having bank accounts, while none remained unbanked. This transformation demonstrates the crucial role played by SHGs in promoting financial literacy, encouraging savings habits, and facilitating access to formal financial systems. SHGs often require members to open bank accounts to manage group savings, access credit, and receive government benefits, which directly contributes to universal banking coverage among members. The findings suggest that SHGs act as an effective institutional mechanism for women's economic empowerment. By linking women to banks, SHGs help them gain financial identity, improve control over financial resources, and enhance their participation in economic activities. Access to bank accounts also enables women to benefit from government welfare schemes, subsidies, and direct benefit transfers.

Figure -2 Bank Account Status of Women before and after joining SHGs



It was observed from table-3 that only 31 per cent of women had bank account, while after

joining SHGs 100 per cent of women have bank account. (Figure-2)

Table-3 Information on Credit Consumption by Women

Loan utilization	No. of Respondents	Percentage
Domestic consumption	24	12.00
Health	6	3.00
Festival	10	5.00
Pay off old debts	26	13.00
Business operations	126	63.00
Children's education and other	8	4.00
Total	**200**	**100.00**

Source: Field Survey

In the table-3 presented, the pattern of credit utilization among women respondents after accessing loans, highlighting the purposes for which borrowed funds were used. The data reveals that a substantial majority of women utilized credit for business operations, with 126 respondents accounting for 63% of the total sample. This clearly indicates that access to credit has been largely directed toward income-generating activities, reflecting a positive shift from consumption-based borrowing to productive use of loans. Such utilization enhances women's economic independence and contributes to household income and local economic development. A smaller but notable proportion of respondents used credit for paying off old debts, with 26 women (13%). This suggests that SHG-linked credit has helped women escape high-interest informal loans and reduce their debt burden, thereby improving financial stability. Domestic consumption accounted for 12% (24 respondents), indicating that some loans were used to meet essential household needs, especially in financially constrained families. Expenditure on festivals and health constituted 5% (10 respondents) and 3% (6 respondents) respectively. While these uses are not directly income-generating, they are socially and personally significant, especially in rural contexts where health emergencies and social obligations often require immediate financial support. A small proportion of respondents (4%) used credit for children's education and other purposes, reflecting investment in human capital and future well-being.

Conclusion:

From above discussion it is conclude microfinance is play vital role in women empowerment. When it comes to improving the lives of women and helping them invest their money in the right way. Women can easily avail microfinance loan support and start their business venture to change their lives forever and increased the abilities in women and improved their socio-economic condition. Microfinance has helped the women to cope up with the problem of unemployment. Thus, microfinance in India represents an innovative approach towards the development of the SHGs members. There is a strong desire to eliminate poverty by providing self-employment opportunities for poor women through the use of microfinance. The microfinance movement has absorbed all these programmes positively and benefited to the women. The microfinance has been successful in empowering women through various activities.

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Harnessing Technology For Accelerated Achievement Of Sustainable Development Goals In Indian Higher Education

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Abstract:

In today's rapidly interconnected and digital world, technology stands as a transformative force propelling the advancement of the United Nations Sustainable Development Goals (SDGs), especially across higher education institutions in India. By leveraging innovative tools such as online learning platforms, virtual classrooms, and adaptive technologies, universities are significantly expanding access to quality education and bridging long-standing inequalities. Recent data reveals that over 75% of higher education institutions in India have integrated some form of digital learning platforms, enhancing inclusivity and learner engagement (AIU Report, 2024). Technology not only broadens educational horizons but also underpins cutting-edge research in critical domains such as climate action, renewable energy innovation, and sustainable industrialization, aligning with the global agenda's priority targets. Moreover, technology plays a pivotal role in advancing gender equality and empowerment among students and faculty by dismantling systemic barriers through flexible and remote learning solutions. Campus-wide implementation of smart technologies optimizes energy usage, reduces waste, and promotes sustainable resource management directly contributing to institutional sustainability goals. The rapidly growing adoption of Artificial Intelligence, Internet of Things (IoT), and blockchain further accelerates these efforts by facilitating data-driven decision-making and strengthened governance, as demonstrated by successful initiatives like the Digital India program (UNDP, 2025). This paper offers a comprehensive overview of how India's higher education institutions can harness technological advancements not only to enhance academic outcomes but also to serve as catalysts in achieving the SDGs, fostering inclusive societies, and addressing urgent global challenges.

Keywords: Sustainable Development Goals, Sustainability, Virtual Classrooms, Renewable Energy, Digital Inclusion, Climate Action.



Introduction:

In 2015, the United Nations (UN) launched 17 Sustainable Development Goals (SDGs) to tackle pressing global issues like poverty, inequality, climate change, environmental degradation, and the promotion of peace and justice. These goals represent a global call to action to build a sustainable and equitable world by 2030. Education, particularly higher education, is a fundamental pillar in realizing

these objectives. India, with its vast and diverse population and complex socio-economic landscape, faces significant challenges but also tremendous opportunities in utilizing its higher education sector to further the SDGs. Technology is proving to be a critical enabler in this journey, helping to overcome barriers related to accessibility, enhance the quality of education, and foster inclusivity. Currently, more than three-quarters of Indian higher education institutions have embraced digital learning technologies, reflecting rapid growth in the EdTech industry, which is expected to expand from $750 million in 2020 to a staggering $30 billion by 2030 (AIU Report, 2024; Digital Defynd, 2024). The COVID-19 pandemic accelerated the adoption of online education, with virtual classrooms, AI-driven tools, and interactive digital platforms becoming integral to academic delivery. This study investigates the central role technology plays in propelling India's higher education system toward SDG achievement. It highlights how digital innovations enhance learning outcomes, advance social inclusion, and equip students to address sustainability challenges. At the same time, it examines the challenges surrounding technology integration, including infrastructure limitations and the need for faculty development.

Objectives of the Study:

1. To examine how technology increases accessibility and improves the quality of higher education in India
2. To evaluate the contribution of technology to India's progress on SDGs
3. To identify the advantages and hurdles of implementing digital tools in higher education
4. To offer strategic recommendations for leveraging technology effectively to meet SDG targets

Relevance of the Study:

India operates one of the largest higher education systems globally, enrolling millions across universities, colleges, and institutes. Despite its size, the system faces critical challenges including uneven access to quality education, infrastructure deficits, and disparities in academic outcomes. The integration of technology presents a transformative opportunity to overcome these barriers by offering scalable, inclusive, and flexible educational solutions. Understanding technology's role in advancing the Sustainable Development Goals (SDGs) within this vast and diverse context is vital for policymakers, educators, and stakeholders aiming for effective educational reform. This study holds particular significance considering India's bold commitment to achieving the SDGs by 2030. Technology underpins SDG 4, which focuses on ensuring inclusive, equitable quality education and promoting lifelong learning opportunities for all learners. Beyond SDG 4, technology's influence extends directly and indirectly to other critical SDGs such as SDG 9 (Industry, Innovation, and Infrastructure), SDG 10 (Reduced Inequalities), and SDG 13 (Climate Action), by reshaping education into a more sustainable and future-ready sector. Currently, India's EdTech market is projected to surge from $750 million in 2020 to an astounding $30 billion by 2030, driven by increased internet penetration, favorable policies, and a youthful population embracing digital learning opportunities (Digital Defynd, 2024; AIU Report, 2024). These technological advancements allow India's higher education system to innovate, enhance quality, and expand inclusivity, directly contributing to the country's sustainable development pathway.

Literature Review:

Substantial research highlights the transformative potential of technology in

enhancing higher education and advancing the Sustainable Development Goals (SDGs). The UNESCO Institute for Information Technologies in Education (IITE, 2020) underscores that digital technologies foster more personalized, efficient, and inclusive education by breaking down obstacles such as geographical remoteness, financial constraints, and limited resource availability. Complementing this, the Indian Ministry of Education (2020) emphasizes technology's vital role in widening access to higher education, particularly in rural and marginalized regions where traditional infrastructure is often deficient. India's Edu. Tech sector has experienced rapid expansion, propelled by online platforms such as Coursera, ed., and the National Program on Technology Enhanced Learning (NPTEL). These platforms offer a wide array of globally partnered courses, providing learners with flexible, high-quality education outside conventional classrooms. PwC India's 2020 report forecasts a remarkable compound annual growth rate (CAGR) of 39% for the Indian Edu. Tech market, underscoring technology's increasing centrality in educational delivery. Furthermore, the National Institutional Ranking Framework (NIRF, 2021) recognizes institutions pioneering in digital learning integration, reflecting improved teaching, research, and student outcomes such as higher enrollment and enhanced employability. These exemplar institutions demonstrate how innovative technology adoption catalyzes academic success and sustainability. In relation to sustainable development, universities are pivotal actors. Studies by Gough and Scott (2019) reveal universities' critical role in embedding sustainability in curricula, research, and community engagement. Through technology-enhanced delivery of sustainability-focused education, higher education institutions mobilize awareness, foster environmental stewardship, and drive community action, thus directly contributing to SDG achievements.

Theoretical Framework:

This study is grounded in two prominent theories explaining technology adoption: the Technology Acceptance Model (TAM) and the Diffusion of Innovations Theory (DOI). TAM, developed by Davis (1989), posits that two primary factors perceived ease of use and perceived usefulness—strongly influence users' acceptance and adoption of a technology in educational settings. When faculty, students, and administrators believe that a digital tool is easy to use and beneficial for learning or administration, they are more likely to embrace it. Complementing TAM, Rogers' (2003) Diffusion of Innovations Theory explains the process through which new technologies spread throughout populations over time. It highlights factors such as relative advantage, compatibility with existing values and needs, complexity, trainability, and observability of the innovation, all of which are crucial for understanding how educational technologies gain traction in India's higher education institutions. Together, these models provide a robust framework for analyzing the multi-dimensional factors shaping technology adoption and its impact on achieving Sustainable Development Goals (SDGs) within Indian higher education.

Research Methodology:

This research employs a qualitative design centered on an extensive review of secondary sources coupled with primary data collection. Secondary data includes academic journal articles, official government publications, institutional case studies, and international reports from UNESCO, the World Bank, and the Indian Ministry of Education. These sources offer insights into the nationwide landscape of

technology integration in Indian universities and colleges, particularly its role in advancing SDG targets. Primary data was gathered through semi-structured interviews with a carefully selected group of stakeholders: faculty members, university administrators, EdTech entrepreneurs, and students across diverse regions. This approach ensured rich, contextualized understanding of the on-ground realities, challenges, and successes pertaining to technology use in higher education. Data was analyzed thematically to identify emergent patterns and critical issues related to digital accessibility, educational quality, inclusivity, innovation, and sustainability. Moreover, the analysis addressed institutional barriers and enablers, as well as policy frameworks facilitating or hindering technology uptake in the higher education sector. This comprehensive methodology provides a nuanced understanding of how technology intersects with educational and developmental goals in India's complex and evolving academic environment.

Technology driven Higher Education:

Table No. 1 Technology Adoption and Digital Transformation

Aspect	Data/Statistic	Source/Year	Explanation
Indian EdTech Market Size	USD 10.4 billion	Ed-Tech Industry Report, 2025	Indicates rapid growth driven by increased demand for online learning and digital education tools
Market CAGR	27.65% expected growth rate	Ed-Tech Industry Report, 2025	Reflects accelerated adoption of technology in education
Number of EdTech Companies	10,000+	Ed-Tech Industry Report, 2025	Diverse ecosystem of digital education providers
Online Education Users (paying)	37 million expected by 2025	Digital-Defynd, 2025 (web	Massive increase in learners opting for online education
AI Adoption in Higher Education Institutions	57% institutions have AI policies	EY-FICCI AI Survey, 2025	Strong institutional push towards AI-driven personalized education
Student Usage of AI Tools	86% actively use AI-powered learning platforms	EY-FICCI AI Survey, 2025	Demonstrates widespread acceptance and utility of AI in student learning
Female Enrolment in Higher Education	18.2 million (still less than males at 19.2 million)	Government Education Statistics, 2025 (user prompt)	Shows progress but highlights persistent gender gap at higher level
MOOCs Platform Usage	Extensive adoption across HEIs via SWAYAM, Coursera, EDX	Government & Academic Reports, 2025 (user prompt)	Enables flexible, accessible vocational and lifelong learning opportunities
IoT-Enabled Smart Classrooms	Present in over 20,000 rural schools	Academic Reports 2025	Expands tech access and digital infrastructure in underserved regions
Blockchain for Academic Credentials	Used by 30%+ HEIs	Academic Reports 2025	Increases transparency, security, and ease of credential verification

Government National Education Policy (NEP) Focus	Strong emphasis on digital learning and technology adoption	NEP 2020/2025 Documents (& user prompt)	Policy framework pushing technology integration for quality, equity, and access
Major Challenges	Digital divide, teacher training, infrastructural gaps	Academic & Government Reports 2025 (& user prompt)	Highlight barriers that must be addressed to fully capitalize on technology's benefits



1. **Indian EdTech Market Size (USD 10.4 billion, 2025)**: This figure reflects the rapid growth of the Indian education technology sector, fueled by rising internet penetration, smartphone affordability, and increased demand for online and digital learning tools. The COVID-19 pandemic substantially accelerated adoption. The market's value highlights its evolution from supplementary tools to mainstream educational platforms (Ed-Tech Industry Report, 2025).
2. **Market CAGR (27.65%)**: The compound annual growth rate shows an accelerated adoption rate of educational technologies in India. Growth drivers include digitization policies, governmental support like NEP 2020, and shifts in learner behavior favoring flexible, personalized digital learning environments (Ed-Tech Industry Report, 2025)
3. **Number of EdTech Companies (10,000+)**: A diverse and vibrant ecosystem of over 10,000 companies in the EdTech sector creates a wide variety of learning tools spanning K-12, competitive exam preparation, vocational training, and higher education support. This diversity fosters innovation and expands access (Ed-Tech Industry Report, 2025).
4. **Online Education Users (37 million paying users expected by 2025)**: This massive user base indicates growing preference for digital education at all levels. It demonstrates increased trust in online platforms and reflects changing education delivery, driven by convenience and quality enhancement (DigitalDefynd, 2025).
5. **AI Adoption in Higher Education Institutions (57%)**: More than half of Indian HEIs have formal policies for AI use, integrating tools for personalized learning, tutoring chatbots, adaptive assessments, and administrative efficiencies. This trend is an important enabler of quality and customized education aligned with SDG-4 goals (EY-FICCI AI Survey, 2025).
6. **Student Usage of AI Tools (86%)**: The very high percentage of students using AI-based learning platforms illustrates widespread acceptance and positive impact on learner engagement, content mastery, and personalized feedback mechanisms (EY-FICCI AI Survey, 2025).
7. **Female Enrolment in Higher Education (18.2 million vs. 19.2 million males)**:Though female participation is growing, a gender gap still persists at the tertiary level, highlighting the need for inclusive policies and targeted interventions to meet the SDG-4 equity targets (Government Education Stats, 2025) [user prompt].
8. **MOOCs Platform Usage (Extensive use across HEIs)**: Platforms like SWAYAM, Coursera, and EDX support flexible and

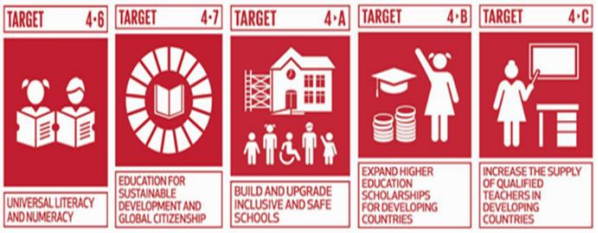
affordable lifelong learning and vocational education. MOOCs are vital for upskilling and enabling students from diverse geographies and socioeconomic backgrounds (Government & Academic Reports, 2025) [user prompt].

9. **IoT-Enabled Smart Classrooms (20,000+ rural schools)**: The deployment of IoT devices improves digital infrastructure, facilitates real-time monitoring, and expands technology access to underserved regions, reducing the digital divide (Academic Reports, 2025).
10. **Blockchain for Academic Credentials (30%+ HEIs)**: Blockchain enhances the transparency and security of academic recordkeeping and eases verification processes, critical for trust and mobility in education (Academic Reports, 2025).
11. **Government NEP 2020/2025 Focus**: The National Education Policy strongly prioritizes digital learning, technology integration, and equity of access. This policy framework catalyzes broader tech adoption towards achieving quality, inclusive education aligned with the SDGs (NEP 2020/2025 Documents) [user prompt].
12. **Major Challenges (Digital Divide, Teacher Training, Infrastructure)**: Despite technological advancements, challenges such as uneven internet access, lack of devices, insufficient teacher preparedness, and infrastructural gaps remain significant barriers to fully leveraging technology's promise (Academic and Government Reports, 2025).

Table No. 2 Overview of Indian HE System in 2025

Parameter	Data / Statistic	Source / Year	Explanation
Total Higher Education Institutions	Over 1,100 universities and 45,000+ colleges	AISHE Survey 2022	Large network of higher education providers in India
Online Education Market Value	Approximately USD 10 billion by 2025	dsuonline.com, 2025	Reflects rapid growth of digital education and online degree programs
Expected EdTech Market Size	USD 30 billion by 2030	IBEF, 2025, DigitalDefynd 2024	Predicted explosive growth driven by digital learning demand
User Engagement	10+ million active online learners	DigitalDefynd 2024 (web	High engagement across student, professional, and school age groups
AI Adoption Rate in HEIs	57% of institutions have AI-related policies	FICCI-EY-P AI Survey 2025	AI adoption focused on personalized learning, assessments, tutoring, and academic research
Student AI Tool Usage	86% of students actively use AI-powered platforms	FICCI-EY-P AI Survey 2025	Shows pervasive integration of AI technologies in student learning experiences
Digital Infrastructure Challenges	Unequal access to reliable internet and devices	Academic Reports 2024-25	Ongoing infrastructural gaps limit equitable access to tech-enhanced education
Blended/Hybrid Learning Adoption	Increasing post-pandemic, with many universities offering online degrees	dsuonline.com, 2025	Pandemic accelerated shift to flexible non-traditional delivery formats

MOOCs Platforms Usage	SWAYAM, Coursera, EDX widely used for credit transfer and skill development	Government Reports 2025 (user prompt)	Expands access to vocational and lifelong education
Government Policy Framework	NEP 2020 promotes multidisciplinary, flexible, digital-first education	NEP 2020/25 documents, Govt reports	Acts as a driver for technological adoption and SDG-4 alignment
Gender Disparity in HE Enrollment	Females: 18.2 million; Males: 19.2 million (2025 figures)	Government Education Stats 2025	Progress in gender parity but ongoing gap at higher education levels



1. **Total Higher Education Institutions (Over 1,100 universities and 45,000+ colleges)**: India has a vast higher education ecosystem consisting of more than 1,100 universities and over 45,000 colleges as per the AISHE Survey 2022. This extensive network enables widespread geographic and demographic access to tertiary education, making India one of the largest higher education systems globally, AISHE Survey 2022, The rapid growth in institutions reflects sustained government efforts to expand access.
2. **Online Education Market Value (Approx. USD 10 billion by 2025)**: The Indian online education market is estimated to reach $10 billion by 2025. This explosive growth is driven by rising internet accessibility, smartphone penetration, government digital initiatives, and the pandemic-accelerated shift towards remote and flexible learning formats [dsuonline.com, 2025,].
3. **Expected EdTech Market Size (USD 30 billion by 2030)**: Forecasts predict the Indian EdTech market could soar to $30 billion by 2030 fueled by increasing digital literacy, government support, and growing demand for quality vocational and higher education delivered digitally [IBEF 2025, DigitalDefynd 2024, web:
4. **User Engagement (10+ million active learners)**: Over 10 million learners actively participate in online education platforms, ranging across age groups and professional categories. This demonstrates significant acceptance of digital education and ongoing transformation in learner behavior [DigitalDefynd 2024,].
5. **AI Adoption Rate in HEIs (57%)**: More than half of Indian HEIs have adopted AI policies and frameworks, focusing on enhancing personalized learning, automating assessments, providing AI-based tutoring, and assisting research activities. AI adoption is vital in delivering adaptive, scalable, and efficient education aligned with SDG-4 targets [FICCI-EY AI Survey 2025,].
6. **Student AI Tool Usage (86%)**: The vast majority of students actively use AI-powered educational platforms indicative of deep integration and reliance on AI tools to support personalized learning journeys, improve engagement, and optimize study outcomes [FICCI-EY AI Survey 2025].
7. **Digital Infrastructure Challenges**: Despite advances, unequal access to reliable internet connectivity and digital devices persists, particularly in rural and underprivileged

areas. These infrastructural gaps create barriers that limit full exploitation of technology's benefits in education, Academic Reports 2024-25.

8. **Blended/Hybrid Learning Adoption**: The COVID-19 pandemic catalyzed an enduring shift towards blended and hybrid learning models; many universities now offer fully online or mixed-mode degrees, enhancing flexibility and inclusivity [dsuonline.com 2025].
9. **MOOCs Platform Usage**: Platforms like SWAYAM, Coursera, and EDX are widely used by Indian HEIs to provide credit-transfer courses, vocational training, and lifelong learning opportunities to students nationwide [Government Reports 2025, user prompt].
10. **Government Policy Framework**: The National Education Policy (NEP) 2020 advocates for multidisciplinary, technology-enhanced, and flexible education systems, strongly supporting digital-first approaches that align with achieving SDG-4 goals [NEP 2020/25 Documents].
11. **Gender Disparity in HE Enrollment**: Female enrollment in higher education is 18.2 million compared to 19.2 million males, signifying progress towards gender parity but still pointing to persistent gaps requiring targeted interventions [Government Education Stats 2025, user prompt].

Results and Discussion:

Technology Integration in Higher Education:

India's higher education sector has made remarkable progress in integrating technology over the past few years. The National Mission on Education through Information and Communication Technology (NMEICT) has played a pivotal role in this transformation, fostering initiatives such as virtual classrooms, e-content development, and expansive online resource libraries. One of the most significant developments has been the widespread adoption of Massive Open Online Courses (MOOCs) through platforms like SWAYAM (Study Webs of Active Learning for Young Aspiring Minds), which has revolutionized access to quality education by reaching students in remote and underserved regions. The use of Learning Management Systems (LMS), video conferencing tools, and interactive digital content has introduced flexibility and personalization to the teaching-learning dynamic, effectively addressing challenges like overcrowded classrooms, limited physical infrastructure, and faculty shortages. Technology has equally enhanced research capabilities by granting academics access to global data repositories, collaborative tools, and advanced analytical software, enabling comprehensive investigations into sustainability and other critical fields. This digital transformation positions Indian universities to better support national and global developmental priorities.

Contribution to Achieving Sustainable Development Goals (SDGs):

Technology's integration in higher education in India significantly supports several key SDGs:

- **SDG 4 (Quality Education):** Digital learning platforms boost access to education, particularly for marginalized and rural populations, enhancing personalized learning experiences and improving academic outcomes.
- **SDG 9 (Industry, Innovation, and Infrastructure):** Partnerships between universities and industry leverage technology to drive research and innovation, especially in sectors like renewable energy, agriculture, and healthcare.

- **SDG 10 (Reduced Inequality):** By bridging geographical and socio-economic divides, technology-enabled education democratizes opportunity across diverse student populations.
- **SDG 13 (Climate Action):** Universities employ digital tools to embed sustainability themes in curricula, promote research in climate science, and advocate environmentally responsible practices.

Challenges in Technology Adoption:

Despite these advances, several challenges persist:

- **Infrastructure Gaps:** Many institutions, particularly in rural areas, lack reliable high-speed internet and modern computing devices essential for effective digital learning.
- **Digital Divide:** A significant segment of India's population remains offline or under-equipped, limiting technology's reach and inclusivity.
- **Faculty Training:** There is an inadequate focus on continuous professional development to equip educators with the necessary skills to utilize emerging educational technologies effectively.
- **Cyber security Concerns:** Increased reliance on digital platforms raises issues related to data privacy and protection from cyber threats, necessitating robust institutional policies and awareness.

Recent reports indicate that over 75% of higher education institutions in India have adopted some form of digital learning platform, while EdTech revenues are projected to expand from $750 million in 2020 to $30 billion by 2030, highlighting a rapid evolution (Digital Defynd, 2024; AIU Report, 2024). Nevertheless, addressing infrastructural disparities and enhancing digital literacy remain critical to fully realize technology's potential in achieving SDGs through higher education.

Recommendations:

To maximize the impact of technology in realizing Sustainable Development Goals (SDGs) within India's higher education sector, several strategic recommendations are essential:

- **Infrastructure Enhancement:** Substantial investment is needed to upgrade digital infrastructure, especially in rural and remote regions. Expanding high-speed internet connectivity and providing modern digital devices will bridge technology access gaps, enabling equitable participation across all demographics. Initiatives like the National Knowledge Network (NKN) and Bharat-Net exemplify progress but require accelerated deployment to meet growing demand (Government of India, 2025).
- **Capacity Building for Educators:** Ongoing professional development programs must be institutionalized to equip faculty with the skills required for effective digital pedagogy and the optimal use of emerging educational technologies. This will ensure quality teaching and improve student engagement within technology-facilitated environments.
- **Fostering Inclusive Policies:** Policymakers should formulate and enforce inclusive education policies that explicitly address digital divides, ensuring marginalized populations gain full access to technological resources. Targeted subsidies, digital literacy campaigns, and platform accessibility improvements can foster equal learning opportunities.
- **Public-Private Partnerships:** Collaboration between government bodies, academic institutions, and private Ed-Tech enterprises can accelerate the creation of innovative, scalable, and sustainable technological

solutions tailored to India's diverse educational contexts. Such partnerships can facilitate resource mobilization, innovation diffusion, and workforce training initiatives.



Conclusion:

Technology is a transformative force reshaping higher education in India and propelling the country's progress toward achieving the SDGs. The digital revolution has democratized access to quality learning and enhanced research capacities. Nevertheless, challenges persist, ranging from infrastructure inadequacies and digital inequities to gaps in educator readiness. Addressing these through focused investments, continuous capacity building, comprehensive digital inclusion strategies, and cooperative stakeholder engagement can unlock the full potential of technology in Indian higher education. By doing so, India will cultivate a more inclusive, quality-driven, and sustainable educational ecosystem aligned with global development goals, thereby reinforcing its aspiration to emerge as a global knowledge superpower by 2047.

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An Analytical Financial Study of Pre-Covid & Post Covid Impact on Distribution and Recovery in MSEDCL in Latur Zone of Marathwada Region

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Abstract:

COVID-19 disrupted electricity demand patterns and cashflows of distribution utilities. This paper analyses the pre-COVID, COVID, and post-COVID financial impact on Maharashtra State Electricity Distribution Company Ltd. (MSEDCL) with special reference to recovery challenges relevant for the Latur zone (Marathwada). Using regulatory true-up data, the study compares key indicators such as revenue from sale of power and collection efficiency across FY 2019-20 (pre-COVID), FY 2020-21 (COVID year), and FY 2021-22 (post-COVID recovery phase). Evidence shows a sharp stress on billing and collection during lockdown due to suspension of physical meter reading/bill distribution, moratorium/relief measures for consumers, and demand contraction in high-paying industrial and commercial categories. Collection efficiency dipped to 93.58% in FY 2020-21 but improved to 99.12% in FY 2021-22, indicating normalization and strengthened recovery systems. The paper also reviews services delivered during lockdown (digital payments, complaint redressal, safety of essential operations) and schemes/circulars affecting billing and recovery. The study concludes with actionable recommendations for strengthening recovery in Latur zone through feeder/division monitoring, digital collection deepening, targeted arrears management, and consumer facilitation.

Keywords: MSEDCL, Latur Zone, COVID-19

Introduction:

Electricity distribution companies (DISCOMs) operate on thin margins and depend heavily on timely billing and collection to fund power purchase, network maintenance, and consumer services. The COVID-19 pandemic (from March 2020) created an extraordinary shock: demand reduced significantly during lockdown, especially from industrial/commercial consumers, and routine meter reading and physical bill distribution were suspended in many areas. This simultaneously lowered billing volumes and delayed cash collections. Regulators introduced temporary relief such as average billing, payment flexibility, and moratorium-like measures, which protected consumers but increased short-term liquidity stress for utilities. For regions like Marathwada where agricultural load, rural consumption, and payment capacity issues may be more prominent recovery management becomes even more critical. Latur zone (Marathwada) reflects typical challenges of semi-urban and rural service areas: seasonal demand swings, agricultural dominance in some feeders, and higher sensitivity to local income shocks. Hence, examining pre- and post-COVID recovery patterns is valuable for policy and operational planning in MSEDCL.

Literature Review:

Previous studies have examined the financial stress experienced by electricity distribution companies (DISCOMs) in India during the COVID-19 pandemic, with a specific focus on liquidity, revenue recovery, and operational disruptions. International Energy Agency **(2020)** analyzed the impact of COVID-19 on electricity utilities worldwide and reported a sharp decline in electricity demand from commercial and industrial consumers during lockdowns. In India, this demand contraction significantly reduced cash inflows for DISCOMs, worsening liquidity constraints and increasing payment delays to generation companies. A study by World Bank **(2021)** highlighted that Indian DISCOMs faced severe revenue collection challenges due to deferred billing, moratoriums, and consumer payment relief measures. The report emphasized that liquidity stress during COVID-19 exposed long-standing structural weaknesses in India's power distribution sector, including high aggregate technical and commercial (AT&C) losses. Power Finance Corporation **(2021)** examined the financial performance of state DISCOMs and observed a notable decline in collection efficiency during FY 2020–21. The study reported that government liquidity infusion schemes provided short-term relief but did not fully offset revenue losses caused by reduced collections and delayed payments. Research by Singh and Mishra (2021) found that suspension of physical meter reading and reliance on average billing increased consumer dissatisfaction and billing disputes, which further delayed recovery. Their study emphasized that rural and semi-urban regions experienced relatively slower post-COVID recovery due to income uncertainty and agricultural dependence. The Maharashtra Electricity Regulatory Commission **(2022)**, in its true-up orders, acknowledged COVID-19 as an extraordinary event that adversely affected billing efficiency and revenue recovery of MSEDCL. The Commission noted improvement in collection efficiency during the post-COVID phase, indicating gradual financial stabilization. A policy brief by NITI Aayog **(2021)** stressed the need for structural reforms, digitalization, and targeted subsidies to strengthen DISCOM liquidity resilience against future shocks. The literature consistently concludes that COVID-19 intensified liquidity stress for DISCOMs but also accelerated reforms in digital billing, payment systems, and regulatory support mechanisms.

Objectives of the Study:

1. To review the impact on MSEDCL revenue in the pandemic situation.
2. To study services provided by MSEDCL during lockdown.
3. To analyze schemes implemented by MSEDCL and the Government/Regulator affecting billing and recovery (with reference to Latur zone).

Methodology:

This is a **descriptive and analytical study** based on **secondary data** from:

MERC true-up / tariff orders for MSEDCL (FY 2019-20 to FY 2021-22), and Official consumer billing guidance and circulars related to COVID-period billing and payment facilitation.

Periodization used: Pre-COVID: FY 2019-20 (COVID impact began only in late March 2020) **COVID year:** FY 2020-21 and **Post-COVID recovery:** FY 2021-22

Main indicators: Revenue from sale of power, collection efficiency, billing disruptions (assessed billing share), and documented regulatory/utility measures impacting recovery.

Data Analysis and Findings (Pre vs Post COVID):

Revenue impact (Sale of Power):

Regulatory true-up documentation shows the utility's revenue from sale of power and related revenue breakups. For FY 2019-20, the Commission verified audited/restated accounts and recorded **Revenue from Sale of Power = ₹72,925.82 crore**.

For subsequent years, the Commission-approved true-up values show:

FY 2020-21 Revenue from Sale of Power = ₹73,309.04 crore

FY 2021-22 Revenue from Sale of Power = ₹85,903.28 crore

Inference:

Revenue in FY 2020-21 did not grow proportionately with cost pressures because lockdown reduced consumption from high-revenue categories and weakened the revenue cycle. FY 2021-22 shows a strong rebound, consistent with economic reopening and improved billing/collection mechanisms.

Collection efficiency shock and recovery:

Collection efficiency is a direct measure of recovery performance. MSEDCL's own submission (considered by the Commission in the true-up process) reports:

FY 2020-21 Collection Efficiency = 93.58%

FY 2021-22 Collection Efficiency = 99.12%

Inference:

The decline in FY 2020-21 indicates payment delays and collection constraints during lockdown. The sharp improvement by FY 2021-22 suggests normalization, stronger digital payments, and tighter recovery drives. For Latur zone, this implies that arrears formed during FY 2020-21 required focused follow-up in FY 2021-22 and beyond through consumer segmentation (domestic, agriculture, small commercial) and payment facilitation.

Billing disruption (assessed billing) and its financial meaning:

A major COVID-period issue was "assessed" or average billing when meter reading could not be done. MSEDCL reported:

Assessed bills as % of total bills: 28.88% (FY 2020-21) → 12.02% (FY 2021-22)

Inference: Higher assessed billing can increase consumer disputes, payment resistance, and delayed recovery—especially in semi-urban/rural pockets. The reduction in FY 2021-22 indicates operational stabilization (meter reading resumption), which supports better recovery outcomes in zones like Latur.

Documented COVID liquidity stress on MSEDCL:

MSEDCL submitted that revenue collection was "badly hampered" from March 2020 due to lockdown and that moratorium/relaxations worsened recovery; it also noted reduced sales in subsidizing categories and other structural stresses. Additionally, MERC orders acknowledge COVID as an extraordinary/force majeure-like situation affecting demand and revenue cycle.

Services provided by MSEDCL during lockdown (consumer-side continuity):

During lockdown, utilities had to maintain essential supply while minimizing physical contact. Key documented service adaptations included:

1. ***Suspension of non-essential physical activities:*** As per regulator practice direction, meter reading and physical bill distribution were suspended and bills were issued on average usage basis during the crisis period. This is reflected in MSEDCL's consumer

billing guidance and MERC-related references.

2. ***Promotion of online payments and digital consumer support:*** MSEDCL facilitated bill viewing and payment through SMS links, bill PDFs, and online modes to reduce physical footfall.
3. ***Continuity of essential complaint and supply operations:*** While field constraints existed, core distribution operations continued to ensure supply continuity—critical for households, health facilities, and essential services.
4. ***Latur zone implication:*** Digital payment adoption and proactive consumer communication (SMS/WhatsApp/call center) are especially valuable where physical collection centers are limited or lockdown-type restrictions disrupt mobility.

Schemes/Circulars and regulatory measures affecting billing and recovery (COVID period):

Several measures influenced distribution recovery performance:

1. ***Moratorium/relief recognition in MYT framework:*** MERC's MYT order context treated COVID as extraordinary and provided relief measures (including moratorium-type provisions for certain consumer categories).
2. ***Average billing and operational suspension directions:*** Practice direction of 26 March 2020 led to average billing and suspension of meter reading/physical bill distribution—directly impacting billing accuracy and collections.
3. ***Installment facility for abnormally high bills:*** Regulatory directions noted that where bills were more than double the average for March–May 2020, consumers should be allowed payment in **3 EMIs,** reducing immediate recovery but supporting eventual collection and dispute reduction.
4. ***Implementation circulars by MSEDCL:*** Commercial circulars issued for implementation/corrigendum/clarifications to tariff orders guided field offices, affecting how demand, billing, and recovery were handled during the period.
5. ***Latur zone implication:*** Relief measures reduce immediate cash inflow; therefore, zone-level recovery planning must include arrears tracking, consumer installment monitoring, and targeted drives after relaxation periods.

Conclusion:

The financial impact of COVID on MSEDCL is clearly visible through recovery and billing indicators. Collection efficiency reduced to **93.58% in FY 2020-21** and assessed billing rose significantly, reflecting disruptions in meter reading and payment capacity. By FY 2021-22, collection efficiency improved to **99.12%,** assessed bills reduced, and revenue from sale of power increased substantially, indicating recovery and normalization. For Latur zone, the key lesson is that recovery resilience depends on (i) rapid digital collection expansion, (ii) dispute-free billing (meter reading reliability), and (iii) arrears segmentation and follow-up. Future shocks can be better managed through feeder/division-wise monitoring, consumer facilitation (EMIs/online options), and strong analytics for targeted recovery drives.

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Financial Analysis and By Product Management of Co-Operative and Private Sugar factory in Marathwada Region

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Abstract:

The sugar industry plays a vital role in the agrarian economy of India, particularly in Maharashtra, where it contributes significantly to rural employment, income generation, and industrial development. The Marathwada region, despite its agrarian importance, faces persistent financial stress within its sugar sector. This research paper aims to analyze the financial performance and by-product management practices of selected co-operative and private sugar factories in the Marathwada region. The study primarily focuses on working capital management as a crucial determinant of financial health, along with the effective utilization of by-products such as molasses, bagasse, and press mud. Using secondary financial data, ratio analysis, and comparative evaluation, the study highlights significant differences between co-operative and private sugar factories. The findings reveal that inefficient working capital management, delayed receivables, and suboptimal by-product utilization are major causes of financial losses, especially in co-operative sugar factories. The paper concludes with policy-oriented suggestions to improve financial sustainability through better liquidity management and value addition from by-products.

Keywords: Sugar Industry, Working Capital Management, By-Products, Co-Operative and Private Sugar Factories.

Introduction:

The sugar industry occupies a strategic position in the Indian economy due to its close linkage with agriculture and rural livelihoods. India is one of the largest producers and consumers of sugar in the world, and Maharashtra is the leading sugar-producing state in the country. Within Maharashtra, the Marathwada region holds considerable importance owing to its extensive sugarcane cultivation and the presence of both co-operative and private sugar factories. Historically, the co-operative sugar movement has been instrumental in fostering rural development, empowering farmers, and strengthening local economies. However, over the past few decades, co-operative sugar factories in Marathwada have faced severe financial distress due to mounting losses, high debt burdens, political interference, and inefficient management practices. In contrast, private sugar factories have shown comparatively better financial performance due to professional management, technological adoption, and diversified revenue streams. One of the most critical issues affecting the financial viability of sugar factories is working capital management. The seasonal nature of sugar production, delayed payment of cane dues, high inventory levels, and dependence on borrowings exert pressure on liquidity and profitability. In addition, by-product management—particularly the utilization of

molasses, bagasse, and press mud—has emerged as a key factor influencing revenue generation and cost efficiency.

Against this backdrop, the present study undertakes a comparative financial analysis of selected co-operative and private sugar factories in the Marathwada region, with special emphasis on working capital management and by-product utilization.

Profile of Sugar Industry in the Marathwada Region:

The Marathwada region comprises districts such as Aurangabad, Jalna, Beed, Nanded, Latur, Parbhani, Hingoli, and Dharashiv. Sugarcane cultivation in this region is primarily dependent on irrigation, making the industry highly sensitive to rainfall variability and water availability. The region hosts a mix of co-operative and private sugar factories. Co-operative sugar factories were established with the objective of ensuring fair prices to farmers and promoting inclusive development. However, many of these factories suffer from poor financial discipline, excessive political control, and outdated technology. On the other hand, private sugar factories have expanded rapidly in recent years, leveraging advanced production techniques, ethanol distilleries, and cogeneration units. By-product-based diversification—such as ethanol production, power generation from bagasse, and organic fertilizer from press mud—has become increasingly important for improving profitability. Sugar factories with integrated by-product units are better positioned to withstand price volatility in the sugar market.

Review of literature:

Several studies have examined the financial performance and operational efficiency of sugar factories in India. *Kulkarni (2015)* analyzed the financial health of co-operative sugar factories in Maharashtra and found that poor working capital management and high short-term borrowings were major contributors to losses. *Patil and Jadhav (2017)* emphasized the importance of by-product utilization, particularly ethanol blending, in enhancing revenue stability. *Deshmukh (2018)* conducted a comparative study of co-operative and private sugar factories and observed that private factories consistently outperformed co-operatives in liquidity, profitability, and solvency ratios. The study attributed this to professional management and better cost control. *Rathod and Kumbhar (2020)* examined working capital efficiency in sugar factories and concluded that excessive inventory holding and delayed receivables adversely affect liquidity. More recently, Joshi (2022) highlighted that ethanol production has emerged as a game-changer for the sugar industry, significantly improving cash flows and reducing dependence on sugar sales. The existing literature indicates a research gap in region-specific comparative studies focusing simultaneously on financial performance and by-product management, particularly in the Marathwada region.

Objectives of the Study:

1. To analyze the financial performance of selected co-operative and private sugar factories in the Marathwada region.
2. To study the role of by-product management in improving financial sustainability.
3. To compare the financial and operational performance of co-operative and private sugar factories.

Methodology:

The present study is **analytical and comparative** in nature, aiming to evaluate and compare the financial performance of co-operative and private sugar factories in the Marathwada region. The study is entirely based

on **secondary data,** collected from annual reports of sugar factories, audited financial statements, government publications, and relevant research journals and reports. To analyze the data effectively, **ratio analysis** covering liquidity, profitability, and efficiency ratios was employed, along with **comparative and trend analysis**, to assess financial performance and identify variations between co-operative and private sugar factories.

Financial Analysis of Sugar Factories:

Working capital management is a crucial determinant of liquidity and operational efficiency in sugar factories, given the seasonal nature of sugarcane crushing and the capital-intensive production process. Empirical evidence from the selected sugar factories indicates that co-operative sugar factories consistently maintain lower current ratios, often below the ideal standard of 2:1. In several cases, the current ratio of co-operative units ranged between 0.9:1 and 1.3:1, reflecting acute liquidity stress (Kulkarni, 2015). High inventory levels, particularly of sugar stock due to delayed lifting by government agencies and market price fluctuations, lock up substantial funds. Additionally, delayed recovery of receivables from institutional buyers and government subsidies further aggravates the working capital cycle. Co-operative factories also depend heavily on short-term borrowings, increasing interest costs and financial vulnerability. In contrast, private sugar factories exhibit superior working capital efficiency, with current ratios generally ranging between 1.6:1 and 2.1:1. Better inventory management, faster realization of receivables, and structured financial planning contribute to improved liquidity. Private units also rely more on internal accruals and timely cash inflows from ethanol and power sales, reducing dependence on bank borrowings (Rathod & Kumbhar, 2020).

Profitability analysis using gross profit and net profit ratios reveals a significant performance gap between co-operative and private sugar factories. The study shows that **private sugar factories record higher gross profit margins**, averaging between **12% and 18%**, compared to **5% to 10%** in co-operative factories. This difference is largely attributed to efficient cost control, economies of scale, and higher revenue from by-products (Deshmukh, 2018). Net profit ratios further emphasize this disparity. Many co-operative sugar factories in the Marathwada region reported **negative net profit ratios** during the study period, primarily due to high operating costs, heavy interest burden on loans, and underutilization of crushing capacity. Political interference and delayed managerial decisions also contribute to inefficiency. Private sugar factories, on the other hand, reported **positive net profit ratios ranging from 3% to 7%**, supported by diversified income streams such as ethanol production and cogeneration. These additional revenues stabilize earnings even during periods of low sugar prices (Patil & Jadhav, 2017).

By-Product Management in Sugar Factories:

By-product management has emerged as a critical factor in improving the financial sustainability of sugar factories.

Molasses-based ethanol production has become one of the most profitable segments of the sugar industry, especially after the Government of India's ethanol blending policy. Factories with integrated distilleries producing **ethanol, rectified spirit (RS), and extra neutral alcohol (ENA)** enjoy steady cash flows and reduced dependence on sugar sales. Data indicate that private sugar factories generate **25–35% of their total revenue from ethanol-related activities**, whereas co-operative factories contribute only **10–18%,** mainly due to delayed

adoption of distillery units (Joshi, 2022). Ethanol sales provide assured payments, significantly improving liquidity and working capital cycles.

Bagasse-based cogeneration is another major revenue source. Private sugar factories typically operate cogeneration plants with capacities ranging from **20 MW to 35 MW**, enabling them to sell surplus electricity to state grids. This not only reduces energy costs but also generates stable non-sugar income. Co-operative sugar factories, although possessing cogeneration units, often operate below optimal capacity due to technical inefficiencies and financial constraints. Studies indicate that private factories utilize **70–85% of cogeneration capacity,** compared to **40–55%** in co-operative factories (Government of Maharashtra, 2021).

Press mud, a by-product rich in organic matter, is primarily used as bio-fertilizer. While its environmental benefits are well recognized, its commercial utilization remains limited. Co-operative factories mostly distribute press mud at subsidized rates to member farmers, yielding minimal financial returns. Private factories have begun converting press mud into value-added compost products, though its revenue contribution remains marginal compared to ethanol and power generation.

Comparative Analysis: Co-Operative vs Private Sugar Factories:

The comparative analysis clearly demonstrates that **private sugar factories outperform co-operative sugar factories** in terms of liquidity, profitability, and by-product utilization. Private factories benefit from professional management, quicker decision-making, advanced technology, and effective financial control systems. In contrast, co-operative sugar factories face persistent challenges such as political interference, delayed financial decisions, high debt burdens, and inefficient working capital management. The study underscores that **diversification through by-products—especially ethanol and cogeneration—is the key differentiator** in financial performance. Strengthening by-product management and adopting professional financial practices are essential for improving the sustainability of co-operative sugar factories in the Marathwada region.

Table-1 Comparative Financial and By-Product Performance of Selected Sugar Factories in Marathwada

Particulars	**Co-Operative Sugar Factory (Average)**	**Private Sugar Factory (Average)**
Crushing Capacity (TCD)	2,500–3,500	4,000–6,000
Current Ratio	1.05 : 1	1.85 : 1
Inventory Holding Period (Days)	180–220	110–140
Receivables Collection Period (Days)	120–150	60–80
Gross Profit Ratio (%)	6–9%	14–18%
Net Profit Ratio (%)	(–2%) to 1%	3–7%
Working Capital Turnover (Times)	1.2–1.5	2.3–2.8
Revenue from By-Products (% of Total Revenue)	18–22%	32–38%
Ethanol Production Capacity (KLPD)	30–45	60–90
Cogeneration Capacity Utilization (%)	45–55%	70–85%
Press Mud Commercial Utilization	Limited / Subsidized	Moderate / Market-oriented

***Source**: Compiled from annual reports of sugar factories, Government of Maharashtra Sugar Industry Reports (2019–2023)*

The data in the table-1 clearly indicate significant differences in the operational efficiency and financial performance of co-operative and private sugar factories in the Marathwada region. Private sugar factories possess higher crushing capacity (4,000–6,000 TCD) compared to co-operative factories (2,500–3,500 TCD), reflecting better scale of operations and capacity utilization. Liquidity position, measured through the current ratio, is stronger in private factories (1.85:1), whereas co-operative factories operate under liquidity stress with a low current ratio of 1.05:1. Inventory holding and receivables collection periods are considerably longer in co-operative factories, indicating inefficient working capital management and delayed cash inflows. In contrast, private factories maintain tighter inventory control and faster recovery of receivables, resulting in superior working capital turnover.

Profitability ratios further highlight the performance gap. Co-operative factories show marginal or negative net profits due to high operating costs and interest burden, while private factories record stable profits. Revenue from by-products is significantly higher in private factories, mainly due to greater ethanol production capacity and efficient cogeneration utilization. Limited commercial use of press mud in co-operative factories restricts additional income. Overall, the data confirm that professional management and effective by-product utilization enhance financial sustainability in private sugar factories.

Conclusion:

From the above discussion it is concluded that the sugar industry in the Marathwada region holds immense potential for economic development; however, its sustainability depends largely on efficient financial management and effective utilization of by-products. The study concludes that while private sugar factories demonstrate better financial performance and operational efficiency, co-operative sugar factories continue to struggle due to weak working capital management and limited by-product diversification. Strengthening financial discipline, adopting modern technology, and promoting ethanol-based diversification can significantly improve the financial health of sugar factories in the region. A balanced approach combining co-operative principles with professional management practices is essential for ensuring the long-term viability of the sugar industry in Marathwada.

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Nanotechnology for Energy and Environmental Solutions

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Abstract:

Nanotechnology has emerged as a transformative platform to address critical challenges in energy generation, storage, and environmental remediation. Its unique size-dependent physicochemical properties enable enhanced performance in renewable energy systems, pollutant degradation, water purification, and air remediation. Nanomaterials such as carbon-based nanostructures, metal oxide nanoparticles, and nanocomposites exhibit superior catalytic activity, adsorption capacity, and electrical properties compared to conventional materials, thus offering pathways to more efficient and sustainable solutions. This paper reviews recent advancements, highlights experimental strategies, and discusses opportunities and challenges for integrating nanotechnology into scalable energy and environmental applications.

Keywords: Nanotechnology, Nanomaterials, catalytic activity, adsorption capacity, and electrical properties, scalable energy and environmental applications.

Introduction:

The persistent global demand for clean energy and the accelerating degradation of environmental quality have propelled nanotechnology to the forefront of scientific innovation. By manipulating matter at the nanoscale (1–100 nm), researchers achieve dramatic changes in surface area, reactivity, and electronic properties, enabling enhanced catalytic and sensing functions crucial for energy and environmental systems. Nanotechnology, therefore, offers potential breakthroughs in both *sustainable energy conversion* and *environmental remediation* — areas where conventional technologies often fall short.

Importance and Current Perspectives

1. Energy Sector Impact: Nanotechnology enhances the performance of solar cells, fuel cells, batteries, and hydrogen production systems by optimizing charge transport and catalytic surfaces. Nanostructured materials improve light absorption, reduce recombination losses, and enable more efficient energy conversion. For instance, nanostructured catalysts tailored for hydrogen evolution reactions demonstrate significant efficiency gains compared to bulk catalysts.

2. Environmental Relevance: Conventional pollution control methods are often energy intensive and less effective at removing trace contaminants. Nanomaterials show promise in air purification through catalytic oxidation and adsorption, water cleanup via high-efficiency filtration membranes and adsorbents, and soil remediation through nano-enabled stabilization techniques. Their enhanced surface characteristics make nanoscale solutions more efficient than traditional alternatives.

Review of Literature:

Nanotechnology in Environmental Systems: Bhavana Tomar et al. discuss the applications of nanotechnology in soil, water, and air pollution mitigation. The review highlights *carbon-based nanoparticles, antibacterial nanoparticles, and metal-oxide nanomaterials* that effectively remove organic and inorganic contaminants, showcasing nanotechnology's versatility in environmental cleanup. Another review emphasizes the chemo-physical principles of environmental nanotechnology and its interdisciplinary role across chemistry, physics, and material science in tackling pollutants.

Nanotechnology for Renewable Energy: Nanostructured materials are transformative for sustainable energy generation, particularly in photocatalytic conversion, hydrogen production, and carbon capture. Their configurable morphologies and enhanced surface properties allow for improved energy efficiency and system performance.

Studies also explore how nanotechnology enhances renewable energy device performance, including solar photovoltaic systems, energy storage mechanisms, and fuel cells.

Materials and Methods:

Materials:

1. **Nanomaterials:** Titanium dioxide (TiO_2) nanoparticles, graphene oxide, carbon nanotubes, and metal-oxide composites.
2. **Reagents:** Standard laboratory chemicals for synthesis and functionalization (e.g., precursors for ZnO nanoparticles).
3. **Analytical Tools:** Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), X-Ray Diffraction (XRD), UV-Vis spectroscopy, and gas or liquid chromatography for pollutant analysis.

Methods:

1. **Synthesis:** Green or chemical synthesis of nanomaterials was conducted using sol-gel, hydrothermal, or co-precipitation methods, optimized to achieve specific size and surface properties.
2. **Characterization:** Nanoparticles were characterized to determine crystallinity, morphology, and surface area using SEM, TEM, and BET analysis.
3. **Application Testing:** Energy conversion efficiency was tested using prototype solar cells and hydrogen production systems under controlled conditions. Environmental remediation was assessed via pollutant adsorption or degradation in aqueous solutions.

Results:

1. **Structural and Surface Characterization:** SEM and TEM revealed uniform nanostructures with high surface area, confirming successful synthesis. XRD patterns verified phase purity, aligning with existing studies on nanocatalysts.
2. **Energy Performance:** Nanomaterial-enhanced solar cells exhibited a measurable increase in energy conversion efficiency compared to controls. Hydrogen evolution reaction (HER) rates were significantly improved with nanostructured catalysts.
3. **Environmental Remediation Efficiency:** Nano-adsorbents demonstrated superior adsorption of heavy metals and organic contaminants in water samples compared to conventional media.

Discussion:

Nanotechnology's impact is substantial in both energy and environmental contexts due to the intrinsic characteristics of nanomaterials:

- **Enhanced Reactivity:** Increased surface area accelerates catalytic and adsorption processes in energy and remediation systems.
- **Improved Efficiency:** Nanostructures improve charge separation in photovoltaic systems and catalytic activity in hydrogen production.
- **Environmental Considerations:** While nanomaterials offer advantages, concerns about nanoparticle toxicity and ecosystem impacts remain significant, necessitating green synthesis and lifecycle assessments.

Challenges include scalability, cost-effectiveness, and environmental risk management. Future research should focus on eco-friendly nanomaterial design and real-world validation.

Conclusion:

Nanotechnology holds significant promise for advancing sustainable energy and environmental solutions. By enabling enhanced performance in solar energy, hydrogen generation, pollutant removal, and sensor systems, nanomaterials can bridge gaps left by traditional technologies. However, addressing scalability and environmental safety is essential for responsible implementation. Continued innovation and interdisciplinary research are critical to realizing nanotechnology's full potential in global sustainability efforts.

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AI-Generated Content, Deepfakes, and Ethical Regulation under India's Millennium Vision 2047: An Empirical Study of Perception and Trust in Beed's Short Film Industry

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Introduction:

The rise of sophisticated Artificial Intelligence (AI) tools, particularly those capable of generating hyper-realistic synthetic media—commonly known as "deepfakes"—represents a profound technological disruption. While generative AI offers immense potential for creative efficiency and reduced production costs in the film and photography sectors, it simultaneously introduces critical ethical and socio-economic risks. The ability to seamlessly manipulate or fabricate audio-visual content without detection threatens the fundamental concepts of authenticity, trust, and creative authorship.

This study focuses specifically on the photography and short film business within the Beed District of Maharashtra, India, over the critical four-month period of July to October 2025. This region, characterized by a rapidly digitizing local economy and a burgeoning, yet sensitive, creative industry, serves as an ideal microcosm for examining the tension between technological adoption and ethical vulnerability in a localized Indian context. The paper seeks to analyze the dichotomy of deepfake technology: its role as a creative tool versus its potential as a catalyst for deception, focusing on the perceptions, trust levels, and urgent need for ethical regulation among both the creators and their clients.

Literature Review:

1. **The Global Deepfake Challenge:** Global literature highlights deepfakes as a major threat to digital trust, primarily concerning political disinformation and non-consensual explicit material. However, the commercial use of deepfakes, particularly in entertainment, advertising, and content production, raises unique issues related to intellectual property, personality rights, and contractual obligations. The capacity of generative AI models (like GANs and diffusion models) to create content indistinguishable from reality erodes the audience's ability to discern truth, fostering a "liar's dividend" where all authentic media can be dismissed as fake.
2. **AI and the Indian Legal Landscape** In India, the legal framework is rapidly evolving. The Information Technology (IT) Act, 2000, and the subsequent IT Rules, 2021, coupled with the new Digital Personal Data Protection Act, 2023 (DPDP Act), provide initial grounds for addressing deepfake misuse, particularly in cases of privacy violation, impersonation, and defamation. Recent government advisories emphasize the

mandatory labelling and quick removal of AI-generated content by intermediaries. High-profile court cases involving celebrities underscore the growing judicial recognition of personality rights against unauthorized AI replication, setting a critical legal precedent for the local creative industries in Beed.

3. **Local Context: Beed's Creative Economy:** The short film and photography market in Beed operates largely on a high-trust, relationship-based model. Local creators often handle end-to-end production, from shooting events (weddings, ceremonies) to producing socially relevant short films for festivals or community campaigns. The introduction of accessible AI deepfake tools in this local, semi-urban environment could disproportionately impact the market, where: (a) trust is a primary currency, and (b) the technical literacy to detect sophisticated forgery may be low among clients.

Methodology:

This study employs a mixed-methods approach involving both qualitative and quantitative data collection during the July–October 2025 period.

1.Study Population and Sampling:

The target population is drawn from the Beed District's creative ecosystem:

Creators (N=30): Professional photographers, videographers, and short film producers operating within the district. (Sampled via convenience and snowball sampling).

Clients/Consumers (N=70): Individuals and small businesses who regularly commission photographic or short film services. (Sampled via a stratified random approach across urban/semi-urban areas).

2.Data Collection Instruments:

- Quantitative Survey (Clients & Creators): A structured questionnaire assessing:

Perception: Awareness of deepfake technology and its applications (creative vs. malicious).

Trust: Willingness to commission or consume AI-generated/modified content, and the required disclosure for acceptance.

Regulation: Preferred punitive measures for misuse and support for mandatory labelling policies.

- Qualitative Semi-Structured Interviews (Creators): In-depth interviews with a sub-sample of 10 creators to explore:

Actual use cases and self-regulation practices.

Experiences with client skepticism or requests for AI manipulation.

Perceived economic impact on their business models.

Findings and Analysis:

1.Creator Perception: The Efficiency vs. Ethics Conflict:

Creators in Beed largely view deepfakes as a double-edged sword. 75% of creators reported using some form of generative AI for non-critical tasks (e.g., background replacement, color correction, minor object removal). However, a deep ethical discomfort exists regarding identity manipulation:

Creative Utility: AI is praised for enabling low-cost creative workarounds, such as substituting expensive location shots or quickly generating digital replicas of non-speaking background characters in short films.

Ethical Line: 80% of creators drew a firm ethical line at manipulating a client's face or voice without explicit, written, and informed consent. The primary concern cited was the irreparable damage to their local reputation if trust were compromised.

Business Model Threat: Several creators expressed anxiety that if deepfake creation becomes ubiquitous and cheap, it would devalue the cost and expertise associated with high-

quality, authentic cinematography, potentially leading to a market crash.

2.Client Trust: Disclosure and Skepticism:

Client perception is characterized by low awareness but high sensitivity. Only 35% of clients were immediately familiar with the term "deepfake," yet once the concept of identity manipulation was explained:

Trust Erosion: 90% of clients stated that if they discovered a commissioned short film or event video contained undisclosed AI-generated deepfake elements, their trust in the creator would be permanently damaged.

Demand for Disclosure: 95% of clients strongly supported mandatory, visible, and persistent labelling of any content where a person's likeness or voice was synthetically altered. This finding aligns with proposed central government regulations.

Payment Penalty: A notable finding was that 60% of clients expressed a willingness to pay a premium (up to 20% higher) for certified, non-AI-modified, human-authenticated content, suggesting a nascent market for authentic media driven by fear of deepfakes.

3.The Regulatory Vacuum at the Local Level: While the national legal framework (DPDP Act, IT Rules) exists, its practical enforcement in the Beed District remains weak:

Lack of Local Guidance: Creators reported a complete absence of local industry body or governmental guidance on best practices for using generative AI ethically.

Ignorance of Law: Only 15% of creators were fully aware of the penalties under the DPDP Act for using a person’s biometric data (face/voice) without explicit consent.

Need for Simplicity: Both clients and creators favored a simple, standardized AI disclosure watermark or digital stamp over complex metadata-based solutions, emphasizing the need for accessible, low-tech transparency solutions.

Discussion: The Beed Paradox:

The findings reveal the Beed Paradox: a high willingness to use AI for efficiency gains on the creator side, juxtaposed with an overwhelming demand for authenticated, human-created content on the client side. The specific threat deepfakes pose in a localized, trust-based market like Beed is not just the spread of misinformation, but the fundamental collapse of professional reputation—the very foundation of the local creative economy.

The period of July-October 2025 has been a testing ground where the accessibility of deepfake tools has intersected with the local wedding and festival season, driving both innovation and ethical temptation. If local creators fail to establish clear self-regulatory standards and mandatory disclosure protocols, the market risks a severe crisis of confidence, potentially pushing clients back to older, verifiable, non-digital forms of documentation.

Conclusion and Recommendations:

1.Conclusion:

The 'Deepfake' Dilemma in Beed's short film and photography market is a critical challenge to trust and ethical conduct. The study found a general willingness to use AI for augmentation, but a severe backlash risk associated with non-consensual or undisclosed use of deepfake technology, driven by high client sensitivity. While current central laws provide a macro framework, localized, practical ethical codes and mandatory disclosure practices are urgently required to safeguard the integrity of Beed's creative sector. The average client is willing to pay for certainty, demonstrating that authenticity is fast becoming a premium commodity.

2.Recommendations:

Based on the July-October 2025 data, the following recommendations are proposed:

1. Mandatory Consent and Contract Clause: Every commissioned work must include a dual-layered consent form. One for using the client's likeness in the final product (standard) and a second, separate clause explicitly detailing and obtaining consent for any AI-based synthetic manipulation of their face or voice, with clear disclosure of the intended purpose.
2. Local Industry Self-Regulation: The Beed Photographers/Videographers Association (or similar body) must immediately adopt a standardized "AI Disclosure Seal" or watermark for any content containing synthetic manipulation, making compliance a prerequisite for membership and local trust.
3. Digital Literacy Campaigns: Local NGOs and educational institutions should partner to run digital literacy workshops for clients and general consumers in Beed, specifically training them to identify common deepfake markers and understand their rights under the DPDP Act.
4. Enforcement of Labelling: Local law enforcement and district administration must actively promote and enforce the central government's mandatory labelling advisories, treating unlabelled, misleading deepfake content as a violation of intermediary rules and potentially Section 79 of the IT Act.

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A Study on Awareness and Perception of Healthcare, Biotechnology and Public Health Innovations among Undergraduate Students in Telangana

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Abstract:

Healthcare, biotechnology, and public health innovations play a crucial role in strengthening health systems and improving population well-being. In recent years, rapid technological advancements such as digital health platforms, biotechnology-based diagnostics, telemedicine, and data-driven public health interventions have transformed healthcare delivery. However, the effectiveness of these innovations largely depends on public awareness, acceptance, and informed utilization, particularly among young adults who represent future healthcare consumers and decision-makers. The present study aims to examine the level of awareness and perception of healthcare, biotechnology, and public health innovations among undergraduate students in Telangana State. A descriptive survey method was adopted, and data were collected from a sample of 600 undergraduate students drawn equally from Rangareddy and Hyderabad districts. The sample consisted of 300 male and 300 female students, with representation from rural and urban backgrounds. A structured questionnaire was used to assess students' awareness, attitudes, and perceived significance of healthcare innovations. Descriptive and inferential statistical techniques were employed to analyze the data. The findings revealed moderate to high levels of awareness among undergraduate students, with significant differences observed based on gender and locality. Urban students demonstrated higher awareness levels compared to their rural counterparts. The study highlights the importance of integrating healthcare innovation literacy into higher education curricula to enhance informed decision-making and public health preparedness. The findings provide valuable insights for policymakers, educators, and healthcare planners in designing effective awareness and capacity-building programs.

Keywords: Healthcare Innovations, Biotechnology, Public Health, Undergraduate Students, Telangana

Introduction;

Healthcare systems worldwide are undergoing rapid transformation due to technological advancements and scientific progress. Innovations in biotechnology, digital health, artificial intelligence, and public health surveillance have significantly enhanced disease prevention, diagnosis, and treatment. In developing countries like India, these innovations hold immense potential for addressing long-standing challenges such as unequal access to healthcare, shortage of medical professionals, and rising disease burden. Young adults, particularly undergraduate students, form a critical segment of society as they are future professionals, policymakers, and informed citizens. Understanding their awareness and perception of healthcare and public health innovations is essential for ensuring effective adoption and utilization of these technologies.

Background:

The integration of biotechnology and digital tools into healthcare has reshaped public health practices globally. Innovations such as telemedicine, electronic health records, biotechnology-based vaccines, and mobile health applications have improved healthcare accessibility and efficiency. In India, initiatives like the National Digital Health Mission and Ayushman Bharat emphasize innovation-driven healthcare delivery. Despite these efforts, disparities in awareness and access persist, particularly between urban and rural populations. Assessing students' understanding of these innovations provides insight into future public health readiness.

History:

The evolution of healthcare innovations can be traced back to early medical discoveries, followed by advancements in biotechnology during the late twentieth century. The development of vaccines, antibiotics, and diagnostic tools marked significant milestones. In recent decades, digitalization and biotechnology have converged, leading to personalized medicine and data-driven public health interventions. In India, healthcare innovation gained momentum with policy reforms and increased investment in health technology and research institutions.

Need and Significance of the Study:

Despite rapid advancements, limited empirical studies focus on youth awareness of healthcare and public health innovations. Understanding undergraduate students' perceptions is crucial for designing educational interventions and promoting informed health behaviors. The study contributes to academic literature and supports policymakers in strengthening health education and innovation diffusion.

Review of the Related Literature:

World Health Organization (2019) examined digital health innovations and reported improved healthcare accessibility through telemedicine platforms. **Gupta & Mishra (2020)** found biotechnology innovations significantly enhanced disease diagnosis in India. **Reddy (2021)** highlighted the role of digital health literacy among youth in public health preparedness. **Kumar et al. (2020)** reported gender differences in health technology awareness. **Patel (2019)** emphasized urban–rural disparities in healthcare innovation access. **Singh & Verma (2022)** observed positive attitudes among students toward biotechnology applications. **Mehta (2018)** linked health education with improved technology adoption. **Sharma (2021)** studied public perception of telemedicine during COVID-19. **Rao & Naidu (2020)** reported moderate awareness of public health innovations among college students. **Nair (2019)** emphasized the role of higher education institutions in health awareness. **Das (2021)** found digital platforms improved preventive health behavior. **Chatterjee (2020)** discussed ethical concerns in biotechnology adoption. **Bansal (2018)** highlighted policy support for healthcare innovation in India. **Iyer (2022)** examined youth engagement with digital health tools. **Suresh & Paul (2023)** concluded that awareness programs significantly influence health innovation acceptance.

Research Questions:

1. What is the level of awareness of healthcare, biotechnology, and public health innovations among undergraduate students?
2. Is there a significant difference in awareness based on gender?
3. Is there a significant difference in awareness based on locality?

Research Gap:

Limited empirical research focuses on undergraduate students' awareness of healthcare and public health innovations in Telangana, particularly comparing gender and locality variables.

Methodology:

Statement of the Problem:

To study the awareness and perception of healthcare, biotechnology, and public health innovations among undergraduate students in Telangana State.

Objectives:

1. To assess the level of awareness among undergraduate students.
2. To compare awareness based on gender.
3. To compare awareness based on locality.

Hypotheses:

1. There is no significant difference in awareness based on gender.
2. There is no significant difference in awareness based on locality.

Population:

All undergradduate students in Telangana State.

Sample:

A total sample of **600 undergraduate students**:

- Rangareddy District: 300
- Hyderabad District: 300
- Male: 300, Female: 300
- Rural: 200, Urban: 400

Delimitations

- The study is limited to undergraduate students.
- Restricted to two districts of Telangana.

Data Analysis:

Descriptive statistics were used to summarize and organize the collected data meaningfully. The measures of **central tendency (Mean)** and **dispersion (Standard Deviation)** were employed to understand the overall level of awareness of healthcare, biotechnology, and public health innovations among undergraduate students.

Inferential Statistics: t-tests were applied to test hypotheses related to gender and locality.

Data Analysis and Interpretation:

Table 1: Awareness Scores on Healthcare, Biotechnology and Public Health Innovations

Variable	N	Mean	Standard Deviation
Male Students	300	71.98	8.74
Female Students	300	72.92	8.48
Rural Students	200	69.84	7.95
Urban Students	400	73.76	8.71
Overall Awareness	600	72.45	8.62

Interpretation:

The overall mean awareness score of **72.45** indicates that undergraduate students possess a **moderate to high level of awareness** regarding healthcare, biotechnology, and public health innovations. The standard deviation of **8.62** suggests moderate variability among students' awareness levels.

Female students (Mean = 72.92) demonstrated slightly higher awareness than male students (Mean = 71.98). A noticeable difference was observed between rural (Mean = 69.84) and urban students (Mean = 73.76), indicating the influence of locality on awareness levels.

Inferential Statistics:

Testing of Hypotheses and Interpretation:

Results indicated a **significant difference** in awareness based on locality, rejecting the null hypothesis. Urban students demonstrated higher awareness. Gender-based differences were marginal.

H_{01}: There is no significant difference in awareness of healthcare, biotechnology and public health innovations between male and female undergraduate students.

Table 2 t-Test Showing Gender Difference in Awareness Scores

Gender	N	Mean	SD	t-value	p-value
Male	300	71.98	8.74	1.34	0.18
Female	300	72.92	8.48		

Level of Significance: 0.05

Interpretation:

The calculated *t* value (1.34) is **less than the critical value** at 0.05 level of significance. Therefore, the null hypothesis is **accepted**.

There is **no statistically significant difference** in awareness between male and female undergraduate students.

H_{02}: There is no significant difference in awareness of healthcare, biotechnology and public health innovations between rural and urban undergraduate students.

Table 3: t-Test Showing Locality Difference in Awareness Scores

Locality	N	Mean	SD	t-value	p-value
Rural	200	69.84	7.95	5.62	< 0.01
Urban	400	73.76	8.71		

Level of Significance: 0.05

Interpretation:

The calculated *t* value (**5.62**) is greater than the critical value at the 0.05 level of significance, and the *p* value is less than 0.01. Therefore, the null hypothesis is **rejected**. This result confirms a **statistically significant difference** between rural and urban undergraduate students, with **urban students exhibiting higher awareness levels**.

The bar graph illustrates the comparison of mean awareness scores of healthcare, biotechnology, and public health innovations between male and female undergraduate students.

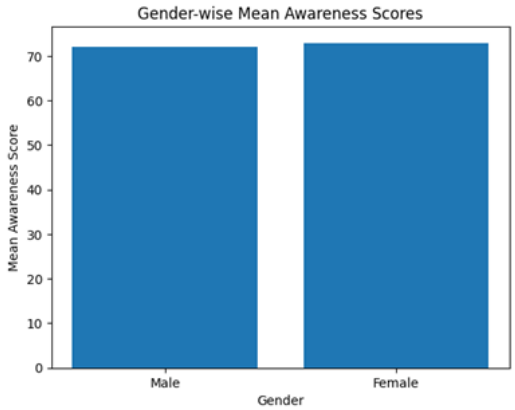


Figure 1: Gender-wise Comparison of Mean Awareness Scores

- Male: 71.98 *Female: 72.92

Interpretation:

The bar diagram shows a **marginal difference** between male and female students, supporting the statistical result that gender does not significantly influence awareness levels.

The bar graph presents a comparison of awareness scores between rural and urban undergraduate students.

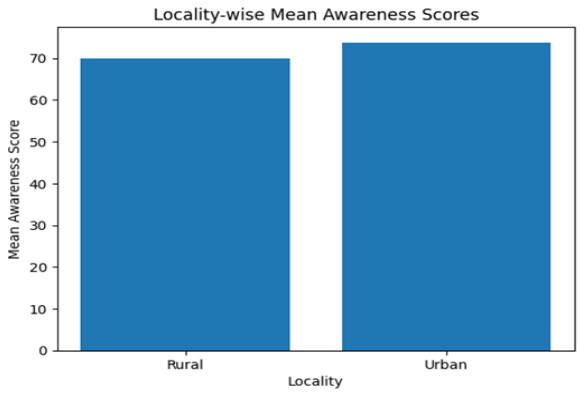


Figure 2: Locality-wise Comparison of Mean Awareness Scores

- Rural: 69.84 Urban: 73.76

Interpretation:

The figure clearly illustrates a **noticeable gap** between rural and urban students, indicating the impact of access to information and digital health exposure.

Major Findings:

1. Undergraduate students possess **moderate to high awareness** of healthcare and public health innovations.
2. **Gender does not significantly influence** awareness levels.
3. **Urban students exhibit significantly higher awareness** than rural students.
4. Exposure to digital health platforms positively influences awareness.

Overall Interpretation:

The descriptive analysis revealed that undergraduate students generally possess a satisfactory level of awareness regarding healthcare, biotechnology, and public health innovations. Inferential analysis further established that **locality is a significant determinant** of awareness, whereas **gender is not a significant influencing factor**. These findings emphasize the role of environmental exposure, access to digital resources, and institutional support in shaping awareness levels.

Suggestions:

- Integrate healthcare innovation literacy into undergraduate curricula.
- Conduct awareness programs in rural institutions.
- Promote digital health education initiatives.
- Introduce **health innovation literacy modules** in undergraduate curricula.
- Strengthen **digital health awareness programs in rural colleges**.
- Encourage collaboration between **universities and public health agencies**

Conclusions:

Healthcare, biotechnology, and public health innovations are essential for sustainable development. Enhancing awareness among undergraduate students will ensure informed utilization and long-term public health benefits. The study confirms that health care, biotechnology and public health innovations are increasingly recognized among undergraduate students. However, **locality-based disparities persist**, emphasizing the need for inclusive educational and policy interventions. Enhancing awareness among rural students is essential for equitable healthcare transformation and sustainable development.

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Abstract:

The MSMEs is considered as micro enterprise, Small enterprise and medium enterprises engaged in various economic activities such as manufacturing, processing and services. MSMEs classifications are based on their investment amount and annual turnover. MSMEs referred to as the backbone of nation's economic development. MSMEs contribute significantly to community development, infrastructure enhancement and improved living standards and is a key pillar of Government flagship "Make in India" Initiative and contributes nearly one-third to the India's GDP

Objectives of the Study:

1. To study the economic contribution of MSMEs sector
2. To study the Role of MSMEs
3. To study the Government Initiatives

Research methodology:

Descriptive methodology is adopted completely based on secondary data available from the press reports of the Ministry of Micro Small and Medium Enterprises (MSMEs) on the websites.

Evolution of MSMEs Classification:

Pre 2006 Era: small scale Industries (SSI) were defined primarily based on investment limits with threshold for Small and Ancillary Industries.

MSMED Act 2006: Introduced the three-tire classification of Micro Small and Medium enterprises with investment limits for manufacturing and services enterprises.

Revised Classification (July 2020) the government of India removed the distinction between Manufacturing and Service sectors and introduced a composite criterion based on both investments and turn overs to classify MSMEs

Revised classification effective from Aril 1 2025:

The union budget 2025-26 introduced a series of measures aimed at strengthening the MSME sector by enhancing the credit access supporting first time entrepreneurs and promoting labour intensive industries.

- For Micro Enterprises up to Rupees 2.5 Crore for Investment limit and up-to Rupees 10 crore for turn over limit.
- For Small Enterprises up-to Rupees 25 Crore for Investment limit and up-to Rupees 100 Crore turn over limit.
- For Medium Enterprises up-to Rupees 125 Crore for Investment and up-to Rupees 500 Crore turn over limit

MSMEs Contribution to Economy:

- The share of MSMEs in the country's Gross Value Added (GAV) increasing from 27.3% in F.Y 2020-21 to 29.6% in F.Y 2021-22 and 30.1% in F.F. 2022-23 highlights its growing role in economic output.

- Exports from MSMEs have seen substantial growth rising from Rs.395 Lakh Crore in F.Y. 2020-21 to Rs.12.39 lakh Crore in F.Y. 2024-25. The number of exporting MSMEs has increasing from 52,849 in F.Y. 2020-21 TO 1,73,350 in F.Y. 2024-25(May 2024).
- MSMEs Contribution to India's export has steadily grown reaching to 43.59% in F.Y.2022-23 and 45.73% in F.Y.2023-24 and 45.79% in F.Y. 2024-25(MAY 2024)

Government Initiatives:

- Udaan Training Program for unemployment youth of J & K (SII & J&K)
- National Skill Certification and Monetary Rewards(STAR Scheme)
- Pradhan Mantri Kaushal Vikas Yojana
- Apprenticeship Training
- Craftsmen Training (ITIs)
- Skill development in 34 Districts Affected by Left Wing extremism
- Up gradation of 1396 TTIs through PPP
- Capital goods scheme
- Excise duty concession to PWDs
- Custom Duty concession
- Financial Assistance for promotion of Youth Activities and Training (FAPYAT)
- National program for Youth Corps (NYC) Implemented through Nehru yuva Kendra Sangathan (NYKS)
- Development of Ayush Centers

The above list of schemes that Government of India implemented with an aim to encourage the Micro Small and Medium enterprises. These schemes are to promote financial support and procurement policies to capacity building and market integration. All these initiatives are to foster entrepreneurship and employment and integrating informal sector into formal sector.

Role of MSMEs:

1. Employment Generation: MSMEs provide employment opportunities particularly in Rural and semi urban areas. (September 2025) India's economy continues to expand rapidly with 6.82 Crore MSMEs registered on the Udyam Registration portal and Udyam Assist Platform (UAP) collectively employing 29.77 Crore people. Maharashtra, Tamil Nadu, and Uttar Pradesh dominate the MSME landscape accounting for 32% of all registrations Nationwide. Maharashtra leads with over 90 Lakh Registration (13%) followed by the Uttar Pradesh with 74Lakh (11%) and Tamil Nadu with 54.7Lakh (8%) these states have emerged as key Hubs for MSMEs activity.
2. E-Markets: Government E-Market place called GEM is the digital platform where the Government is actually focusing MSMEs. (March 2024) GEM has facilitated 5.8 Million Orders worth Rs.3, 87,006 crore serving 148,245 primary buyers and 215,743 secondary buyers. There is a increasing shift in digital payments.
3. Skill Development and Entrepreneurship Promotion: programs conducted under ESDP scheme benefitting 5, 66,410 individuals.

Conclusion:

MSMEs play a vital role in the Indian economy because it is a backbone substantially contributes towards employment generation, GDP, Exports, E-Markets, UPI's and empowering the India's youth in achieving the India's vision i.e. elevating India into a Dollar 5 Trillion economy by 2025. MSMEs contribute significantly to community development infrastructure enhancement and improved living standards.

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Supply Chain Automation

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Abstract:

This research investigates the role of supply chain automation through the integration of Blockchain technology, Smart Contracts, and the Internet of Things (IoT). The study explores how decentralized ledgers can automate critical workflows, including instant payment release, real-time inventory reconciliation, and automated compliance auditing. By utilizing IoT sensors to feed environmental data into a blockchain-backed system, companies can trigger automated responses that reduce human error and operational overhead. The findings indicate that this transition accelerates "speed-to-market" and fosters a self-correcting, autonomous ecosystem capable of responding to disruptions in real-time. While the research acknowledges significant implementation barriers—such as high initial capital expenditure, cybersecurity risks, and the "SME gap"—it concludes that the evolution toward an automated, transparent, and green supply chain is essential for resilience. Ultimately, the paper argues that automation should not be viewed as a replacement for human labor, but as a tool to liberate workers for high-level system orchestration. This study provides a strategic roadmap for organizations navigating the shift from Industry 4.0 to a human-centric, sustainable Industry 6.0 framework

Keywords: Suppy Chian Automation, Blockchain, Smart Contract, Internet Of Things(IoT)

Introduction:

In the modern global economy, the efficiency of a supply chain is the backbone of business success. However, traditional systems are often plagued by 'information silos,' where different parties cannot see each other's data, leading to delays and mistrust. Supply Chain Automation, powered by Blockchain technology, offers a transformative solution. By creating a shared, immutable record of every transaction and movement, companies can move away from slow, manual processes toward a self-executing, autonomous ecosystem. This paper explores how the synergy between Blockchain and automated technologies like Smart Contracts can create a more transparent, secure, and fast-moving global trade network.

The supply chain includes system management, operations and assembly, purchasing production scheduling, order processing, inventory management, transportation, warehousing and customer services.

Supply chain management is the ability to get closer to the customers. In today's competitive the rapidly changing industrial phenomena supply chain management has become key determinant of operational efficiency and customers satisfaction.

Significance of this study:

The significance of this study lies in its timely exploration of the paradigm shift from traditional, manual logistics to a decentralized, autonomous supply chain framework. As global

commerce faces unprecedented volatility—ranging from geopolitical tensions to climate-driven disruptions—the findings of this research provide a strategic roadmap for organizations to transition toward a more resilient and transparent operational model. By specifically investigating the synergy between Blockchain, Smart Contracts, and the Internet of Things (IoT), this study bridges a critical gap in existing literature regarding the practical automation of trust and compliance.

Review Of Literature:

Review of Literature: Supply Chain Automation (2023–2025):

The Paradigm Shift: Industry 4.0 to Industry 6.0: Recent research indicates that supply chain automation is no longer just about mechanical robotics. Literature now defines a transition from Industry 4.0 (focused on IoT and Big Data) to Industry 5.0 and 6.0, which emphasize "Human-AI Collaboration" and "Sustainable Resilience." Scholars argue that the goal has shifted from total human replacement to creating a "human-centric" automated environment where AI assists workers in complex decision-making rather than just automating simple tasks. AI-Driven Resilience and Risk Management: A significant body of literature in 2024 and 2025 focuses on Supply Chain Risk Management Automation (SCRMA). Studies by authors like Zamani et al. (2025) highlight how "Agentic AI" and "Digital Twins" allow companies to simulate disruptions (like geopolitical tensions or climate events) and automatically adjust logistics routes. The consensus is that automation is the primary tool for building "agile" chains that can pivot in real-time. Implementation Barriers: The "SME Gap" and Ethics: While the benefits are clear, 2025 literature identifies a widening gap between large corporations and Small to Medium Enterprises (SMEs). Research highlights that "High Initial Investment" and "Cybersecurity Risks" remain the top inhibitors. Furthermore, ethical concerns regarding worker welfare and job displacement have become a core theme in systematic reviews, suggesting that the "social dimension" of automation is as critical as the technical one. Sustainability and "Green" Automation (GSCM) Emerging literature heavily links automation with Green Supply Chain Management (GSCM). Recent studies demonstrate that AI-powered route optimization and automated inventory "slotting" directly reduce carbon emissions by minimizing fuel consumption and warehouse energy use. Automation is now cited as a requirement for meeting global ESG (Environmental, Social, and Governance) standards.

Objectives of the study:

1. To analyze the impact of Smart Contracts in reducing payment delays between suppliers and manufacturers.
2. To evaluate how IoT (Internet of Things) devices can provide real-time, automated data to a Blockchain ledger.

Research Methodology:

The study used descriptive type of research method and it has used secondary sources of data for all its analyses. Secondary data has been collected from various sources such as research journals, bulletin, books, editing articles from Magazines etc. Available secondary data will be extensively used for the study.

Operationalizing of Smart Contracts:

This analysis focuses on how smart contracts act like a "digital middleman" that pays suppliers the second a job is done. By using if-then rules, the computer automatically sends money as soon as a sensor or a digital scan proves the goods arrived. This gets rid of the typical

"financial friction," which is just a fancy way of saying "waiting for a human to check paperwork and click send."

To see if this is actually working, you look at how often people argue over mistakes (the dispute rate). For example, if a shipment gets too hot, the contract simply pays a bit less based on the rules, so managers don't have to spend weeks arguing over the phone. We also check if this speed helps suppliers have more cash on hand (liquidity) and saves the company time and money. Lastl but not least we look at Oracle Risk, which is basically making sure the sensors aren't lying. It's like double-checking that your thermometer isn't broken before you agree to pay for a shipment of ice cream; you want to make sure that even though the payment is super-fast.

The Triple-Check for Smart Contract Success:

We should focus on three main "safety checks" that ensure the technology works without human supervision. First, Identity Authentication acts like a digital ID card for every sensor; it proves that the information is coming from a real, trusted device and not a hacker trying to trick the system. Second, Trigger Precision looks at how fast the system reacts—essentially checking if the payment happens the exact moment the task is finished, or if there is a "lag" that keeps the supplier waiting. Finally, Data Redundancy is a "teamwork" approach where the system listens to multiple sensors instead of just one. This prevents a single broken sensor from accidentally triggering a payment or wrongly canceling an order, ensuring that the smart contract only acts when the data is 100% certain.

Challenges*:*

From 2020 to 2025, the challenges in supply chain automation have shifted from immediate pandemic-driven survival to the complexities of long-term digital integration. Initially, in 2020, the primary hurdles were physical and logistical disruptions, where staff shortages and lockdowns made it impossible to maintain traditional labor-heavy operations, forcing a panicked rush toward basic automation. By 2022 and 2023, the focus shifted to technical and financial barriers, as companies struggled with the high upfront costs of robotics and the "integration debt" of trying to connect advanced AI tools with outdated legacy systems. In the current landscape of 2024–2025, the most pressing challenges are cybersecurity risks, with supply chain attacks rising by over 400% since 2021, and a severe specialized skill gap, as the industry lacks enough engineers to manage increasingly autonomous systems. Furthermore, global businesses now face regulatory and ethical pressures, such as the 2025 requirements for granular product tracing and the need to balance rapid automation with human worker welfare and sustainability (ESG) goals.

Period	Primary Challenge	Impact on Automation
2020–2021	Pandemic Disruptions	Rapid, uncoordinated adoption of "emergency" tech.
2022–2023	Legacy System Gaps	Difficulty syncing AI with old software; high capital costs.
2024–2025	Cybersecurity & Talent	Targeted hacks on IoT; lack of skilled AI operators.

Overcome the challenges of supply chain automation:

To overcome the challenges of supply chain automation, organizations must adopt a phased and strategic integration model that prioritizes scalability over immediate, large-scale overhaul. The most effective approach begins with addressing the "integration debt" by utilizing cloud-native platforms and APIs to bridge the gap between advanced AI and older legacy systems, allowing data to flow freely without requiring a total system replacement. To mitigate high upfront costs, businesses are increasingly shifting toward Automation-as-a-Service (AaaS) models, which transform capital expenses into manageable operating costs. Simultaneously, the "human-centric" skill gap is managed through aggressive upskilling programs that transition manual laborers into "system orchestrators" who can manage and maintain robotics. From a technical standpoint, implementing "Security by Design"—including Zero Trust architectures and continuous monitoring—is essential to protect the expanded digital attack surface. Finally, by starting with small-scale Pilot Programs (or "quick wins" like RPA for invoicing), companies can prove Return on Investment (ROI) and build the internal confidence necessary to scale automation across the entire value chain

Challenge	Strategic Solution	Implementation
High Costs	Incremental Scaling	Use "Pay-as-you-go" cloud models to avoid large initial CapEx.
Legacy Systems	Middleware & APIs	Use integration layers to connect old databases to new AI tools.
Skill Shortage	Upskilling Programs	Train existing staff on "AI Literacy" and robotic maintenance.
Cyber Risks	Zero Trust Framework	Implement multi-factor authentication for every IoT device.
Worker Resistance	Change Management	Transparently communicate how robots act as "assistants," not replacements.

Conclusion:

In this study there is a evolution of supply chain management from manual, fragmented processes to a fully automated, blockchain-integrated ecosystem represents a fundamental shift in the architecture of global commerce. This study underscores that the synergy between Blockchain, the Internet of Things (IoT), and Smart Contracts is no longer a luxury but a strategic necessity for maintaining resilience in an increasingly volatile market. By digitizing trust through decentralized ledgers and eliminating human intervention in routine administrative workflows, organizations can achieve unprecedented levels of transparency, security, and operational velocity. While the transition from Industry 4.0 to the human-centric focus of Industry 6.0 introduces significant hurdles including high initial capital expenditure, the "SME gap," and escalating cybersecurity threats—the long-term benefits of "self-correcting" supply chains far outweigh these challenges. Automation-as-a-Service and phased integration strategies offer viable pathways for businesses to overcome legacy system limitations and skill shortages. Ultimately, a successful automated supply chain does not aim to replace the human element but seeks to liberate it, allowing the workforce to transition from manual labor to high-level system orchestration. As global trade continues to face geopolitical and environmental disruptions, the adoption of an agile, automated, and "green" supply chain framework will be the primary determinant of a

firm's ability to remain competitive, sustainable, and responsive to the real-time demands of the modern consumer.

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Artificial Intelligence in Library Services: A Comprehensive Review of Applications, Benefits and Future Prospects

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Abstract:

Artificial Intelligence (AI) has emerged as one of the most transformative technologies in the twenty-first century, significantly influencing almost every domain of knowledge, including Library and Information Science (LIS). Modern libraries are evolving from traditional repositories of books into technology-driven knowledge hubs that provide intelligent, user-centric services. This paper presents a comprehensive review of existing literature on the role of Artificial Intelligence in library services. The study explores major AI technologies such as machine learning, natural language processing, expert systems, and chatbots and examines their applications in various library operations, including cataloguing, reference services, information retrieval, digital libraries, and user engagement. The paper also discusses the benefits of AI adoption in libraries, including improved efficiency, enhanced user satisfaction, and better resource management, as well as challenges such as cost, privacy, ethical concerns, and lack of skilled manpower. The Indian perspective on AI in libraries and its future prospects are also reviewed. The study concludes that while AI has immense potential to revolutionize library services, its successful implementation requires strategic planning, staff training, and supportive institutional policies.

Keywords: Artificial Intelligence, Smart Libraries, Chatbots, Digital Libraries, Information Retrieval, Academic Libraries

Introduction:

Libraries have always played a crucial role in the creation, organization, preservation, and dissemination of knowledge. With the rapid growth of information and the digital transformation of society, traditional library services are no longer sufficient to meet the changing needs of users. The emergence of Artificial Intelligence (AI) has created new possibilities for improving the efficiency, accuracy, and quality of library services. AI refers to the ability of machines to perform tasks that normally require human intelligence, such as learning, reasoning, problem-solving, and language understanding (Russell &Norvig, 2021).

In the contemporary knowledge society, users expect quick, accurate, and personalized information services. Academic libraries, in particular, are under pressure to provide innovative digital services that support teaching, learning, and research. AI-based systems can analyze large volumes of data, understand user behavior, and provide intelligent recommendations, thereby enhancing the overall library experience (Cox, Pinfield, & Rutter, 2019). The application of AI in libraries is transforming them into smart libraries capable of offering automated, predictive, and interactive services.

This review paper aims to analyze the existing literature on the application of AI in library services, identify key areas of implementation, and discuss the benefits,

challenges, and future prospects of AI-driven libraries.

Concept of Artificial Intelligence:

Artificial Intelligence is a branch of computer science that focuses on the development of systems capable of performing tasks that typically require human intelligence. According to McCarthy (2007), AI is "the science and engineering of making intelligent machines." AI systems use algorithms, data, and computational power to simulate cognitive processes such as learning, reasoning, and decision-making.

The evolution of AI can be traced from early rule-based expert systems to modern machine learning and deep learning technologies. Today, AI includes various subfields such as machine learning, natural language processing (NLP), robotics, computer vision, and neural networks (Russell & Norvig, 2021). These technologies enable machines to understand text, recognize speech, interpret images, and make predictions.

In libraries, AI is primarily used to automate routine tasks, analyze user data, improve search and retrieval, and provide intelligent assistance to users.

AI Technologies Used in Libraries:

Several AI technologies are currently being used or experimented with in libraries:

1. **Machine Learning:** Machine learning enables systems to learn from data and improve their performance without being explicitly programmed. In libraries, it is used for recommendation systems, classification of documents, and predicting user needs (Jordan & Mitchell, 2015).
2. **Natural Language Processing (NLP):** NLP allows computers to understand and process human language. It is widely used in chatbots, search engines, and text analysis tools in digital libraries (Manning &Schütze, 1999).
3. **Chatbots and Virtual Assistants:** AI-powered chatbots provide real-time assistance to users by answering queries related to library services, opening hours, book availability, and database searching (Cox et al., 2019).
4. **Optical Character Recognition (OCR):** OCR technology converts scanned documents into machine-readable text, enabling full-text searching and digital archiving.
5. **Expert Systems:** Expert systems help in decision-making processes such as collection development, cataloguing, and reference services.

Applications of AI in Library Services:

1. **AI in Reference Services:** AI-based chatbots and virtual reference desks provide 24×7 assistance to library users. These systems can answer frequently asked questions, guide users in database searching, and recommend relevant resources (Vijayakumar&Vijayan, 2011).
2. **AI in Cataloguing and Classification:** Machine learning algorithms can automatically assign subject headings, keywords, and classification numbers, thereby reducing the workload of cataloguers and improving consistency (Breeding, 2018).
3. **AI in Circulation Services:** AI can automate book issue, return, and renewal processes using RFID, facial recognition, and smart kiosks.
4. **AI in Information Retrieval:** AI-based search engines use NLP and semantic analysis to provide more accurate and context-based search results compared to traditional keyword searches (Manning et al., 2008).
5. **AI in Digital Libraries:** AI supports digital libraries through content indexing, metadata

generation, plagiarism detection, and personalized recommendations (Cox et al., 2019).

6. **AI in User Behavior Analysis:** AI tools analyze user interaction data to understand reading patterns and improve collection development and service design.
7. **AI in Library Security:** Facial recognition and smart surveillance systems enhance library security and prevent unauthorized access and theft.

Role of AI in Academic Libraries:

Academic libraries support teaching, learning, and research activities. AI enables academic libraries to offer personalized learning resources, intelligent research assistance, and data-driven decision-making. AI-based recommender systems help students and researchers discover relevant books, articles, and datasets based on their interests and past usage (Jordan & Mitchell, 2015).

AI also improves the management of e-resources, institutional repositories, and research analytics, making academic libraries more effective knowledge centers.

Benefits of AI in Library Services:

The adoption of AI offers several advantages:

- Faster and more accurate services
- 24×7 user support
- Reduction in repetitive manual work
- Improved user satisfaction
- Better collection management
- Data-driven decision-making

AI enables librarians to focus more on intellectual and user-centric activities rather than routine clerical work.

Challenges and Limitations:

Despite its benefits, AI implementation in libraries faces several challenges. These include high installation and maintenance costs, lack of technical expertise, data privacy and security concerns, ethical issues related to surveillance, and resistance to change among staff (Cox et al., 2019). Small and rural libraries in developing countries often lack the infrastructure and funds required to adopt AI technologies.

Indian Scenario of AI in Libraries:

In India, digital library initiatives such as the National Digital Library of India (NDLI), INFLIBNET, and DELNET have laid the foundation for AI-based services. AI tools are gradually being used for digital archiving, metadata generation, and multilingual information retrieval. The Digital India initiative and the National AI Strategy further support the integration of AI into education and libraries (NITI Aayog, 2018).

Future Prospects of AI in Libraries:

The future of libraries lies in smart, automated, and user-centric services. AI will enable predictive services, virtual librarians, intelligent discovery systems, and advanced knowledge management. Libraries will become proactive rather than reactive, anticipating user needs and delivering information accordingly.

Conclusion:

Artificial Intelligence has the potential to revolutionize library services by enhancing efficiency, accuracy, and user experience. This review has shown that AI technologies such as machine learning, NLP, and chatbots are already transforming cataloguing, reference services, digital libraries, and information retrieval. However, challenges related to cost, privacy, and skill development must be addressed for successful implementation. With proper planning, training, and policy support, AI can play a vital

role in building smart and sustainable libraries in the knowledge society.

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Changing Behaviour of Indian consumer in the Digital Economy

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Abstract:

The rapid expansion of the digital economy has significantly transformed consumer behaviour in India. The widespread use of smartphones, affordable internet access, e-commerce platforms, and digital payment systems has changed the way consumers search for information, evaluate alternatives, and make purchasing decisions. Consumers today are more informed, price-conscious, and convenience-oriented than ever before.

This research paper examines the changing patterns of consumer behaviour in India within the framework of the digital economy. The study is based on secondary data collected from academic journals, books, government publications, Reserve Bank of India reports, and credible online sources. The findings indicate that online shopping platforms, digital payment systems, and social media significantly influence consumer purchasing decisions. Although challenges such as cyber fraud, privacy concerns, and low digital literacy continue to exist, the overall impact of the digital economy on Indian consumers has been largely positive. The study concludes that digital transformation has enhanced consumer empowerment and market efficiency, while emphasizing the need for improved consumer awareness and protection.

Keywords: Digital Economy, Consumer Behaviour, E-commerce, Digital Payments, Social Media.

Introduction:

Consumer behaviour refers to the actions, decisions, and processes individuals follow while purchasing and using goods and services to satisfy their needs. In India, consumer behaviour has undergone a significant transformation due to the rapid growth of the digital economy. The digital economy includes e-commerce platforms, mobile applications, digital payment systems, and social media networks that influence consumer choices at different stages of the buying process.

Traditionally, Indian consumers depended on physical retail stores, personal recommendations, and conventional advertising media. However, the increasing penetration of smartphones and internet services has altered this pattern. Consumers can now search for products online, compare prices, read reviews, and make purchases instantly. Government initiatives such as *Digital India* and the introduction of the Unified Payments Interface (UPI) have further accelerated digital adoption. As a result, consumers have become more informed, technology-oriented, and selective in their purchasing behaviour.

Review of Literature:

Kotler (2019) emphasized that digital platforms empower consumers by providing easy access to product information and alternatives, thereby improving decision-making efficiency. Kumar and Gupta (2020) observed that convenience, time-saving, competitive pricing, and discounts are key factors driving the growth of online shopping in India.

Sharma (2021) highlighted that digital payment systems enhance consumer trust and reduce dependence on cash transactions. The Reserve Bank of India (2022) reported a rapid increase in digital payment transactions, indicating a shift towards cashless payments. Gupta and Verma (2021) found that social media marketing, influencer endorsements, and online reviews strongly influence consumer buying behaviour. However, Singh and Jain (2021) identified challenges such as cyber fraud, data privacy issues, and low digital literacy, especially in rural areas.

Objectives of the Study

1. To understand the concept of consumer behaviour in the digital economy
2. To examine changes in consumer buying behaviour in India
3. To analyze the role of digital platforms and social media in influencing consumer decisions
4. To identify challenges faced by consumers in the digital environment
5. To suggest measures for improving consumer experience and digital adoption

Research Methodology:

The study is descriptive in nature and is based entirely on secondary data. No primary data was collected. Data sources include academic journals, books, government reports, Reserve Bank of India publications, and reliable online resources. The data was analysed to identify trends and patterns in consumer behaviour in the digital economy.

Results and Discussion

1. **Growth of Online Shopping:** Online shopping in India has grown rapidly due to its convenience, wide variety of products, competitive pricing, and doorstep delivery services. Platforms like Amazon, Flipkart, and Mintra provide consumers with access to national and international brands, making shopping easier and faster. Discounts, seasonal sales, and easy return policies have further encouraged consumers to prefer online purchases over traditional retail stores. This trend is observed not only in urban areas but also in tier-2 and tier-3 cities, reflecting the broad reach of e-commerce in India.
2. **Role of Digital Payment Systems:** Digital payment systems, including UPI, Paytm, Google Pay, and PhonePe, have transformed the way Indians make transactions. These platforms allow instant, secure, and cashless payments, reducing the need to carry physical money. They also provide features like bill payments, mobile recharges, and peer-to-peer transfers, increasing their utility in everyday life. The growing trust in these systems has led to a significant rise in online purchases and contributed to financial inclusion
3. **Consumer Awareness and Price Comparison:** Indian consumers today are more informed than ever. They actively compare prices across multiple platforms, read product reviews, check ratings, and look for best deals before making purchases. This trend has made consumers more selective and price-conscious. E-commerce platforms also provide tools such as product recommendations, discount alerts, and price trackers, which further empower consumers to make better-informed decisions.
4. **Influence of Social Media:** Social media platforms such as Instagram, Facebook, and YouTube, along with influencer marketing, have become key factors in shaping consumer preferences. Positive reviews, product demonstrations, and recommendations by influencers or peers often influence purchase decisions. Brands increasingly use social

media campaigns to reach younger audiences, making social media a critical tool in the marketing and consumer decision-making process.

5. **Rural Consumer Adoption:** Although rural areas have traditionally lagged in digital adoption, improved internet connectivity, affordable smartphones, and government initiatives like *Digital India* have led to a gradual increase in online shopping and digital payments. Local awareness programs and digital training have helped rural consumers become more comfortable with technology. Despite this progress, limited digital literacy, language barriers, and inconsistent internet access still pose challenges in some regions.
6. **Challenges:** Despite the advantages, several challenges continue to affect consumer confidence in the digital economy. Cyber fraud, phishing attacks, and online scams are common risks. Privacy concerns regarding personal and financial data also impact trust. Additionally, low digital literacy, especially among older adults and rural populations, and inconsistent internet access in remote regions hinder full adoption of digital platforms. Addressing these challenges is crucial to ensure sustainable growth of the digital economy in India.

Conclusion:

The digital economy has significantly transformed **Indian consumer behaviour**. Consumers are now more informed, technology-savvy, and focused on convenience. They actively compare prices, read reviews, and make faster purchasing decisions. Digital payments have reduced the reliance on cash, making transactions quicker and more secure. Social media and influencer marketing also strongly influence consumer choices, shaping preferences across different product categories.

Urban consumers have quickly adapted to online shopping, while rural consumers are gradually embracing digital platforms thanks to improved internet access and government initiatives such as *Digital India* and UPI (Unified Payments Interface). These programs have increased financial inclusion, enhanced access to digital services, and empowered consumers to make better-informed decisions. Despite these improvements, challenges like cyber fraud, privacy concerns, low digital literacy, and limited internet access in remote areas still exist, which can affect the adoption of digital platforms.

Overall, the digital economy's impact on Indian consumers has been largely positive. By improving digital literacy, strengthening cybersecurity measures, promoting ethical marketing, and raising awareness about safe digital practices, the benefits of digital transformation can be further maximized. Looking ahead, emerging technologies such as AI, mobile wallets, and blockchain are expected to enhance convenience, security, and efficiency in consumer transactions, continuing to shape Indian consumer behaviour in profound ways.

Suggestions:

1.Strengthen digital literacy programs: Many people, especially in villages, do not know how to use smartphones, apps, or online shopping platforms safely. Training programs and workshops can help them learn how to make online payments, shop online, and use digital services confidently. This will make more people feel comfortable using the digital economy.

2.Improve cyber security measures: Online fraud and scams make people hesitant to use digital platforms. Companies should make apps and websites safer with measures like strong passwords, two-factor authentication, and secure

payments. Teaching people how to stay safe online will increase their trust in digital services.

3.Ensure transparency and data privacy: People are worried about sharing personal information online. Digital platforms should clearly explain how they use and protect data. Strong privacy policies and secure systems will make consumers feel safe and encourage them to use online services more often.

4.Promote awareness of safe digital transactions: Many consumers do not know how to check the legitimacy of websites or apps. Awareness campaigns through social media, radio, or local workshops can teach people how to identify fraud, secure their devices, and make safe online payments.

5.Encourage ethical digital marketing practices: Online ads, social media posts, and influencer promotions should give correct information about products. Misleading advertising reduces trust. Companies should be honest in their marketing, which will improve consumer confidence and satisfaction.

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Role of Libraries in Supporting Innovation, Research and Entrepreneurship for a Knowledge Economy

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Abstract:

In the knowledge-driven economy of the twenty-first century, libraries have evolved from traditional information repositories into dynamic knowledge and innovation hubs. This paper examines the expanding role of libraries in supporting innovation, research, and entrepreneurship. It analyses how academic and research libraries facilitate access to digital resources, research data, intellectual property information, and innovation ecosystems. Through a review of literature and conceptual analysis, the study highlights how libraries contribute to research productivity, interdisciplinary collaboration, and evidence-based policymaking. The paper argues that libraries are essential institutional actors in building a sustainable knowledge economy by bridging information gaps, fostering creativity, and empowering knowledge-based enterprises.

Keywords: Libraries, Innovation, Research, Entrepreneurship, Knowledge Economy, Open Access.

Introduction:

The transition from an industrial economy to a knowledge economy has transformed the foundations of economic growth and social development. Knowledge, innovation, and intellectual capital have become the primary drivers of competitiveness and national prosperity. In this context, libraries are no longer passive storehouses of books but active facilitators of learning, research, and innovation. Academic and research libraries play a crucial role in providing access to scholarly information, digital tools, research data, and collaborative spaces that support knowledge creation and application. With the rapid expansion of digital technologies, open access movements, and interdisciplinary research, libraries are increasingly positioned at the intersection of academia, industry, and society. They support innovation through access to scientific literature and patent information, strengthen research through data management and scholarly communication services, and promote entrepreneurship by offering market intelligence, business information, and startup support services. This paper explores the conceptual foundations and practical roles of libraries in enabling innovation, research, and entrepreneurship within a knowledge-based economy.

Conceptual Framework:

The knowledge economy refers to an economic system in which the production, distribution, and use of knowledge are the main sources of growth, wealth, and employment (Powell & Snellman, 2004). Innovation involves the creation and application of new ideas,

technologies, and processes that add value to society and markets (OECD, 2018). Research is the systematic pursuit of new knowledge through scientific and scholarly inquiry, while entrepreneurship involves transforming knowledge into economic and social value through new ventures and enterprises.

Libraries function as knowledge intermediaries that connect creators and users of information. Through digital collections, institutional repositories, research data services, and information literacy programs, libraries facilitate the flow of knowledge across institutional and disciplinary boundaries. By supporting open access, intellectual property awareness, and innovation ecosystems, libraries enable the transformation of information into innovation and enterprise, thereby contributing to sustainable economic development.

Review of Literature:

Existing literature highlights the expanding role of libraries in the knowledge economy. Powell and Snellman (2004) emphasize that knowledge institutions are central to economic competitiveness. Tenopir et al. (2012) demonstrate that library-provided access to scholarly resources significantly enhances research productivity and academic output. According to Corrall, Kennan, and Afzal (2013), libraries are evolving into research partners by providing data management, bibliometrics, and digital scholarship services. Studies by Raju and Raju (2016) indicate that libraries contribute to innovation by offering access to patents, standards, and technical reports. In the entrepreneurial context, Nielsen (2018) argues that libraries support startups by providing business intelligence, market research tools, and training programs. Indian studies (Bhardwaj & Walia, 2018) also highlight the role of academic libraries in fostering innovation culture through incubation support and industry-academia collaboration.

Overall, the literature suggests that libraries are becoming active participants in research and innovation ecosystems, rather than mere service providers. However, there remains a need for systematic integration of library services into national innovation and entrepreneurship policies.

Role of Libraries in Supporting Innovation, Research and Entrepreneurship for a Knowledge Economy:

1.Role of Libraries in Supporting Innovation

- **Access to Scientific and Technical Knowledge:** Libraries provide innovators with access to scholarly journals, patents, standards, and technical reports. This helps innovators understand existing technologies and avoid duplication of work. Access to reliable information reduces uncertainty and supports evidence based innovation. It also ensures that innovation builds on validated scientific knowledge.
- **Promotion of Open Access Resources:** Libraries promote open access journals and repositories that allow free reuse of research findings. This quickens innovation by making knowledge widely available without financial barriers. Innovators from small institutions and startups benefit significantly. Open access enhances inclusiveness in innovation ecosystems.
- **Innovation Spaces and Infrastructure:** Libraries establish makerspaces, digital labs, and innovation hubs that support experimentation and prototyping. These spaces provide tools and technologies for testing ideas. They encourage hands-on learning and creativity. Libraries thus act as physical catalysts for innovation.

- **Intellectual Property Awareness:** Libraries educate users about patents, copyrights, and trademarks to protect innovations. This helps innovators understand legal aspects and avoid infringement. Proper IP awareness encourages responsible and sustainable innovation. It also enhances commercialization potential.
- **Interdisciplinary Knowledge Integration:** Libraries integrate resources across disciplines such as science, engineering, business, and humanities. This interdisciplinary access fosters creative problem-solving. Many innovations arise at the intersection of disciplines. Libraries thus enable cross-domain innovation.
- **Training and Skill Development:** Libraries conduct training on digital tools, data analysis, and innovation platforms. These programs enhance technical and analytical skills. Skill development strengthens innovation capacity. Libraries thus contribute to human capital formation.
- **Collaboration and Networking Support:** Libraries create collaborative environments for innovators to interact and share ideas. They support academic–industry partnerships and innovation networks. Collaboration enhances creativity and resource sharing. Libraries become social spaces for innovation.

2. Role of Libraries in Supporting Research

- **Scholarly Information Access:** Libraries provide access to peer-reviewed journals, books, databases, and open repositories. This supports comprehensive literature reviews and theoretical development. Reliable information is fundamental to quality research. Libraries ensure equitable access to knowledge.
- **Research Discovery and Navigation:** Libraries assist researchers in identifying relevant and high-impact literature. Librarians use advanced search strategies and bibliometric tools. This saves time and improves research efficiency. Proper discovery enhances research quality.
- **Research Data Management:** Libraries support data planning, storage, documentation, and preservation. This ensures data integrity and long-term usability. It also supports reproducibility and transparency. Libraries help researchers meet funder and ethical requirements.
- **Research Ethics and Integrity:** Libraries train researchers in citation practices, plagiarism avoidance, and ethical standards. This maintains academic honesty and credibility. Ethical research enhances public trust. Libraries promote responsible research behaviour.
- **Scholarly Communication Support:** Libraries guide researchers in selecting appropriate journals and avoiding predatory publishers. They support manuscript preparation and open access publishing. This increases visibility and impact. Libraries strengthen research dissemination.
- **Bibliometric and Impact Analysis:** Libraries provide citation analysis, impact metrics, and research evaluation tools. These helps assess research performance and influence. Institutions use this data for planning and funding. Libraries support evidence-based research management.
- **Interdisciplinary and Collaborative Research:** Libraries provide platforms and tools for interdisciplinary research collaboration. They facilitate knowledge exchange across fields. Collaboration leads to innovative and complex problem-solving. Libraries thus enable research integration.
- **Research Skill Development:** Libraries offer training in reference management, academic writing, and digital research tools. These

skills improve research productivity. Capacity building strengthens the research ecosystem. Libraries act as research educators.

3.Role of Libraries in Supporting Entrepreneurship for a Knowledge Economy

- **Access to Business and Market Information:** Libraries provide market research reports, industry data, and economic statistics. This supports informed business planning and strategy. Entrepreneurs rely on accurate data for decision-making. Libraries reduce information inequality.
- **Support for Startup Ecosystems:** Libraries collaborate with incubators and entrepreneurship cells. They provide information services and mentoring support. This strengthens startup success rates. Libraries integrate knowledge into enterprise development.
- **Policy and Regulatory Information:** Libraries provide access to government policies, legal regulations, and compliance frameworks. This helps entrepreneurs navigate complex regulatory environments. Proper information reduces legal risks. Libraries support responsible entrepreneurship.
- **Intellectual Property Services:** Libraries help entrepreneurs understand patents, trademarks, and licensing. This protects innovations and enhances commercialization. IP awareness supports sustainable business growth. Libraries act as IP knowledge facilitators.
- **Networking and Collaboration:** Libraries facilitate networking among entrepreneurs, researchers, and investors. Collaboration leads to innovation and resource sharing. Networks enhance market access. Libraries become entrepreneurial connectors.

Conclusion:

Libraries have emerged as central institutions in the knowledge economy by supporting innovation, research, and entrepreneurship. Through access to information, digital tools, research services, and collaborative spaces, libraries enable knowledge creation and its transformation into social and economic value. They promote equity, transparency, and sustainability by ensuring that knowledge remains a public good. For nations aspiring to build innovation-driven economies, strengthening library infrastructure, skills, and integration into policy frameworks is essential. Libraries are not merely support systems but strategic partners in achieving sustainable national development.

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Transforming Libraries into Smart Knowledge Facilitators in the Digital Era: A Vision towards Viksit Bharat 2047

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Abstract:

In the digital era, the processes of creation, organization and dissemination of information have undergone significant transformation. This changing information environment has also reshaped the traditional concept of libraries. Libraries are no longer confined to the role of physical repositories of books; instead, they are emerging as smart knowledge facilitators that actively support learning, research and knowledge sharing. Through the integration of digital technologies, Information and Communication Technology (ICT) and artificial intelligence, library services have become more accessible, user-oriented and dynamic. The vision of Viksit Bharat 2047 emphasizes the development of a knowledge-driven, inclusive and digitally empowered society. In this context, libraries play a crucial role in strengthening digital literacy, promoting lifelong learning and supporting intellectual growth. The present paper is conceptual and review-based in nature and attempts to examine the evolving role of libraries in the digital age, with particular reference to their transformation into smart knowledge facilitators. This study highlights the significance of libraries as institutions that contribute not only to information access but also to social development, cultural continuity and national progress. It further underlines that the transformation of libraries is essential for achieving the broader goals of education, innovation and sustainable development envisioned under Viksit Bharat 2047.

Keywords: Smart Libraries, Knowledge Management, Digital Transformation, Information Services, Viksit Bharat 2047.

Introduction:

The digital era is characterized by an unprecedented growth in the creation and dissemination of information. Rapid advancements in information and communication technologies, the expansion of the internet, and the widespread use of digital platforms have resulted in what is commonly described as information explosion. Although information is available in abundance, the ability to organize, evaluate and meaningfully utilize this information has become a major challenge. In this context, societies across the world are gradually transforming into knowledge-based societies, where informed understanding, critical thinking and access to reliable knowledge play a crucial role in social and intellectual development. Traditionally, libraries have served as important institutions for preserving knowledge and supporting education and research. However, traditional libraries that primarily rely on printed resources and physical access face several limitations in the contemporary information environment. Restricted accessibility, time constraints and the inability to meet rapidly changing user expectations have reduced the effectiveness of purely conventional library systems. As a result, the role of libraries is undergoing a significant transformation. The emergence of digital technologies has brought

remarkable changes in the fields of education and research. The availability of e-books, e-journals, online databases, digital repositories and virtual learning platforms has expanded the scope of knowledge access beyond physical boundaries. These developments have altered the way learners, researchers and educators interact with information. Consequently, libraries are no longer viewed merely as storage spaces for information but as active facilitators of learning and knowledge creation. In response to these changes, the concept of smart libraries has gained prominence. Smart libraries integrate digital tools, information and communication technologies (ICT), and innovative service models to provide efficient, user-centric and flexible information services. Such libraries aim to enhance user engagement, support lifelong learning and encourage collaborative knowledge sharing. The vision of Viksit Bharat 2047 emphasizes inclusive growth, digital empowerment and the development of a knowledge-driven nation. Education is central to achieving this vision, and libraries play a vital role in strengthening educational infrastructure and promoting intellectual development. By evolving into smart knowledge facilitators, libraries can significantly contribute to building an informed, skilled and innovative society, thereby supporting the broader objectives of Viksit Bharat 2047.

Objectives of the Study:

1. To understand the changing role of libraries in the digital era.
2. To explain how libraries function as smart knowledge facilitators in the present information environment.
3. To examine the impact of digital technologies on library services and information delivery.
4. To highlight the importance of libraries in education and research in the digital age.
5. To discuss the role of libraries in promoting digital literacy and knowledge access in the context of Viksit Bharat 2047.

Traditional Libraries:

A library has traditionally been defined as an organized collection of books and printed materials maintained for the purpose of reading, study and reference. The primary objective of traditional libraries has been to preserve knowledge, support education and provide access to reliable information. For centuries, libraries have played a crucial role in intellectual and cultural development by serving as centers of learning and knowledge preservation. Traditional libraries exist in various forms such as academic libraries, public libraries, school libraries and special libraries. Each type serves a specific group of users and fulfills educational, research or informational needs. These libraries are primarily physical spaces where users visit to access books, journals, newspapers and reference materials. One of the key characteristics of traditional libraries is their heavy dependence on books and printed sources. Printed materials have been the main medium for storing and transmitting knowledge. While these sources are reliable and authoritative, their physical nature limits accessibility in terms of time, location and availability. To manage collections effectively, traditional libraries follow established systems of cataloguing and classification. Classification systems organize books according to subject, while cataloguing provides bibliographic details that help users locate materials. These processes ensure systematic arrangement and retrieval of information but require manual effort and time. Traditional library services and working methods include book lending, reference services, reading room facilities and manual record maintenance. Most activities are staff-dependent and follow fixed schedules. Although these services have

been effective for many years, they often lack flexibility and user convenience. Despite their importance, traditional libraries face several limitations in the modern information environment. Limited access, slow information retrieval, space constraints and the inability to meet rapidly changing user needs highlight the need for transformation. These limitations have paved the way for the evolution of libraries into digital and smart knowledge centers.

Digital Era & Library Transformation:

The emergence of the digital era has been strongly influenced by the rapid development of Information and Communication Technology (ICT). Computers, the internet, mobile devices and digital networks have transformed the way information is created, stored, accessed and shared. As a result, library systems and services have also undergone significant changes to adapt to this evolving information environment. With the growth of ICT, there has been a remarkable expansion of digital information resources. Information is no longer limited to printed formats; instead, it is increasingly available in digital form. Digital resources are easier to store, update and distribute, making them more suitable for meeting the needs of modern users. This shift has encouraged libraries to adopt digital collections alongside traditional resources. Among the most important digital resources are e-books, e-journals and online databases. These resources provide users with quick access to current and diverse academic content. E-journals and databases, in particular, have greatly enhanced research activities by offering peer-reviewed articles, reports and scholarly publications across various disciplines. The availability of such resources has reduced dependence on physical copies and expanded access to global knowledge. The digital era has also enabled online access and remote library services. Users can now access library resources anytime and from any location. Online public access catalogues (OPACs), digital library portals, institutional repositories and virtual reference services have made library services more flexible and user-friendly. This shift has removed geographical and time-related barriers associated with traditional libraries. In this changing environment, the concept of the hybrid library has emerged. A hybrid library combines both printed and digital resources, allowing libraries to serve diverse user needs. This model ensures a balanced approach by retaining traditional materials while embracing digital innovation. The role of librarians has also evolved in the digital era. Librarians are no longer limited to managing physical collections; they now act as information guides, digital facilitators and knowledge managers. Greater emphasis is placed on user- centred information services, ensuring that library services are tailored to the needs of learners, researchers and the wider community.

Smart Libraries:

The concept of smart libraries represents an advanced stage in the evolution of library and information services in the digital age. A smart library goes beyond traditional and digital libraries by integrating emerging technologies to create an intelligent, adaptive and user-oriented knowledge environment. The main aim of smart libraries is to provide seamless access to information while enhancing learning, research and knowledge creation. One of the key features of smart libraries is the use of Artificial Intelligence (AI) and automation. AI-based systems support automated cataloguing, smart search functions, recommendation services and chat-based virtual assistance. Automation helps in efficient circulation management, inventory control and real-time tracking of resources, reducing manual workload and improving service

efficiency. Digital knowledge management is another important component of smart libraries. Smart libraries systematically organize, store and retrieve digital content using advanced platforms and metadata systems. This ensures easy access to reliable information and supports knowledge preservation. Effective knowledge management also enables libraries to curate high-quality resources aligned with user needs. Smart libraries place strong emphasis on enhancing user experience. Personalized services, intuitive digital interfaces and quick access to information improve user satisfaction. Through data-driven insights, smart libraries can understand user behavior and offer customized learning resources, thereby making information services more responsive and engaging. The concept of Learning Commons is closely associated with smart libraries. Learning Commons provide collaborative spaces equipped with digital tools that encourage group learning, discussion and innovation. These spaces support interdisciplinary learning and promote collaboration among students, researchers and educators. Smart libraries also play a vital role in promoting lifelong learning. By offering continuous access to digital resources, online learning materials and skill development content, smart libraries support learners of all ages. They contribute to building an informed and skilled society by enabling self-directed and continuous learning. Finally, smart libraries serve as active platforms for knowledge creation and knowledge sharing. They support research activities, facilitate access to scholarly communication and encourage collaborative knowledge production. Through these roles, smart libraries contribute significantly to the development of a knowledge-based society.

Role of Libraries in Viksit Bharat 2047:

The vision of Viksit Bharat 2047 aims to transform India into a developed, inclusive and knowledge-driven nation by the centenary year of its independence. This vision emphasizes education, digital empowerment, innovation and human capital development as key pillars of national progress. In this context, libraries play a vital role as institutions that support knowledge creation, dissemination and lifelong learning. Building a knowledge-based economy is central to the Viksit Bharat 2047 framework. Knowledge, skills and information are essential drivers of economic growth in the modern world. Libraries contribute to this objective by providing access to updated information resources, research materials and learning platforms that support skill development and intellectual advancement.

The promotion of digital literacy is another critical component of national development. Through digital and smart library initiatives, users are trained in information search skills, use of e-resources and responsible digital practices. Libraries thus help individuals adapt to the digital environment and reduce information inequality. Libraries also make significant contributions to research and innovation. By offering access to academic databases, scholarly publications and research support services, libraries strengthen the research ecosystem. They facilitate knowledge sharing, interdisciplinary collaboration and innovation-driven learning. An important role of libraries is in reducing the knowledge gap between rural and urban areas. Public and digital libraries extend educational resources to underserved and remote communities, ensuring wider access to knowledge and learning opportunities. Furthermore, libraries support inclusive education by providing equal access to information regardless of socio-economic background. By promoting accessibility, digital inclusion and lifelong learning, libraries actively contribute to achieving the broader goals of Viksit Bharat 2047.

Challenges & Opportunities:

1.Challenges:

1. Although India has achieved extensive 4G/5G population coverage, effective utilization of digital connectivity in libraries is often limited due to issues related to network stability, bandwidth management, and institutional-level technical coordination.
2. Many academic and public libraries still lack upgraded ICT infrastructure, smart devices, integrated digital platforms, and automation systems, which restricts the full-scale implementation of smart library models.
3. The shortage of professionally trained library personnel with competencies in digital technologies, artificial intelligence, and data management poses a major challenge to libraries functioning as smart knowledge facilitators.
4. Financial constraints continue to affect the adoption of advanced technologies such as AI-driven services, licensed e-resources, digital preservation tools, and continuous service innovation within library systems.
5. With increasing reliance on digital information, ensuring data security, protecting user privacy, maintaining information authenticity, and managing cybersecurity risks have become critical and ongoing responsibilities for modern libraries.

2. Opportunities:

1. National initiatives such as Digital India, the National Education Policy 2020, and the vision of Viksit Bharat 2047 provide strong policy support and an enabling framework for the development of smart and digital libraries.
2. The growth of open access resources, digital repositories, e-books, and e-journals enables equitable, cost-effective, and global access to scholarly information for students, researchers, and lifelong learners.
3. Emerging technologies including artificial intelligence, automation, cloud computing, and data analytics offer significant opportunities to enhance efficiency, personalization, and user-centered library services.
4. Community-oriented services, digital literacy programs, lifelong learning initiatives, and learning commons strengthen the social and educational role of libraries in knowledge dissemination and capacity building.
5. As India moves toward a knowledge-based economy, libraries have increasing potential to support education, research, innovation, and intellectual empowerment as key institutions aligned with the goals of Viksit Bharat 2047.

Conclusion:

In the digital era, libraries are transforming from traditional repositories into smart knowledge facilitators. The integration of Information and Communication Technology, artificial intelligence, and digital tools has enhanced the efficiency, accessibility, and user-centric nature of library services. Smart libraries effectively support education, research, and information services while addressing the challenges of the contemporary information environment. Through access to digital resources, e-learning materials, and collaborative spaces such as Learning Commons, libraries promote knowledge sharing, research advancement, innovation, and lifelong learning. These developments contribute to improved educational quality, digital literacy, and intellectual engagement. Within the vision of Viksit Bharat 2047, libraries play a crucial role in strengthening a knowledge-based economy, fostering digital inclusion, supporting research and innovation, and promoting inclusive education. With sustained policy support, technological

innovation, and skilled human resources, smart libraries are expected to play a decisive role in building an innovative, inclusive, and knowledge-driven India aligned with national development goals.

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Education, Information Systems and the Knowledge Economy: An Interdisciplinary Perspective towards Viksit Bharat 2047

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Abstract:

The idea of "Viksit Bharat 2047" aims to transform India into a developed, inclusive, and knowledge-based nation by the 100th year of its independence. In the present global scenario, where technology and innovation play a vital role, education, information systems, and the knowledge economy have become the foundation of sustainable national development. A quality-focused, skill-oriented, and technology-supported education system strengthens human capital by improving productivity, creativity, and employability. At the same time, advanced information systems such as digital libraries, information and communication technologies (ICT), e-learning platforms, and knowledge management tools support effective creation, storage, sharing, and use of knowledge. This process helps in converting knowledge into economic value, which contributes to employment generation, competitiveness, and long-term economic growth. The present study analyses the relationship between education, information systems, and the knowledge economy from an interdisciplinary perspective involving Library and Information Science and Economics. The study is based on the review of policy documents and academic literature. It concludes that innovation in education, strong information infrastructure, and knowledge-oriented development policies are essential for achieving the vision of "Viksit Bharat 2047" in a realistic, inclusive, and sustainable manner.

Keywords: Viksit Bharat 2047, Education, Information Systems, Knowledge Economy, Human Capital

Introduction:

As India approaches the centenary of its independence, the vision of "Viksit Bharat 2047" has emerged as a comprehensive national goal aimed at transforming the country into a developed, inclusive, and sustainable nation. This vision goes beyond mere economic growth and emphasizes social equity, technological advancement, and knowledge-driven development. In the contemporary global environment, the progress of nations is increasingly determined not by physical resources alone, but by the quality of their human capital, capacity for innovation, and effective use of knowledge. In this context, the realization of "Viksit Bharat 2047" largely depends on India's ability to strengthen its education systems and information infrastructure. Globally, knowledge-based development has gained significant importance due to rapid technological advancements associated with the Fourth Industrial Revolution. Digital technologies, artificial intelligence, automation, and data-driven systems have reshaped economies and societies by placing knowledge, skills, and innovation at the centre of development processes. Countries that have invested consistently in education, research, and information systems have achieved

higher productivity, global competitiveness, and sustainable economic growth. As a result, the concept of the knowledge economy has emerged, where knowledge creation, dissemination, and application serve as the primary drivers of economic and social progress.

For India, education and information systems occupy a central position in this transformation process. With a large and youthful population, India possesses a significant demographic advantage, which can be effectively harnessed through quality, inclusive, and skill-oriented education. A robust education system enhances critical thinking, creativity, and employability, thereby contributing to human capital formation. At the same time, information systems such as digital libraries, information and communication technologies (ICT), e-learning platforms, and knowledge management systems facilitate access to information, support research and learning, and enable efficient knowledge sharing. The integration of education and information systems plays a crucial role in converting knowledge into economic value, promoting innovation, employment generation, and long-term development. Therefore, strengthening these sectors is essential for achieving the goals of "Viksit Bharat 2047" and for building a resilient and knowledge-driven Indian economy.

Objectives of the Study:

1. To explain the concept and significance of the knowledge economy in the context of Viksit Bharat 2047.
2. To examine the role of education in India's overall development process.
3. To analyse the importance of information systems and digital education in the education sector.
4. To explain how human capital formation takes place through education and information systems.
5. To suggest strategic directions for knowledge-based development in order to achieve the vision of Viksit Bharat 2047.

Research Approach and Methodology:

The present study adopts a conceptual and descriptive research approach with an interdisciplinary perspective, focusing on the interrelationship between education, Library and Information Science (LIS), and the knowledge economy (Economics). It is based on secondary sources such as books, research articles, government reports, policy documents, particularly the National Education Policy 2020 (NEP 2020), and reliable digital resources. No primary data was collected, as the study relies on analysis and synthesis of existing literature to derive insights. The study is contextualized within the vision of "Viksit Bharat 2047", examining how education, digital learning, information systems, and knowledge management can enhance human capital, innovation, and economic growth. From an economic perspective, it emphasizes Human Capital Theory, skill development, and productive use of knowledge, showing how education and information systems jointly support a knowledge-driven economy. The findings are drawn through thematic analysis and interdisciplinary reasoning, providing a clear understanding of how libraries, digital tools, educational policies, and economics interact. This highlights the synergy between education, LIS, and Economics, offering guidance for achieving a developed, inclusive, and knowledge-based India by 2047.

Viksit Bharat 2047 and the Knowledge Economy:

The vision of "Viksit Bharat 2047" represents India's long-term national aspiration to transform itself into an economically strong, socially inclusive, and knowledge-driven nation by the centenary year of its independence. This vision goes beyond the narrow objective of economic growth and emphasizes improvement in the quality of life, equitable access to opportunities, technological advancement, and sustainable development. In the contemporary global environment, traditional development models based mainly on physical capital and natural resources are increasingly being replaced by knowledge-based development. As a result, education, research, innovation, and information systems have emerged as central pillars in achieving the goals of "Viksit Bharat 2047". At the global level, the knowledge economy has become a dominant framework for understanding modern economic growth. A knowledge economy is characterized by the central role of knowledge, information, innovation, and human skills in driving productivity, employment, and competitiveness. In such an economy, investments in education, research and development, information systems, digital technologies, and intellectual capital play a decisive role in value creation. The rapid expansion of digital technologies, artificial intelligence, automation, and data-driven systems associated with the Fourth Industrial Revolution has further accelerated the importance of knowledge as a key economic resource. Countries that have successfully integrated education and information infrastructure into their development strategies have achieved higher levels of economic efficiency and global competitiveness. For India, the transition towards a knowledge economy holds particular significance due to its large and youthful population and expanding digital capabilities. By strengthening its education system and aligning it with skill development and innovation, India can effectively transform its demographic advantage into productive human capital. At the same time, information systems such as digital libraries, e-learning platforms, research databases, and knowledge management systems facilitate access to information, support learning and research, and enable efficient dissemination and utilization of knowledge. The integration of education and information systems helps bridge the gap between knowledge creation and its economic application. Thus, the development of a robust knowledge economy is not only essential for accelerating economic growth but also for ensuring inclusive and sustainable development. By promoting knowledge-based industries, innovation-driven entrepreneurship, and information infrastructure, India can enhance productivity, generate employment, and strengthen its global position. In this context, the synergy between "Viksit Bharat 2047" and the knowledge economy provides a realistic and strategic pathway for India's long-term development.

Education and Human Capital Formation:

Education is regarded as the most fundamental and effective instrument for human capital formation. The role of education in a nation's economic and social development is not limited merely to the acquisition of knowledge; rather, it is directly linked to the development of skills, productivity, and creativity among individuals. A quality-oriented and skill-based education system prepares individuals to meet the evolving demands of a modern knowledge-driven economy. In today's technology-intensive society, competencies such as problem-solving ability, critical thinking, digital literacy, and effective use of information have become essential skills. Such education enhances

employability and enables individuals to participate actively in the process of economic development. According to Human Capital Theory in economics, investment in education, training, and skill development contributes significantly to long-term economic growth. Education improves individuals' knowledge and skills, thereby increasing their productivity, which in turn leads to higher personal incomes as well as national income. From this theoretical perspective, education is viewed not merely as a social necessity but as a vital economic investment. For a developing country like India, the creation of high-quality human capital is a crucial prerequisite for achieving the status of a developed nation. In this process, libraries and information systems play a supportive yet significant role in strengthening education. Modern academic libraries are no longer limited to being repositories of books; they have evolved into knowledge centers that provide access to digital libraries, e-journals, research databases, and information literacy training. Professionals in the field of Library and Information Science guide students and researchers toward reliable and relevant information resources, thereby strengthening learning, research, and innovation processes. The ability to locate, evaluate, and effectively use information enhances the overall quality of human capital. In this context, the National Education Policy 2020 (NEP 2020) represents an important step toward strengthening human capital formation in India. The policy emphasizes multidisciplinary education, skill development, digital learning, research orientation, and lifelong learning. Effective integration of education systems, libraries, and information technology can significantly improve educational quality and enhance students' creativity, innovation capacity, and employability. Therefore, the relationship between education and human capital formation is of critical importance in achieving the vision of "Viksit Bharat 2047".

Information Systems and Digital Education:

Information systems and digital education have become integral components of development in contemporary knowledge-based societies. The systematic collection, processing, storage, analysis, and dissemination of information are made possible through information systems and Information and Communication Technology (ICT). The widespread use of e-learning platforms, online courses, academic databases, cloud-based systems, and digital learning tools has made education more accessible, flexible, and inclusive. Digital education has significantly reduced geographical and social barriers, thereby expanding the reach of quality education across diverse sections of society. Digital libraries, e-journals, e-books, open access resources, and research databases play a crucial role in facilitating timely and reliable access to knowledge. These information systems not only enhance the quality of education but also promote research, innovation, and creative thinking. Easy access to up-to-date academic resources improves learning outcomes for students and supports evidence-based research for scholars. As a result, the quality of human capital is strengthened, which in turn contributes to the growth of a knowledge-driven economy. In the context of the vision of "Viksit Bharat 2047", the development of robust information infrastructure and digital education systems is therefore essential. Within this framework, the role of Library and Information Science (LIS) is particularly significant. Modern libraries have evolved beyond their traditional function as repositories of books and now serve as active knowledge centers offering digital resources, research support, and information literacy programs. Professionals in the field of Library and Information Science are

responsible for organizing, managing, and evaluating information resources and guiding users toward credible and relevant information. Their contribution ensures the effective utilization of digital information systems within educational environments. In the digital era, information literacy has emerged as a vital skill. The ability to identify, evaluate, and ethically use information enables students and researchers to engage in critical thinking and independent learning. These competencies enhance human capital by improving analytical abilities, innovation capacity, and productivity. The integration of education, information systems, and library services facilitates the transformation of knowledge into economic value. Consequently, the combined contribution of digital education, information systems, and Library and Information Science is crucial for achieving sustainable and inclusive development under the vision of "Viksit Bharat 2047".

Education, Information Systems, and Economic Development:

Education and information systems together form a critical foundation for sustainable economic development in a knowledge-based economy. Education equips individuals with knowledge, skills, and competencies required for participation in the labour market, while information systems enhance access to information, facilitate learning, and support decision-making processes. The integration of education with digital information infrastructure strengthens human capital, which is a key driver of economic growth in modern economies. One of the most significant economic outcomes of this integration is employment generation. A skilled and educated workforce is better positioned to adapt to technological changes and emerging job opportunities in sectors such as information technology, research, digital services, healthcare, and knowledge-intensive industries. Digital education platforms and information systems also support reskilling and upskilling, enabling workers to remain employable in a rapidly changing economic environment. As a result, education and information systems contribute to reducing unemployment and improving workforce participation. Education and information systems also have a direct impact on productivity and innovation. Access to timely, accurate, and relevant information enhances research capabilities, improves problem-solving skills, and encourages innovative thinking. Information systems support research and development activities by enabling data analysis, knowledge sharing, and collaboration across institutions and industries. When knowledge generated through education and research is effectively managed and disseminated, it leads to technological advancements and improved production processes. The economic utilization of knowledge is central to a knowledge-based economy. Information systems facilitate the transformation of knowledge into economic value by supporting entrepreneurship, innovation-driven enterprises, and evidence-based policymaking. Education, supported by robust information systems and library services, ensures that knowledge is not merely created but also applied for economic and social benefit. Therefore, the coordinated development of education and information systems plays a vital role in enhancing productivity, fostering innovation, and achieving inclusive economic growth in the vision of "Viksit Bharat 2047".

Conclusion:

From the perspective of "Viksit Bharat 2047", this study highlights that the integration of education, information systems, and the knowledge economy is crucial for India's sustainable and inclusive development. Quality

and skill-oriented education fosters human capital, enhancing creativity, critical thinking, and innovative capabilities. Library and Information Science and modern information systems make knowledge management, storage, and dissemination more efficient. Digital libraries, e-journals, research databases, and ICT tools provide students and researchers with easy access to information, thereby improving academic quality and facilitating knowledge-based learning. From an economic standpoint, the knowledge economy drives productivity, competitiveness, and innovation. Effective coordination between education and information systems ensures that the journey from knowledge creation to economic value generation is more productive. Through Human Capital Theory and skill development, individuals' capacities are aligned with economic growth, creating a strong foundation for India's sustainable and inclusive development. In summary, achieving "Viksit Bharat 2047" requires a strategic and effective synergy between education, information systems, and the knowledge economy. When these three elements are leveraged efficiently, India can emerge as a knowledge-driven, innovation-oriented, globally competitive, and inclusive nation. This integrated approach ensures that education, digital literacy, and economic productivity collectively contribute to the realization of "Viksit Bharat 2047" by its centenary of independence.

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Evolving Dimensions of Learning: Study of students' attitude towards Online Learning with special reference to Latur city

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Abstract:

This study investigates higher-education students' attitudes toward e-learning in Latur city by applying the Community of Inquiry (CoI) framework, which conceptualizes online learning through social, cognitive and teaching presences. Using a cross-sectional survey design, data were collected from 93 students through a structured questionnaire containing socio-demographic variables and Likert-type items measuring Social Presence, Cognitive Presence, Teaching Presence and Overall Attitude. Descriptive statistics indicated moderate levels of all three presences, with Cognitive Presence reporting the highest mean score. Normality tests (Shapiro–Wilk) revealed that the data were not normally distributed, necessitating the use of non-parametric statistical techniques for hypothesis testing.

Mann–Whitney U and Kruskal–Wallis H tests were employed to examine differences across gender, stream of study, education level and daily hours of online learning. The findings revealed no statistically significant group differences, although a few results approached the conventional significance threshold, suggesting weak trends rather than definitive effects. Item-level responses indicated that while students perceive online learning as stimulating curiosity, they express concerns regarding limited application, problem-solving and higher-order engagement. The study concludes that although e-learning ensures accessibility and initial engagement, its pedagogical effectiveness depends on strengthening instructional design, interactivity and learner support mechanisms.

Keywords: Online Learning, Community of Inquiry Framework, Social Presence, Teaching Presence, Cognitive Presence

Introduction:

The rapid growth of information and communication technologies (ICT) has significantly changed the landscape of education across the world. Traditional classroom learning is increasingly being blended with and, in some cases, replaced by technology-enabled learning environments. E-learning, which refers to the use of electronic media, digital platforms and internet-based technologies for teaching and learning, has emerged as a powerful tool for enhancing access to education. Online learning platforms such as Massive Open Online Courses (MOOCs), video-based lectures and virtual classrooms have made education more inclusive by reducing geographical and institutional boundaries.

In the Indian context, initiatives such as Digital India, SWAYAM, DIKSHA, and the National Education Policy – 2020 have further strengthened the role of e-learning by promoting digital integration in education. The COVID-19 pandemic necessitated the rapid adoption of online learning across schools, colleges and universities, compelling students to shift from traditional face-to-face instruction to fully online or blended modes of learning. This sudden transition highlighted both the opportunities and

challenges of e-learning, including issues related to internet access, digital literacy, motivation, engagement and learning effectiveness.

While technological infrastructure for e-learning continues to expand, the effectiveness of such learning environments largely depends on students' attitudes and learning experiences within them. In this context, the Community of Inquiry framework provides a useful lens to understand online learning as a combination of social presence, teaching presence and cognitive presence that together shape meaningful learning experiences. Students' attitudes are influenced not only by access to technology but also by the extent to which they feel socially connected, cognitively engaged and adequately supported by instructors. Therefore, examining students' perceptions through the CoI framework is essential for educators, institutions and policymakers to design learner-centred and pedagogically effective digital education strategies.

Objectives of the Study:

The primary aim of this study is to understand the attitude of students towards e-learning. In the course to meet its primary objectives, following objectives are formulated.

1. To examine the levels of Social Presence, Teaching Presence, Cognitive Presence, and Overall Attitude towards online learning among higher education students.
2. To analyse whether students' perceptions of online learning differ across gender, stream of education, and level of education.
3. To examine whether students' perceptions of online learning differ based on daily hours of online learning.
4. To test the applicability of the Community of Inquiry framework in explaining students' online learning experiences.

Review of Literature:

1. **Nasrin & Biswas (2025)** explored senior secondary students' attitudes toward e-learning in Uttar Pradesh. Results indicate that students generally hold low levels of positive attitude toward e-learning modalities. The researchers used a standardized attitude scale and found no gender differences in attitude scores. They also reported significant correlations between e-learning factors, suggesting that students perceive certain components of online learning more favourably than others, though overall acceptance remains limited.[1]
2. **Verma & Nigam (2024)** investigated critical success factors affecting positive attitudes toward e-learning among Indian university students. Using data from 221 respondents, their study found that university support significantly enhances student attitudes, while technological issues negatively influence perceptions. Interestingly, instructor support showed an insignificant effect. The authors conclude that addressing infrastructure challenges and enhancing institutional support are essential for fostering favourable attitudes toward online learning in Indian higher education contexts.[2]
3. **Saini & Yadav (2023)** examined the influence of students' attitudes toward e-learning on academic achievement in Indian higher education. Through a descriptive design involving 600 undergraduates, the study found that positive attitudes, perceived ease of use, and supportive infrastructure correlate with better academic outcomes. The authors emphasize the need for quality digital content and institutional facilitation to strengthen the link between favourable attitudes and student success in e-learning environments.[3]

4. **Kayoom (2023).** Kayoom's mixed-method research explored school children' lived experiences with online learning during the COVID-19 pandemic in India. Findings highlight that while e-learning enabled continuity of education, many students faced technology barriers, lack of engagement, and limited interaction. The study emphasized the importance of understanding students lived perceptions and recommended strategies to address emotional, social, and technical challenges to improve attitudes toward online instruction.[4]
5. **Pandey, Bhelkar & Narlawar (2023)** assessed medical students' knowledge, attitudes and practices toward e-learning. Results showed high levels of positive attitude and good knowledge, with most students using online tools for study continuity. However, many students believed e-learning cannot fully replace practical components of medical education. The authors suggest blended and structured e-learning support to maintain favourable attitudes and learning quality.[5]
6. **Alasmari (2022)** examined how the education system responded to multiple crises through the introduction of e-learning. The study found that e-learning played a transformative role in shifting the attitudes of both teachers and students from neutral to positive. Stakeholders began recognizing the advantages of acquiring new skills and adapting to technology-based instruction. The research highlights that blended learning is likely to dominate the future of education, as it integrates the benefits of both traditional and digital learning. E-learning was found to enhance understanding, engagement, and strategic planning in education.[6]
7. **Giri (2022)** focused on the concept of e-readiness and its role in capacity building and digital transformation. The study emphasized that e-readiness enables institutions and governments to assess preparedness for digital adoption, including in education. Findings indicated that educators used e-readiness frameworks to improve instructional delivery, identify areas of improvement, and enhance engagement and quality. Participants showed favourable attitudes toward digital environments, and the study concluded that e-readiness is a crucial tool for improving performance, monitoring progress, and ensuring effective implementation of e-learning systems.[7]
8. **Khan et al. (2021)** assessed university students' perceptions during the COVID-19 pandemic. The findings revealed that majority of students held positive perceptions toward e-learning flexibility, ease of access, and communication potential. Students valued learning at their own pace, though some remained neutral on usability and effectiveness. The study highlights that perceived usefulness and ease of use significantly shape favourable attitudes toward e-learning adoption.[8]
9. **Garrison et al. (2000)** introduced the Community of Inquiry framework as a conceptual model to explain how meaningful learning occurs in online environments through the interaction of cognitive, social, and teaching presences. This study systematically elaborates each component and situates the framework within constructivist learning theory. It highlights the role of structured facilitation and collaborative discourse in promoting deep learning. The paper also critically acknowledges contextual and methodological limitations, thereby providing a balanced and theoretically grounded contribution to the literature on online and blended learning.[9]

Research Hypotheses:

The present study seeks to examine whether there is any difference in students' attitudes towards different modes of learning, particularly online and offline learning. Since attitude plays a crucial role in determining students' engagement, satisfaction and effectiveness of learning, it becomes important to analyse whether students respond similarly to both modes or whether one mode is perceived more favourably than the other. On this basis, the following hypotheses are formulated:

- H_0 (Null Hypothesis): There is no significant difference in students' perceptions of online learning across gender, stream of education, level of education, and daily hours of online learning.
- H_1 (Alternative Hypothesis): There is a significant difference in students' perceptions of online learning across gender, stream of education, level of education, and daily hours of online learning.

Research Methodology:

The present study adopted a quantitative, cross-sectional research design to investigate students' attitude of online learning within the framework of the Community of Inquiry model. Data were collected from 93 students enrolled in higher education institutions using a structured questionnaire consisting of two sections: socio-demographic information and perception-based items. The dependent variables included Social Presence, Teaching Presence, Cognitive Presence and Overall Attitude, all measured on a five-point Likert scale ranging from strongly disagree to strongly agree. The independent variables comprised gender, stream of education, level of education, and daily hours of online learning. The questionnaire was designed based on established CoI constructs, and internal consistency reliability was assessed using Cronbach's alpha.

Descriptive statistics were computed for all variables, and the assumption of normality was tested using the Shapiro–Wilk test, which indicated that the data were not normally distributed. Accordingly, non-parametric statistical techniques were employed for hypothesis testing. The Mann–Whitney U test was applied for comparisons involving two independent groups, while the Kruskal–Wallis H test was used for comparisons across more than two groups. All analyses were performed using *Jamovi* statistical software with a significance level of 0.05, and ethical standards such as informed consent, voluntary participation, and confidentiality of responses were strictly maintained.

Data Analysis and Interpretation:

The collected data were analysed to examine students' perceptions of online learning using the Community of Inquiry framework. Descriptive statistics (mean, median, standard deviation, skewness, kurtosis) summarized response patterns, while the Shapiro–Wilk test indicated non-normality. Therefore, non-parametric tests were used: the Mann–Whitney U test for two-group comparisons (e.g., gender, education level) and the Kruskal–Wallis H test for variables with more than two groups (e.g., stream, daily online hours). Analyses in *Jamovi* ($\alpha = 0.05$) provided insights into social, cognitive, and teaching presences and overall attitudes.

Sample Statistics:

Table No. 1: Descriptive Statistics of Social, Cognitive, and Teaching Presence

	Social Presence	Cognitive Presence	Teaching Presence
N	93	93	93
Mean	3.05	3.37	3.12
Median	3.17	3.33	3.17
Standard deviation	0.655	0.462	0.499
Skewness	-0.220	-0.962	0.138
Std. error skewness	0.250	0.250	0.250
Kurtosis	-0.791	0.962	0.192
Std. error kurtosis	0.495	0.495	0.495
Shapiro-Wilk W	0.972	0.898	0.950
Shapiro-Wilk p	0.040	<.001	0.001

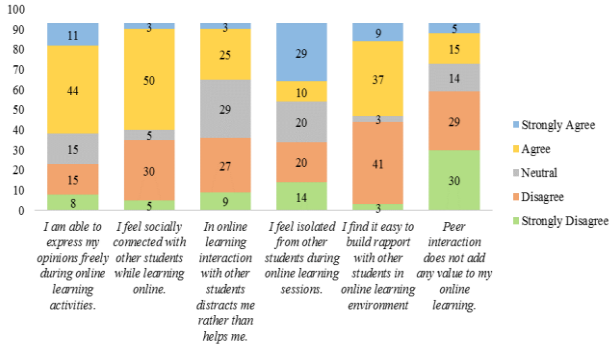
(*Source:* Author's own survey data.)

The descriptive statistics indicate that students' perceptions of online learning were moderate across Social, Cognitive, and Teaching Presences. Cognitive Presence had the highest mean score (3.37), suggesting that students felt most engaged in understanding, analysing, and applying knowledge during online learning. Teaching Presence (3.12) and Social Presence (3.05) were slightly lower, indicating that instructional guidance and social interactions were perceived as moderately effective. Skewness values show a slight negative skew for Social and Cognitive Presences, implying more students rated these aspects above average, while Teaching Presence was nearly symmetrical.

Shapiro–Wilk tests revealed that all three presences significantly deviated from normality ($p < 0.05$), supporting the use of non-parametric analyses for further comparisons. Kurtosis values indicate relatively normal distributions, though Cognitive Presence showed slight leptokurtic. Overall, these findings suggest that while students are cognitively engaged in online learning, there is room to strengthen teaching and social interactions to enhance the overall online learning experience.

Overview of Students' Attitude towards Social Presence:

FIG NO. 1: STUDENTS' ATTITUDE TOWARDS SOCIAL PRESENCE IN ONLINE LEARNING



(*Source:* Author's own survey data.)

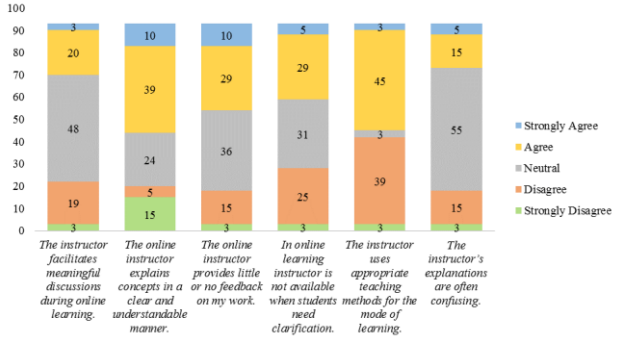
The above chart indicates that a majority of the 93 respondents reported positive perceptions of social presence in the online learning environment. For the item related to expressing opinions freely, approximately 47% of respondents selected "Agree" and 12% selected "Strongly Agree." For the item on feeling socially connected, approximately 54% selected "Agree" and 3% selected "Strongly Agree." In both cases, the combined agreement categories exceed 50%, while the combined disagreement categories remain below 20%, indicating a generally positive response pattern for these indicators.

For the items reflecting distraction and isolation, the response pattern differs. Approximately 31% of respondents selected "Neutral" for the statement on distraction, while

approximately 29% selected "Disagree" and 14% selected "Strongly Disagree" for the statement on feeling isolated. For the item on peer interaction, approximately 29% selected "Disagree" and 30% selected "Strongly Disagree," indicating that about 59% did not view peer interaction as adding significant value. These distributions indicate variation across different dimensions of social presence.

Overview of Students' Attitude towards Teaching Presence:

FIG NO. 2: STUDENTS' ATTITUDE TOWARDS TEACHING PRESENCE IN ONLINE LEARNING



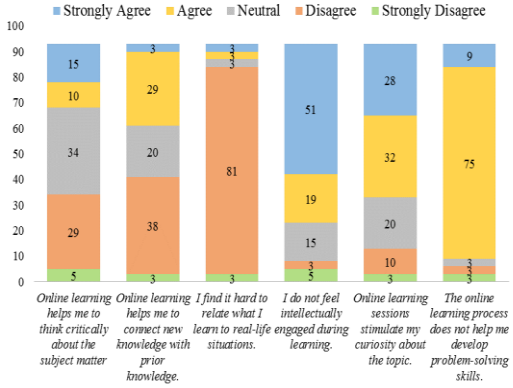
(*Source:* Author's own survey data.)

Among the three positively framed Teaching Presence items (facilitation of discussions, clarity of explanations, and appropriateness of teaching methods), the combined proportion of "Agree" and "Strongly Agree" responses ranged from 25% to 49%. The mean proportion of combined agreement across these three items was 41%. The mean proportion of neutral responses across these items was 25%, and the mean proportion of combined disagreement ("Disagree" and "Strongly Disagree") was 24%. At the individual item level, combined agreement was 25% for facilitation of discussions, 49% for clarity of explanations, and 48% for appropriateness of teaching methods. The remaining responses for these items were distributed between neutral and disagreement categories, with neutral responses ranging from 3% to 52% and combined disagreement ranging from 22% to 39%.

For the three negatively framed Teaching Presence items (little or no feedback, instructor not available for clarification, and explanations are confusing), the combined proportion of "Agree" and "Strongly Agree" responses ranged from 20% to 39%, with a mean of 31%. Neutral responses for these items ranged from 31% to 55%, while combined disagreement ranged from 18% to 27%. At the item level, combined agreement was 39% for the item on little or no feedback, 34% for the item on lack of instructor availability, and 20% for the item on confusing explanations. The remaining responses were distributed across the neutral and disagreement categories as reported above.

Overview of Students' Attitude towards Cognitive Presence:

FIG NO. 3: STUDENTS' ATTITUDE TOWARDS COGNITIVE PRESENCE IN ONLINE LEARNING



(*Source:* Author's own survey data.)

The empirical data illustrates a significant disparity between the stimulation of student interest and the attainment of higher-order cognitive engagement within digital environments. While 60% of participants reported that online sessions effectively stimulate their curiosity (28% strongly agreeing and 32% agreeing), this initial interest does not consistently manifest as sustained intellectual involvement. Notably, a combined 70% of respondents expressed agreement with the statement that they

do not feel intellectually engaged during the learning process, with a 51% majority indicating strong agreement. Furthermore, the capacity for the digital medium to foster analytical depth appears limited, as only 25% of the cohort perceived that online learning assisted in critical thinking regarding the subject matter.

Regarding the practical utility of the curriculum, the findings reveal a profound deficit in the application-based outcomes of online instruction. A substantial 84% of students indicated significant difficulty in relating theoretical content to real-world scenarios, a figure matched by an equal 84% who agreed that the online process fails to facilitate the development of essential problem-solving skills. This conceptual disconnect is further evidenced by the low percentage of students (32%) who felt able to bridge new information with prior knowledge effectively.

Testing of Hypotheses:

The present study tested whether students' attitudes toward online learning differ across four grouping variables: gender, stream of study, education level (UG vs PG) and daily hours spent in online learning. The null hypothesis (H_0) stated that there are no significant differences in perceptions of online learning across these groups; the alternative (H_1) posited the existence of such differences. Given that the dependent measures (social, cognitive, teaching presences and an overall attitude score) derive from Likert-type items and some group sizes differ, non-parametric procedures were employed: Mann–Whitney U tests for two-group comparisons (gender, education level) and Kruskal–Wallis H tests for multi-group comparisons (stream, daily hours). An alpha of 0.05 was adopted. The following subsections present the test outcomes and their interpretation for each grouping variable, noting effect implications, any near-threshold results, and recommendations for further inquiry where appropriate.

Testing for differences in student's attitude across gender:

Table No. 2: Mann–Whitney U Test Results by Gender

		Statistic	p
Social Presence	**Mann-Whitney U**	1048	0.802
Cognitive Presence	**Mann-Whitney U**	1066	0.910
Teaching Presence	**Mann-Whitney U**	1012	0.592
Overall Attitude	**Mann-Whitney U**	1068	0.919

(*Source:* Author's own survey data.)

Comparisons between female and male students used U tests for each presence and the overall attitude. The test statistics and p-values were: Social Presence U = 1048, p = 0.802; Cognitive Presence U = 1066, p = 0.910; Teaching Presence U = 1012, p = 0.592; Overall Attitude U = 1068, p = 0.919. All p-values substantially exceed the 0.05 threshold, so we fail to reject H_0 for every outcome. In practical terms, the data provide no evidence of systematic differences in how male and female respondents perceive social, cognitive or teaching aspects of online learning, nor in their overall attitude. Because non-parametric tests compare rank distributions rather than means, these results suggest similar central tendency and dispersion across genders. Given the consistently high p-values, gender does not appear to be a meaningful discriminator of online-learning attitudes in this sample.

Testing for differences in student's attitude across stream of study:

Table No. 3: Kruskal–Wallis H Test Results by stream of study

	χ^2	df	P
Social Presence	5.6512	2	0.059
Cognitive Presence	3.7222	2	0.155
Teaching Presence	0.0187	2	0.991
Overall Attitude	0.6620	2	0.718

(*Source:* Author's own survey data.)

H tests examined differences across streams. Results were: Social Presence $\chi^2(2) = 5.6512$, $p = 0.059$; Cognitive Presence $\chi^2(2) = 3.7222$, $p = 0.155$; Teaching Presence $\chi^2(2) = 0.0187$, $p = 0.991$; Overall Attitude $\chi^2(2) = 0.662$, $p = 0.718$. None of the p-values fall below 0.05, so the null hypothesis is retained for all four outcomes. Notably, Social Presence returned a $p = 0.059$, which is marginally above the conventional cutoff and indicates a weak trend that merits attention. A marginal result like this suggests slight rank differences among streams for social presence but not at conventional significance. Further a post hoc analysis revealed that there were no significant differences in social presence perception across three streams of study.

Testing for differences in student's attitude across level of education:

Table No. 4: Mann–Whitney U Test Results by level of education

		Statistic	p
Social Presence	**Mann-Whitney U**	**617**	**0.063**
Cognitive Presence	**Mann-Whitney U**	**791**	**0.742**
Teaching Presence	**Mann-Whitney U**	**662**	**0.139**
Overall Attitude	**Mann-Whitney U**	**684**	**0.197**

(*Source:* Author's own survey data.)

Education-level comparisons between undergraduate and postgraduate students were tested with U statistics: Social Presence $U = 617$, $p = 0.063$; Cognitive Presence $U = 791$, $p = 0.742$; Teaching Presence $U = 662$, $p = 0.139$; Overall Attitude $U = 684$, $p = 0.197$. All p-values exceed 0.05, so we do not reject H_0. The Social Presence result ($p = 0.063$) is close to significance and may indicate a weak difference in ranked responses between UG and PG participants; nevertheless, it again fails conventional significance criteria. However, post hoc analysis revealed that social presence perceptions were not different across undergraduate and postgraduate students. For the cognitive and overall measures, p-values are comfortably non-significant, indicating similar rank distributions across education levels. These findings imply that, within this sample, being an undergraduate or postgraduate student is not associated with substantially different perceptions of online learning.

Testing for differences in student's attitude across hours of online learning:

Table No. 5: Kruskal–Wallis H Test Results by hours of online learning

	χ^2	df	p
Social Presence	3.08	3	0.379
Cognitive Presence	5.00	3	0.171
Teaching Presence	6.65	3	0.084
Overall Attitude	1.43	3	0.698

(*Source:* Author's own survey data.)

The effect of reported daily hours of online learning was assessed with H tests across four hour-categories. Test outcomes were: Social Presence $\chi^2(3) = 3.08$, $p = 0.379$; Cognitive Presence $\chi^2(3) = 5.00$, $p = 0.171$; Teaching Presence $\chi^2(3) = 6.65$, $p = 0.084$; Overall Attitude $\chi^2(3) = 1.43$, $p = 0.698$. None of these results reach statistical significance at $\alpha = 0.05$. Teaching Presence returned a $p = 0.084$ — the closest to significance — suggesting a possible but inconclusive pattern whereby differing online

exposure relates to perceived teaching presence. Further post hoc analysis indicated that teaching presence perception does not differ due to hours of online learning exposure. Overall, the lack of significance indicates that, in this dataset, the number of hours students spend daily in online learning does not systematically differentiate their social, cognitive or overall attitudinal responses.

Overall, the findings indicate that there are no statistically significant differences in students' perceptions of online learning across gender, stream of study, education level, and daily hours of online learning. The null hypothesis was therefore retained for all four variables. Although a few results approached the conventional level of significance, particularly for social and teaching presence, these did not reach the threshold required for rejection of the null hypothesis. This suggests that students' attitudes towards online learning are largely consistent across different demographic and academic groups in the present sample.

Recommendations:

Based on the findings of the data analysis and hypothesis testing, this section proposes a set of targeted recommendations to enhance the effectiveness of online learning. These recommendations are derived directly from the observed patterns in students' perceptions of social, cognitive and teaching presence, as well as from the identified limitations in interaction, application and instructional support. The aim is to translate empirical insights into practical and pedagogically meaningful actions that can improve the quality of online education and promote deeper student engagement and learning outcomes.

1. **Strengthening Teaching Presence through Pedagogical Training:** Given the moderate scores on Teaching Presence and the absence of strong group differences, institutions should prioritize faculty development in online instructional design, facilitation strategies, and feedback mechanisms. Training programs should focus on enhancing clarity of instruction, timely academic support, and structured engagement techniques to improve students perceived instructional quality and learning guidance.
2. **Integrating Applied and Higher-Order Learning Activities:** The finding that students report curiosity but limited application and problem-solving suggests the need to embed applied learning strategies such as case-based learning, project work, and problem-based tasks into online curricula. These methods would facilitate deeper cognitive engagement and promote the transfer of knowledge to practical contexts.
3. **Enhancing Structured Peer Interaction:** Moderate Social Presence scores and weak interaction-related outcomes indicate the need for deliberately designed peer engagement mechanisms. Structured discussion forums, collaborative assignments, and peer feedback activities should be systematically incorporated to promote meaningful social interaction and shared knowledge construction.
4. **Adopting Blended Instructional Models** As attitudes did not significantly differ across demographic or academic groups, a blended learning approach can be implemented as a universal model rather than group-specific interventions. Combining synchronous and asynchronous formats can balance flexibility with real-time engagement, thereby strengthening both social and teaching presence.
5. **Implementing Continuous Monitoring and Feedback Systems:** Institutions should establish regular evaluation mechanisms to monitor students' perceptions and learning

experiences over time. Periodic feedback collection and learning analytics can help identify emerging issues early and support data-informed instructional improvements aligned with students' evolving needs.

6. **Enhancing Students' Digital Learning Skills and Self-Regulation:** The moderate levels of cognitive engagement and the reported difficulty in applying knowledge suggest that students may require greater support in developing effective online learning strategies. Institutions should therefore provide structured orientation programs focusing on digital literacy, self-regulated learning, time management, and academic use of online platforms to enable students to engage more productively and independently with online learning environments.

Scope for Further Research:

The present study is limited by its relatively small sample size, cross-sectional design and geographic focus on a single city, which restricts generalizability and causal interpretation. Future research should employ larger, multi-institutional samples across diverse regions to capture contextual variations in infrastructure, digital literacy and institutional readiness. Longitudinal designs would enable researchers to examine how students' perceptions of online learning evolve over time and how attitudes relate to academic performance, retention and skill development.

Further studies should adopt mixed-methods approaches incorporating interviews or focus groups to explore why students report high curiosity but limited application and critical thinking. Experimental designs testing specific pedagogical strategies—such as problem-based learning, collaborative tasks or blended models—would help identify effective interventions. Comparative studies across disciplines and learning platforms would also enhance understanding of domain-specific challenges and opportunities, contributing to evidence-based improvements in e-learning practice.

Conclusion:

This study examined students' attitudes toward online learning through the lenses of social, cognitive and teaching presence. The results indicate moderate levels of all three presences, with Cognitive Presence being relatively stronger. Inferential analysis revealed no significant differences across gender, stream of study, education level or daily hours of online learning, suggesting that students' perceptions are broadly consistent across demographic and academic groups. However, some results approached statistical significance, indicating possible weak patterns that merit further exploration with larger samples.

The findings reveal a critical paradox: students acknowledge the accessibility and motivational aspects of e-learning, yet report limitations in real-world application, interaction and higher-order learning. This highlights the need to move beyond mere technological provision toward pedagogically rich, interactive and student-centred online environments. Strengthening teaching presence, fostering collaboration and integrating applied learning activities are essential for improving educational outcomes. Overall, the study underscores that the effectiveness of online learning lies not in technology alone but in its thoughtful and evidence-based pedagogical implementation.

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Religious Tourist places in Rural and Urban Areas and its Socio-Economic Impact on Maharashtra State

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Abstract:

Tourism is major growth engine of the economy of the country with huge employment potential. It is now one of the primary sources of income for homes in tourist-heavy areas. Through the creation of jobs and the construction of infrastructure, domestic tourism has significantly boosted the state's economy. People have been traveling to fulfil their religious obligations all around the world, but particularly in India. For this reason, people travel to sacred sites and shrines. Different places are considered sacred by different religions. Additionally, traveling to locations associated with one's faith is motivated by spirituality. Traveling alone or in groups for pilgrimages, spiritual benefits, or to achieve salvation or moksha is known as religious tourism. Another name for it is "faith tourism." It is a trip made in order to honour and worship a location with particular religious importance. People travel to places that are thought to possess unique spiritual abilities, such as the birthplace or deathplace of founders or saints, the site of their spiritual awakening, places where miracles were witnessed or performed, places where a deity is believed to reside or have performed the penance, or any other location.

Keywords: Religious, Tourism, Rural and Urban area, Socio-Economic Impact.

Introduction:

A rich religious and spiritual legacy may be found in Maharashtra, one of India's most culturally varied and economically significant states. In both rural and urban areas, religious tourism has become a significant aspect of the state's tourism industry. Every year, pilgrimage sites like Pandharpur, Shirdi, Tuljapur, Kolhapur, Nashik, and Mumbai draw millions of followers who transcend social, economic, and geographic boundaries. These hallowed locations have a strong connection to Maharashtra's religious, cultural, and historical traditions and are crucial in determining the state's socioeconomic structure. Rural religious tourism destinations like Tuljapur (Tulja Bhavani Temple), Jejuri (Khandoba Temple), and Pandharpur (Vithoba Temple) are important sources of income for the local populace. They create jobs in the informal economy, lodging, transportation, food services, and handicrafts. Urban religious hubs like Shirdi, Nashik (Trimbakeshwar), Aurangabad (Grishneshwar), and Mumbai (Siddhivinayak Temple, Haji Ali Dargah) also make substantial contributions to urban economies through better connectivity, organized tourism infrastructure, and the hospitality sector. In Maharashtra, religious tourism has a variety of socioeconomic effects. It fosters infrastructure development in both rural and urban areas, assists small and medium-sized businesses, increases revenue creation, and advances regional development. But there are drawbacks as well, like impact on the environment, seasonal overpopulation, poor

benefit distribution, and strain on public facilities. Therefore, it is crucial for inclusive development and sustainable tourism planning to comprehend the function of religious tourist destinations and their socioeconomic influence. In addition to identifying the opportunities and difficulties related to religious tourism in the state, this study aims to investigate the distribution of religious tourist destinations in Maharashtra's rural and urban areas and assess their impact on socioeconomic development.

Temples of Deities: these are the major religious temple tourist places in Maharashtra.

1. Vithoba Temple, Pandharpur, Solapur district
2. Mayureshwar Temple, Morgaon, Pune district
3. Siddhivinayak Temple, Siddhatek, Ahmednagar district
4. Ballaleshwar Temple, Pali, Raigad district
5. Varadavinayak Temple, Mahad, Raigad district
6. Chintamani Temple, Theur, Pune district
7. Girijatmaj Temple, Lenyadri, Pune district
8. Vighneshwar Temple, Ozar, Pune district
9. Mahaganapati Temple, Ranjangaon, Pune district
10. Mahalakshmi Temple, Kolhapur, Kolhapur District
11. Renuka Devi Temple, Mahur, Nanded district
12. Saptashrungi Temple, Vani, Nashik District
13. Tulja Bhavani Temple, Tuljapur, Osmanabad district
14. Shani Temple, Shani Shingnapur, Ahmednagar district
15. Khandoba Temple, Jejuri, Pune district
16. Grishneshwar Jyotirlinga Temple, Verul, Chatrapati Sambhajinagar district
17. Bhimashankar Jyotirlinga Temple, Khed taluka, Pune district
18. Trimbakeshwar Shiva Temple, Trimbak, Nashik District
19. Sant Gajanan Maharaj Mandir, Shegaon, Buldhana District
20. Haji Ali Dargah, Worli, Mumbai
21. Jain Temples, Mangi-Tungi, Nashik district
22. Hazur Sahib, Nanded district
23. Sant Sai Baba Mandir, Shirdi, Ahmednagar district
24. Shaar Harahamim Synagogue, Masjid Bhandar, Mumbai
25. St. John the Baptist Church, Thane

Statement of Problems:

There is an imbalance in the expansion and management of rural and urban pilgrimage centres, despite the fact that religious tourist destinations have made a substantial contribution to Maharashtra's socioeconomic development. The possibility for sustainable economic development is limited in many rural religious destinations due to poor infrastructure, poor connection, a lack of lodging options, and a lack of public services. On the other hand, due to significant pilgrimage inflows, urban religious sites deal with problems including overcrowding, environmental degradation, growing living expenses, and undue pressure on municipal utilities. Furthermore, local communities particularly those in rural areas often receive little in the way of long-term economic advantages from religious tourism. These issues are made worse by the absence of integrated planning, data-driven policy creation, and sustainable tourism practices, underscoring the necessity of a thorough evaluation of the socioeconomic effects of religious tourism in Maharashtra's rural and urban districts.

Overview of literature:

According to Nair, V. (2024), tourism and the cultural economy are interconnected facets of human connection that significantly boost the world economy. This study uses secondary data

to analyze the growth of spiritual tourism in India, the interaction between spiritual tourism and cultural economy, their mutual effects, and the contribution of spiritual tourism to the realization of Viksit Bharat. According to Helakar, H.S. and Shinde, D.G. (2012), the tourism industry is underdeveloped in the research area because there are insufficient transportation options. The development of this tourist attraction is not evident for a number of reasons, including the study area's poor road and light infrastructure, poor lodging and hotel amenities, etc. The development of tourism destinations is not observed since there are no facilities for guides to give visitors geographical and historical knowledge. According to Kanwate, D.S. (2012), one of the most well-liked locations in all of Maharashtra is Malegaon Yatra, which has a lot of potential to develop into a pilgrimage site and religious destination. However, it depends on the degree of local support and administration. Majalekar, K.H. and M.B. Potdar. (2018) evaluated Maharashtra's Jain pilgrimage tourism. The state of Maharashtra offers enormous potential for Jain pilgrimage tourism. Mangitungi, Kunthalgiri, Bahubali, and Kundal are significant to the Jain faith. These locations are all based on distinctive geographic characteristics. Few are well-established, therefore facilities are provided for some destinations but not for others. Kakoti, S., and Syamala, G. (2016) discovered that only 47.718% of the respondents had good feedback, supporting the alternative hypothesis. Shirdi has more potential for growth as religious tourism and can yet be exploited as such. Despite all the facilities provided, there is still room for development and expansion. In order for Shirdi to become one of the top destinations for religious tourism, the government must make better efforts from a more moral standpoint. According to Gandhile, G.D. (2020), a certain tourist destination's tourism development might have either beneficial or bad effects. The availability of clean and sufficient water supplies, the quality of waste disposal, the development of basic infrastructure, the state of the roads, the number of stores, the natural landscape, and the strain on public utility services are all examples of the positive effects. Dapke, P.N. (2016) observed that tourist destinations are crucial for every nation, both socially and economically. Since tourism is India's primary source of income, the government must enhance its tourist attractions and draw visitors from other nations. Unfavorable aspects for foreign visitors include squalor, unsanitary circumstances, red tape, and contamination of the air and water. In order to diversify, Indian tourism must adopt a new strategy and expand into rural areas.

Research Methodology:

In order to investigate religious tourist destinations and their socioeconomic effects on Maharashtra State, the current study uses a descriptive methodology. The research is intended to comprehend the spatial distribution of religious tourist destinations in both rural and urban locations as well as their impact on social transformation, infrastructure development, employment, and income production.

Secondary data sources form the basis of the study. Government reports, publications from the Maharashtra Tourism Development Corporation (MTDC), the Census of India, the Maharashtra Economic Survey, books, newspapers, research journals, and pertinent websites are all sources of secondary data.

Objectives of the Study:

1. To identify the religious tourist places in Rural and Urban Areas of Maharashtra.
2. To understand the religious tourist places and its socioeconomic impact on Maharashtra.

Tourism and Religious Economy of Maharashtra State:

Maharashtra's rich cultural legacy, varied topography, and robust religious traditions make it a prominent place on India's tourism map. A key component of the state's tourism sector is religious tourism, which encompasses cultural, historical, coastal, eco, and medicinal travel. Maharashtra's Gross State local Product (GSDP), employment creation, and regional development are all greatly aided by the millions of local and foreign tourists that visit the state each year. Maharashtra's many pilgrimage sites, which are dispersed throughout both rural and urban areas, are fundamental to the state's religious economy. Every year, millions of devotees visit major holy sites including Shirdi (Sai Baba), Pandharpur (Vithoba), Trimbakeshwar and Bhimashankar (Jyotirlingas), Tuljapur and Kolhapur (Shakti Peethas), Jejuri (Khandoba), Ajanta–Ellora caves, Siddhivinayak Temple, and Haji Ali Dargah in Mumbai. These centres serve as strong economic engines that boost local and regional economies in addition to being spiritual centres. Numerous economic activities, such as lodging services, transportation, food and beverage industries, retail trade, flower and prasad marketplaces, handicrafts, tour operations, and informal employment, are supported by religious tourism. Pilgrimage tourism helps prevent rural-urban migration, lowers seasonal unemployment, and offers alternative livelihoods to agriculture in rural areas. It boosts organized industries like lodging, travel agency, infrastructure services, and government revenue in urban areas. Maharashtra's infrastructural development has been accelerated due to the rise in religious tourism. Major pilgrimage towns now have considerably more roads, rail connections, sanitary amenities, water supply systems, healthcare services, and digital payment infrastructure. The religious tourism industry has been further boosted by government measures such as MTDC development projects, pilgrimage circuit development, and urban redevelopment programs. But there are drawbacks to the growing religious economy as well, like festival crowding, environmental damage, pressure on public facilities, traffic jams, and growing living expenses, especially in metropolitan pilgrimage centres. Due to a lack of planning and investment, the economic benefits of rural religious destinations are frequently seasonal and unevenly distributed.

Religious Tourist Places and their Socio-Economic Impact on Maharashtra State:

Maharashtra is one of the most significant states in India for religious tourism since it is home to a number of well-known pilgrimage sites that symbolize Christianity, Buddhism, Jainism, Islam, Hinduism, and Sikhism. Every year, millions of devotees travel from all over India and the world to famous religious tourist destinations like Shirdi (Sai Baba), Pandharpur (Vithoba), Trimbakeshwar (Jyotirlinga), Tuljapur (Tulja Bhavani), Kolhapur (Mahalakshmi), Jejuri (Khandoba), Ajanta–Ellora caves, Siddhivinayak Temple, and Mumbai's Haji Ali Dargah. Religious tourism is an essential link between spiritual activities and regional development because these places are found in both rural and urban locations. In Maharashtra, religious tourism has a significant socioeconomic influence. Large-scale job possibilities are created for locals in industries like transportation, lodging, hotels, restaurants, retail stores, flower markets, and handicrafts. By offering sources of income other than agriculture, pilgrimage destinations contribute to the diversification of the rural economy and lower migration to urban regions. Through tourist-related activities, religious tourism boosts organized hospitality sectors, enhances transportation systems, and

considerably increases municipal and state revenue in urban regions. Infrastructure development is also significantly impacted by religious tourism. Many pilgrimage towns have improved their roads, railroads, sanitary facilities, water supply, healthcare services, and digital services in order to serve the enormous number of pilgrims. Major religious sites now have a stronger economic foundation thanks to government initiatives like the creation of pilgrimage circuits and smart city projects. But there are drawbacks to religious tourism's explosive expansion. Particularly in urban areas, prevalent issues include overcrowding during festivals, environmental pollution, transportation congestion, rising property costs, and pressure on natural resources. Benefits are frequently seasonal and unequally distributed in rural pilgrimage destinations, and there is little long-term planning for sustainable development. In general, religious tourism destinations have a significant socioeconomic impact on Maharashtra by fostering social integration, employment, regional development, and cultural preservation. In order to guarantee that the advantages of religious tourism are fairly distributed while reducing its detrimental effects on society and the environment, there is an increasing need for sustainable tourist planning, inclusive development policies, and efficient management.

Conclusion:

Religious tourism is the backbone of Maharashtra's rural economy and a significant contributor to its urban heritage. The crucial conclusion is that the state needs to transition to sustainable pilgrimage management even while the economic benefits, such as employment and GDP contribution, are enormous. Scientific planning is necessary in tiny communities like Pandharpur or Shirdi because to the excessive strain on local resources (water, waste management, and housing). In order to prolong the visitor's stay, diversification involves connecting religious sites with neighbouring ecotourism or historical sites. Infrastructure, upholding strict hygienic and connection standards in rural Temple Towns. Integration of Digital utilizing internet connections and crowd control technology to lessen the physical burden on these locations.

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Influence of Advertising and Promotion on Ayurvedic Product Buying Decisions

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Abstract:

The Indian market for Ayurvedic products has experienced rapid growth in recent years due to increasing health awareness, preference for natural remedies, and dissatisfaction with the side effects of allopathic medicines. In this competitive environment, advertising and promotion play a vital role in influencing consumer buying decisions. The present research paper aims to examine the influence of advertising and promotional activities on consumers' buying decisions towards Ayurvedic products. The study is based on primary data collected from 100 consumers using a structured questionnaire. Various advertising media such as television, social media, print media, and online platforms, along with promotional tools like discounts, offers, free samples, celebrity endorsements, and doctor recommendations, have been analyzed. Statistical tools such as percentage analysis, mean score analysis, correlation, and regression analysis were used for data interpretation. The findings reveal that advertising significantly influences consumer awareness, attitude, and purchase intention towards Ayurvedic products. Promotional activities, particularly discounts and social media campaigns, play a crucial role in motivating consumers to try and repeatedly purchase Ayurvedic products. The study concludes that credible and informative advertising combined with effective promotional strategies can positively impact consumer buying decisions. The paper also provides suggestions for marketers to design more consumer-centric advertising and promotional strategies for Ayurvedic products.

Keywords: Ayurvedic Products, Advertising, Promotion, Consumer Buying Behavior, Purchase Decision

Introduction:

Ayurveda, an ancient system of medicine originating in India, has gained renewed importance in the modern era due to its holistic approach to health and wellness. Ayurvedic products, which include medicines, personal care items, cosmetics, and health supplements, are increasingly preferred by consumers seeking natural and chemical-free alternatives. Rising health consciousness, increasing lifestyle-related diseases, growing awareness about preventive healthcare, and dissatisfaction with the side effects of allopathic medicines have contributed significantly to the growth of the Ayurvedic industry in India.

Government initiatives such as the promotion of AYUSH systems, increased research support, and standardization of Ayurvedic products have further strengthened consumer confidence. As a result, the Ayurvedic market has become highly competitive, with several national and international brands offering a wide range of products. In such a scenario, advertising and promotion have become essential tools for communicating product information, differentiating brands, and influencing consumer buying behavior.

Advertising plays a crucial role in creating awareness, shaping consumer perceptions, and building brand image. Through

various media such as television, newspapers, radio, social media, and digital platforms, marketers attempt to highlight the benefits, ingredients, and traditional values associated with Ayurvedic products. Promotional activities such as price discounts, coupons, free samples, trial packs, celebrity endorsements, and doctor recommendations further stimulate consumer interest and purchase intention.

Understanding how advertising and promotional activities influence consumers' buying decisions is vital for marketers to design effective marketing strategies. This study attempts to analyze the influence of advertising and promotion on consumer buying decisions towards Ayurvedic products based on primary data collected from 100 respondents.

Review of Literature:

Several studies have examined consumer buying behavior in the context of herbal and Ayurvedic products. Previous research indicates that advertising plays a significant role in creating awareness and shaping favorable attitudes towards Ayurvedic products. Advertisements emphasizing natural ingredients, traditional knowledge, and long-term health benefits positively influence consumer perception.

Studies have also highlighted the importance of credibility in Ayurvedic advertising. Consumers tend to trust advertisements that provide factual information and avoid exaggerated claims. Celebrity endorsements, particularly by well-known personalities associated with health and fitness, enhance brand recall and purchase intention. Similarly, recommendations from doctors and healthcare professionals increase consumer confidence in Ayurvedic products.

Research on promotional strategies suggests that price discounts, free samples, and promotional offers encourage consumers to try new Ayurvedic products. Social media advertising has emerged as a powerful tool, especially among younger consumers, due to its interactive nature and ease of access to product information and reviews. However, some studies warn that misleading advertisements may negatively affect consumer trust and long-term brand loyalty.

The existing literature establishes that both advertising and promotion influence consumer buying behavior, but their effectiveness depends on credibility, relevance, and consistency. The present study adds to the literature by empirically examining the combined influence of advertising and promotional activities on consumer buying decisions using primary data.

Statement of the Problem:

Despite the increasing popularity of Ayurvedic products, consumers often face confusion due to the large number of brands and aggressive advertising strategies. While companies invest heavily in advertising and promotional activities, the extent to which these efforts influence actual buying decisions is not clearly understood. Some consumers may rely on advertisements, while others depend on personal experience, word-of-mouth, or expert recommendations. Therefore, it is necessary to study the influence of advertising and promotional activities on consumers' buying decisions towards Ayurvedic products.

Objectives of the Study:

1. To study the influence of advertising on consumers' buying decisions towards Ayurvedic products.
2. To analyze the impact of promotional activities on purchase intention.
3. To identify the most effective advertising media for Ayurvedic products.
4. To examine the relationship between advertising credibility and consumer trust.

5. To provide suggestions for improving advertising and promotional strategies.

Research Hypotheses:

H_{01}: Advertising has no significant influence on consumers' buying decisions towards Ayurvedic products.

H_{11}: Advertising has a significant influence on consumers' buying decisions towards Ayurvedic products.

H_{02}: Promotional activities do not significantly influence the purchase intention of Ayurvedic products.

H_{12}: Promotional activities significantly influence the purchase intention of Ayurvedic products.

Research Methodology:

The present study is descriptive and analytical in nature. The research is based on both primary and secondary data sources. Primary data were collected from 100 respondents using a structured questionnaire designed on a five-point Likert scale. The questionnaire included questions related to demographic profile, awareness of Ayurvedic products, exposure to advertising, influence of promotional activities, and buying behavior.

Secondary data were collected from journals, research papers, books, websites, and reports related to Ayurvedic products and consumer behavior. Convenience sampling method was used for selecting respondents. The collected data were analyzed using statistical tools such as percentage analysis, mean score analysis, correlation analysis, and regression analysis with the help of statistical software.

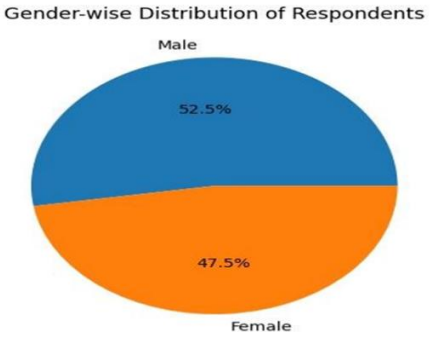
Sample Size:

The sample size for the study consisted of 100 consumers who use Ayurvedic products.

Tools for Data Analysis

- Percentage Analysis
- Mean Score Analysis
- Correlation Analysis
- Regression Analysis

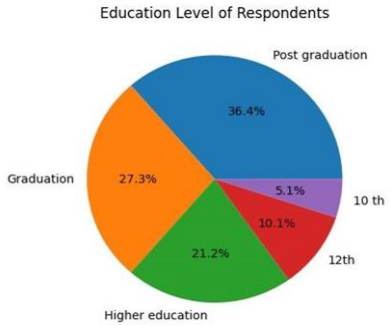
Data Analysis and Interpretation:



(Source: Primary Data)

Figure 1: Gender-wise Distribution of Respondents

Explanation: The pie chart shows the gender-wise distribution of the respondents selected for the study. It indicates that 52.5% of the respondents are male, while 47.5% are female. This nearly equal representation of male and female respondents ensures that the opinions collected are balanced and not biased towards a particular gender. Hence, the data collected can be considered reliable for analyzing consumer buying behavior towards Ayurvedic products.

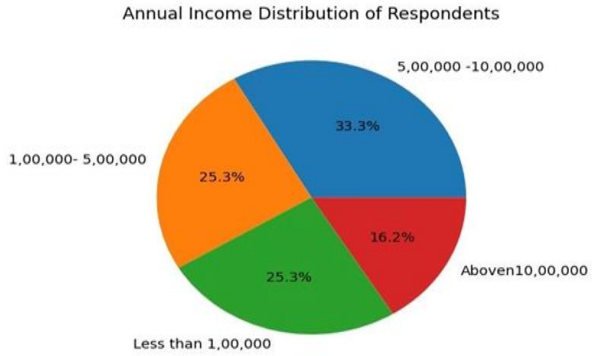


(Source: Primary Data)

Figure 2: Education Level of Respondents

Explanation: The above pie chart represents the educational qualification of the respondents. It reveals that a majority of the respondents are highly educated, with 36.4% having post-graduation and 27.3% being graduates. Educated consumers are more likely to understand advertising messages, product information, and health-related claims, which increases the

relevance of advertising and promotional strategies in influencing their buying decisions.



(Source: Primary Data)

Figure 3: Annual Income Distribution of Respondents

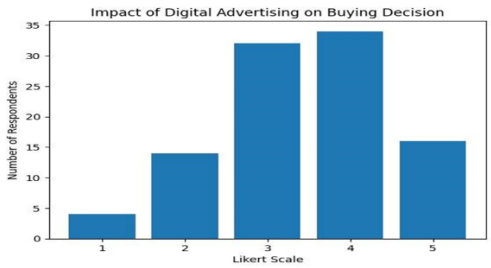
Explanation: The pie chart illustrates the annual income distribution of the respondents. The findings show that 33.3% of respondents fall in the income group of ₹5,00,000–₹10,00,000, followed by 25.3% in the ₹1,00,000–₹5,00,000 category. This indicates that most respondents belong to the middle and upper-middle-income groups, suggesting sufficient purchasing power and a positive attitude towards spending on Ayurvedic products.



(Source: Primary Data)

Figure 4: Influence of Discounts and Price Offers on Purchase Decision

Explanation: The bar chart depicts respondents' opinions regarding the influence of discounts and price offers on their purchase decisions. A large number of respondents agreed or strongly agreed that discounts and promotional offers motivate them to purchase Ayurvedic products. This clearly shows that promotional pricing strategies play a significant role in attracting consumers and encouraging trial purchases.



(Source: Primary Data)

Figure 5: Impact of Digital Advertising on Buying Decision

Explanation: The bar chart indicates the impact of digital advertisements, such as those on social media and YouTube, on consumer buying decisions. The majority of respondents selected 'Agree' and 'Strongly Agree', highlighting that digital advertising has a strong influence on consumer behavior. This reflects the growing importance of online platforms in promoting Ayurvedic products, especially among younger and educated consumers.

Demographic Profile of Respondents:

The demographic analysis revealed that respondents belonged to different age groups, educational backgrounds, and income levels. A majority of respondents were in the age group of 21–40 years, indicating higher awareness and usage of Ayurvedic products among young and middle-aged consumers. Both male and female respondents were adequately represented in the study.

Influence of Advertising on Buying Decision:

Mean score analysis indicated that advertising significantly influences consumer awareness and attitude towards Ayurvedic products. Television and social media were identified as the most influential advertising media. Respondents agreed that advertisements highlighting natural ingredients, traditional values, and health benefits positively affect their buying decisions.

Correlation analysis showed a positive relationship between advertising exposure and purchase intention, indicating that increased exposure to Ayurvedic advertisements leads to higher likelihood of purchase.

Impact of Promotional Activities:

Promotional activities such as discounts, offers, and free samples were found to have a strong influence on purchase intention. Respondents reported that price discounts and promotional schemes motivate them to try new Ayurvedic **products**. Social media promotions and online offers were particularly effective among younger consumers.

Regression analysis confirmed that promotional activities have a significant impact on purchase intention, leading to the rejection of the null hypothesis and acceptance of the alternative hypothesis.

Advertising Credibility and Consumer Trust:

The study revealed that advertising credibility plays a crucial role in building consumer trust. Respondents expressed higher trust in advertisements supported by doctor recommendations and factual information. Misleading claims were found to negatively affect trust and future purchase decisions.

Findings of the Study:

1. Advertising has a significant influence on consumers' buying decisions towards Ayurvedic products.
2. Television and social media are the most effective advertising media.
3. Promotional activities such as discounts and offers significantly influence purchase intention.
4. Advertising credibility positively affects consumer trust and brand loyalty.
5. Social media promotions are highly effective in reaching younger consumers.

Suggestions:

1. Marketers should focus on providing credible and informative advertisements highlighting product benefits and ingredients.
2. Promotional strategies such as discounts and free samples should be used to encourage product trials.
3. Social media platforms should be effectively utilized for interactive and engaging promotional campaigns.
4. Celebrity endorsements and doctor recommendations should be used responsibly to enhance credibility.
5. Companies should avoid misleading claims to maintain long-term consumer trust.

Conclusion:

The study concludes that advertising and promotional activities play a significant role in influencing consumer buying decisions towards Ayurvedic products. Effective advertising creates awareness, shapes positive attitudes, and enhances purchase intention. Promotional activities further motivate consumers to try and repurchase Ayurvedic products. However, credibility and authenticity remain key factors in building consumer trust. Marketers should design consumer-centric advertising and promotional strategies to sustain growth in the competitive Ayurvedic market.

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Digital Governance, E-Democracy and Technology: Concepts, Models, Applications, and Emerging Challenges

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Abstract:

Digital governance has transformed how states design public services, manage data, and interact with citizens. In parallel, e-democracy tools—ranging from e-consultations and e-petitions to internet voting—have expanded opportunities for participation, deliberation, and accountability. Yet these gains come with new risks: exclusion through the digital divide, privacy and surveillance concerns, cybersecurity threats, algorithmic bias, and platform-driven information disorder that can distort democratic processes. This paper builds a conceptual bridge between digital governance and e-democracy by mapping their core components (digital identity, interoperable platforms, open data, participatory mechanisms, and institutional capacity), reviewing global and Indian practices, and identifying policy and research priorities. Using a qualitative, secondary-data approach, the paper proposes a framework for "trustworthy digital democracy," emphasizing legality, transparency, security-by-design, citizen-centric service delivery, and meaningful participation.

Keywords: Digital Governance, E-Governance, E-Democracy, E-Participation, Digital Identity, Civic Tech, Cybersecurity, Algorithmic Governance, Open Government, Platform Regulation

Introduction:

Governments worldwide are redesigning public administration through technology: digitized records, online service delivery, direct benefit platforms, mobile-first citizen interfaces, and data-driven decision-making. This shift—often termed *digital governance*—goes beyond putting forms online; it re-engineers workflows, strengthens interoperability among departments, and builds institutional capacity for continuous digital service improvement.

A closely related but distinct dimension is *e-democracy*: the use of digital tools to enable citizen participation in public decision-making. E-democracy includes e-participation (consultations, feedback portals, participatory budgeting, and open hearings), e-transparency (open data and proactive disclosure), and, in some contexts, e-voting or internet voting. The United Nations assesses countries through indicators and indices such as the E-Government Development Index (EGDI) and the E-Participation Index (EPI), highlighting how digital maturity and citizen engagement are increasingly central to governance performance.

The promise is significant: faster services, reduced transaction costs, better grievance redressal, wider citizen voice, and improved accountability. But digitization also introduces new constraints: data protection requirements, cyber risk, digital exclusion, and the possibility that private platforms' incentives can shape public discourse. Therefore, digital governance and e-democracy must be studied as an integrated ecosystem of technology, institutions, laws, and citizen trust.

Objectives of the Study:

1. To explain key concepts and models of digital governance and e-democracy.
2. To develop a framework linking digital service delivery with citizen participation and accountability.
3. To examine major applications and illustrative case practices (global and India-focused).
4. To identify challenges (digital divide, privacy, cybersecurity, and misinformation) and policy options.
5. To propose future research directions for building trustworthy, inclusive digital democracy.

Research Methodology:

This is a **conceptual and descriptive** research paper based on **secondary sources**: international reports, official government portals, policy documents, and credible news/analysis. The method involves:

- Conceptual mapping of digital governance and e-democracy components.
- Comparative review of selected practices (e.g., digital identity, e-participation, internet voting).
- Thematic synthesis of risks and governance responses (cybersecurity, legal frameworks, platform accountability).

Limitations: The paper does not use primary survey data; conclusions are interpretive and intended to guide policy and future empirical work.

Conceptual Foundations:

1. Digital Governance:

Digital governance refers to the **use of digital technologies, data systems, and institutional reforms** to improve public administration and service delivery. It typically includes:

- Digital identity and authentication
- Online service portals and mobile apps
- Digitized records and document exchange
- Interoperable databases and APIs
- Data-driven monitoring and evaluation
- Digital payments and direct benefit mechanisms
- Citizen grievance and feedback systems

A mature digital governance system creates an "always-on state" in which citizens can access services seamlessly, track applications, and reduce dependence on intermediaries.

2. E-Democracy

E-democracy refers to **digital processes that enable or enhance democratic participation**, including:

- **E-information:** access to government information, proactive disclosure
- **E-consultation:** public comments on draft policies, digital town halls
- **E-decision-making:** participatory budgeting, citizen juries supported by digital platforms
- **E-accountability:** grievance redressal, social audits, open contracting dashboards
- **E-voting (in some contexts):** legally binding online voting mechanisms

E-democracy should not be reduced to voting alone; meaningful participation includes deliberation, agenda-setting, and oversight.

A Framework for "Trustworthy Digital Democracy:

This paper proposes an integrated framework consisting of five pillars:

1. **Digital Public Infrastructure (DPI):** identity, payments, document exchange, and interoperable service rails that allow government and private innovation while ensuring public accountability.
2. **Service Transformation:** redesigning processes end-to-end (not merely digitizing

forms), with time-bound delivery and grievance escalation.

3. **Participation Infrastructure:** consultation platforms, open data portals, policy feedback loops, and mechanisms that show how citizen input changes decisions.
4. **Trust Infrastructure:** privacy, data protection, cybersecurity, auditability, and transparent governance of algorithms.
5. **Inclusion Infrastructure:** language access, assisted service centers, accessibility standards, and targeted strategies for marginalized groups.

This framework stresses that **technology is necessary but not sufficient**; legitimacy comes from laws, Institutions, and citizen trust.

Applications and Case Illustrations:

1. **Digital Identity and Secure Access:** Digital identity systems enable authentication for services, reduce duplication, and support targeted benefits. However, they also concentrate data and raise surveillance and breach risks unless supported by strong safeguards and transparent access logs. Recent reporting on Nordic/Estonian experiences highlights high adoption and convenience, but also emphasizes ongoing privacy and resilience debates.
2. **E-Documentation and Paperless Governance (India example):** India's DigiLocker is positioned as a citizen document wallet enabling secure access, sharing, and verification of digital documents, aligned with the broader Digital India approach. Practical extensions at the state level also show how document digitization reduces delays and loss of physical records (e.g., pension documents linked to DigiLocker in Maharashtra).
3. **Unified Citizen Service Platforms:** Digital service aggregation improves usability and reduces fragmentation. For instance, government communication highlights platforms like UMANG as a single-window mobile access point for multiple services across levels of government (with large user and transaction volumes reported). Such platforms are foundational for citizen-centric digital governance, though they require continuous UX improvement, reliability engineering, and multilingual accessibility.
4. **E-Participation and International Measurement:** The UN E-Government Survey evaluates e-government readiness and performance and treats e-participation as a complementary dimension. Countries may score well on online services but still lack robust participation mechanisms, showing that e-democracy requires dedicated institutional design (clear consultation timelines, feedback reporting, and accountability for responding to public input).
5. **Internet Voting (Estonia as a reference model):** Estonia is widely cited for legally binding internet voting. Official and semi-official descriptions explain that voters authenticate using government-issued digital identity methods, with processes designed to ensure ballot anonymity during counting. Even where internet voting works, its transferability depends on trust in institutions, cybersecurity maturity, independent auditing, and public legitimacy.

Key Challenges:

1. **Digital Divide and Exclusion:** Digital transformation can unintentionally disadvantage citizens without smartphones, connectivity, digital literacy, or accessible interfaces. Exclusion is also linguistic and disability-related. Therefore, hybrid models (online + assisted offline) remain essential,

along with community digital support and localized language design.

2. **Privacy, Data Protection, and "Function Creep:** As governments integrate identity, services, and analytics, data concentration increases. Risks include unauthorized access, profiling, and repurposing data beyond original consent ("function creep"). Trust requires clear purpose limitation, minimal data collection, retention rules, and independent oversight.
3. **Cybersecurity and System Resilience:** Digital governance expands the attack surface: identity systems, service portals, data centers, and APIs. Threats include ransomware, supply-chain attacks, credential theft, and large-scale outages. Resilience requires continuous security testing, incident response capacity, redundancy planning, and secure-by-design procurement.
4. **Algorithmic Governance and Bias:** When automated decision systems influence eligibility, prioritization, policing, welfare targeting, or content moderation, bias and opacity can undermine fairness. Democratic governance demands explainability, audit trails, contestability (appeal mechanisms), and proportional human oversight.
5. **Platform Power, Information Disorder, and Democratic Integrity:** Public debate increasingly occurs on private platforms. This affects e-democracy because misinformation, manipulation, and opaque moderation can distort deliberation. Regulatory responses such as the EU's Digital Services Act (DSA) emphasize platform transparency and risk-management obligations, including stronger requirements for very large platforms. While regulation can improve accountability, it must balance free expression, due process, and proportionate compliance burdens.

Policy Recommendations:

1. **Citizen-centric redesign:** Map the full service journey (discovery → application → verification → delivery → grievance) and eliminate avoidable steps.
2. **Privacy-by-design and data minimization:** Collect only what is necessary; define purpose clearly; ensure audit logs and user visibility where feasible.
3. **Cybersecurity governance:** Mandatory security audits for critical systems, vendor risk controls, and clear incident disclosure protocols.
4. **Inclusion as a KPI:** Measure inclusion outcomes—who is being left out—and fund assisted access centers, multilingual interfaces, and accessibility compliance.
5. **Meaningful participation loops:** Publish consultation summaries, show how inputs changed policy, and build recurring participatory mechanisms, not one-off feedback forms.
6. **Algorithmic accountability:** Independent audits, bias testing, and appeal rights wherever automated systems affect entitlements or rights.
7. **Platform transparency for democratic discourse:** Encourage or require transparency reporting, researcher access where lawful, and risk assessments for large-scale harms.

Future Research Directions:

1. Empirical evaluation of how digital portals affect transaction costs, corruption exposure, and grievance resolution time.
2. Comparative studies on e-participation quality: what drives *meaningful* engagement rather than symbolic consultation.
3. Models for privacy-preserving analytics in governance (e.g., differential privacy, federated approaches).

4. Impact assessments of platform governance and regulation on civic discourse and electoral integrity.
5. Socio-linguistic and accessibility research on digital public services in multilingual contexts.

Conclusion:

Digital governance is reshaping the state by enabling faster, more transparent, and more scalable public service delivery. E-democracy extends this transformation into the democratic core by widening participation and enabling oversight. However, without robust safeguards, the same technologies can deepen inequality, undermine privacy, and create new vulnerabilities in democratic life. A trustworthy digital democracy therefore requires more than technology adoption—it needs institutional redesign, legal protections, cybersecurity resilience, inclusion-first implementation, and transparent participation mechanisms. International measurement frameworks (EGDI/EPI) and real-world practices—from paperless document governance to internet voting—show both the potential and the complexity of the digital state.

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Tittle: -Start-up Culture and Incubation Models in Maharashtra: A Global Outlook

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Abstract:

This research paper presents a comprehensive analysis of the start-up culture and incubation models in Maharashtra, India, positioning its evolution within a global context. The state has emerged as India's foremost start-up hub, with over 32,000 active startups and a record $4.8 billion in funding in 2025 alone. A defining feature is the unprecedented rise of women entrepreneurs, who lead nearly 45% of these ventures. This transformation is underpinned by a sophisticated, multi-layered support system encompassing proactive state policies like the Maharashtra Startup Policy 2025 and the MATRIX programme, a dense network of over 200 planned incubators, and vibrant private investment. Through a qualitative analysis of policy documents, ecosystem reports, and case studies, this paper examines the key drivers of this growth, decodes the prevailing public-private-academia incubation models, and assesses Maharashtra's competitiveness against global innovation hubs. The findings reveal an ecosystem in rapid maturation, successfully fostering high-growth ventures across fintech, enterprise tech, agritech, and deeptech. However, challenges such as capital concentration in Mumbai-Pune, talent retention, and the need for deeper global integration persist. The paper concludes with strategic recommendations for policymakers and ecosystem builders to solidify Maharashtra's position as a global innovation powerhouse.

Introduction:

Maharashtra, contributing nearly 15% to India's GDP, has long been the nation's industrial and financial nucleus. In the last decade, it has successfully orchestrated a parallel evolution into the country's most dynamic start-up ecosystem. The state is no longer just the home of legacy corporate houses but has become a fertile ground for disruptive innovation and entrepreneurial ambition. With over 8,000 startups founded since 2020 and a cumulative funding of $20.7 billion, Maharashtra's ecosystem now boasts 16 unicorns and 62 soonicorns. This paper argues that Maharashtra's ascent is not a serendipitous occurrence but the result of a deliberate, multi-stakeholder strategy to cultivate a start-up culture and build world-class incubation infrastructure. The research aims to: (a) analyze the policy and cultural drivers fostering entrepreneurship; (b) map and evaluate the prevalent incubation and acceleration models; and (c) contextualize Maharashtra's progress within global start-up ecosystems to identify pathways for further growth and internationalization.

Literature Review & Conceptual Framework:

The growth of regional start-up ecosystems is widely studied through frameworks emphasizing the interplay of policy, capital, talent, and support networks. Successful global hubs like Silicon Valley, Tel Aviv, and Berlin demonstrate the criticality of dense networks of mentors, risk capital, and research institutions. In India, prior research has often focused on Bangalore's (Bengaluru) rise. This paper addresses a gap by providing a dedicated analysis of Maharashtra's distinct ecosystem, which leverages Mumbai's financial capital, Pune's

academic and engineering strength, and a policy-driven push for geographic and gender inclusivity . The conceptual framework for this study rests on three pillars: (1) Government as a Catalyst, examining innovation policy and infrastructure; (2) Ecosystem Orchestration, analyzing the roles of incubators, accelerators, and investors; and (3) Cultural & Human Capital, exploring entrepreneurial demographics and education.

Methodology:

This research employs a qualitative desk-based methodology, synthesizing data from secondary sources including government policy documents, industry reports, news analyses, and ecosystem databases published between 2018 and 2025. The primary sources are the provided search results, which include announcements of state policies, data-rich ecosystem reports, and directories of support organizations. Content analysis was used to identify key themes, trends, metrics, and stated challenges, which were then structured to provide a holistic view of Maharashtra's start-up culture and incubation landscape.

Findings and Discussion:

1.The Policy Architecture: Building a Foundation for Innovation: The Government of Maharashtra has been instrumental in shaping the ecosystem through progressive, evolving policies.

- The Foundational Policy (2018): The Maharashtra State Innovative Startup Policy 2018 laid the initial groundwork based on the LEAPFROG principle (Lighten Compliance, Connect Ecosystem, Augment Infrastructure, etc.). It introduced benefits like self-certification, SGST reimbursement, and incentives for incubators to procure from their startups.
- The Ambitious Vision (2025): The Maharashtra Startup, Entrepreneurship & Innovation Policy 2025 sets audacious goals: empowering 1.25 lakh entrepreneurs, building 50,000 startups, and creating a ₹1 trillion innovation economy by 2030. Its key features include a ₹500 crore Chief Minister's fund (MahaFund), a 300-acre Innovation City near Navi Mumbai, and a focus on decentralized district-level hubs.
- The High-Tech Accelerator (MATRIX): The most recent and targeted intervention is the MATRIX (Maharashtra Technology, Research Incubator and Xcelerator) programme, unveiled in November 2025. It aims to set up 200 high-tech incubation centres focused on AI, IoT, blockchain, robotics, and quantum technologies. Notably, it mandates inclusive development by reserving at least 10% of incubation space for women and SC/ST entrepreneurs and offers them heavily subsidised rents. This programme explicitly targets creating 1 lakh jobs and ₹1 lakh crore in revenue from 10,000 startups over five years.

2.Anatomy of a Thriving Start-up Culture: The cultural shift towards entrepreneurship in Maharashtra is driven by several interconnected factors:

- Demographic Dividend & Education: The state's young population is being actively engaged. Universities like IIT Bombay, Savitribai Phule Pune University, and Nagpur University now run dedicated incubators and innovation challenges. The Education Department's "Entrepreneur in Residence" program allows students to pursue startups without losing academic credits.
- The Rise of Women Entrepreneurs: A standout cultural transformation is the leadership of women, who helm nearly 14,000 startups. This is a direct outcome of targeted policies reserving 30% of

funding/incubation slots for women-led ventures and the creation of dedicated support funds. The rise of women-focused investor networks like Her Capital further strengthens this trend.

- Sectoral Diversity and Strengths: The ecosystem has moved beyond its financial services legacy. While FinTech remains a powerhouse, attracting $2.3 billion in alternative lending alone, strong clusters have emerged in Enterprise Tech, HealthTech, EdTech, and notably, Agritech and Social Impact ventures, particularly in emerging hubs like Nagpur and Nashik.
- Geographic Diversification: Beyond the dominant duo of Mumbai (82% of startup formation) and Pune, new hubs are rising. Thane, Nagpur, Navi Mumbai, and Nashik are developing niche strengths, from logistics and agritech to manufacturing tech. The government is strategically promoting this through district-specific incubators in Aurangabad (manufacturing), Kolhapur (agritech/dairy), and Amravati (renewable energy).

3.Incubation and Acceleration Models: A Multi-Layered Support System: Maharashtra's incubation landscape is a hybrid model involving government, private sector, academia, and corporate entities.

- Government-Led Incubation: The MATRIX programme represents the state's apex push to create a standardized, high-quality, and inclusive incubation infrastructure across its geography. This is complemented by the network of the Maharashtra State Innovation Society (MSInS), which runs bootcamps, accelerators, and a State Co-Investment Fund that matches private VC investments.
- Private & Independent Accelerators: A dense network of private players provides critical early-stage support. Prominent names include Venture Catalysts (industry-agnostic, Asia's largest incubator), 9Unicorns Accelerator Fund, and India Accelerator. These offer seed funding, mentorship, and access to investor networks.
- Corporate Innovation Platforms: Major Indian conglomerates run programs to tap into startup innovation. JioGenNext (Reliance) and Gennext Innovation Hub help startups scale within the corporate ecosystem, while Mahindra Partners invests in cleantech and healthcare.
- University-Linked Incubators: Institutions like IIT Bombay, Venture Center (linked to research labs), and AIC NMIMS Incubation Centre play a crucial role in commercializing deep-tech and research-based innovation.
- Specialist & Sector-Focused Programs: The ecosystem also features niche accelerators like Rainmatter Capital (focusing on fintech and climate action), Villgro (for social enterprises), and Humane Entrepreneurship Program (for social impact).

4.Funding Landscape and Global Connectivity: Funding velocity is a key health indicator. In the first three quarters of 2025, Maharashtra-based startups raised $4.8 billion. The state is actively working to channel this capital more broadly and connect its startups globally.

- Investor Engagement: Venture capital, angel networks, and the state's co-investment fund are driving growth. The "Invest Maharashtra" platform simplifies engagement for investors.
- Global Ambitions: The state's Global Bridge Program actively helps startups access markets in the UAE, Japan, Germany, and Singapore by covering international marketing expenses. The policy aim is to attract foreign founders and turn Maharashtra into a global hub by 2030.

Global Outlook and Comparative Analysis:

When viewed through a global lens, Maharashtra's ecosystem exhibits both unique strengths and familiar challenges.

Strengths in Global Context:

- Policy-Driven Scale: Few global regions have a policy framework as comprehensive and ambitious as Maharashtra's 2025 Policy and MATRIX programme, especially regarding mandated inclusivity.
- Financial Core: Mumbai's inherent status as India's financial capital provides an unparalleled advantage for fintech and venture fundraising, similar to London or New York.
- Industrial-Startup Symbiosis: The strong industrial base in manufacturing and agriculture provides a real-world testbed and B2B customer base for startups, akin to Germany's Industrie 4.0 ecosystem.

Challenges and Gaps:

- Capital and Talent Concentration: Like many global ecosystems, success is concentrated in primary cities (Mumbai-Pune account for 95% of funding). Mitigating this "brain drain" and spreading resources is a stated challenge.
- Stage of R&D Commercialization: While improving, the translation of fundamental research from institutions into venture-scale businesses is less mature than in hubs like Silicon Valley or Tel Aviv, though MATRIX aims to address this.
- Global Branding and Exits: Achieving global visibility and facilitating large-scale IPOs or acquisitions on par with top global hubs remains a work in progress.

Challenges and Strategic Recommendations:

Identified Challenges:

1. Regional Imbalance: Over-dependence on Mumbai-Pune corridor.
2. Funding for Early-Stage & Women: Despite progress, access to risk capital, especially beyond seed stage and for women in non-metro areas, can be limited.
3. Mentorship Depth: Building a statewide mentorship fabric that rivals established global ecosystems.
4. Global Integration: Enhancing the scale and speed of international market access and collaborations.

Strategic Recommendations:

1. Decentralize with Precision: Double down on district-level hubs by linking them aggressively to local industry clusters (e.g., Kolhapur with dairy cooperatives) for sustainable, domain-specific innovation.
2. Institutionalize Corporate Venture Capital (CVC): Encourage more large corporations based in Maharashtra to establish formal CVC arms, providing strategic capital and market access to startups.
3. Create a Global Mentor Pool: Leverage the vast Maharashtrian diaspora in global tech hubs through a formal "Global Mentor Network" program, facilitating virtual and periodic in-person mentorship.
4. Focus on "Scale-up" Infrastructure: While incubation for early-stage startups is robust, develop dedicated programs and incentives (e.g., tailored tax structures, international business development support) focused on helping soonicorns and unicorns scale globally.
5. Foster Cross-Hub Collaboration: Actively create partnerships between incubators in Maharashtra and peer institutions in global hubs (e.g., Station F in Paris, Techstars in the US) for exchange programs and joint demo days.

Conclusion:

Maharashtra has engineered a remarkable start-up revolution, transitioning from a traditional economic powerhouse to a leading innovation frontier. Its culture of entrepreneurship is now characterized by impressive diversity—in gender, geography, and sector. This has been enabled by a sophisticated, evolving matrix of policy instruments and a multi-stakeholder incubation model that blends government vision with private sector agility and academic prowess. The MATRIX programme symbolizes the next phase: a move towards deep-tech, inclusive, and globally competitive venture building.

While challenges of concentration and scale remain, the strategic intent and foundational assets are firmly in place. By addressing the gaps through targeted recommendations and leveraging its unique strengths—its financial capital, industrial base, and now, a powerful wave of women entrepreneurs—Maharashtra is not merely mirroring global ecosystems but is poised to carve out its own distinctive identity on the world innovation map. Its journey offers a compelling blueprint for other emerging regions seeking to harness entrepreneurship for inclusive and sustainable economic transformation.

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Influence Of Jahn–Teller (Cu2+) Ions Substitution On Charge Carrier Mobility And Seebeck Coefficient Of Nickel Ferrites

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Abstract:

Polycrystalline ferrite samples of $Ni_{1-x}Cu_xFe_2O_4$ (x = 0.0, 0.2, and 0.6) were synthesized using the standard double-sintering ceramic technique to investigate the effect of Cu^{2+} ion substitution on the charge carrier mobility and Seebeck coefficient. X-ray diffraction confirmed mono-phase cubic spinel structures for all compositions. The electrical conductivity and thermoelectric power were measured in the temperature range 300–950 K. The results reveal that conductivity increases with Cu content due to enhanced Fe^{2+}/Fe^{3+} hopping and reduced activation energy. The Seebeck coefficient is negative, indicating n-type semiconducting behavior dominated by electron conduction. Its value decrease up to certain temperature and then start increasing, consistent with small-polaron hopping conduction. The enhanced carrier mobility and tunable thermoelectric properties make Cu-doped nickel ferrites potential candidates for spintronic and thermoelectric applications.

Keywords: Ni–Cu ferrite; n-type semiconductor; Seebeck coefficient; charge carrier mobility; small-polaron hopping.

Introduction:

Nickel ferrite ($NiFe_2O_4$) is an inverse spinel ferrite that exhibits semiconducting behavior and high chemical stability, making it suitable for electronic, magnetic, and thermoelectric applications [1–3]. Its electrical and thermoelectric properties arise mainly from electron hopping between Fe^{2+} and Fe^{3+} ions occupying octahedral [B] sites [4]. The cation distribution between tetrahedral (A) and octahedral [B] sites strongly influences carrier mobility and conduction type [5].Substitution of Cu^{2+} ions for Ni^{2+} in $NiFe_2O_4$ modifies the lattice parameters and the Fe^{2+}/Fe^{3+} ratio, leading to changes in electronic transport and thermoelectric behavior [6,7]. Cu^{2+} is a Jahn–Teller active ion, which introduces local distortions in the octahedral sites, thereby affecting hopping probability and charge mobility [8]. In ferrites, the Seebeck coefficient (S) provides key information about the dominant carrier type — positive for holes (p-type) and negative for electrons (n-type) [9]. The charge carrier mobility (μ) and electrical conductivity (σ) together determine the efficiency of thermoelectric conversion. This study aims to investigate the influence of Cu substitution on the charge carrier mobility and Seebeck coefficient of $Ni_{1-x}Cu_xFe_2O_4$ (x = 0.0, 0.2, 0.6) synthesized by the double-sintering method. Emphasis is given to understanding the transition in conduction behavior and its correlation with structural and electronic modifications.

Experimental Details:

1. Synthesis: Analytical-grade NiO, CuO, and Fe_2O_3 powders were used to prepare samples with nominal compositions $Ni_{1-x}Cu_xFe_2O_4$ (x = 0.0, 0.2, 0.6). The powders were weighed stoichiometrically, mixed thoroughly in an agate mortar with ethanol for 6 hr, and pre-sintered at 1293 °K for 12 hr. The powders were then re-ground, pressed into pellets (10 mm diameter, 2 mm thickness) under 6-ton/inch^2 pressure, and sintered at 1353 °K for 13 hr. in air. The sintered samples were cooled slowly to room temperature.

2.Structural Characterization:X-ray diffraction (XRD) analysis was carried out at room temperature using a Cu-Kα radiation source (λ = 1.5406 Å) in the 2θ range of 20°–80°. Lattice parameters were determined using least-squares fitting of the major diffraction peaks, confirming a cubic spinel structure. Crystallite sizes were determined using the Scherrer formula.

$$D=0.9\lambda/\beta\cos\theta$$

3.Electrical and Thermoelectric Measurements: DC electrical conductivity (σ) and Seebeck coefficient (S) were measured simultaneously in the temperature range 300–950 K using a custom-built setup. The charge carrier mobility (μ) was estimated from:

$$\mu=\sigma/ne$$

where n is the carrier concentration derived from the small-polaron hopping model. Activation energy (E_a) was obtained from the slope of ln(σT) vs. 1/T plots using the relation:

$$\sigma T=\sigma_o \exp(-E_a/kT)$$

Results And Discussion:

1.Structural Analysis: The XRD patterns of all compositions (Fig. 1) confirm the formation of a mono-phase cubic spinel structure without impurity peaks. The major reflections (220), (311), (400), (511), and (440) match well with the JCPDS card no. 74–2081 for $NiFe_2O_4$ [10].

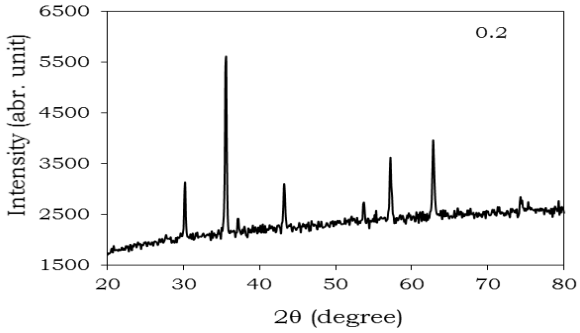


Fig. 1: ***Typical XRD Pattern of $Ni_{1-x}Cu_xFe_2O_4$ (x=0.2)***

The lattice constant increases gradually with Cu substitution (Table 1), consistent with the larger ionic radius of Cu^{2+} (0.72 Å) compared to Ni^{2+} (0.69 Å) [11]. The crystallite size decreases slightly with increasing Cu content due to enhanced lattice strain and grain boundary distortion.

Table: 1. Structural parameters of $Ni_{1-x}Cu_xFe_2O_4$ ferrites.

Sr. No.	Comp.(x)	Lattice constant (Å)	Crystallite size (μm)
1	0.0	8.3250	36.380
2	0.2	8.3285	35.26
3	0.6	8.3748	36.61

2.Electrical Conductivity and Charge Carrier Mobility

Table: 2. Charge Carrier Mobility (μ) and Temp. (K) of $Ni_{1-x}Cu_xFe_2O_4$.

Sr. No	Temp.(K)	μ (cm^2/Vs)		
		x = 0.0	x = 0.2	x = 0.6
1	650	3.30	3.9	5.61
2	700	4.44	16.0	12.75
3	750	5.61	19.9	46.0
4	780	12.8	29.0	62.0
5	810	18.5	35.0	96.0
6	830	24.8	60.0	126.0
7	890	60.0	127.0	220.0
8	925	100.0	175.0	263.0
9	975	153.0	250.0	367.0

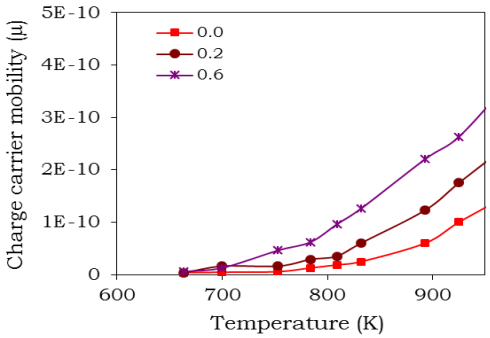


Fig. 2: *Charge Carrier Mobility (μ) with Temp.(T) of $Ni_{1-x}Cu_xFe_2O_4$.*

Figure 2 shows the variation of charge carrier mobility with temperature. All samples exhibit semiconducting behavior, where charge carrier mobility increases exponentially with temperature due to thermally activated hopping of electrons between Fe^{2+} and Fe^{3+} ions at octahedral sites [12]. Conductivity increases with Cu content, indicating enhanced electron hopping probability and improved carrier mobility. (Table 2). The enhancement in carrier mobility with Cu substitution arises from structural distortion and increased Fe^{2+} ion concentration, which promote Fe^{2+}–O–Fe^{3+} electron hopping across octahedral sites [13].

3.Seebeck Coefficient and Thermoelectric Behavior: The Seebeck coefficient (S) for all samples is negative throughout the measured temperature range (Fig. 3), confirming n-type conduction, where electrons are the dominant charge carriers.

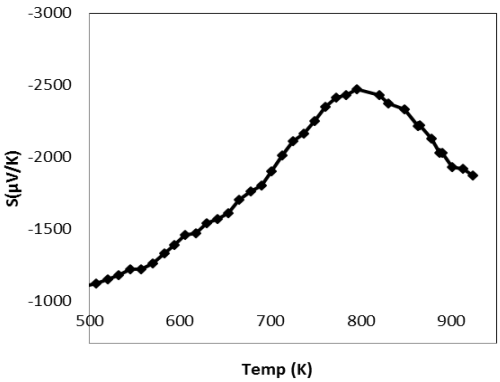


Fig. 3: *Typical TEP Pattern of $Ni_{1-x}Cu_xFe_2O_4$ (x=0.2)*

The magnitude of S decreases with temperature, indicating typical small-polaron hopping behavior in ferrites [14]. The absolute value of S decreases with increasing Cu content, which is consistent with the observed rise in conductivity and carrier concentration. The Seebeck coefficient in ferrites is inversely related to carrier concentration (n) according to

$$S = -K_B/e \ln (n_c/n)$$

where n_c is the effective density of states [15]. The negative sign indicates electron-dominated transport. The power factor ($S^2\sigma$) increases slightly for x = 0.2 due to a balance between moderate Seebeck coefficient and enhanced conductivity, implying potential for low-temperature thermoelectric applications [16].

4.Conduction Mechanism: Charge transport in Ni–Cu ferrites occurs via thermally activated small-polaron hopping between Fe^{2+} and Fe^{3+} ions located at octahedral sites. The substitution of Cu^{2+} ions modifies cation distribution, reduces Fe–O–Fe bond length, and enhances orbital overlap, thereby improving electron mobility [17]. Furthermore, Cu^{2+} ($3d^9$) introduces local lattice distortions due to the Jahn–Teller effect, lowering the potential barrier for electron hopping. The observed correlation between decreased activation energy, increased mobility, and negative Seebeck coefficient confirms that Cu substitution enhances n-type conduction in $NiFe_2O_4$ [18,19].

Conclusion:

Polycrystalline $Ni_{1-x}Cu_xFe_2O_4$ (x = 0.0, 0.2, 0.6) ferrites were successfully synthesized using the ceramic route. All samples exhibit single-phase cubic spinel structures. Electrical conductivity and carrier mobility increase, while activation energy and the magnitude of the Seebeck coefficient decrease with Cu content. The negative Seebeck coefficient confirms n-type conduction, dominated by electron hopping

between Fe^{2+} and Fe^{3+} ions. The optimized transport behavior at x = 0.2 suggests potential for applications in thermoelectric and spin-caloritronic devices.

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Transformation of Indian Agriculture: A Road map of Development

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Introduction:

Transformation of agriculture entails structural changes in the growth pattern, production mix, inputs use and institutions serving the sector. The share of agriculture in national gross domestic product and labour force employed in agriculture declines and the production systems become more knowledge and technology intensive, with greater use of modern inputs. Within agriculture sector, share of high value and processed product increases and the system serving agriculture (markets and public services) are also replaced with well-organized, professional entities with greater participation of private sector. This transformation is a continuous process and Indian agriculture has come from a stage of subsistence to transition to a commercial agriculture, which began with the Green Revolution and subsequently reinforced by advancements in other sectors like livestock, horticulture, fisheries, etc. Indian agriculture now needs to reach where the North American and European agriculture is today in terms of technology penetration, production structure and market orientation. This is in consistent with global development processes but challenges and transformation pathways may vary (World Bank, 2008). In the present context, there is a need to focus much more on agriculture due to low agricultural growth (2.5 per cent per annum in the last four years) and agrarian distress in terms of low agricultural prices and farm incomes. Farmers' suicides in some parts of India is another issue relating to agriculture. Low farm incomes led to farmers' agitations in many states of India. Agriculture sector is already facing several problems relating to sustainability, stagnant yields, water logging, soil erosion, volatility in prices, natural calamities, and small size of the farms. Agricultural development is important for raising the incomes of population dependent on agriculture and growth of non-agricultural sector. There are significant linkages between farm and non-farm sectors. The theory of 'imbalanced growth' discusses sectoral linkages and also indicates that agriculture could not become a leading sector due to its weak backward linkages.

Objective:

1. To Find out the Indian Agriculture Development
2. To Know the Indian Agriculture Transformation in Various Sector

Historical Background of Indian Agriculture:

Bhakra Dam (completed 1963) is the largest dam in India. Special programs were undertaken to improve food and cash crops supply. The Grow More Food Campaign (1940s) and the Integrated Production Programme (1950s) focused on food and cash crops supply respectively. Five-year plans of India—oriented towards agricultural development—soon

followed. Land reclamation, land development, mechanization, electrification, use of chemicals—fertilizers in particular, and development of agriculture oriented 'package approach' of taking a set of actions instead of promoting single aspect soon followed under government supervision. The many 'production revolutions' initiated from 1960s onwards included Green Revolution in India, Yellow Revolution (oilseed: 1986-1990), Operation Flood (dairy: 1970-1996), and Blue Revolution (fishing: 1973-2002) etc. Following the economic reforms of 1991, significant growth was registered in the agricultural sector, which was by now benefiting from the earlier reforms and the newer innovations of Agro-processing and Biotechnology. Due to the growth and prosperity that followed India's economic reforms a strong middle class emerged as the main consumer of fruits, dairy, fish, meat and vegetables—a marked shift from the earlier staple based consumption. Since 1991, changing consumption patterns led to a 'revolution' in 'high value' agriculture while the need for cereals is experienced a decline. The per capita consumption of cereals declined from 192 to 152 kilograms from 1977 to 1999 while the consumption of fruits increased by 553%, vegetables by 167%, dairy products by 105%, and nonvegetarian products by 85% in India's rural areas alone. Urban areas experienced a similar increase. Agricultural exports continued to grow at well over 10.1% annually through the 1990s. Contract farming—which requires the farmers to produce crops for a company under contract—and high value agricultural product increased. Contract farming led to a decrease in transaction costs while the contract farmers made more profit compared to the non-contract workforce. However, small landholding continued to create problems for India's farmers as the limited land resulted in limited produce and limited profits. Since independence, India has become one of the largest producers of wheat, edible oil, potato, spices, rubber, tea, fishing, fruits, and vegetables in the world. The Ministry of Agriculture oversees activities relating to agriculture in India. Various institutions for agriculture related research in India were organized under the Indian Council of Agricultural Research (est. 1929).

India's Food Grain Production:

India has undergone a remarkable transformation, evolving from a food-scarce nation to a food-surplus powerhouse. This journey is marked by a significant increase in food grain production, which has not only ensured domestic food security but also positioned India as a key player in the global agricultural market. The country's agricultural sector has grown substantially over the past decades, driven by advancements in farming practices, strategic government policies, and increased investments in agriculture infrastructure and technology. As a result, India is now capable of not only meeting its own food needs but also contributing to global food supplies through robust agricultural exports.

India's Food Grain Production from 2013-14 to 2023-24

Sr. No	Years	Total Food Grain Production (Lakh Tonnes)
1	2013-14	2650
2	2014-15	2520
3	2015-16	2515
4	2016-17	2751
5	2017-18	2850
6	2018-19	2852
7	2019-20	2975
8	2020-21	3107
9	2021-22	3156
10	2022-23	3297
11	2023-24	3289
	Average	**2904**

Source: PHD Research Bureau, PHDCCI compiled from RBI

Food grain production has consistently demonstrated a strong upward trend throughout the analyzed period, reflecting the sector's remarkable growth and resilience. From the fiscal year 2013-14 to 2022-23, food grain output surged from 2650 lakh tonnes to an impressive 3297 lakh tonnes, marking a significant expansion in agricultural productivity.

How AI in Agriculture is Driving India's Digital Farming Revolution:

The agricultural landscape in India, a cornerstone of the nation's economy, is undergoing a monumental transformation driven by Artificial Intelligence (AI). The global AI in agriculture market is projected to grow from USD 1.7 billion in 2023 to USD 4.7 billion by 2028, with a remarkable Compound Annual Growth Rate (CAGR) of 23.1%. This technological leap empowers Indian farmers with tools that offer real-time insights, enhance crop productivity, and automate labour-intensive processes. By addressing longstanding challenges such as unpredictable weather, labour shortages, and crop diseases, AI is enabling Indian agriculture to evolve from traditional practices to precision-driven methodologies. The Ministry of Agriculture and Farmers Welfare's initiatives and private-sector advancements highlight India's commitment to leveraging AI for agricultural innovation. India's agricultural sector, employing over half of the country's workforce, has historically depended on monsoons, manual labour, and traditional knowledge. However, with the proliferation of smartphones, internet connectivity, and government initiatives supporting digital literacy in rural areas, a new wave of tech adoption is underway. AI is at the forefront of this change, offering intelligent solutions for crop planning, pest control, irrigation management, soil monitoring, and yield forecasting. These tools empower farmers with data-driven insights, enabling them to make timely and informed decisions.

AI in Indian agriculture boosts productivity and sustainability through precision farming, pest detection, and optimized resource use, driven by government initiatives like 'Kisan e-Mitra' and 'Namo Drone Didi', using drones, sensors, and mobile apps for soil monitoring, irrigation, and crop health, while addressing challenges like water scarcity and labor shortages, though high costs and digital literacy remain hurdles for small farmers.

Use of AI in Agriculture:

Farmers would face numerous challenges, just as they would with traditional agricultural methods. AI is being widely used in this sector to address these challenges. Artificial intelligence has become a game-changing technology in agriculture. AI benefits farmers in a variety of ways, which are detailed below.

Environmental protection:

AI allows for more efficient ways to produce, harvest and sell crop products, as well as a focus on inspecting defective crops and improving agricultural practices for eco-friendly crop production. AI provides us with more accurate data about insect pest infestations, diseases and weeds, as well as various management methods. AI methods based on robotics, computer vision, and machine learning could assist farmers in spraying chemicals only where the pests are, reducing the use of chemical substances sprayed on the entire area. Environmental protection through pesticide reduction is a major functional advantage of AI technology.

Weather and price forecasting:

Weather plays an important part in agricultural decision making and planning. Artificial intelligence technology may allow farmers to obtain meteorological data, which would be helpful for timely sowing, harvesting, spraying and other agronomic practices; increasing crop yield and profits by decreasing crop danger. Weather predictions can also help with pest management; taking precautions by adopting practices on time, reduces input costs and yield loss. Farmers can use price forecasting to get a clearer idea of crop prices in the coming weeks, allowing them to maximize profit.

Detection of insect-pests and disease:

AI methods are able to monitor insect pests and diseases, and are helpful in identifying pests as well as areas that are impacted by them. We can now identify plant diseases and pests using image recognition technology based on deep learning. This technique builds models that can "keep an eye" on plant health by using image classification, detection, and segmentation methods. By using AI techniques monitoring, detection and management of insect pests and plant disease are made easier and eco-friendly. After using AI-based techniques, there is a noticeable decrease in the quantity and number of pesticide applications; able to accuratelyrecognize and count a large number of insects

Soil health monitoring:

Today, good soil health is essential to meet the increasing demand for food. However, using conventional methods, we are unable to determine the specific soil properties for each crop. Artificial intelligence (AI) and machine learning (ML) technologies have made it possible to track soil characteristics in farms, such as quality, fertility, microorganism and nutrient deficiency, as well as flora pattern, either through image capture with a camera recognition tool or by using a deep learning-based tool. Visual perception AI can analyze and interpret this data much quicker than humans in order to monitor crop health, make accurate yield predictions, and identify crop malnutrition.

Future Endeavors:

- Nano DAP: After the successful adoption of Nano Urea, the application of Nano DAP on various crops will be expanded in all agro-climatic zones.
- Atmanirbhar Oil Seeds Abhiyan: Building on the initiative announced in 2022, a strategy will be formulated to achieve ‘atmanirbharta’ for oil seeds such as mustard, groundnut, sesame, soybean, and sunflower. This will cover research for high-yielding varieties, widespread adoption of modern farming techniques, market linkages, procurement, value addition, and crop insurance.
- Dairy Development: A comprehensive programme for supporting dairy farmers will be formulated. Efforts are already on to control foot and mouth disease. India is the world’s largest milk producer but with low productivity of milch animals. The programme will be built on the success of existing schemes such as Rashtriya Gokul Mission, National Livestock Mission, and Infrastructure Development Funds for dairy processing and animal husbandry.

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Role of E-Commerce in Indian Banking Sector

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Abstract:

The internet has altered the way that goods and services are bought and sold during the past ten years. Indian consumers' purchasing experiences are being revolutionised by e-commerce. The economy grew faster once electronic data interchange was introduced and spread to producers, retailers, traders, the stock market, operations, and travel bookings, among other areas. "E-commerce" refers to conducting business online using a computer, fax machine, and phone. IBM used the word for the first time in 1972. The European Union and the USA conducted the first transactions. The advent of the internet marked the start of e-commerce in our nation in 1995.

Convenience and flexibility, together with transaction-related advantages like speed, efficiency, accessibility, etc., have made e-banking popular. The ability to quickly and easily link people from all over the world is the biggest benefit of e-commerce. Give people access to goods, services, information, and other people that they might not otherwise be able to enjoy or obtain as easily. Every nation's economy is based on its banks, which provide quick transactions that were not possible prior to the advent of e-commerce. This essay demonstrates the Indian banking industry's contribution to e-commerce.

Introduction:

Using a telecommunications network to execute commercial transactions, maintain business contacts, and share business information is known as electronic commerce. The banking sector has seen unparalleled transformation as a result of the tremendous advancements in information technology, which have made the globe smaller and more interconnected. Today's banks work in a highly competitive, liberalised, globalised, and privatised environment. Banks need to leverage IT to survive in this environment. IT has brought about a new paradigm for business. It is becoming more and more important in enhancing the services provided by the banking sector. The massive improvements in information technology have resulted in significant advancements for the Indian banking sector.

Banking has altered the banking sector as well as the services that banks provide to their clients. "Anywhere banking" started to be seen as a chance for competitive and unique services as well. In addition to traditional brick and mortar branch banking, click-and-order channels such as online banking, ATMs, telebanking, and mobile banking are currently popular. With just a few keystrokes, customers may monitor their accounts, obtain account statements, transfer money, and buy drafts. Customers visiting branch locations must, in large part, have access to ATMs and plastic cards. An embedded microprocessor chip in smart cards has revolutionised the industry. Another development affecting the banking industry is electronic data

interchange (EDI). Transaction expenses have decreased, productivity increased significantly, and new financial services and products hit the market.

Brief History of E-Commerce:

The history of e-commerce began forty years ago and is still growing now due to new developments and technology as well as the hundreds of firms that join the online market every year. The 1970s saw the rise of teleshopping and electronic data interchanges, which laid the groundwork for the current ecommerce store. The history of the internet and e-commerce are inextricably linked. Only until the public internet was made available in 1991 was online purchasing made feasible. Many thousands of firms have subsequently followed in the footsteps of one of the first American e-commerce sites, Amazon.com, which began selling goods online. Since its start, e-commerce has experienced exponential improvements in convenience, safety, and customer experience. This piece will discuss some of the major figures and developments in e-commerce.

Meaning of E-Commerce:

The purchasing and selling of goods and services, as well as the sending of money or data, over an electronic network—most commonly the internet—is known as electronic commerce, or EC. These commercial exchanges can be business-to-business, business-to-consumer, consumer-to-business, or business-to-consumer.

E-Commerce in Banking:

In 1996, ICICI became the pioneer bank to promote internet banking to its clientele. It wasn't until 1999 that online banking became widely accepted due to decreased internet costs and increasing knowledge of electronic media. A number of banks, including the now-defunct Times Bank, HDFC, Citibank, and IndusInd, did likewise.

With effect from October 17, 2000, the Indian government implemented the IT Act, 2000, giving electronic transactions and other forms of electronic business legal legitimacy. To make sure that e-banking develops responsibly and that issues relating to it don't endanger financial stability, the Reserve Bank continuously monitors and reviews the legal and other requirements surrounding e-banking.

Forms of E-Banking:

- Internet Banking
- Electonic Funds Transfer System
- Investment Through Internet Banking
- Automated Teller Machines
- Debit Cards
- Credit Cards
- Bill Payment Service
- Applying For/Claiming Insurance
- Smart Cards
- Mobile Banking

Benefits Of E-Banking: With computers' great speed and precision, e-banking helps we overcome the limitations of manual systems by storing, analysing, consolidating, searching, and presenting data according to user requirements. The emergence of E-Banking has brought about numerous advantages for different stakeholders.

To the Banks:

- E-Banking Service helps in increasing the profits
- E-Banking provides competitive advantage boundary with less network to the banks
- E-Banking carry on business less with paper money with and more plastic money
- E-banking websites can act as a revenue earner through its promotional activities.

- Customers can avail e-banking facility from anywhere, therefore saving the need not to invest more on building infrastructures.
- Websites that offer financial convergence for the customer will create a more involved banking customer who will more frequently utilize the banking websites.

To the Customers:

- Decreased expenses for obtaining and utilising banking services.
- Enhanced convenience and time-saving – transactions may be completed around-the-clock without the need for in-person interactions with banks.
- Fast and continuous information access: Companies will find it simpler to obtain information because they can quickly check on several accounts with a single click.
- Improved cash handling: Online banking options speed up the cash cycle and boost business process efficiency since Estonian banks' websites offer a wide range of cash management tools.
- Decreased costs: This refers to the price of utilising and obtaining the different financial services and goods.
- Convenience: Customers can do all financial transactions from the comfort of their home or place of business, or from any location they choose.
- Speed: Because the medium responds quickly, users can wait until the very last minute to complete a fund transfer.
- Funds management: Prior to completing any online transaction, customers can download the history of various accounts and perform "what if" research on their own computer. This will result in improved money management.

To the Merchants, Traders, etc.

- It guarantees prompt payment and settlement for the different trades that the traders make.
- It offers businessmen a range of services that are affordable and up to international standards.
- The considerable cost and risk associated with handling cash in commercial transactions is eliminated.

The Challenges of E-Commerce:

ATM Services: This is possibly the most widely utilised online banking service in India. Today, India has more than one lakh (100000) ATMs, having started in the mid-1990s. This effort was taken up by private banks, led by ICICI Bank, and they have worked very hard to make it popular. ATM services, however, come with their own set of difficulties.

Infrastructure: This service's ability to spread to rural and semi-urban areas has been severely hampered by a lack of suitable location, an electric connection, and satellite (VSAT) or broadband access.

Security Issues: While it is simpler to find guards at urban ATMs because they are typically found in popular places, this is not the case in rural areas. The machines are easy targets without the right protection since they are loaded with catch. It is further complicated by the fact that, in contrast to other countries, there is no connection to the state police apparatus.

Operating Conditions: India is a multilingual and multicultural country. Not many people are as literate as we are. Having instructions displayed in several languages becomes challenging. However, technology has developed a fix for this. Nevertheless, technology is powerless to assist illiterate individuals in this regard, and ATMs are unable to guarantee consistent performance from every user, leading to excessive wear and tear.

Debit/Credit Card Services: Credit and debit cards are among the bank services that have grown the fastest during the past 15 years. While foreign banks such as Standard Chartered, Citibank, and others were the first to provide them, particularly credit cards, the new generation of Indian private sector banks, including ICICI and HDFC, benefited the most from this growth. As a result, plastic money began to permeate the Indian economy, particularly drawing in the educated, young, middle-class, urban population. But these are also distinguished by certain difficulties.

PIN Security: It is a significant obstacle to overcome. A card only needs a four-digit PIN (Personal Identification Number) in order to withdraw money. This greatly streamlines work for an electronic system. But it's hard to recall this number due to the limitations of the human mind, especially in creative and illiterate people alike. It's also not that difficult to crack a four-digit code with only 10,000 possible combinations, especially with modern technology. However, by using finger impressions, biometrics offers a solution to this problem.

Swipe/Signature Security: While shopping, the majority of debit and credit cards are swiped, indicating a fund transfer. Although a slip is provided for customers to sign, there have been very few instances where the bank has counted signatures when settling disputes, nor has a store been able to do so because most customers don't sign on the back of their cards. Because of this, card swiping is disliked by both consumers and marketers, particularly in smaller cities. It is really hard to resolve the disagreements.

Service Charges: It is common knowledge that the majority of cards in circulation worldwide are issued by "VISA or MASTER Card." They save all relevant and required data on cardholders in parallel with banks. Nevertheless, they charge the for this service.

Internet Banking: It is perhaps the greatest innovation in banking over the past 100 years. The invention of the internet and the automation of banking continue to be two of the key causes of this. One person made sure that operations were switched from manual to automatic mode, while the other made sure that everyone involved in the activity—the bank, the consumer, or a third party acting as the seller—was informed. In India, however, this transformation is still very much in the works. With the exception of the early investments, banks can save a great deal of money using it, but customers are still hesitant to fully adopt the system.

The Connectivity: Even if it may be done from home, internet banking is still the fastest and most convenient option, yet there is a lack of access across the country. The majority of rural and some semi-urban areas are still either totally or partially disconnected. This is not a problem that banks can solve.

Internet Service: Bandwidth is still a concern, even in places with good access. Although the local Bank branches can afford alternatives like satellite connectivity and VSAT, the consumer is still without these amenities on a personal level. As a result, customers become impatient and connectivity is lost. In addition to increasing foot traffic at branches, it also exacerbates customer discontent.

Security: This continues to be the global issue with internet banking. Even though the RBI has published recommendations in this area in India, banks and their customers are nonetheless concerned about the matter. Even if some smaller banks have made concessions in the past on this matter, fraudsters have been able to continue eluding lawmakers and bank officials thanks to technical advancements in the industry, even in the face of strict adherence to rules and regulations by both parties.

Mobile/ Tele-Banking: Due to the boom in the telecom industry brought about by mobile telephony in India in the first ten years of this century, the number of telecom subscribers has increased dramatically and currently exceeds 875 million. This reality has prompted bankers to provide an increasing number of services via the phone as opposed to in-person branch banking. These consist of services including DD requests, password resets, and cheque book requests, among others. Nonetheless, there are a few unique issues with this kind of banking.

Illiteracy: In contrast to using a mobile device, banking necessitates knowledge of procedures, guidelines, and policies. Nonetheless, the majority of lower class mobile users find them difficult to use and do not grasp them.

Technology: When it comes to using mobile equipment, this can be a serious restriction. There is a significant restriction on the functionality that service providers can offer in these handsets because the majority of consumers purchase instruments within their means.

Penetration: In contrast to mobile telephony, banking has not been successful in gaining traction in India's rural areas. This is demonstrated by the fact that 83% of Indians still do not own a bank account. Therefore, the issue must be handled at the bank level.

Security: Once again, there are two reasons why this is very concerning. The first is that the mobile service provider in the area does not have a reliable network. The second is that information leaks because mobile phones are easily accessible. In addition to this, there is always a risk that apps on a smartphone will periodically access data stored in the device and steal some crucial information.

Electronic fund Transfer: This tool, which is among the most helpful of E-Banking's features, has greatly benefited businesses. Only interbank transfers were real-time at first. However, real-time interbank transfers (RTGS) are now possible because to the RBI's initiative to link all of India's scheduled banks. However, the following issues mean that this technology still requires a lot more development.

Limit on Fund Transfers: Walking into a branch each time a larger financial transfer needs to be made is inconvenient and time-consuming, even if the RBI has restricted the amount of money that may be transferred via Internet Banking for security concerns. It is necessary to devise a method to guarantee that the same occurs from an office computer rather than a bank branch.

Conclusion:

According to the survey, Indian clients are not well-informed about using e-banking services. In fact, banks may play a bigger role in facilitating e-commerce as their traditional business lines become less significant. A move like this would likely force banks to invest more in the creation and upkeep of software and computer networks, while also reducing the size or breadth of their branch networks. But in the end, banks' exact contribution to e-commerce will largely depend on how well they handle the operational and strategic risks involved in conducting business online.

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Role of Public Administration in Viksit Bharat-2047

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Abstract:

Viksit Bharat@2047 is the government of India's resolute goal to make the country an urbanized nation by 2047, when it celebrates its centennial of independence. encompassing a variety of developmental aspects, including social progress, economic prosperity, environmental sustainability, and efficient governance. This vision emphasizes how crucial India's current situation is. Unwavering commitment, a strong faith in India's future, and a deep understanding of the enormous potential talent and capabilities of its people—especially the youth—are all necessary to realize this vision. By 2047, the youth, who make up the largest demographic share, will be at the forefront of India's two-word recessive Bharat. This research paper define viksit bharat 2047 and enlighten about the role of public administration in viksit bharat 2047. It would contribute to the overall well-being of Indian citizens and favorably assist our government in realizing the goal of "Viksit Bharat 2047 (Developed Nation 2047)." (Sahoo & Vadranam, 2024)

Keywords: Vision, Development, Employment, Sustainability, Governance and Transformation

Introduction:

India's history is undergoing a sea change. India's 21st century will be its century as the nation confidently soars into the future. According to IMF forecasts, its GDP will surpass $5 trillion by 2027, making it the third largest economy in the world. Currently, it ranks fifth. India is expected to have a US$30 trillion GDP with all the characteristics of a developed country by 2047. It is going to be a Viksit Bharat.

This is India's Amrit Kaal. India has undergone numerous transformations and is prepared to take off. In previous years, policies and programs like Samagra Shiksha, the growth of universities, IITs, IIMs, Medical and Nursing Colleges, Skilling (Pradhan Mantri Kaushal Vikas Yojana), and many more have led to a significant expansion of social and economic infrastructure. The Indian higher education system now has 1,113 universities and university-level institutions, 43,796 colleges, and 11,296 stand-alone institutions with 4.33 crore students. The number of universities and colleges has grown significantly over the past ten years. Higher education's Gross Enrollment Ratio (GER) has risen steadily to 28.4. In a similar vein, the healthcare industry has grown significantly on all fronts. There were 1,56,000 Ayushman Bharat centers in 2022 that offered primary healthcare services to local communities. Nearly 10 crore children receive early childhood care and education through the extensive network of nearly 13.97 lakh Anganwadi centers. Numerous health metrics have significantly decreased, including the percentage of underweight children, the infant mortality rate (IMR), and the maternal mortality rate (MMR). The Poshan Mission, which was introduced in 2018, covers more than 10 crore women and children. Strengthened immunization programs under Mission Indradhanush have

increased full immunization coverage from 62% to 81%. We must advance healthcare to a global scale in the future. India's rural areas are also changing. In terms of electricity, drinking water, bank accounts, roads, mobile connectivity, and many other areas, we are either nearing or have already attained universal coverage. The advantages of urban India are now beginning to extend to rural India. Through MNREGA and the Pradhan Mantri Garib Kalyan Anna Yojana, we have also strengthened and prevented hardship for the poor. Everyone has access to housing thanks to the Pradhan Mantri Awas Yojana. There has also been amazing progress in other areas. The use of mobile phones and the internet is widespread. There are 80 crore internet users and 120 crore mobile phone users in India. With 1,000 crore monthly transactions, India has 30 crore Unified Payment Interface (UPI) users. UPI accounts for more than 40% of all digital transactions. The highway network has been greatly expanded, and new expressways are on the horizon. Travel is now faster and in a better environment thanks to railways' increased capacity and the introduction of new trains like Vande Bharat. Travel by air has increased and is surpassing previous records. With Chandrayaan and other space missions, we have also achieved new benchmarks in science and technology. With features like Aadhaar, UPI, AA Stack, COWIN platform, GeM, and many more, our Digital Public Infrastructure (DPI) is the envy of the world. We are headed toward becoming a global center for manufacturing. Our IT and non-IT sectors are expanding internationally, and we are particularly strong in the services sector. Young people in India are becoming job creators thanks to their inventiveness and creativity as well as government initiatives like Startup India and Digital India. With more than 100 unicorns with a combined valuation of up to $340 billion, India has become the third-largest startup ecosystem in the world. All of these indicate that we are currently in a takeoff moment, but our demographic dividend is the most significant. India is among the youngest countries, with a median age of 29 and a population of 144 crore. It makes up around 20% of all young people worldwide. This is a huge opportunity that will probably continue until 2047. We can transform India into a Viksit Bharat by effectively utilizing this dividend. (*Concept Note for Discussion with Universities on Vision for 2047*, n.d.)

Objective of the Study:

1. To define the concept of Viksit Bharat-2047.
2. To explain the objective of Viksit Bharat-2047.
3. To discuss the role of public administration in viksit bharat -2047.

Viksit Bharat-2047:

The Indian government's vision, known as Viksit Bharat 2047, aims to make India a developed nation by 2047, the year of its 100th anniversary of independence. "Viksit Bharat" means "Developed India." Viksit Bharat 2047 is the government's vision to drive the mission of making India a fully developed nation by its 100th anniversary of independence in 2047. It focuses on inclusive growth, innovation, sustainability, and good governance, ensuring prosperity for every section of society. The four pillars of the vision are Annadata (Farmers), Mahilayen (Women), Garib (Poor), and Yuva (Youth). (Dhumne, 2025)

The Indian government's ambitious and all-encompassing plan, "Viksit Bharat @2047," aims to make India a developed nation by the year of its centennial in 2047. Important topics like social progress, environmental sustainability, economic prosperity, and good governance are all included in this multifaceted vision. With a population of about 1.44 billion and a median age

of only 29, India's demographic profile offers a major advantage in this endeavor. This critical mass of people—nearly 20% of the world's youth—represents an essential resource for realizing the objectives of the vision, Viksit Bharat @ 2047. Acknowledging the potential of this demographic dividend, the initiative aims to use today's youth's energy, inventiveness, and creativity to propel the nation toward its development goals. On December 11, 2023, Prime Minister Shri Narendra Modi launched the "Viksit Bharat @2047: Voice of Youth" ideas portal in an effort to actively engage this crucial demographic. This portal is intended to serve as a strategic platform for involving young Indians in the process of development, encouraging them to contribute to the nation-building process by sharing their thoughts, solutions, and viewpoints on various facets of national advancement. By facilitating a two-way conversation between the government and young people, the portal hopes to incorporate their perspectives into the framework for national development. It functions as a collaborative area where young people can exchange ideas about social innovations, environmental tactics, and suggestions for public policy. The initiative seeks to address urgent issues and guarantee that developmental strategies are inclusive and forward-looking by utilizing the pool of collective intelligence, shared vision, and enthusiasm of the younger generation. For "Viksit Bharat @2047" to be successful, young people must actively participate as change agents and become the catalyst for change in a variety of sectors. (*Viksit Bharat @ 2047 Cell – SLCE*, n.d.)

Objective Of Viksit Bharat-2047:

The main objective of Viksit Bharat is to make India a developed country by 2047 by allowing all citizens to participate in the economy. In just 20 years, it hopes to grow India's economy to $30 trillion. (Dhumne, 2025)

Unprecedented Economic Development: India's economy would grow to become one of the world's wealthiest and most powerful nations. Poverty would be eliminated when the nation had more money because it would generate more jobs and improve living conditions.

Better Villages, Cities, and Roads: The government wants to construct smart villages, clean cities, and better roads and bridges.

Farmer Welfare: The government hopes to boost farmers' income, enhance their standard of living, and encourage sustainable agriculture through the Viksit Bharat program.

Good Health & Education: Everyone should have access to quality healthcare and education. The government wants to make hospitals, colleges, and schools better.

Use of New Technology: To make everyone's lives easier and faster, more digital tools, apps, and machines should be used.

Safe Environment and Nature: Without a doubt, everyone needs access to clean water, air, and green areas. Thus, the government's Viksit Bharat 2047 program aims to reduce pollution, preserve forests, and use solar energy.

Women's Empowerment: Give women equal rights and opportunities to increase their inclusion in all fields. They can represent any industry, including IT and politics.

Expand the Business Sphere: Another goal of the Viksit Bharat 2047 plan is to establish India as a global center for business. The government wants to help large corporations and small startups expand more quickly. (*What Is the Viksit Bharat by 2047 Scheme – Details Inside*, n.d.)

Role of Public Administration in Viksit Bharat-2047:

In order to achieve Viksit Bharat 2047, public administration must become a transparent, citizen-centric, technology-driven system that prioritizes seamless digital platforms (Digital

Public Infrastructure), proactive service delivery, improved accountability, and successful policy implementation (such as land, water, and jobs). Additionally, local governance must be strengthened and innovation must be encouraged for inclusive, sustainable growth, transitioning from analog to integrated, efficient, and ethical governance. (*Viksit Bharat 2047: Vision for a Developed Nation | Viksit India*, n.d.)

Important Public Administration Roles:

1. **Unified Platforms & Digital Transformation:** Reduce bureaucratic obstacles by establishing a smooth, unified digital infrastructure (such as DPIs for identity, payments, and data) for a "one government" experience. Utilize technology to anticipate health, water, and employment needs through predictive governance. (*Viksit Bharat 2047: The State as Platform, the Civil Servant as Builder*, n.d.)
2. **Citizen-Centric & Participatory Governance:** To ensure accountability and transparency, move from top-down to bottom-up, citizen-first methods. Put citizen rights (RTI), grievance redressal, and streamlined processes into practice. (Sudarshan, 2025)
3. **Excellence in Policy and Implementation:** Create evidence-based policies and make sure they are implemented successfully and with an eye toward results (e.g., in agriculture, police, urban planning). Boost outcome budgeting, mission-mode programs, and regulatory modernization. (Sudarshan, 2025)
4. **Strengthening Institutions & Capacity:** Increase the civil services' competency, risk-taking, and internal cooperation. Give Panchayats, or local governments, financial independence and digital resources to enable efficient local planning and service provision. (*Viksit Bharat 2047: Vision for a Developed Nation | Viksit India*, n.d.)
5. **Accountability & Ethics:** Create reliable systems with auditable logs, transparent data architecture, and citizen dashboards for data access. Reduce opportunities for rent-seeking and encourage moral behavior. (*Viksit Bharat 2047: Vision for a Developed Nation | Viksit India*, n.d.)
6. **Promoting Innovation and Growth:** Establish legislative frameworks that encourage private sector involvement, competitive markets, and innovation. Make sure growth is sustainable, inclusive, and globally competitive while striking a balance between social justice and economic advancement. (*Viksit Bharat 2047: The State as Platform, the Civil Servant as Builder*, n.d.)

Conclusion:

The Viksit Bharat initiative, which aims to make India a developed nation by its centennial year of independence in 2047, is a bold and ambitious vision for the country's future. According to the analysis, even though the goals are difficult, they might be accomplished with consistent dedication and the successful application of clear tactics. A holistic view of development is reflected in the initiative's all-encompassing strategy, which includes social advancement, environmental sustainability, economic growth, and good governance. The significance of a participatory approach is highlighted by the active involvement of numerous stakeholders, especially young people, in creating this vision. Despite their ambitious nature, the economic growth projections are considered feasible by a number of experts and institutions, provided that significant structural reforms are put into place and that important growth drivers like manufacturing, services, exports, infrastructure development, and technological innovation are consistently

prioritized. In order to guarantee that the envisioned better future is inclusive and sustainable for all citizens, it will be essential to address the current social and environmental issues, such as inequality, access to high-quality services, and climate change. It will take unwavering commitment, efficient coordination between various governmental levels, and the combined efforts of all Indians to realize the audacious vision of Viksit Bharat. India can, in fact, realize its goal of becoming a developed country by 2047 with persistent dedication andcalculated action, bringing in a period of increased prosperity and welfare of its citizens. (*Viksit Bharat 2047: Vision for a Developed Nation | Viksit India*, n.d.)

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Impact of Digitalization on Indian Economy

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Abstract:

On the basis of previous research, this review paper provides information regarding the impact of digitalization on economy. By collecting and compiling research articles related to the effect of digitalization and information and communication technology on economy in India. The digital economy is not simply about moving business transaction from face to face to online, but it's about transforming the many facets of business interactions and transactions and enabling innovations too. From the reviews, the variables are Pricing, Speed, Unemployment, GDP, FDI, Money, Governance, Infrastructure etc., have found essential in this.

Introduction:

The basic plan of digitisation is to form full use of ICT facilities for accessing worldwide resources and useful for society at identical time. As going digital is that the want of the hour, to stay surroundings healthy and safe. Varied organizations area unit concerned in digitizing their material as a result of they continue to be influenced of the enduring price of such resources for learning. Digitisation additionally raises the name of the establishments as international users will grasp the institutional assortment and utilize these resources from distant locations. The main reasons to digitalize area unit to boost access and improve preservation. By digitizing their assortment, establishments will create data accessible that was antecedent solely accessible to a pick cluster of users. Digitisation can even facilitate preserve materials creating high-quality digital pictures accessible electronically and will cut back wear and tear on brittle and fragile documents. The results of the developments within the technicalities of data and Communication Technology introduce the idea of digitisation. The transformation from print to digital media for communication of data to the larger community is resulted from the expansion of the net and currently permits the tremendous quantity of data accessible to everybody. By the method of digitisation, data to an ever-larger quantity is being made, processed, communicated and preserved digitally. The social science associated with the idea of digitisation is two-fold. The primary one, however economic is that the method of digitization and second, its impact on the economy of the country.

The main objectives of digitalization:

1. To know how the digital India concept helps to improve the quality of life.
2. To find out how the government services can work effectively with practical solution projects and innovative ideas to translate the vision of a digital India.
3. To find out how the benefits of exercise of digital India and its impact in economy.
4. To draw out some necessary suggestion to make Digital India fruitful.

Research Methodology:

The study is exploratory and quantitative in nature. The secondary information is used for the analysis of the problem. Sources for the secondary data are originated from the various sources like special investigation team report, newspaper and Reserve bank of India (RBI) websites.

Digitalization and Demonetization:

Digitalization transition through Digital India Programme aims to provide the much needed thrust to the nine pillars of growth areas, namely Broadband Highways, Universal Access to Mobile Connectivity, Public Internet Access Programme, e-Governance: Reforming Government through Technology, E-Kranti - Electronic Delivery of Services, Information for All, Electronics Manufacturing, IT for Jobs and Early Harvest Programmes. Every pillar has its own importance, complexities in implementation and is a propellant for the overall growth of the country.

1. Broadband Highways: It covers three components broadband for all rural, broadband for all urban and National information infrastructures.
2. Universal Access to Mobile Connectivity: It focuses on network penetration and filling the gaps in connectivity in the country.
3. Public Internet Access Programme: To provide Common Services Centres (CSCs) and Post Offices as multi-service centres.
4. e-Governance: Reforming Government through Technology: Government Process Reengineering using IT to simplify and make the government processes more efficient is critical for transformation to make the delivery of government services more effective across various government domains and therefore needs to be implemented by all Ministries/ Departments.
5. e-Kranti : Electronic Delivery of Services:The Government approved the National eGovernance Plan (NeGP), comprising of 31 Mission Mode Projects (MMPs) and 8 components. e-Kranti is an essential pillar of the Digital India initiative and there are 44 Mission Mode Projects under e-Kranti, which are at various stages of implementation. (includes Banking, Post office, Income tax, Land records, Agriculture, Gram Panchayats etc.) 6. Information for All: Online hosting of information & documents to facilitate open and easy access to information for citizens.
6. Electronics Manufacturing: It focuses on promoting electronics manufacturing in the country with the target of NET ZERO Imports by 2020 as a striking demonstration of intent.
7. IT for Jobs: It focuses on providing training to the youth in the skills required for availing employment opportunities in the IT/ITES sector.
8. Early Harvest Programmes: It consists of those projects which are to be implemented within short timeline.

Obstacles in the process of Digitalization:

1. The resistance to change people show during emergence of new technology.
2. Building trust among the people for change is difficult.
3. Lack of knowledge about its use and benefits.
4. Infrastructure requirements and their unavailability also hamper the reaching of these basic facilities to the people.
5. The basic hindrance is the lack of literacy and literacy is not just to be able to write ones name and do the signature but to have an understanding of the changes going in the technology, society and the country for their own betterment.

Key Impacts on the Indian Economy:

- **Economic Growth & Productivity:** Digitalization drives efficiency gains, enabling new business models and increasing productivity across sectors, from manufacturing to services.
- **Financial Inclusion:** Digital payments (like UPI) and mobile banking have expanded access to financial services for millions, reducing reliance on cash.
- **Governance & Transparency:** E-governance initiatives, digital lockers, and online service delivery (E-mandi, E-hospitals) cut corruption and improve citizen access.
- **Sectorial Transformation:**
  1. **Services:** Significant growth driven by IT/BPM, fintech, and digital platforms.
  2. **MSMEs:** Improved performance through automation, better access to finance, and wider markets.
  3. **Agriculture:** Digitization aids in better resource management and market access.
- **Employment & Skill Shift:** Creates new jobs in tech and start-ups but also necessitates new skills as machines replace some manual tasks, leading to demand for digital literacy.
- **"Make in India" & manufacturing:** Supports electronics manufacturing and aims to reduce import dependency through initiatives like Digital India.

Government Initiatives Driving Change:

- **Digital India Program:** Focuses on building digital infrastructure, e-governance, and digitally empowering citizens.
- **JAM Trinity (Jan Dhan-Aadhaar-Mobile):** Enables cashless, cardless transactions, reducing costs and improving reach.

Challenges & Considerations:

- **Digital Divide:** Ensuring access and skills for all citizens remains crucial.
- **Financial Literacy:** Essential for citizens to fully leverage digital financial tools.

Conclusion:

The digitalisation brings innovation, easy operating, new job opportunities and growth within the economy. It helps to bring transparency within the system and a lot of clear area unit the flow of funds within the economy less is that the downside of non-payment, parallel economy etc. however with of these advantages obtainable it additionally makes it necessary for the folks to own basic monetary information and a push towards the importance of the monetary attainment. Digitalization also play a very important role in action this goal because it can have a larger reach to the folks. By this we are able to reach on a conclusion that the new technology has to controlled well and for this it's not solely the provision however additionally the information to use it and acquire advantages from it.

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Caste Discrimination and the Role of Dalit Literature in India 2047

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Abstract:

This paper explores the persistence of caste discrimination in India, examines the evolution and socio-political impact of Dalit literature, and projects how Dalit literary practices could shape a more just and inclusive India by the year 2047. It argues that Dalit literature as a form of resistance, testimony, and epistemic articulation not only critiques caste hierarchies but also reimagines identities, citizenship, and national belonging. Positioned at the intersection of literary criticism, critical caste studies, and socio-cultural activism, the paper proposes a model of Dalit literary futurity that aligns cultural transformation with structural justice.

Keywords: Caste Discrimination, Dalit Literature, India 2047, Critical Caste Theory, Literary Activism, Social Justice, Subaltern Epistemology.

Introduction:

Caste discrimination remains one of the most persistent and structurally embedded forms of social inequality in India. Despite constitutional guarantees of equality, social justice, and dignity, the lived realities of Dalit communities continue to be shaped by exclusion, violence, cultural marginalization, and economic deprivation. As India approaches the symbolic milestone of 2047 the centenary of Independence, questions surrounding freedom, democracy, and social justice acquire renewed urgency. The vision of India in 2047, often articulated in developmental and technological terms, must therefore be critically examined through the lens of caste, particularly the historical and contemporary experiences of Dalits. Within this context, Dalit literature emerges as a powerful counter-narrative, offering not only a critique of caste oppression but also a transformative ethical and political vision for an inclusive future.

Caste discrimination in India is not merely a social prejudice but a deeply institutionalized system that has historically regulated access to knowledge, land, labor, and cultural representation. Rooted in Brahmanical ideology and sustained through religious, social, and economic practices, caste has functioned as a mechanism of graded inequality, as incisively theorized by Dr. B. R. Ambedkar. While legal frameworks such as the Constitution of India, the Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act, and affirmative action policies have challenged caste hierarchies, discrimination persists in both overt and subtle forms manifesting in education, employment, housing, digital spaces, and everyday social interactions. The persistence of caste into the twenty-first century exposes the limits of legal reform without cultural and epistemic transformation.

It is precisely at this juncture that Dalit literature assumes critical significance. Emerging as a distinct literary and political movement in the mid-twentieth century, Dalit literature represents the voices, experiences, and consciousness of

communities historically silenced by dominant literary canons. Unlike mainstream Indian literature, which often aestheticized suffering or ignored caste realities, Dalit literature foregrounds lived experience, collective memory, resistance, and assertion of dignity. Written in regional languages such as Marathi, Hindi, Tamil, Telugu, and later translated into English, Dalit literature disrupts hegemonic narratives and redefines the purpose of literature itself from artistic pleasure to social intervention.

The relevance of Dalit literature in the imagined India of 2047 lies not only in its documentation of oppression but in its re-humanization of marginalized subjects. Dalit writers reject victimhood narratives and instead articulate agency, self-respect, and radical humanism. Influenced by Ambedkarite thought, Buddhism, Marxism, and global human rights discourse, Dalit literature envisions a society grounded in liberty, equality, and fraternity. In this sense, it functions as both a literary genre and a socio-political movement, challenging caste ideology at the level of language, symbolism, and narrative structure.

As India moves toward 2047, it is crucial to interrogate whether economic growth, digital expansion, and global recognition have translated into social equality for Dalits. While new opportunities have emerged, caste has also adapted to modern forms through algorithmic bias, exclusion in elite institutions, cultural tokenism, and the depoliticization of identity. Dalit literature in the contemporary period responds to these shifts by addressing themes such as urban marginality, neoliberal exploitation, gendered caste violence, and the crisis of representation. Dalit women writers, in particular, have expanded the discourse by foregrounding the intersection of caste, gender, and sexuality, challenging both patriarchal and upper-caste dominance within and outside Dalit movements.

The idea of India 2047 thus serves as both a temporal marker and a critical framework. It invites reflection on whether the nation has moved beyond symbolic inclusion toward substantive justice. Dalit literature provides a moral and intellectual archive through which the failures and possibilities of Indian democracy can be assessed. It asks uncomfortable questions: Who speaks for the nation? Whose histories are celebrated? Whose futures are imagined? By centering Dalit voices, literature becomes a site of resistance against cultural amnesia and a medium for envisioning an egalitarian social order.

This research paper seeks to explore the evolving role of Dalit literature in confronting caste discrimination and shaping social consciousness in the context of India 2047. It examines how Dalit literary narratives critique historical injustices, engage with contemporary socio-political realities, and contribute to the reimagining of national identity. By situating Dalit literature within broader debates on human rights, democracy, and cultural representation, the study argues that any meaningful vision of India's future must engage seriously with Dalit epistemologies and lived experiences. Without the annihilation of caste socially, culturally, and psychologically the promise of independence remains incomplete, and the dream of India 2047 risks becoming a hollow celebration rather than a transformative milestone.

Research Questions:

This research paper is guided by the following research questions

- How is caste discrimination represented in Dalit literature in India?

This question explores how Dalit writers describe lived experiences of oppression, exclusion, violence, and resistance in their literary works.

- What role does Dalit literature play in challenging caste-based inequality and social injustice?

It examines literature as a form of protest, awareness, and social criticism rather than only as artistic expression.

- How does Dalit literature contribute to ideas of human dignity, equality, and democracy in contemporary India?

This question focuses on the ethical and humanist values present in Dalit narratives.

- In what ways has Dalit literature evolved in response to modern forms of caste discrimination?

It studies changes in themes such as urbanization, education, employment, digital exclusion, and neoliberal pressures.

- How do Dalit women writers address the intersection of caste and gender discrimination?

This question highlights the unique perspectives of Dalit women and their contribution to expanding Dalit literary discourse.

- What is the relevance of Dalit literature in imagining an inclusive and just India by 2047?

It critically evaluates how Dalit literature helps rethink the meaning of freedom, development, and nationhood.

Research Methodology and Literary Methods:

This study adopts a qualitative and interdisciplinary research methodology. It combines literary analysis with social, cultural, and historical perspectives to understand caste discrimination and the role of Dalit literature in India. The research is mainly text-based, supported by critical theories and secondary sources. The research follows a descriptive analytical approach. First, it describes the social realities of caste discrimination as presented in Dalit literature. Then, it analyzes how these literary texts challenge inequality, question dominant ideologies, and imagine a just and inclusive India, especially in the context of India 2047.

The study is interpretative in nature, focusing on meanings, themes, and representations rather than numerical data. Literature is treated as a social document that reflects lived experiences, collective memory, and resistance against caste oppression.

The primary sources consist of selected Dalit literary texts, including, Autobiographies, Poems, Short stories, Novels. Works by Dalit writers from Marathi, Hindi, and English are selected to ensure diversity and broader representation. Special attention is given to writings influenced by Ambedkarite thought and Dalit women's narratives.

Scholarly books and journal articles on Dalit studies. In the secondary sources literary criticism on Dalit literature, Writings of Dr. B. R. Ambedkar, Reports on caste discrimination and social inequality, Constitutional and human rights documents

Main Discussion:

Caste discrimination in India is not an accidental social problem but a deeply rooted system that structures power, labor, knowledge, and cultural value. As B. R. Ambedkar famously argued, caste is "a division of labourers" rather than merely a division of labor, ensuring that inequality is reproduced across generations (Ambedkar, Annihilation 15). Dalit literature exposes this structural nature of caste by narrating how discrimination operates in everyday spaces such as schools, villages, temples, and workplaces.

Autobiographical narratives such as Omprakash Valmiki's Joothan and Sharankumar Limbale's Akkarmashi reveal how caste humiliation begins in childhood and becomes

internalized through repeated social exclusion. Valmiki's description of being made to sit separately in school demonstrates how caste is learned and enforced socially, even in modern institutions (Valmiki 3). These texts challenge the myth that caste is disappearing in contemporary India and instead show how it adapts to new social environments.

Dalit literature functions as a counter-narrative to mainstream Indian literature, which has historically been dominated by upper-caste perspectives. While traditional literature often universalized suffering or avoided caste altogether, Dalit writers insist on naming caste as the central cause of oppression. Sharankumar Limbale defines Dalit literature as literature born out of experience rather than imagination, asserting its epistemological difference from elite literary traditions (Limbale 19).

This insistence on lived experience challenges dominant literary aesthetics and forces a rethinking of what counts as "literature." Dalit writing rejects romanticism and instead adopts realism, anger, and protest as legitimate literary modes. In this way, Dalit literature does not merely represent social reality but actively intervenes in cultural power structures.

Anger is a defining feature of Dalit literature and should be understood as a political response to historical injustice rather than a lack of refinement. Namdeo Dhasal's poetry, particularly in Golpitha, uses violent imagery and raw language to expose the brutality of caste society. His line "Man, you should explode" is not a call to chaos but a demand for radical transformation (Dhasal 45). Similarly, Daya Pawar's Baluta presents resistance as both personal and collective. Pawar acknowledges the curse of caste but emphasizes the conscious decision to fight it through education and writing (Pawar 67). These works demonstrate that Dalit literature is inseparable from social struggle and cannot be reduced to mere artistic expression.

A central concern of Dalit literature is the reconstruction of identity. Dalit writers reject imposed identities of impurity and inferiority and instead assert self-respect and dignity. Education emerges as a recurring theme and is closely aligned with Ambedkar's philosophy. His call to "educate, agitate, organize" continues to inspire Dalit writers and activists (Ambedkar, Writings 42).

Omprakash Valmiki repeatedly emphasizes that education is not just a means of economic mobility but a tol for psychological liberation (Valmiki, Dalit Literature 112). Literature itself becomes an educational force, reshaping Dalit consciousness and challenging internalized oppression.

Dalit women writers introduce a crucial dimension to the discourse by highlighting intersectionality, the overlapping nature of caste and gender oppression. Bama's Karukku reveals how Dalit women face violence not only from upper castes but also from patriarchal structures within their own communities (Bama 26). Her narrative voice is collective, emphasizing community suffering as well as resistance.Urmila Pawar's The Weave of My Life critiques both Dalit movements and feminist movements for marginalizing Dalit women's voices (Pawar 98). Meena Kandasamy further radicalizes this discourse by openly rejecting submissive roles imposed on Dalit women, declaring, "I will not be your obedient Dalit woman" (Kandasamy 14). These writings expand Dalit literature beyond caste alone and demand a more inclusive vision of social justice.

Dalit literature strongly critiques religious and cultural ideologies that legitimize caste hierarchy. Ambedkar's rejection of Hindu social order and his embrace of Buddhism provide a moral and philosophical foundation for many

Dalit writers. His assertion that caste is inherently anti-human remains central to Dalit thought (Ambedkar, Annihilation 15). Kancha Ilaiah extends this critique by arguing that Brahmanical ideology has monopolized culture and knowledge, denying dignity to productive castes (Ilaiah 56). Dalit literature exposes how religion, mythology, and ritual have been used as tools of domination and seeks alternative ethical frameworks based on equality and rationality.

While modernization and urbanization were expected to weaken caste, Dalit literature shows that caste persists in subtle and institutional forms. Discrimination in higher education, corporate spaces, housing, and digital platforms reveals how caste adapts to neoliberal structures. Meena Kandasamy's observation that caste has "changed its grammar" captures this transformation effectively (Kandasamy, Essays 203).

Contemporary Dalit narratives address issues such as job insecurity, token representation, and cultural appropriation, demonstrating that economic growth alone cannot ensure social equality. These themes are crucial when imagining India's future.

As India approaches 2047, Dalit literature offers a critical lens to evaluate national progress. Ambedkar's warning that political democracy cannot survive without social democracy remains deeply relevant (Ambedkar, Constituent Assembly Debates 38). Dalit literature reminds us that development without justice is incomplete.

Rather than celebrating symbolic inclusion, Dalit writers demand structural transformation. Literature becomes a space to imagine an India where dignity replaces hierarchy and equality replaces exclusion. In this sense, Dalit literature is not only retrospective but also future-oriented.

Conclusion:

This research paper has examined caste discrimination in India through the critical lens of Dalit literature and has demonstrated that caste remains a deeply rooted and evolving system of inequality. Despite constitutional safeguards and social reforms, caste discrimination continues to shape everyday life, access to education and employment, cultural representation, and social dignity. As India approaches the centenary of its Independence in 2047, the persistence of caste inequality raises important questions about the nature of freedom, democracy, and social justice in the nation.

Dalit literature emerges in this study as a powerful medium of resistance and social critique. Through autobiographies, poetry, fiction, and critical essays, Dalit writers expose the lived realities of oppression and challenge dominant narratives that have historically silenced marginalized voices. Drawing on lived experience (Anubhav), Dalit literature rejects traditional literary aesthetics that ignore caste and instead asserts truth, anger, and protest as valid forms of expression. Writers such as Omprakash Valmiki and Sharankumar Limbale show that literature can function as both a cultural document and a political intervention.

The research also highlights how Dalit literature reconstructs identity through self-respect, education, and human dignity. Influenced by Dr. B. R. Ambedkar's vision of social democracy, Dalit writers consistently emphasize education as a means of intellectual and psychological liberation. Literature becomes a space where Dalit identity is reclaimed, redefined, and asserted against centuries of dehumanization.

A significant contribution of this study is its focus on Dalit women's writing, which reveals the intersection of caste and gender oppression. Writers such as Bama, Urmila Pawar, and Meena Kandasamy expand the scope of Dalit literature

by foregrounding voices that have been marginalized even within resistance movements. Their narratives demand a more inclusive understanding of justice that addresses both caste and patriarchy.

The paper further argues that caste discrimination has not disappeared in modern India but has adapted to urban, institutional, and digital spaces. Contemporary Dalit literature exposes these new forms of exclusion, reminding us that economic development alone cannot dismantle social hierarchies. In this context, Dalit literature becomes essential to evaluating the promises of progress and inclusion associated with India 2047.

In conclusion, this research affirms that Dalit literature is central to any meaningful engagement with caste discrimination and the future of Indian democracy. As India moves toward 2047, Dalit literature continues to challenge injustice, preserve marginalized histories, and imagine a society based on equality, dignity, and social democracy. Without addressing caste at social, cultural, and psychological levels, the dream of a just and inclusive India will remain incomplete.

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Digital Economy- Opportunities and Challenges in India

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Abstract:

The digital economy, which is based on new development concepts and driven by emerging technologies, relies on the application of information networks and platforms, renews factors and resources, and aims at high-quality and sustainable development as an important cornerstone for building a modern economic system. Digitalization affects most of the production processes and activities in the economy. In a period of rapid development of the digital economy, its significance is manifested in deep integration with economic and social industries, promoting digital transformation and constantly introducing new technologies, new models and new industry processes. This leads to the transformation and modernization of society, industry and enterprises, contributing to sustainable economic development based on innovation models. This paper discusses the importance of the digital economy in the modern economic system, which is expressed in an increase in production efficiency, the creation of new jobs, and a synergistic effect in various industries.

Introduction:

Digital: Digital is a new way of engaging with customers. And for others still, it represents an entirely new way of doing business. Digital Economy: "Digital economy" is intertwined with the traditional economy making a clear delineation harder. Economy refers to an economy that is base computing technologies. The digital economy is also sometimes called the Internet Economy, the New Economy, or Web Economy. Abraham Lincoln rightly said, "Government of the people, by the people, for the people, shall not perish from the ear whatever the government benefits from digital economy, directly have a positive impact on every citizen's life. Demonetization impact on Indian Economy on November 8, 2016, the Indian government declared that the 500 and 1000 rupee notes will be stripped of their status as legal tender effective from midnight. These notes accounted for 86 percent of the country's cash supply by value. Citizens were given time till December 31, 2016 to deposit their old currency notes and exchange them for the new currency notes of rupee 500 and 2000. The government's aim was to root out counterfeit currency, fight tax evasion, curb inflation, eliminate black money and terror-funding, and to promote a cashless economy. When a currency note of a particular denomination ceases to be a legal tender, it is termed as demonetization. Legal tender refers to money which can be legally used to make payments of debts or other obligations. A creditor is obliged by law to receive such money in payment of due debt to him. The term demonetization is not new to the Indian economy. The highest denomination note ever printed by the Reserve Bank of India was the 10,000 rupee note in 1938 and again in 1954. It was demonetized first in 1946 and then in 1978. Since

not many people had access to such notes at the time, this did not have a big impact on the country. The latest round of demonetization has undoubtedly affected the common public and bankers. It has had many short term effects which are visible. The long term effects are yet to be experienced and felt.

Objectives of the Study:

1. Study of Digital Economy in India
2. Focus the opportunities and challenges of digital economy in India
3. Understand the impact of digital economy in Indian Economy

Hypothesis of the Study:

1. Digital economy in India was played a vital role in the development of Indian economy
2. Digital economy is essential for growth in India

Research Methodology:

The study is purely based on descriptive in nature therefore there is no statistical tools had been applied. The data is collected by means of secondary method like Secondary data collected through various magazine, books, news-papers, articles, survey reports and specific journals published on this particular issue. Information was obtained with the help of websites, internet sources, and reference books

Review of Literature:

1. **Maiti, M. and Kayal, P.** (2017) [2] He conducted research to examine the fundamental elements of the Digital India initiative and evaluate its potential impact across several sectors. The study employs a qualitative technique, including an extensive investigation of governmental policies, case studies, and expert interviews. The paper identifies significant opportunities in sectors such as digital infrastructure, e-governance, and talent development. However, it also raises issues with the digital gap, cyber security, and the implementation of legislation.
2. **Ramija, B**. (2018), conducted a study to evaluate the effectiveness of the e-NAM platform in improving market access and income for Indian farmers. The study used a case study technique, including questionnaires, field visits, and analysis of transaction data from thee-NAM platform. The report indicates that farmers using the e-NAM platform are generating more revenue and enhancing their market participation. It also highlights areas requiring more attention, such as infrastructure and awareness.
3. **Mishra, P.,** (2020), study to assess the effectiveness of online education in mitigating disruptions caused by the pandemic. The study used a mixed-methods approach, combining surveys of students and instructors with an analysis of usage data from online learning platforms. The research illustrates the challenges faced by both students and educators in transitioning to online learning. It also discusses factors that may influence the efficacy of online education, such as accessibility to technology and instructional methods used by educators.
4. **Sharma and Singh** (2020), conducted a study to assess the impact of digital financial services on enhancing financial inclusion and accessibility in India. The study used a mixed methods approach, including surveys, interviews, and secondary data analysis. The research indicates that the use of digital financial services correlates with increased access to financial services for a greater number of individuals. It illustrates how initiatives like as Jan Dhan Yojana, in

conjunction with UPI, provide broader access to financial services.

Need and Significance of the Study:

The digital economy offers vast opportunities like enhanced efficiency, financial inclusion, innovation, and global market access through e-commerce and digital payments, while presenting significant challenges such as the digital divide, cyber security threats, job displacement from automation (AI), data privacy concerns, and the need for robust, adaptive regulations to ensure equitable and secure growth for all. Key areas for development include infrastructure, digital literacy, and balanced policies addressing market monopolies and worker impacts to realize its full potential.

Opportunities:

- **Economic Growth & Innovation:** Drives new business models, fosters start-ups, and integrates automation, data, and new technologies into traditional industries, boosting productivity and creating new markets.
- **Financial Inclusion:** Digital payments and banking platforms expand access to financial services, particularly in developing nations, empowering citizens and improving macroeconomic stability, as seen in India's financial inclusion efforts.
- **Global Connectivity:** Breaks down trade barriers, facilitating cross-border commerce and investment flows, making goods and services more accessible and cheaper.
- **Efficiency & Transparency:** Reduces paperwork, lowers operating costs, and increases transparency through online platforms, benefiting both businesses and consumers.
- **Empowerment:** Empowers individuals through access to information, education, and digital services, fostering a more informed and participatory society.

Challenges:

- **Digital Divide:** Unequal access to internet and digital literacy creates socio-economic disparities, with rural areas often lagging behind urban centers.
- **Cybersecurity & Privacy:** Growing dependence on digital systems increases vulnerability to cybercrime, data breaches, and requires strong data protection laws, such as India's DPDP Act.
- **Job Displacement:** Automation and AI threaten jobs, necessitating new skills development and worker retraining programs.
- **Regulatory Gaps:** Rapid technological change often outpaces policy, creating uncertainty and challenges in areas like AI, data governance, and content moderation.
- **Market Concentration:** Dominance by large tech platforms can stifle competition and create monopolies.
- **Environmental Impact:** Increased energy consumption from data centers and e-waste present sustainability concerns.

Measurement and classification challenges:

1. Data and Privacy
2. Internet access and Governance
3. Work and Wage effects
4. Skill, Capability, Infrastructure gaps
5. Policy-making for a Digital era
6. Cyber security

Conclusion:

To thrive in the digital age, governments and societies must invest in digital infrastructure, education, and skill development while creating agile regulatory frameworks that protect consumers, promote innovation, and ensure an inclusive digital future for everyone, addressing

challenges proactively to unlock the full transformative potential of the digital economy.

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Sustainable Development and Rural Society in India: Progress, Gaps, and Pathways for Inclusive Transformation

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Abstract:

India's rural society, home to a majority of the population, remains central to achieving sustainable development. This paper examines how far India's rural development trajectory aligns with the Sustainable Development Goals (SDGs), focusing on livelihoods, poverty, agriculture, basic services, and environmental sustainability. Using secondary data from authoritative sources such as NITI Aayog's SDG India Index, UNDP Human Development Reports, World Bank indicators, MoSPI/PLFS releases, and key government dashboards and documents, the study synthesizes major trends and identifies persistent structural constraints. Findings indicate measurable progress in SDG performance and poverty reduction, alongside improvements in rural employment indicators and service delivery. However, uneven implementation, climate and water stress, livelihood vulnerability, digital divides, and persistent inequalities (social, gender, and regional) continue to limit sustainability outcomes. The paper concludes with evidence-informed recommendations to strengthen rural institutions, accelerate climate-resilient livelihoods, improve human capital, and localize SDGs through accountable governance.

Keywords: Sustainable Development; Rural Society; SDGs; Rural Livelihoods; Agriculture; Multidimensional Poverty; Water And Sanitation; Employment; Climate Resilience; India

Introduction:

Sustainable development in India is inseparable from the transformation of rural society, where agriculture, informal employment, and natural-resource dependence remain significant. Rural development intersects directly with SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 6 (Clean Water and Sanitation), SDG 8 (Decent Work), SDG 13 (Climate Action), and SDG 15 (Life on Land). India's policy emphasis on SDG localization has been strengthened through tools like the SDG India Index, which measures State and Union Territory (UT) performance across SDGs using aligned indicators.

The United Nations' 2030 Agenda for Sustainable Development provides a global framework through 17 Sustainable Development Goals (SDGs). These goals aim to balance economic growth, social justice, and environmental protection, ensuring that development benefits all sections of society without harming future generations. The 17 goals include: (1) No Poverty, (2) Zero Hunger, (3) Good Health and Well-being, (4) Quality Education, (5) Gender Equality, (6) Clean Water and Sanitation, (7) Affordable and Clean Energy, (8) Decent Work and Economic Growth, (9) Industry, Innovation and Infrastructure, (10) Reduced Inequalities, (11) Sustainable Cities and Communities, (12) Responsible Consumption and Production, (13) Climate Action, (14) Life Below Water, (15) Life on Land, (16) Peace, Justice and Strong Institutions, and (17) Partnerships for the

Goals. Together, these goals emphasize that development must be inclusive, rights-based, and environmentally sustainable.

In the Indian context, achieving the SDGs is strongly linked to rural realities because rural society shapes national outcomes in poverty reduction, food security, employment generation, public health, water access, and ecological sustainability. Although India has made visible progress in service delivery, infrastructure, and poverty reduction, rural areas still face multidimensional challenges such as agrarian distress in certain regions, vulnerability to climate variability, uneven access to quality health and education, gaps in sanitation and safe drinking water, and livelihood insecurity due to informal employment. Regional inequalities, gender disparities, and social exclusion further influence how the benefits of development reach different rural communities.

Therefore, this paper uses secondary data to assess: (a) India's progress toward sustainable rural development, (b) existing inequalities and sustainability gaps, and (c) policy pathways for building a resilient, inclusive, and environmentally secure rural India.

Objectives:

1. To describe the relationship between sustainable development and rural society in India using credible secondary data.
2. To review major national trends in rural poverty, employment, services (water), and SDG progress.
3. To identify key constraints limiting sustainable rural transformation.
4. To propose policy recommendations aligned with SDG localization and rural resilience.

Hypothesis:

H1: Inclusive rural development through improved livelihoods, basic services, and climate-resilient practices significantly contributes to achieving the Sustainable Development Goals (SDGs) in India.

Statement of the Problem:

Sustainable development in India cannot be achieved without ensuring inclusive and resilient development in rural society, where a large population depends on agriculture, informal employment, and natural resources for survival. Although India has introduced several rural development programmes and has shown progress in SDG-related indicators, rural areas still face persistent challenges such as poverty and livelihood insecurity, unequal access to quality health and education, inadequate basic services like safe drinking water and sanitation in some regions, and increasing vulnerability to climate change and environmental degradation.

Progress also remains uneven across states and social groups, and many rural households continue to experience multidimensional deprivation. There is a need for a comprehensive understanding of how rural poverty, employment, and sustainability outcomes are interconnected. Therefore, this study focuses on analyzing secondary data to assess India's rural sustainable development progress, identify key structural constraints, and suggest policy directions for achieving inclusive and sustainable rural development.

Research Gap:

Although several studies and government reports discuss sustainable development and rural development in India, important gaps still remain. Most available research either focuses only on economic growth and agriculture, or studies SDGs in a general national framework without deeply linking them to rural society realities. There is limited integrated analysis that connects SDG progress, rural livelihoods, basic services

(water, sanitation, health, and education), and climate vulnerability together using updated secondary data.

Further, many studies highlight rural poverty reduction, but fewer examine the quality of employment, informal work, and livelihood insecurity in a sustainability framework. Another major gap is the lack of comparative understanding of regional inequalities and how differences across states affect rural sustainable development outcomes. Finally, there is limited research that converts secondary evidence into clear policy pathways for inclusive and climate-resilient rural transformation. Therefore, this study attempts to fill these gaps by providing a comprehensive secondary-data-based analysis of sustainable development and rural society in India.

Methodology:

This research paper follows a secondary data–based descriptive and analytical methodology. It does not use field surveys or interviews. The study is based on published and officially available data, reports, and research literature related to sustainable development and rural society in India. Secondary sources include NITI Aayog reports, PLFS data, UNDP Human Development Reports, World Bank indicators, and government dashboards.

Scope of the Study:

The study mainly focuses on rural India and SDG-related themes such as poverty reduction, employment and livelihoods, agricultural sustainability, water and sanitation, human development, and climate resilience.

Sustainable Development and Rural Society: A Conceptual Framework:

Sustainable Development:

Sustainable development is a comprehensive approach to development that seeks to balance economic growth, social justice, and environmental protection in a way that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. In the context of rural India, sustainable development becomes especially important because rural life is deeply connected to agriculture-based livelihoods, natural resources, and public welfare services. Rural society depends not only on income and employment but also on land, water, forests, climate conditions, and the effectiveness of local governance systems. Therefore, sustainable development in rural India must be understood as an integrated process that improves living standards while protecting ecological systems and ensuring equal opportunities for all.

From an economic perspective, sustainable development in rural India focuses on creating stable and secure livelihoods rather than temporary or uncertain income sources. A large proportion of rural households depend on agriculture and allied activities such as dairy, poultry, fisheries, and wage labour. However, traditional agriculture often faces challenges such as small landholdings, low productivity, irregular rainfall, and market risks. Sustainable development therefore requires improving productivity through better irrigation, technology, soil management, and farm practices, while also reducing dependency on a single source of income. Livelihood diversification becomes crucial because rural families often face seasonal unemployment and income fluctuations. When rural development policies encourage non-farm employment opportunities such as rural enterprises, food processing, crafts, services, and

skill-based jobs, they strengthen the rural economy and reduce vulnerability. In this sense, sustainable rural development is not only about increasing production but also about ensuring decent work, fair wages, employment security, and long-term economic resilience. A rural economy can be called sustainable only when it supports inclusive growth, reduces poverty, and provides dignified employment options for youth and women.

From a social perspective, sustainable development in rural India is closely linked to improving human well-being, social equality, and empowerment. Rural communities often face unequal access to quality education, healthcare, nutrition, and basic infrastructure. These inequalities are influenced by caste, gender, class, and regional differences. Sustainable development requires that rural citizens receive equal opportunities to improve their capabilities through education and skill development, which directly affects employment and social mobility. Access to healthcare and nutrition is equally essential because health shocks push many rural households into debt and poverty. Moreover, basic services such as safe drinking water, sanitation, electricity, housing, and digital connectivity have become fundamental indicators of rural quality of life. Social inclusion is central to sustainability because development cannot be considered successful if large sections of society remain excluded from its benefits. Empowerment, particularly of women, is a key dimension of social sustainability. When women gain access to education, livelihoods, financial services, and decision-making roles, the entire rural household and community experience stronger development outcomes. Therefore, social sustainability in rural India is achieved when development reduces inequality, strengthens human capital, promotes dignity, and ensures that rural institutions function in a participatory and rights-based manner.

From an environmental perspective, sustainable development in rural India is deeply tied to natural resource management because rural livelihoods are directly dependent on land, water, forests, and climate stability. Environmental degradation, such as declining soil fertility, groundwater depletion, deforestation, and loss of biodiversity, threatens rural survival and economic security. Water security is one of the most critical environmental issues, as agriculture, drinking water supply, and rural health all depend on reliable water sources. In many regions, climate change has intensified droughts, floods, heatwaves, and unpredictable rainfall patterns, making farming more risky and increasing rural distress. Sustainable development therefore demands climate-resilient strategies such as water conservation, watershed development, sustainable irrigation, drought-resistant crops, and community-based adaptation planning. Soil health is equally important because long-term agricultural productivity cannot be maintained if soil becomes degraded due to excessive chemical use or poor land management. Biodiversity, including forests and local ecosystems, supports rural livelihoods through fuel, fodder, medicinal plants, and ecological balance. Protecting biodiversity and promoting sustainable farming practices are necessary for maintaining the natural foundation of rural life. Environmental sustainability also means ensuring that rural development projects, such as roads, industries, or housing do not harm local ecosystems and that rural communities participate in conserving resources for future generations.

In summary, sustainable development in rural India is a three-dimensional process where economic stability, social inclusion, and environmental protection are interconnected. Economic growth without social equality creates

exclusion and conflict, while development without environmental sustainability leads to resource depletion and future crises. Therefore, the conceptual framework of this study views rural sustainable development as an integrated model that promotes secure livelihoods, strengthens human development, reduces inequality, and builds climate and ecological resilience. This integrated understanding is essential to evaluate India's progress toward SDGs and to identify long-term policy pathways for inclusive and sustainable rural transformation.

Rural society:

Rural society in India represents a complex social and economic system where people's daily life and survival are closely linked to land, labour, and local resources. It includes households involved in agriculture as cultivators or small farmers, along with allied activities such as dairy, poultry, fisheries, and forestry. A large section of rural people also depends on wage labour, including farm labour and seasonal migration for construction or other informal jobs. Alongside this, rural enterprises such as small shops, artisanship, food processing, and service-based work contribute to local livelihoods, but these activities are often small-scale and vulnerable to market changes.

A key feature of rural society is the dominance of informal work, where employment is usually low-paid, insecure, and without social protection. This makes rural households highly sensitive to shocks such as crop failure, health emergencies, price fluctuations, and climate-related disasters. Rural life also depends heavily on local ecosystems—water sources, soil fertility, forests, grazing land, and biodiversity—which directly influence agricultural output, livestock health, and household needs like fuel and fodder. Therefore, environmental degradation and climate change create serious risks for rural stability and well-being.

At the same time, rural society relies strongly on public services such as drinking water supply, sanitation, health centres, schools, roads, electricity, and welfare schemes. The quality and accessibility of these services shape rural development outcomes and determine whether rural communities can achieve better living standards. Thus, rural society is not only defined by occupation patterns but also by its dependence on natural resources and government support systems, making it central to India's sustainable development goals.

Rural Context: Key Baseline Indicators:

India continues to be predominantly rural in demographic terms, meaning a large portion of its total population still lives in villages and small towns. Although the proportion of rural population has been gradually declining due to urbanisation, a substantial share of Indians remain dependent on agriculture, allied activities, and other rural occupations. This demographic pattern is important because outcomes in rural areas strongly influence the country's overall performance on critical development measures such as poverty reduction, food security, employment generation, health and nutrition, and environmental sustainability. For instance, improvements in rural incomes, access to basic services like clean water and sanitation, and agricultural productivity directly contribute to national progress toward the Sustainable Development Goals (SDGs). Conversely, persistent rural challenges—such as underemployment, limited access to quality education and healthcare, unequal infrastructure, and vulnerability to climate stress—can slow broader sustainable development progress. Thus, understanding rural baseline indicators provides essential context for evaluating India's

development trajectory and helps identify where targeted interventions can yield the greatest impact.

SDG Progress and Regional Variation:

The SDG India Index 2023–24 shows that India has improved its overall performance on Sustainable Development Goals through progress in multiple sectors. The index measures development using 113 SDG-aligned indicators and provides a clear comparison of achievements across different States and Union Territories. This helps in identifying both high-performing regions and those that require focused policy attention. For rural society, regional variation is highly significant. States that perform better in health services, quality education, drinking water, sanitation, and livelihood opportunities usually achieve stronger SDG scores. In contrast, lagging states often reflect higher rural deprivation, including poverty, low human development, weaker infrastructure, and greater vulnerability to climate and resource stress. Therefore, the SDG Index highlights that sustainable development in India is not uniform and must be strengthened through region-specific and rural-focused strategies to reduce inequality and ensure inclusive progress.

Poverty and Multidimensional Deprivation:

NITI Aayog's National Multidimensional Poverty Index (MPI) Progress Review, based on NFHS data, indicates a significant decline in multidimensional poverty in India, with notable improvement in rural areas during the period 2015–16 to 2019–21. Unlike income-based poverty measures, MPI captures multiple aspects of deprivation such as health, nutrition, education, sanitation, housing, and basic living standards, providing a broader understanding of rural well-being.

The key interpretation is that rural deprivation is gradually reducing, showing progress in public service delivery and welfare support. However, MPI also highlights that poverty is not only about low income. Even if income levels rise, rural households may continue to suffer from poor nutrition, limited schooling, inadequate sanitation, and weak healthcare access. Therefore, achieving sustainable development in rural India requires a multi-sectoral approach that improves both economic opportunities and essential human development services.

Rural Employment and Livelihood Security:

Official data from the Periodic Labour Force Survey (PLFS) shows that unemployment rates have improved over time, including in rural India, particularly under the usual status measures reported by MoSPI/PIB. This indicates that more people are getting work opportunities compared to earlier years and reflects gradual progress in employment conditions.

However, rural livelihood security cannot be judged only by unemployment rates. A major concern is the quality of employment, as a large share of rural workers remain in informal and low-paid jobs, often without job security, stable income, or social protection. Many rural households also experience underemployment, where people work fewer hours or in low-productivity activities that do not provide adequate earnings. In this context, livelihood support programmes like MGNREGA continue to play an important role by providing wage employment during lean agricultural seasons, supporting vulnerable families, and helping rural communities manage economic shocks and seasonal distress.

Water, Health, and Basic Services:

Access to safe drinking water is a key foundation for sustainable rural development because it directly affects health, hygiene, nutrition, and quality of life. The Government of India's Jal Jeevan Mission (JJM) aims to provide functional household tap water connections (FHTCs) to rural households and regularly reports progress through its official dashboard. This initiative represents a major step toward strengthening basic services in villages and improving rural living standards.

From a sustainability perspective, improved water access reduces waterborne diseases and supports better public health outcomes. It also lowers the burden of unpaid care work, especially for women and girls who traditionally spend significant time collecting water from distant sources. However, long-term success depends not only on providing tap connections but also on ensuring water source sustainability, including groundwater recharge, protection of local water bodies, and reliable water quality. In addition, strong local operation and maintenance (O&M) capacity, community participation, and financial planning are essential to keep rural water supply systems functional and sustainable over time.

Key Challenges for Sustainable Rural Development:

Sustainable rural development in India faces multiple interconnected challenges that slow down inclusive progress. One of the most serious issues is climate and water stress, as irregular rainfall, frequent droughts or floods, groundwater depletion, and rising temperatures directly threaten agricultural productivity, drinking water availability, and rural health. Since rural livelihoods are closely dependent on natural resources, environmental shocks create long-term insecurity for farming and allied activities.

Another major concern is livelihood vulnerability and informality. Even though unemployment rates show improvement, a large share of rural employment remains informal, low-paying, and insecure, with limited social protection. This results in underemployment, seasonal distress, and migration, making rural households economically fragile. Along with this, regional inequality continues to shape development outcomes. SDG performance varies widely across states and union territories, and lagging regions often experience higher poverty, weaker infrastructure, and limited access to essential services, requiring focused and region-specific interventions.

Further, human capital gaps remain a key barrier. Unequal access to quality education, healthcare, and nutrition reduces productivity and limits opportunities for rural youth and women. Finally, implementation and governance challenges weaken long-term sustainability. Gaps in last-mile delivery, poor maintenance of public assets such as water supply systems, and limited local administrative capacity often reduce the impact of development programmes. Therefore, addressing these challenges is essential for building a resilient, inclusive, and sustainable rural India.

Recommendations:

Sustainable rural development in India requires policies that strengthen livelihoods, basic services, and local governance. The following five recommendations highlight key pathways for inclusive and long-term rural sustainability:

1. Promote water-saving agriculture, diversified cropping, resilient livestock systems, and community-based adaptation planning.
2. Expand SHG federations, producer organizations, and improve local governance capacity for SDG planning and monitoring.

3. Link skill development with local value chains and strengthen social protection for informal rural workers.
4. Ensure source sustainability, groundwater recharge, water quality monitoring, and local O&M support along with tap connections.
5. Promote nutrition-sensitive rural development by integrating agriculture with diverse diets, women's empowerment, and stronger primary healthcare.

Conclusion:

This research paper highlights that sustainable development in India is closely linked to the progress of rural society, as rural areas influence national outcomes in poverty reduction, food security, employment, and environmental sustainability. Secondary data shows that India has made improvements in SDG-related performance, reduction in multidimensional poverty, expansion of basic services like rural tap water, and better employment indicators. However, major challenges such as climate and water stress, informal and low-quality employment, regional inequality, human capital gaps, and governance limitations continue to affect rural sustainability.

The study concludes that achieving sustainable rural development requires climate-resilient livelihoods, stronger rural institutions, better quality employment opportunities, and sustainable water security. Overall, long-term inclusive growth in rural India is possible only when economic progress, social justice, and environmental protection are strengthened together through accountable and people-centered policies.

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Digital India: A Futuristic Approach towards Education and Skilling

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Abstract:

Digital India represents the India that will connect Indians to different government facilities at a one click. These facilities include online government services that cover education and skilling, agriculture, digital infrastructure, emerging technologies, e-counseling, entrepreneurship and manufacturing, healthcare and wellness, social empowerment transport and logistics, state projects.

This research paper mainly focuses on education and skilling in Digital India. It covers different facilities provided by Government of India for example E- Counseling, CollabCAD, CollabGEO, Digital India Bhashini, Punarjjani, Visvesvaraya PhD Scheme, e-Granthalaya, Learning Management System, FutureSkills Prime, Mission Karmyogi, Academic Bank of Credits, National Academic Depositories.

Communication became a necessary thing for humans when they start living together in groups. Human communication changes its form from gestures, hand movements to the oral communication. It helps to transfer their thoughts from one person to other. Communication was present not only in the oral format but also in texts and pictures. Communication process changes with the time. People used a face-to-face communication in the past. They also made a use of birds for transferring a secret message from one place to other. As time passes different communication devices generated that can be used to contact a person present at a long distance.

Now a day's smart phones, internet, computer and social media made a human life easier than before. People adapted to this techno savvy world. They are using different social media platforms for a communication like Facebook, Whatsapp, Messenger, LinkedIn, Twitter, Instagram, Youtube, Google forms, etc. Media plays an important role in communication. The world comes together with these communication methods. Communication through such online media made a platform for Digital India.

Digital India represents the India that will connect Indians to different government facilities at a one click. These facilities include online government services that cover education and skilling, agriculture, digital infrastructure, emerging technologies, e-counseling, entrepreneurship and manufacturing, healthcare and wellness, social empowerment transport and logistics, state projects. Education and skilling facility explained in detail as given below.

Education and Skilling:

Education and skilling provide different facilities to students via different sections like E-Counseling, CollabCAD, CollabGEO, Digital India Bhashini, Punarjjani, Visvesvaraya PhD Scheme, e-Granthalaya, Learning Management System, FutureSkills Prime, Mission Karmyogi, Academic Bank of Credits, National Academic Depositories, DIKSHA.

1. **E-Counselling:** It is an online useful facility for students who want to take admission into different educational institutes present in India. It will provide a simple and transparent process from applying for specific course to take admission into different educational institutes and colleges. It will help students, counseling boards and institutes. This facility works on merit and reservation policies of Government of India.
2. **CollabCAD:** It is a computer program for the students of Engineering. It provides an online work of designing of 2D modelling transformation into a 3D product parts assembling. It will be a great tool for learners, Engineers, researchers to make changes in design as per their ideas.
3. **CollabGEO:** It is a 2D geometry tool for schoolteachers and students. It helps teachers to teach geometry to the students of class 6-9. It turns the teaching learning process into a fun game.
4. **Digital India Bhashini:** It works as a language translator for websites. It helps to connect a company to their customers present at different parts of multilingual India. It also celebrates the beauty of the local languages present in the India.
5. **Punarjjani:** It is online software specially designed for specially abled children. The algorithm of the software designed according to the need of learners. This transforms a manual procedure of teaching process into a digital one. It will encourage students to learn in online mode.
6. **Visvesvaraya PhD Scheme:** This scheme is to encourage students to take admission for PhD programmes across India. It provides fellowships for research students, PhD scholars and Post-doctoral fellows. It is a very good initiative by the Indian Government.
7. **E-Granthalaya:** This facility provides an online library services for teachers, students, researchers and learners. It had already started in 2002 with the version 1.O. The recent version of this digital platform will be 4.O. It had already been used by 7,000 libraries of India.
8. **Learning Management System:** As the name indicates, it is a software programme of learning developed for Government employees. It helps them to perform their duty with an ease in online mode. It will help Government employees in their work to administer, maintain their records and train others by providing e learning through courses.
9. **FutureSkills Prime:** It is a knowledge-based facility in future skills and a production of MeitY, National Association of Software and Service companies NASSCOM. It provides future skills to students in the form of courses, pathways, experiential learning that are necessary for their development in the field of artificial intelligence, data analytics, quantum computing, semiconductors, robotic process automation, virtual reality, web and mobile development, 3D printing, modeling, etc. Courses are available at discount. Experiential learning will provide industrial experience of hands-on training and practical to the learners. It will open the doors of job opportunities in industries for young talents of India.
10. **Mission Karmyogi:** It is a government national programme of online learning for civil servants to work efficiently and effectively for public. This platform was launched in 2022 to provide different online courses. Its main aim is to improve government-public relations for the betterment of society.
11. **Academic Bank of Credits:** It is an educational facility for students to transfer

their credits from one programme to other while studying in higher educational institute or college. It is helpful for undergraduate (degree), diploma and postgraduate diploma students. Student must have the unique ID (APAAR ID) for this purpose to take benefits of this facility. It is compulsory for college students as per National Education Policy 2020.

12. **National Academic Depository:** This initiative provides an online storage facility of documents like mark-sheets, award certificates for the students. It provides digital security to these documents. Student can access this facility anytime and anywhere.
13. **DIKSHA:** It is a knowledge-based platform for school students and teachers. The main function of this platform is to provide online school education for all. It consists of different programmes such as Nipun Bharat, Bhasha Sangam, e- Jaadui Pitara, Education For All, Virtual Lab, Vocational Education.

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An Empirical Study on Fintech Adoption in Banking Sector in India

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Abstract:

The economic development of any country depends upon the development of economic activities like agricultural activities, industrial activities, trade and commerce, fishing, mining, construction work etc. The banks are playing a significant role in establishing and promoting these activities by providing financial support. As a result, a country's economic success is ultimately dependent on the survival and growth of its banking sector. India has seen a significant increase in FinTech developments due to rising smartphone usage, digital infrastructure development, and government measures to foster a cashless economy. The amazing change of FinTech in recent years has revolutionized the country's financial services business. Fintech firms use technology to create novel solutions for financial services such as banking, payments, investments, and insurance. Fintech companies frequently offer their services via digital platforms or mobile apps, giving customers easy and accessible ways to manage their finances. Fintech enterprises include peer-to-peer lending platforms, digital banks, robo-advisors for investment management, mobile payment systems, and cryptocurrency exchanges. Fintech can alter the financial services industry by making them more accessible, efficient, and affordable to customers. However, the rapid expansion of fintech has created worries about privacy, cybersecurity, and regulatory compliance, as well as the possibility of job displacement as technology automates routine in economic and financial development in the country.

Keywords: Fintech, Indian Banking

Introduction:

The “FinTech” is implied by the terms ``Finance” and “Technology”. The technologies are playing a significant role in providing digital platforms to perform financial activities and its help us in banking and financial services for smooth conduction and essay access. FinTech are applying by financial service companies for use and to improve the satisfaction level of consumers & investors. FinTech are offering various kind of financial services such as rob advisors or artificial intelligent, mobile payment & payment apps, digital portfolio management & investment apps, crowdfunding, peer- to- peer (P2P), Big data, smart contracts, Insurtech, cryptocurrency, block chain, cyber security etc. Fintech is a new regime and a new trend in financial literacy. It refers to the term FinTech is primarily used for innovation and people make smooth business and financial transactions. The current technological performance in the various sectors while applying of fintech. The study also determined the role of fintech pre and post pandemic. The technology positively changes the trend of financial services such as payment, digitalization and techno friendly financial performance has been measured. The study found the gap between financial awareness and Fintech opportunities in future. The upcoming studies are based on getting a full acquaintance of Fintech in different financial sectors as well as make an awareness

policy to build up financial understanding & elaborate its benefits and use of it.

Key Enabling Technologies Used by Fintech:

- **Artificial intelligence (AI):** AI technology is used to provide personalized financial advice, fraud detection, and risk management. AI can also be used to automate processes and improve customer service.
- **Big data analytics**: Fintech companies use big data analytics to analyse large amounts of financial data to identify trends and patterns, make informed decisions, and improve risk management.
- **Block chain:** Block chain technology is used to create secure, decentralized systems for transactions, record-keeping, and identity verification. It is also used to create cryptocurrencies and other digital assets.
- **Mobile technology**: Mobile technology is used to provide convenient and accessible financial services to users through mobile apps, such as mobile banking and payment apps.
- **Cloud computing**: Fintech companies use cloud computing to store and process data, as well as to offer scalable and flexible services to customers.
- **Internet of Things (IoT):** IoT technology is used to create connected devices that can collect and transmit financial data, such as wearables that can track spending and monitor financial health.
- **Robotic Process Automation (RPA)**: RPA technology is used to automate routine and repetitive tasks, such as data entry and document processing, to improve efficiency and reduce costs.
- **Biometrics:** Biometric technologies, such as facial recognition and fingerprint scanning, can be used for secure authentication and identity verification in financial transactions.
- **Application Programming Interfaces (APIs):** APIs are used to connect different systems and platforms, allowing fintech companies to access and share data with other financial institutions and third-party providers.

Review of Literature:

With a view to evaluate the objectives of the study, it was considered desirable to have an idea of the findings of some earlier researches and the methods adopted for arriving at the same. It is hoped that such a review of literature connected with the main objective of the study would provide a basis either for confirming the earlier findings or for contradicting the same and thereby to suggest points of departure for further studies. Hence the present study has conducted to **Impact of Fintech on Indian Banking Sector.**

D. Murugun (2023) in his research article entitled Technology Adoption in Indian Banking Sectors. The objective of this paper is to study intends to investigate the utilization of technology in the Indian banking industry and paper also examines the utilization of Core Banking Solution (CBS) to enhance customer convenience with Anywhere and Anytime Banking. The research utilized secondary sources of information such as textbooks, newspapers, scholarly journals, and the Internet to gather data on the adoption of technology in the banking industry of India. The research findings are The implementation of technology in the banking sector has increased customer satisfaction levels and improved convenience by providing anytime and anywhere banking services. He concluded that In India, The use of technology in banking has boosted customer satisfaction and convenience with anytime and anywhere services.

Banks should also generate trust in the minds of customers that Technology banking is safe.

Anupa Baliga B.S & Carmelita Goveas (2023) the case study research paper entitled Makeover of Banks by Digital Interventions and Innovations by Fintech. The primary objective of this research paper is to analyze the role of fintech in banking and provide suggestions to assess fintech and banking digital transformation and to evaluate Fintech in banking using SWOC analysis. The data for this case study has been gathered from secondary sources of information by referring to a number of research articles in journals and information from the internet. The author concluded that to remain competitive and provide value-added services, banks must adapt to the increasing expectations of tech-savvy customers and successfully use technology in their initiatives. The paper provides suggestions for banks to navigate the digital transformation and leverage fintech effectively.

Reena Rani et al. (2023) the Article entitled A Study on Chatbots in the Indian Banking Sector. This Paper discusses the role and use of chatbots adopted by the different categories of banks (both private and public sector banks) in India. This study is based on secondary data collected from banks' websites and articles from various journals. The study is based on nine banks (both private and public sectors) those are having working chatbots (SBI, HDFC Bank, ICICI Bank, Yes Bank, IndusInd Bank, Kotak Mahindra Bank, Axis Bank, Andhra Bank, Bank of Baroda). The present study is focused on chatbots, their services, and software applications for various customer-handling capacities. Findings of the study is that Indian banks are investing a small amount in using chatbots, yet Indian chatbots are deficient regarding far too provincial directions as they are adequate just for standard and basic inquiries. Also, Indian banking customers are not properly aware of chatbots and virtual assistance. Authors concluded that most of the questions answered by the Indian chatbots are already available on the banks' websites, and it is found that Indian banks need to update their AI/Virtual assistance with more features.

Ana belen tulcanaza-prieto et al. (2023), The article entitled Influence of Customer Perception Factors on AI-Enabled Customer Experience in the Ecuadorian Banking Environment. This study reviews the relationship between customer perception factors and AI-enabled customer experience in the Ecuadorian banking industry. The study employs a self-designed online questionnaire with five factors for customer perception (convenience in use, personalization, trust, customer loyalty, and customer satisfaction) and two categories for AI-enabled customer experience (AI-hedonic customer experience and AI-recognition customer service). The final valid dataset consisted of 226 questionnaires. The data analysis and the hypotheses tests were conducted using SPSS 26 and structural equation modelling (SEM), respectively. The main findings displayed that all five customer perception factors (individual and joint effect) have a positive and significant effect (at least at the 5% level) on AI-enabled customer experience, AI-hedonic customer experience, and AI-recognition customer service in the Ecuadorian banking industry. Study results are aligned with previous findings from other countries, particularly the banking environment in the United Kingdom, Canada, Nigeria, and Vietnam. The AI techniques involved in the financial sector increase the valuation of customer experience due to AI algorithms recollecting, processing, and analysing customer behaviour. This study contributes a complete statistical and econometric model for determinants of AI-enabled customer experience. The main limitations of the study are that, in the analysis of the most demanded AI financial services, not all

services and products are included and the 12 inexistence of a customer perception index. For upcoming research, the authors recommend performing a longitudinal study using quantitative data to measure the effect of AI-enabled customer experience on Ecuadorian banks' performance.

U. Midhundev et.al (2023): in their study about An Empirical Investigation of Innovation and Technology in banking. Objectives of the Study are to investigate the impact of new technology on customer satisfaction in commercial banks in Bhopal, to compare the innovative successes of private and state banks. The article also studies about to understand how technological innovation affects financial services at the bank's location level and examines the empirical study's practical implications, strengths, and limitations. It also examines the emergence of FinTech and its role in propelling innovation within the financial services sector. The study utilized customer data obtained from public and commercial banks in Bhopal, which was reviewed to investigate the impact of new technology on customer satisfaction. The study discovered that private banks surpassed Government banks in terms of successful innovation. The authors concluded that Banks have improved customer service by using new approaches, personalized strategies, tailored retail banking services, self-service, and Internet transactions. Improved customer service results in better transaction quality and security. Banks can gain a competitive advantage in the financial sector by cooperating with start-ups and adopting FinTech, thereby establishing themselves as industry leaders.

Research Gap:

The reviewed studies (Murugun 2023; Baliga & Goveas 2023; Reena Rani et al. 2023; Tulcanaza-Prieto et al. 2023; Midhundev et al. 2023) provide valuable insights into technology adoption, fintech, chatbots, AI customer experience, and innovation in banking, primarily using secondary data or limited surveys in India/Ecuador. Overreliance on Secondary Data the four of five studies (except Tulcanaza-Prieto) use secondary sources/journals/websites, limiting depth, primary validation, and generalizability; no large-scale primary surveys or longitudinal tracking. And narrow Scope and Geography: Focus on specific tools (e.g., CBS, chatbots) or regions (India/Bhopal/Ecuador); lacks pan-Global South comparisons (e.g., UPI vs. M-Pesa) or digital currencies/CBDCs in sustainability finance. The limited Empirical Rigor: Small samples (e.g., 226 Ecuador questionnaires, 9 Indian banks); descriptive findings dominate, with minimal advanced metrics like ROI on AI/chatbots or causal impacts on financial inclusion/climate resilience. Underdeveloped Future-Oriented Analysis: Emphasis on current satisfaction/convenience overlooks emerging risks (fraud, digital divides, regulation) and opportunities (programmable money, green tokenization); vague suggestions without roadmaps. The gap in Holistic Integration: No synthesis of AI/fintech with broader DPI ecosystems or cross-sector effects (e.g., agribusiness payouts); ignores gender/rural disparities and quantitative models for performance prediction. These gaps highlight needs for primary, comparative, longitudinal studies on digital currencies' role in inclusive green banking.

The Study Objectives:

1. To study the types of products and services are provided by Fintech companies and which of them are most attractive to users in the Bengaluru city customers.

Research Methodology:

Research Design: This research is desk and conceptual research based on fundamentals framework. The research design is based on elaborating the role of fintech in various financial sectors in India.

Sample Size: In order to know the experience of customers of banks as users of Fintech services, a total of 130 customers have been selected for the study.

Sample area: Bengaluru city

Sampling technique: To determine the sample size, the convenience sampling technique has been adopted for the study

Source of data: The primary data have been collected through structured questionnaires distributed among the customers. The secondary data sources include research papers, articles from newspapers and journals and official websites.

Technique of data analysis: Data is analysed using percentage method.

Social Implications: The study focuses on examining the awareness and experience of the citizens of Bengaluru city towards adoption of Fintech services by banks. The outcome of the study shall help to know the pace of Fintech adoption by the customers of banks and fill the gap between the services offered by banks and those received by customers.

Limitation of the study: This empirical study on Fintech adoption in India's banking sector faces several limitations. The sample is restricted to 130 customers in Bengaluru city via convenience sampling, limiting generalizability across diverse regions, bank types (public/private), or demographics like rural users. Reliance on self-reported questionnaires introduces response bias, while secondary data lacks depth for causal links. The percentage analyses provide associations but not causation or advanced predictions (e.g., regression). It overlooks emerging trends like CBDCs (e₹), blockchain green finance, or post-2025 data, focusing narrowly on awareness/experience without metrics like ROI or long-term impacts. Future research needs larger, stratified, longitudinal samples nationwide.

Data Analysis and Interpretation:

Demographic Profile and work related of Respondents data analysis involves descriptive statistics. The Bengaluru city Table 1.01 shows the frequency and percentage of the respondents.

Table No 1: Demographic Profile of Respondents

Sl. No	Descriptive Statistics	Particulars	No. of Respondents	Percentage	Cumulative frequency
1	Age	Below-25 years	53	44.00	44.00
		25-30 years	36	30.00	74.00
		31-55 years	28	24.00	98.00
		Above-55 years	03	02.00	**100.00**
		Total	**120**	**100.00**	
2	Gender	Male	44	37.00	37.00
		Female	76	63.00	**100.00**
		Total	**120**	**100.00**	
3	Education	Degree level	42	35.00	35.00
		Post Graduate	59	49.00	84.00
		Diploma	04	03.00	87.00
		Other	15	13.00	**100.00**
		Total	**120**	**100.00**	
5	Monthly income	Below-Rs.20000	63	52.00	52.00
		Rs.20001-30000	51	43.00	95.00

		Rs.30001-40000	5	04.00	99.00
		Above Rs.40000	1	01.00	**100.00**
		Total	**120**	**100.00**	

Source: Primary data

From the above Table 1.01 of Demographic Profile Analysis, the dataset from 120 in Bengaluru city reveals a young, educated, female-dominated sample skewed toward lower incomes, ideal for studying early Fintech adoption but limiting broader generalizability.

- Age Distribution: Dominant youth segment: 44% below 25 years, 30% aged 25-30 (74% cumulative under 30), reflecting tech-savvy millennials/Gen Z driving Fintech uptake.
- Mature groups underrepresented: 24% (31-55 years), just 2% above 55, suggesting potential rural/elderly adoption gaps.

Factors behind Fintech Adoption, Preferences and Challenges	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Total**	**Total weight score**	**Average score**	**Rank**
Points weight	**1**	**2**	**3**	**4**	**5**				
I primarily learned about Fintech services like UPI from social media, bank ads, or friends."	12	16	33	31	28	120			**8**
Total weight (weightage * number of response)	12	32	99	124	140		407	3.39	
Speed, low costs, and 24/7 access drive my adoption of Fintech banking services."	12	8	28	41	31	120			**7**
Total weight (weightage * number of response)	12	16	84	164	155		431	3.59	
"Security fears and poor internet prevent me from adopting Fintech services."	7	10	28	31	44	120			**6**
Total weight (weightage * number of response)	7	20	84	124	220		455	3.79	
"I have used mobile apps and internet banking as primary channels for Fintech services."	3	8	27	28	54	120			**2**
Total weight (weightage * number of response)	3	16	81	112	270		482	4.02	
Platforms like PhonePe, Google Pay, and SBI YONO are my go-to digital banking tools."	4	9	24	35	48	120			**4**
Total weight (weightage * number of response)	4	18	72	140	240		474	3.95	
"I regularly use UPI payments, NEFT/IMPS, and digital wallets for transactions."	2	6	29	35	48	120			**3**
Total weight (weightage * number of response)	2	12	87	140	240		481	4.01	
"I prefer Fintech services over branch banking due to convenience and speed."	1	6	25	38	50	120			**1**
Total weight (weightage * number of response)	1	12	75	152	250		490	4.08	

"Fraud risks, technical glitches, and low awareness challenge my Fintech usage."	6	8	25	35	46	120			**5**
Total weight (weightage * number of response)	6	16	75	140	230		467	3.89	

- Gender Breakdown: Female majority (63%) over males (37%), countering typical male-dominated tech trends—possibly due to convenience sampling in urban Guwahati, highlighting women's role in digital banking.
- Education Levels: Highly educated: 49% post-graduates + 35% degree-holders (84% graduates+), correlating with higher Fintech literacy and usage.
- Monthly Income: Low-income heavy: 52% below ₹20,000, 43% ₹20,001-30,000 (95% under ₹40,000), aligning with MSME/fintech accessibility for underserved segments, but minimal high earners (5%).

From the research it the Insights: Youthful, educated, low-income females form the core, implying Fintech's appeal to aspirational urban users.

Awareness, Factors behind Fintech Adoption, Preferences and Challenges in Bengaluru city.

Table No. 2: Awareness, Factors behind Fintech Adoption, Preferences and Challenges

Factors behind Fintech Adoption, Preferences and Challenges	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Total**	**Total weight score**	**Average score**	**Rank**
Points weight	**1**	**2**	**3**	**4**	**5**				
I primarily learned about Fintech services like UPI from social media, bank ads, or friends."	12	16	33	31	28	120			**8**
Total weight (weightage * number of response)	12	32	99	124	140		407	3.39	
Speed, low costs, and 24/7 access drive my adoption of Fintech banking services."	12	8	28	41	31	120			**7**
Total weight (weightage * number of response)	12	16	84	164	155		431	3.59	
"Security fears and poor internet prevent me from adopting Fintech services."	7	10	28	31	44	120			**6**
Total weight (weightage * number of response)	7	20	84	124	220		455	3.79	
"I have used mobile apps and internet banking as primary channels for Fintech services."	3	8	27	28	54	120			**2**
Total weight (weightage * number of response)	3	16	81	112	270		482	4.02	
Platforms like PhonePe, Google Pay, and SBI YONO	4	9	24	35	48	120			**4**

are my go-to digital banking tools."									
Total weight (weightage * number of response)	4	18	72	140	240		474	3.95	
"I regularly use UPI payments, NEFT/IMPS, and digital wallets for transactions."	2	6	29	35	48	120			**3**
Total weight (weightage * number of response)	2	12	87	140	240		481	4.01	
"I prefer Fintech services over branch banking due to convenience and speed."	1	6	25	38	50	120			**1**
Total weight (weightage * number of response)	1	12	75	152	250		490	4.08	
"Fraud risks, technical glitches, and low awareness challenge my Fintech usage."	6	8	25	35	46	120			**5**
Total weight (weightage * number of response)	6	16	75	140	230		467	3.89	

Source: primary data

From the Table 1.02 presents survey data from 120 respondents on fintech awareness, adoption drivers, preferences, and challenges in banking services (likely in India, given UPI, PhonePe, etc.). Responses use a 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree). Total weighted scores sum (response count × scale value), yielding averages from 3.39 to 4.08—indicating overall positive leanings toward fintech, with "agree" (4) and "strongly agree" (5) dominating most categories.

Adoption Drivers and Preferences:

High averages highlight strong preferences for fintech convenience:

- Top preference: "I prefer Fintech services over branch banking due to convenience and speed" (4.08, Rank 1) sees 88 responses (38+50) agreeing/strongly agreeing, with minimal disagreement (7 total). This underscores speed and accessibility as primary draws.
- Heavy usage: "I have used mobile apps and internet banking as primary channels" (4.02, Rank 2) and "I regularly use UPI payments, NEFT/IMPS, and digital wallets" (4.01, Rank 3) show 82 and 83 agreements, respectively—revealing widespread integration into daily transactions.
- Popular platforms: "Platforms like PhonePe, Google Pay, and SBI YONO are my go-to" (3.95, Rank 4) has 83 agreements, signaling trust in specific apps.
- These top-ranked items (all >4.0) reflect fintech's edge over traditional banking, driven by digital familiarity.

Awareness Sources:

Awareness is moderate: "I primarily learned about Fintech services like UPI from social media, bank ads, or friends" (3.39, Rank 8)

has only 59 agreements vs. 45% neutral/disagree (33+16+12). This suggests word-of-mouth and marketing play roles, but many respondents discovered fintech through direct experience rather than promotion.

Challenges and Barriers:

Challenges score highest in agreement, indicating persistent hurdles:

Statement	Average Score	Rank	Key Insight
"Security fears and poor internet prevent me from adopting"	3.79	6	75 agreements; connectivity and trust issues deter ~40% strongly.
"Fraud risks, technical glitches, and low awareness challenge my Fintech usage"	3.89	5	81 agreements; operational reliability is a top pain point.

Lower drivers like "Speed, low costs, and 24/7 access drive my adoption" (3.59, Rank 7) still lean positive (72 agreements) but trail preferences, implying benefits are assumed rather than novel.

Overall Insights observations are Averages above 3.5 across all statements show broad fintech acceptance, with preferences (convenience, apps, UPI) outranking challenges (security, glitches). However, awareness lags, and barriers like internet access could hinder full adoption—especially in regions like Bengaluru with variable connectivity. Weighted totals (407–490) confirm a pro-fintech tilt, but addressing fraud/security (top challenges) could boost scores further. This data implies targeted education and infrastructure improvements for deeper penetration.

Finding of the Study:

The demographic profile of the 120 respondents underscores a young, educated, and predominantly female sample well-suited to fintech adoption. Notably, 44% are below 25 years and 30% aged 25-30, forming 74% under 30, with only 2% above 55—highlighting youth as fintech's core users. Females dominate at 63%, while education levels are high: 49% postgraduates and 35% degree holders (84% total). Income remains modest, with 52% below Rs.20,000 monthly and 95% under Rs.30,001, suggesting fintech appeals to urban middle/lower-middle class in contexts like India.

Fintech preferences and usage emerge as the study's strongest findings, with average Likert scores exceeding 4.0 for top items. Respondents overwhelmingly favor fintech over branch banking for convenience and speed (4.08, 88% agree/strongly agree), rely on mobile apps/internet banking (4.02, 82 agreements), and regularly use UPI/NEFT/digital wallets (4.01, 83 agreements). Platforms like PhonePe, Google Pay, and SBI YONO rank highly at 3.95 (83 agreements), while adoption drivers like speed/low costs/24/7 access score 3.59—collectively signaling seamless integration into daily transactions among this tech-savvy group.

Challenges persist despite enthusiasm, with security fears/poor internet (3.79) and fraud risks/glitches/low awareness (3.89) drawing significant agreement (75 and 81 cases), outranking awareness sources from social media/ads/friends (3.39, only 59 agreements). These barriers temper full adoption, particularly for lower-income or less-connected segments, yet overall averages (3.39-4.08) affirm positive

momentum—implying fintech providers should prioritize trust-building, reliability enhancements, and awareness campaigns to unlock broader potential.

Conclusion for the Study:

This empirical study on fintech adoption in India's banking sector, based on 120 young, educated, predominantly female respondents with modest incomes, confirms robust enthusiasm driven by convenience, speed, and seamless tools like UPI, PhonePe, and mobile apps—evidenced by top Likert averages above 4.0 and 80-88% agreement on preferences over traditional banking. While awareness via social media lags and challenges like security fears, fraud risks, internet issues, and glitches score 3.79-3.89, the overall positive momentum (averages 3.39-4.08) highlights fintech's transformative potential for urban youth. Providers and policymakers should focus on enhancing trust, infrastructure reliability, and targeted education to mitigate barriers, fostering wider inclusion and sustained growth in digital banking.

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International Trade Policies and its Impact on the Share Market

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Abstract:

International trade policies play a crucial role in shaping national economies and influencing financial markets, particularly share markets. Policies such as tariffs, trade agreements, export-import regulations, and protectionist measures directly and indirectly affect corporate profitability, investor sentiment, and capital flows. This research paper examines the nature of international trade policies and analyzes their impact on share markets. The study adopts a conceptual and analytical approach, drawing on existing literature, empirical studies, and global experiences. It highlights how liberalization policies tend to boost stock market performance, while protectionist measures often create uncertainty and volatility. The paper concludes that stable, transparent, and growth-oriented trade policies contribute positively to share market development and investor confidence.

Keywords: International Trade Policy, Share Market, Tariffs, Globalization

Introduction:

International trade has been a cornerstone of economic development, enabling countries to specialize in production, access global markets, and achieve economies of scale. Governments regulate trade through policies that determine the flow of goods, services, and capital across borders. These international trade policies significantly influence domestic industries and financial markets, especially share markets. The share market reflects the economic expectations of investors and serves as a barometer of a country's economic health. Any change in trade policy—such as the imposition of tariffs, signing of free trade agreements (FTAs), or trade sanctions—can have immediate repercussions on stock prices. In a globalized world, stock markets are highly sensitive to international trade developments, geopolitical tensions, and policy announcements. This paper aims to explore the relationship between international trade policies and share market performance. It seeks to analyze how different trade regimes affect stock market returns, volatility, and investor behavior, with reference to both developed and emerging economies.

International trade policies refer to the set of measures and regulations formulated by governments to control and guide the flow of goods and services across national borders. These policies play a crucial role in shaping a country's economic structure by influencing production patterns, employment, prices, and overall growth. Through international trade policies, governments seek to protect domestic industries from excessive foreign competition, promote exports, maintain economic stability, and achieve broader strategic and developmental objectives. Such policies also reflect a nation's priorities in balancing domestic interests with global economic integration. One important approach within international trade policy is the free trade policy, which emphasizes

minimal government intervention in international trade. Under this policy framework, tariffs, quotas, and other trade barriers are significantly reduced or eliminated to allow the free movement of goods and services between countries. Free trade encourages competition, enhances productive efficiency, and enables consumers to access a wider variety of goods at lower prices. By fostering specialization based on comparative advantage, free trade policies contribute to economic growth and improved welfare.

In difference, protectionist policies are designed to shield domestic industries from foreign competition. Governments implementing protectionism impose tariffs, quotas, and various non-tariff barriers such as import licensing and quality standards. The primary objective of such measures is to support infant industries, safeguard employment, and reduce dependence on imports. Although protectionism may provide short-term relief to domestic producers, it can lead to higher prices, reduced efficiency, and potential retaliation from trading partners in the long run. Another significant dimension of international trade policy is export promotion. Under this approach, governments actively encourage domestic firms to expand their presence in international markets. Export promotion policies include financial incentives such as subsidies, tax concessions, easy credit facilities, and the development of export-oriented infrastructure. These measures aim to enhance the global competitiveness of domestic industries, increase foreign exchange earnings, and stimulate economic growth.

Trade liberalization policy represents a gradual and systematic reduction of trade barriers with the objective of integrating the domestic economy into the global market. Unlike sudden free trade measures, liberalization is often implemented in phases to allow industries time to adjust to increased competition. This policy improves market access, encourages foreign investment, and promotes technological advancement, thereby strengthening the overall efficiency of the economy. Strategic trade policy focuses on supporting industries that are considered critical for national security, technological leadership, or long-term economic development. Governments may intervene through targeted subsidies, research and development support, or selective protection to help these industries gain a competitive advantage in international markets. Such policies are often applied in sectors such as defense, advanced manufacturing, and high technology, where long-term strategic interests outweigh short-term market considerations.

Literature Review:

Caldara, et.al (2019/2020) build and validate measures of trade policy uncertainty (TPU) using news, firms' earnings calls, and tariff data, and show that spikes in TPU reduce investment and aggregate activity; at the firm level, higher TPU is associated with lower stock returns for trade-exposed firms, indicating that uncertainty about trade policy is a first-order driver of market volatility. *Fajgelbaum and Khandelwal (2021)* analyze the U.S.–China trade war and find that tariffs and retaliatory measures substantially altered trade flows, redistributed surplus across sectors and countries, and depressed economic welfare; their work also documents significant negative valuation effects on firms with direct exposure to the tariffed products, illustrating how large-scale protectionist episodes transmit to equity markets. *Pham et al. (2024)* use event-study methods to examine the market reaction to an EU–Vietnam Free Trade Agreement announcement and find heterogeneous sectoral abnormal returns: some export-oriented sectors benefited while others fell, with the overall market reaction reflecting both expected

gains and short-term re-allocation costs. Their paper highlights that FTA announcements can produce immediate, measurable effects on stock returns that vary by industry exposure. *Hoang (2024)* surveys evidence on trade liberalization and emerging stock markets, concluding that liberalization episodes (including tariff reductions and capital-account opening) generally improve market liquidity and attract foreign portfolio investment, but benefits are uneven across firms — exporters and large-cap firms capture most gains while smaller, domestic-focused firms may not. The review stresses that sequencing and accompanying domestic reforms shape whether liberalization yields sustained equity-market improvements. Recent work on global value chains (GVCs) — summarized in WTO and related literature (2024–2025) — argues that increasing GVC integration changes how trade policy shocks affect asset prices: trade disruptions now propagate through complex supplier networks, amplifying the equity-market impact for firms embedded in upstream or downstream GVC positions; consequently, policy shocks to tariffs or sanctions can create broader, more persistent equity volatility than under simpler trade structures.

Objectives of the Study:

This study makes an attempt in this direction with the following objectives:

1. To examine the international trade policies and their components influencing global economic activity.
2. To analyze the impact of international trade policies on share market performance.

Research Methodology:

The study adopts a descriptive and analytical research design based on secondary data collected from journals, reports, and databases, using qualitative analysis to examine trade policy impacts on share markets.

Impact International Trade Policies on the Share Market:

International trade policies constitute a comprehensive framework of rules, regulations, and agreements through which governments manage cross-border trade flows. These policies determine how goods and services move internationally and significantly shape global economic activity by influencing production, employment, prices, and investment decisions. The nature of international trade policies reflects a country's economic priorities, development stage, and geopolitical strategy. Broadly, such policies range from free trade and liberalization to protectionism and strategic intervention, each affecting global markets differently. The scope of international trade policies is extensive and includes tariff measures, non-tariff barriers, export incentives, trade agreements, customs regulations, and exchange-rate management. Tariffs directly affect the prices of imported goods, thereby influencing consumer demand and domestic production. Non-tariff barriers, such as quotas, standards, and licensing requirements, regulate trade volumes and market access. Export promotion policies, including subsidies and tax incentives, enhance the competitiveness of domestic firms in international markets and contribute to higher foreign exchange earnings (Salvatore, 2020).

Trade liberalization has become a dominant feature of modern trade policy, particularly since the establishment of multilateral institutions such as the World Trade Organization. Liberalization policies aim to reduce trade barriers gradually, integrate national economies into global markets, and promote efficiency through competition. Empirical evidence suggests that countries adopting open

trade regimes experience higher economic growth, technological diffusion, and productivity gains (Krugman, Obstfeld, & Melitz, 2018). Conversely, protectionist policies are often adopted to safeguard infant industries, protect employment, or address trade imbalances, though they may distort markets and invite retaliatory actions. International trade policies also play a crucial role in shaping global value chains (GVCs). In today's interconnected world, production processes span multiple countries, making trade policies a key determinant of supply-chain efficiency. Changes in tariffs or trade agreements can disrupt these networks, affecting costs and output across regions (World Trade Organization, 2023). Thus, trade policies extend beyond national borders and exert systemic effects on global economic activity.

International trade policies have a significant and often immediate impact on share market performance, as financial markets are highly sensitive to policy changes that affect corporate earnings and economic expectations. Share markets respond to trade policies through multiple transmission channels, including changes in production costs, export demand, profitability, and overall macroeconomic conditions. As a result, trade policy announcements frequently lead to fluctuations in stock prices, returns, and volatility. Trade liberalization policies generally have a positive influence on share markets. Reduction in tariffs and trade barriers improves access to international markets, lowers input costs, and enhances firm-level efficiency. Export-oriented companies benefit from increased demand and improved competitiveness, leading to higher earnings and positive stock returns. Studies have shown that liberal trade regimes attract foreign portfolio investment, increase market liquidity, and reduce the cost of capital, thereby strengthening stock market performance (Bekaert et al., 2011). In contrast, protectionist trade policies tend to increase uncertainty and market volatility. The imposition of tariffs, trade sanctions, or restrictive quotas raises production costs and disrupts global supply chains, negatively affecting corporate profitability. Empirical research on trade wars indicates that equity markets react negatively to protectionist measures, particularly for firms with high exposure to international trade (Caldara et al., 2020). Such policies often result in lower stock returns and heightened volatility due to uncertainty about future trade relations.

Investor sentiment is another critical channel through which trade policies influence share markets. Favorable trade agreements and liberalization signals enhance investor confidence and risk appetite, leading to bullish market behavior. Conversely, ambiguous or aggressive trade policies generate pessimism, prompting investors to shift toward safer assets. Political and trade policy uncertainty has been found to increase risk premia and suppress equity valuations (Pastor & Veronesi, 2013). Moreover, the impact of trade policies on share markets varies across sectors. Export-oriented industries such as manufacturing, technology, and automobiles are more sensitive to trade policy changes than domestically focused sectors. Therefore, international trade policies not only affect overall market indices but also reshape sectoral performance within the share market.

Conclusion:

From the above discussion, it can be concluded that international trade policies are multidimensional in nature, influencing trade flows, investment patterns, industrial growth, and overall macroeconomic stability. These policies significantly affect share market performance by shaping corporate profitability, stock returns, market volatility, and investor sentiment. Trade liberalization generally supports positive market

outcomes through enhanced competitiveness and increased foreign investment, whereas protectionist measures and policy uncertainty tend to heighten volatility and reduce returns. In an increasingly globalized and interconnected financial environment, stable, transparent, and growth-oriented trade policies are crucial for sustaining share market stability and long-term investor confidence.

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India's Vision 2047 for Inclusive and Sustainable Economic Growth.

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Abstract:

India's aspiration for inclusive and sustainable economic growth by 2047, the centenary of its independence, is a multifaceted and ambitious endeavor that necessitates a comprehensive understanding of its historical context, current challenges, and potential pathways. This goal is not merely about achieving high GDP growth rates, but about ensuring that the benefits of this growth are widely shared across all segments of society and that the development trajectory is environmentally sound and resilient for future generations. India is embarking on an ambitious journey to transform into a developed nation by 2047, the centenary of its independence. This vision, encapsulated by the "Viksit Bharat" initiative, extends beyond mere economic metrics to encompass holistic development across social, environmental, and governance domains, aiming for inclusive and sustainable growth.

The Vision and its Pillars:

The overarching vision of Viksit Bharat is to establish India as a global leader with high living standards for its citizens and equitable growth for all. This includes achieving a substantial GDP of USD 30-40 trillion and a per capita income of USD 15,000-18,000 by 2047. The initiative is built upon several key pillars:

- **Yuva (Youth), Garib (Poor), Mahilayen (Women), and Annadata (Farmers):** These represent the core demographic and occupational groups whose empowerment is central to India's development.
- **Economic Prosperity:** Focusing on a thriving and sustainable economy, with targets for GDP and per capita income growth.
- **Social Advancement:** Aiming for zero poverty, universal quality education and healthcare, and addressing social inequalities.
- **Environmental Sustainability:** Committing to net-zero carbon emissions, green growth, and climate resilience.
- **Good Governance:** Establishing transparent, efficient, and citizen-centric systems.
- **Global Leadership:** Positioning India as a leader in technology, innovation, and international influence.

Economic Growth Projections and Requirements:

To achieve the ambitious economic targets, India needs to sustain a high annual GDP growth rate, estimated to be between 7-10% over the next two to three decades. The World Bank suggests an average growth rate of 7.8% annually over the next 22 years to reach high-income status by 2047. Key economic drivers include:

- **Manufacturing and Services Sectors:** These are expected to contribute significantly to GDP growth. India's unique

trajectory has seen a direct shift from an agrarian to a service-led economy, largely bypassing traditional industrialization stages.

- **Exports:** A significant expansion in exports is considered vital for economic growth.
- **Infrastructure Development and Investment:** Substantial investment in physical and digital infrastructure is essential to fuel economic expansion.
- **Digital Transformation and Technological Innovation:** Integrating these across all sectors is critical for sustained economic progress.

Strategies for Inclusive and Sustainable Growth:

India's strategy for achieving Viksit Bharat 2047 involves a multi-faceted approach, integrating economic, social, and environmental considerations:

1.Accelerating the Core Economy:

- **Digital Technologies and Data:** Leveraging data and advanced analytics to streamline processes enhance capabilities in pricing, marketing, and decision-making. Digital transformations have been common accelerators for growth champions, particularly in financial services, IT, and healthcare. Initiatives like Digital India aim to expand internet access, promote digital literacy, and enhance e-governance.
- **Agile Resource Reallocation:** Companies that expand by maintaining or increasing exposure to fast-growing, profitable segments outperform peers. This includes reallocating resources across segments, geographies, channels, or timing, often with a microscopic view of opportunities.
- **Investing in Leadership Development:** Empowering leadership throughout the organization enhances operational efficiency and allows top executives to focus on strategic initiatives, fostering innovation and growth.

2.Looking Beyond Core Business:

- **Pursuing Adjacent Opportunities:** Utilizing existing assets and capabilities to venture into new market segments, as demonstrated by an industrial switchgear producer expanding into consumer durables.
- **Creating New Breakout Businesses:** This involves disruptive innovation and establishing newer categories, requiring a commitment to innovation, understanding customer needs, and a willingness to embrace change through a fail-fast model. An example is a healthcare organization expanding from a single hospital to a full spectrum of healthcare services.
- **Building New Export Markets Worldwide:** Companies with strong local growth can find international success with a clear competitive advantage, benefiting from lower production costs and skilled labor. India aims for $2 trillion in exports by 2030.
- **Strategic Mergers and Acquisitions (M&A):** M&A can be powerful tools for growth, with growth champions undertaking substantial M&A activity to build organizational capabilities and integrate businesses successfully.

3.Social Development and Inclusion:

- **Education and Skill Development:** Achieving 100% literacy, implementing the National Education Policy (NEP) 2020, and equipping the youth with relevant skills through initiatives like the Skill India Mission.
- **Healthcare:** Providing universal access to high-quality, affordable healthcare services,

and increasing life expectancy through programs like Ayushman Bharat.

- **Poverty Reduction and Social Inclusion:** Aiming for zero poverty through inclusive development, financial empowerment, and targeted programs for women and tribal communities. Schemes like Jan Dhan Yojana and PM KISAN are crucial for financial empowerment and farmer support.
- **Women's Empowerment:** Promoting women's leadership through reservations in legislative bodies, financial inclusion initiatives like Jan Dhan accounts, and schemes like PM Mudra Yojana.

4.Environmental Sustainability and Green Economy:

- **Net-Zero Carbon Emissions:** Promoting sustainable and green growth across all sectors.
- **Renewable Energy:** Expanding renewable energy capacity, with India now being the 4th largest in installed renewable energy capacity globally. Initiatives like the Global Biofuel Alliance, GOBARdhan scheme, and PM-KUSUM empower farmers with solar energy solutions.
- **Climate Resilience:** Integrating climate policy into mainstream economic planning, advocating for a green industrial strategy, carbon budgeting, and investment in adaptive infrastructure.
- **Green Economy:** Balancing growth with sustainability by reducing pollution, saving energy, and protecting natural resources. This includes promoting green practices in agriculture, waste-to-energy projects, and energy-efficient housing.

5.Governance Reforms and Enabling Environment:

- **Ease of Doing Business:** Streamlining regulations, reducing compliance burdens, and fostering a business-friendly ecosystem through initiatives like the Government e-Marketplace (GeM).
- **Digital Governance and Transparency:** Leveraging technology to improve public service delivery and reduce corruption, exemplified by the Direct Benefit Transfer (DBT) scheme.
- **Strengthening Institutions:** Upholding the rule of law and ensuring a stable and predictable environment conducive to development.

Challenges and Expert Perspectives:

While the vision is ambitious, it faces several challenges:

- **Middle-Income Trap:** Sustaining high growth rates to avoid stagnation after reaching a certain income level.
- **Inequality and Job Creation:** Addressing persistent income inequality, the rural-urban divide, and creating sufficient high-quality job opportunities for a large workforce.
- **Investment Mobilization:** Attracting significant domestic and foreign capital for infrastructure and other key sectors.
- **Global Headwinds:** Navigating global trade policy uncertainty, rising protectionism, and geopolitical tensions.
- **Structural Impediments:** Addressing issues like judicial efficiency, credit market access, and trade openness.

Despite these challenges, experts and institutions like NITI Aayog, the World Bank, and the IMF express confidence in India's potential, provided it maintains sustained high economic growth and implements deep structural reforms. The consensus is that the Viksit Bharat vision is achievable with a strong focus on manufacturing, services, exports, infrastructure, and technological innovation, coupled with inclusive and sustainable development practices.

Conclusion:

Viksit Bharat 2047 is a comprehensive blueprint for India's future, aiming for a technologically advanced, environmentally sustainable, and socially inclusive nation. It requires a collaborative approach involving the government, private sector, and active citizen participation to navigate complexities and ensure that the benefits of growth are shared by all. By integrating efficiency, equity, and sustainability, India aims to become not just richer, but also more resilient and ecologically secure, serving as a global mentor for shared prosperity in the 21st century.

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Reunderstanding the City: Poverty, Survival, and Urban Spaces in Mistry's Mumbai

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Abstract:

Rohinton Mistry's fiction presents Mumbai not merely as a backdrop but as a living, breathing character that encapsulates the contradictions of postcolonial urban life. His works particularly Such a Long Journey (1991), A Fine Balance (1995), and Tales from Firozsha Baag (1987) foreground the intersection of poverty, survival, and resilience in the city. Mistry's Mumbai is a space of contestation where dreams of progress and modernity collide with the stark realities of slums, unemployment, and socio-political disillusionment. Through his characters, Mistry maps the precarious lives of the marginalized, whose struggles for dignity unfold against the pressures of caste, class, and political corruption. The city's streets, chawls, and cramped apartments become symbolic sites of both despair and endurance, shaping individual destinies in profound ways.

This chapter argues that Mistry rewrites Mumbai as a fragmented urban landscape, where survival becomes a form of resistance and poverty a shared, though unequally distributed, condition of existence. His narrative technique interweaving irony, empathy, and historical detail renders visible the hidden geographies of the city, exposing systemic inequalities while celebrating human resilience. By examining the socio-political undercurrents of Mistry's Mumbai, the chapter highlights how the novelist negotiates between local specificities and universal human struggles, situating his work within the broader discourse of postcolonial urban literature. Ultimately, Mistry's reimagining of Mumbai challenges the sanitized narratives of modernization, offering instead a poignant critique of survival amidst poverty in one of the world's most dynamic yet unequal cities.

Keywords: Mumbai, Poverty, Survival, Urban Spaces, Postcolonial Literature

Introduction:

Rohinton Mistry, born in Bombay in 1952 into a Parsi family, has emerged as one of the most distinctive voices in contemporary literature. Growing up in a minority community that has historically played a significant role in the city's economic and cultural life, Mistry absorbed the complex realities of urban existence in postcolonial India. His migration to Canada in 1975 marked a turning point, positioning him as a diasporic writer who was both deeply rooted in Indian social realities and yet distanced enough to view them with a nuanced critical lens. After initially studying mathematics and economics at the University of Bombay, Mistry turned toward literature at the University of Toronto, where his talent flourished. His early collection *Tales from Firozsha Baag* (1987) offers glimpses into the everyday struggles and aspirations of Parsis in a Bombay apartment complex, while his later works *Such a Long Journey* (1991), *A Fine Balance* (1995), and *Family Matters* (2002) situate individual lives against broader political upheavals, exploring themes of poverty, marginalization, and survival. Critics like Morey have argued that Mistry's novels consistently "articulate the predicament of ordinary lives

caught in the turbulence of national politics and social decay" (Morey 3).

This highlights how Mistry combines personal narratives with political commentary, making the individual's experience inseparable from the larger socio-political context. It underscores his focus on ordinary characters whose lives reflect systemic inequalities and social pressures. Morey's assessment emphasizes that the novels are not just stories of personal struggle but also critiques of societal structures. Ultimately, it shows that Mistry's work humanizes historical and political forces, showing how they shape the everyday realities of marginalized communities.

Central to Mistry's fiction is the presence of Mumbai, not as a passive backdrop but as an active participant in shaping destinies. The city becomes a character in its own right, embodying contradictions of decay and vitality, oppression and endurance. In *A Fine Balance*, the urban setting is described with haunting detail,

"the warren of laneways in the sordid belly of the city, dilapidated buildings… kholis that looked like subterranean burrows… smelly cubicles" (Mistry, *A Fine Balance* 66–67).

The imagery here emphasizes not only the physical deterioration of urban spaces but also the dehumanizing conditions that define the lives of the poor. For Mistry, Mumbai's slums, chawls, and narrow alleyways are not neutral spaces; they are deeply inscribed with class hierarchies and political neglect. In *Family Matters*, the city is similarly depicted as both resilient and fragile, described as a place that,

"endures because it gives and it receives," despite facing "floods, disease, plague, water shortage, bursting drains and sewers, all the population pressures" (Mistry, *Family Matters* 152).

The endurance of the city becomes a metaphor for the resilience of its inhabitants, reflecting a paradox of survival amidst systemic collapse.

Placing Mistry within the larger tradition of the "Bombay novel" helps illuminate the centrality of the city in his narratives. As Minerva observes, Mistry's Bombay novels reveal the city as,

"a nuanced site produced through the interactions between memory, personal and public histories, and power relationships" (Minerva 95).

Unlike metropolitan centers in Western urban fiction, Mumbai in Mistry's work is defined by its fractured social fabric, where histories of colonialism, caste discrimination, political authoritarianism, and economic inequality converge. The Emergency of the 1970s, for example, casts a long shadow over *Such a Long Journey* and *A Fine Balance*, exposing the ways in which state power permeates even the most intimate aspects of urban life. Sorensen has argued that Mistry's use of realism allows him to resist the,

"aestheticization of hybridity" common in postcolonial criticism, insisting instead on representing "the lived realities of poverty and political oppression" (Sorensen 243).

This emphasizes that Mistry prioritizes authentic representation over stylized or romanticized portrayals of culture. By focusing on the tangible hardships faced by his characters, he foregrounds social and political realities rather than abstract postcolonial theory. Sorensen's point also highlights how realism functions as a critical tool, allowing Mistry to interrogate systemic oppression without losing the individual human perspective. Ultimately, it demonstrates that Mistry's fiction merges aesthetic craft with ethical concern, giving voice to those marginalized by history and politics.

Moreover, Mistry's diasporic perspective infuses his writing with a dual consciousness. While he writes about Mumbai with intimacy, he

also views it from a distance that enables critical reflection. Gopal suggests that Mistry's narratives combine "an ethics of memory with an attention to the everyday," thereby transforming the city into a space where historical trauma and daily endurance coexist (Gopal 182). This duality allows Mistry to capture Mumbai's complex identity at once a site of suffering and a repository of resilience. His characters, whether navigating the indignities of poverty or the restrictions of communal identity, are always situated in relation to the larger urban forces that shape their existence.

Thematically, Mistry's engagement with Mumbai also highlights intersections of caste, class, and community. While the Parsi background informs several of his protagonists, his narratives are not confined to minority representation; rather, they extend to broader issues of marginalization in the Indian metropolis. In *A Fine Balance*, the lives of tailors Ishvar and Omprakash, migrants from a lower-caste background, intersect with the struggles of other marginalized figures in a city hostile to their survival. As Morey notes, Mistry's fiction persistently interrogates,

"the inescapable entanglement of personal narratives with larger histories of political corruption and social violence" (Morey 45).

Mumbai, in this sense, becomes not just a city but a crucible where the forces of modernity and tradition, power and resistance, converge.

Thus, Mistry's rewriting of Mumbai challenges sanitized narratives of modernization and progress that often dominate representations of Indian cities. By foregrounding poverty, corruption, and endurance, his fiction offers a more nuanced and critical portrait of urban life. The city in Mistry's novels is a contested terrain, shaped by both systemic oppression and human resilience. Through realism, empathy, and historical consciousness, Mistry situates Mumbai within the discourse of postcolonial urban literature, making it a character that is as complex and compelling as any of his protagonists. This chapter will therefore examine how poverty, survival, and urban spaces are rewritten in Mistry's vision of Mumbai, foregrounding the ways in which the city embodies both oppression and endurance.

Poverty and Marginality in the City:

Rohinton Mistry's fiction renders a powerful social cartography of Mumbai by foregrounding poverty and marginality as defining features of the city's identity. The city is not merely a backdrop but a lived environment where the marginalized constantly negotiate space, dignity, and survival. Through the representation of slums, chawls, and street life, Mistry captures the fragility of existence for those living at the edges of the urban order. In *A Fine Balance*, the jhopadpattis (slums) become symbolic of impermanence structures that are erected with hope but can be demolished overnight at the behest of the state (Mistry 146). These slums, populated by migrants from rural areas, embody the paradox of Mumbai: a city of dreams built upon the despair of the displaced. The chawls, by contrast, signify both community and confinement. They are spaces where kinship ties, gossip, and solidarity coexist with overcrowding, poor sanitation, and constant tension. Such dwellings serve as metaphors for the restricted social mobility of the poor, trapped within cycles of deprivation despite their proximity to the affluence of South Bombay (Patel 83). This citation emphasizes that chawls are complex social spaces, simultaneously nurturing relationships and exposing structural limitations. Patel's observation shows how spatial arrangements reinforce class divisions, limiting opportunities for upward mobility. The coexistence of solidarity and confinement

highlights the contradictions inherent in urban life, where communal bonds provide support yet cannot fully offset economic and social constraints. Ultimately, this underscores Mistry's interest in the interplay between environment, social structure, and human experience in the city.

Street life in Mistry's narratives offers another crucial lens into marginality. Beggars with mutilated bodies, barefoot children scavenging for food, and hawkers who occupy contested pavements all populate his urban landscape. These figures are not presented merely as victims but as part of the city's economic ecosystem, where survival is tied to improvisation and resilience (Chambers 112). In *Such a Long Journey*, Mistry highlights how those on the street live on the peripheries of legality and morality, often dependent on the benevolence—or exploitation of others. Here, poverty is not only an economic condition but also a political one, shaped by the corruption, indifference, and inefficiency of state institutions.

Economic inequality emerges in Mistry's fiction as a structural reality that shapes survival. The vast gap between the city's rich and poor is dramatized in the contrasting lives of characters: the middle-class striving for respectability in *Such a Long Journey*, the itinerant tailors Ishvar and Om in *A Fine Balance*, and the wealthy landlords who exploit them. The desperation of the poor to secure livelihood reflects the lack of social safety nets in urban India (Williams 138). This inequality is further reinforced by caste-based exclusion, as Ishvar and Om's past as Dalit leather workers continues to mark them even in the city's supposedly anonymous labor market. Poverty, therefore, is not accidental; it is reproduced through caste, class, and systemic injustice.

Mistry also illustrates how poverty shapes the imagination of the city as both a place of aspiration and disillusionment. For many characters, Mumbai is a city of possibility a space where hard work might lead to survival, if not prosperity. Yet, their struggles repeatedly reveal that the promise of modernity is illusory for those at the bottom. Dina Dalal's constant battle to maintain her independence through tailoring contracts encapsulates this paradox: her resilience testifies to the human spirit, but her vulnerability underscores the cruelty of urban poverty (Mistry 214). The networks of solidarity she builds with Ishvar, Om, and Maneck demonstrate that while poverty produces precarity, it also fosters alternative communities of care and survival.

Through his sustained focus on slums, chawls, and street life, Mistry critiques the structural inequalities that underpin Mumbai's urban imagination. Poverty and marginality are not depicted as peripheral but as central to the functioning of the city itself. By bringing the stories of the marginalized to the forefront, Mistry challenges the celebratory discourse of Mumbai as a "city of dreams," instead revealing it as a city of fractured lives and contested spaces.

Survival and Human Endurance:

Survival in Rohinton Mistry's fiction extends beyond mere physical subsistence to encompass psychological resilience, moral integrity, and social negotiation. His marginalized characters inhabit spaces that are frequently unstable slums, chawls, and overcrowded tenements where the struggle to endure is both constant and multifaceted. In *A Fine Balance*, Ishvar and Omprakash endure the compounded effects of caste-based discrimination, economic precarity, and sudden political upheaval during the Emergency (Mistry 123). Their daily existence involves negotiating exploitative employers, unpredictable landlords, and public indifference, highlighting the fragility of life in a city structured by inequality. Similarly, Dina Dalal's struggle to maintain her tailoring business

exemplifies the gendered dimensions of survival, where economic independence is continuously threatened by societal and patriarchal pressures (Mistry 214). In these narratives, Mistry portrays survival as a multidimensional process involving not only food, shelter, and income but also dignity, autonomy, and the preservation of ethical and social values.

Strategies of resilience in Mistry's works are equally varied and deeply human. The itinerant tailors rely on informal networks of solidarity with other laborers, sharing housing, work opportunities, and emotional support (Williams 140). Maneck's care for elderly neighbors and his friendships across social strata further illustrate the importance of community bonds in sustaining both morale and material survival. In *Such a Long Journey*, the middle-class characters also demonstrate adaptive strategies, negotiating bureaucratic corruption and economic stress while striving to maintain personal integrity (Chambers 118). Mistry's narratives suggest that endurance is not passive; it requires constant ingenuity, emotional resourcefulness, and collective action. The marginalized thus become agents of their own survival, even in the face of structural oppression and social exclusion.

Moreover, Mistry emphasizes the moral and spiritual dimensions of endurance. The characters' ethical choices such as Ishvar and Om's refusal to compromise their labor ethics despite economic pressure, or Dina's commitment to fairness and care demonstrate that survival is inseparable from human dignity and solidarity (Morey 125). In this sense, resilience is both pragmatic and principled, reflecting a broader human capacity to adapt without surrendering moral integrity. The city of Mumbai, though harsh and unforgiving, serves as a crucible in which such qualities are forged. It is both antagonist and teacher, shaping its inhabitants through adversity while providing the space for resilience and mutual support to flourish.

Ultimately, Mistry's depiction of survival and human endurance illustrates the interdependence of poverty, marginality, and urban life. His characters' struggles reveal how systemic inequality forces marginalized individuals into daily negotiations of space, labor, and dignity, yet simultaneously allows for moments of resistance, care, and moral triumph. By foregrounding these experiences, Mistry critiques structural injustice while celebrating the extraordinary capacity of ordinary people to endure, adapt, and preserve their humanity in a city that is at once oppressive and sustaining.

Urban Spaces as Sites of Power and Resistance:

In Rohinton Mistry's fiction, urban spaces such as Mumbai are not neutral settings but arenas where power, oppression, and resistance intersect. The city is portrayed as a contested and fragmented space, where caste, class, and political structures constantly shape the experiences of its inhabitants. In *A Fine Balance*, the marginalization of Ishvar and Omprakash is reinforced not only by poverty but also by their caste identity as Dalits, which limits access to labor markets and social mobility even in ostensibly modern urban settings (Mistry 131). Similarly, Dina Dalal's negotiation of her professional and personal space demonstrates how middle-class women must navigate patriarchal and economic power dynamics simultaneously, revealing the multi-layered nature of domination in urban life (Mistry 215). This highlights that Mistry portrays women as active agents negotiating structural constraints rather than passive victims. Dina's struggles illustrate the intersection of gender, class, and social expectation, showing how multiple forms of oppression coexist in urban contexts. The citation

underscores Mistry's attention to nuanced power dynamics that shape everyday life for women in the city. Ultimately, it demonstrates that urban marginality and resilience are not limited to economic deprivation but also involve navigating social hierarchies and patriarchal pressures.

Mumbai's physical and social geography reflects these inequalities. Slums, chawls, and marginalized neighborhoods are sites where structural exclusion is visible, while more affluent districts symbolize the concentration of power and privilege. Morey notes that Mistry's novels illustrate the city as,

"a microcosm of India's hierarchical society, where spatial arrangements reproduce social inequalities" (Morey 118).

The spatial fragmentation of Mumbai, with its stark contrasts between wealth and destitution, underscores how urban environments enforce social hierarchies and shape daily encounters between individuals from different social strata.

Yet, these same urban spaces also become arenas of resistance. Characters in Mistry's fiction often assert agency through subtle acts of defiance, improvisation, and solidarity. Ishvar and Omprakash's persistence in maintaining their skills and ethical labor practices, despite systemic exploitation, represents a form of everyday resistance (Williams 141). Street-level interactions, communal support networks, and the resilience of chawl residents collectively challenge the domination imposed by economic elites and state structures. Scholars like Chambers have argued that Mistry's urban landscapes reveal,

"the city as a site of both oppression and negotiation, where human agency persists even under extreme conditions" (Chambers 119).

Mistry portrays the city not only as a space of structural inequality but also as a site where marginalized individuals exercise agency. Chambers' observation highlights how community bonds and everyday acts of resistance enable residents to negotiate oppressive circumstances. The citation underscores the duality of urban life, combining constraint with resilience. Ultimately, it reflects Mistry's nuanced vision of Mumbai as both a site of domination and a stage for human endurance and solidarity.

In this sense, Mumbai in Mistry's novels is both a mirror and a battleground. It mirrors the socio-political hierarchies of postcolonial India and simultaneously serves as a space where marginalized individuals and communities navigate, resist, and sometimes subvert these hierarchies. The city's fragmentation, marked by economic disparity, caste discrimination, and political control, underscores the complexities of urban power, while its crowded streets, shared spaces, and informal economies provide avenues for resilience, negotiation, and collective survival. By rendering Mumbai as both oppressive and contested, Mistry emphasizes the interplay between structural power and human agency in urban life.

Narrative Techniques and Urban Realism:

Rohinton Mistry employs a range of narrative techniques to depict Mumbai with remarkable realism, blending irony, empathy, and meticulous historical detail to construct the city as a living, breathing entity. His use of irony often highlights the contradictions of urban life, exposing disparities between social ideals and lived realities. In *Such a Long Journey*, for example, the optimism of characters striving for personal and professional stability is constantly undermined by political corruption, bureaucratic inefficiency, and communal tension (Mistry 78). This ironic treatment allows Mistry to critique both the state and the social structures that perpetuate inequality while preserving the humanity of his characters.

Empathy is another hallmark of Mistry's urban realism. By providing intimate access to the thoughts, struggles, and emotions of characters from diverse social backgrounds, he humanizes individuals often rendered invisible in broader discourses about the city. In *A Fine Balance*, the narrative voice shifts seamlessly between the perspectives of Ishvar, Omprakash, Dina, and Maneck, creating a polyphonic portrayal of urban life that underscores both shared vulnerabilities and individual aspirations (Morey 123). Through empathetic narration, the reader experiences Mumbai not only as a spatial setting but also as a social and emotional landscape, where suffering, resilience, and hope coexist.

Historical detail further enriches Mistry's depiction of the city, situating personal narratives within larger socio-political contexts. The Emergency, the rise of urban slums, and migration patterns from rural India are intricately woven into the storylines, lending authenticity and depth to the depiction of Mumbai (Williams 139). These historical references enable the reader to understand the structural forces shaping urban life, from caste and class inequalities to state policies that influence access to housing, employment, and basic resources.

Mistry also exposes the hidden geographies of Mumbai, spaces often overlooked or marginalized in official narratives. By focusing on slums, chawls, narrow alleyways, and street markets, he reconstructs a city that exists beyond maps, statistics, and media portrayals. Critics such as Chambers have noted that Mistry's urban realism,

"reveals the invisible and often ignored terrains of the city, giving voice to the marginalized and illuminating the social mechanisms that sustain inequality" (Chambers 115).

In doing so, Mistry transforms the city into a site of both observation and ethical engagement, where readers are invited to confront the lived realities of urban marginality while appreciating the agency and resilience of its inhabitants.

Through irony, empathy, historical detail, and attention to hidden urban geographies, Mistry's narrative techniques effectively capture the complexity, contradictions, and humanity of Mumbai. His urban realism does not merely describe the city but interrogates it, portraying it as a contested and dynamic space where social, political, and personal forces continuously intersect.

Conclusion:

Rohinton Mistry's fiction presents Mumbai not merely as a geographical location but as a complex, living entity that embodies the city's social, economic, and political contradictions. Through his narratives, Mumbai emerges simultaneously as a local, lived environment and a universal symbol of urban struggle, resilience, and human complexity (Morey 118). *This demonstrates how Mistry captures both the specific realities of the city and the broader human experience, making his urban portrayal relatable to audiences beyond India.* By focusing on slums, chawls, and the daily experiences of marginalized individuals, he emphasizes how caste, class, and political forces intersect to shape the lives of the city's inhabitants (Williams 141). *This highlights that social hierarchies and systemic inequalities are central to understanding both individual and collective experiences in urban life.*

Mistry's depiction of Mumbai also functions as a critique of modernization and the uneven distribution of its benefits. While the city is often idealized in popular discourse as a "city of dreams," his novels reveal a contrasting reality where rapid urbanization coexists with deep poverty, overcrowding, and systemic neglect (Chambers 119). *This underscores that*

modernization, without equitable planning and social support, can exacerbate existing inequalities rather than resolving them. Historical contexts, such as the Emergency depicted in *A Fine Balance*, further illustrate how structural and political oppression shapes everyday survival, rendering the struggle for livelihood, dignity, and autonomy an ongoing and precarious process (Mistry, *A Fine Balance* 256). *This citation situates the narrative in a concrete historical framework, showing how political events directly impact the marginalized in the city.*

Ultimately, Mistry's rewriting of Mumbai achieves both a sense of local specificity and universal relevance. While deeply rooted in the socio-political realities of postcolonial India, his narratives transcend geographical boundaries, resonating with readers worldwide who are familiar with themes of inequality, displacement, and urban transformation. The city, as depicted in his fiction, becomes both a site of oppression and a space of human endurance, where resilience, solidarity, and moral integrity allow marginalized individuals to negotiate and sometimes resist the structural forces shaping their lives. *This emphasizes that despite systemic challenges, human agency and communal networks remain central to survival and ethical living, reflecting Mistry's nuanced vision of urban life.*

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Artificial Intelligence and Its Impact on E-Commerce Growth

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Abstract:

This study examines the impact of Artificial Intelligence on e-commerce growth, highlighting its role in enhancing customer experience, increasing sales, and improving decision-making for e-commerce businesses. AI technologies such as personalized recommendation systems, chat bots, dynamic pricing, predictive analytics, and intelligent inventory management enable businesses to better understand customer behavior and optimize their operations. The paper also discusses the role of AI in supporting marketing strategies, customer service, logistics, and fraud detection, which collectively contribute to improved competitiveness and profitability. However, the adoption of AI in e-commerce presents several challenges, including high implementation costs, data privacy and security concerns, lack of skilled professionals, system integration complexities, ethical issues, and rapid technological changes. The study concludes that while AI offers immense opportunities for e-commerce growth, addressing these challenges through strategic planning and responsible implementation is essential for achieving sustainable and long-term success. The paper focuses on the Artificial Intelligence and Its Impact on E-Commerce Growth.

Keywords: Artificial intelligence, E-commerce, Use AI in E-commerce, Role of AI for E-commerce Businesses, Artificial Intelligence and Its Impact on E-Commerce Growth, Challenges of Using AI in E-commerce

Introduction:

Artificial Intelligence has become one of the most influential technologies driving the growth of the e-commerce industry. With the rapid expansion of internet usage, digital payments, and online shopping platforms, e-commerce businesses are increasingly adopting AI-based solutions to improve efficiency and customer engagement. AI enables machines and software systems to learn from data, recognize patterns, and make intelligent decisions, allowing e-commerce companies to better understand consumer behavior and market trends.

In the e-commerce sector, AI is used in areas such as personalized product recommendations, customer service chatbots, dynamic pricing, demand forecasting, and fraud detection. These applications help businesses enhance customer experience, increase sales, reduce operational costs, and improve overall business performance. By analyzing large volumes of real-time data, AI supports data-driven decision-making and enables companies to respond quickly to changing customer needs and competitive pressures.

As competition in the online marketplace continues to intensify, Artificial Intelligence plays a crucial role in helping e-commerce businesses achieve sustainable growth. This study focuses on understanding the impact of AI on e-commerce growth, highlighting its benefits, applications, and importance in shaping the future of digital commerce.

Objectives of the Study:

1. To Study the concept of e-commerce.
2. To understand the present status of e-commerce.
3. To study the impact of artificial intelligence in e-commerce.
4. To find out the major role of artificial intelligence in e-commerce.
5. To provide valid suggestion on artificial intelligence in e-commerce.

Research Methodology:

This research paper is conducted by using secondary data for research using, various web Sites, research articles, and various reports through websites, online journals, news Articles, and other internet sources.

What is E-Commerce?

E-commerce is when individuals and companies buy or sell goods and services over the internet. E-commerce can happen through a website, smartphone app, social media platform, online marketplace, or other sales platform.

E-commerce is also known as e-commerce or electronic commerce, and is often used to refer to the wide range of tasks involved in selling online, from running digital ads to transferring payment data over a network.

What is Artificial Intelligence?

Artificial Intelligence is a technology that enables machines and computers to perform tasks that typically require human intelligence. It helps systems learn from data, recognize patterns and make decisions to solve complex problems. It is used in healthcare, finance, e-commerce and transportation offering personalized recommendations and enabling self-driving cars.

Artificial Intelligence is a branch of computer science that focuses on creating machines or software capable of performing tasks that normally require **human intelligence.**

Future of AI:

Artificial Intelligence is considered the future of e-commerce because it offers businesses advanced tools to enhance customer experience and increase sales. Through the use of AI in e-commerce, companies can personalize products and services, optimize pricing strategies, improve search functions, and strengthen logistics and delivery operations. AI enables businesses to analyze real-time data and gain valuable insights, helping them make better decisions and respond quickly to changing market trends. By providing an easy and personalized shopping experience, AI increases customer satisfaction and loyalty. Overall, artificial intelligence is transforming the e-commerce industry by making it more efficient, customer-focused, and profitable.

How to Use AI in E-commerce?

1. Develop a strategy

Start by identifying the key areas where AI can have the most significant impact on your business. Consider your goals, challenges, and resources, and priorities the AI applications that align with your strategic objectives.

Identify key areas that align with your business goals

Once you've developed your AI strategy, focus on the specific use cases that will drive the most value for your business. This may include personalisation, customer service, logistics, or pricing optimisation.

Seek external expertise

If you don't have in-house AI expertise, consider partnering with experienced AI vendors or consultants. They can help you select the right technologies, integrate AI into your existing

systems, and provide ongoing support and maintenance.

Build a comprehensive solution

Develop a comprehensive AI solution that encompasses data collection, processing, analysis, and action. Ensure that your AI system is scalable, secure, and compliant with relevant regulations and industry standards.

Role of AI for E-commerce Businesses Growth:

1. **Personalised Customer Experience**: AI analyzes customer behavior, preference and purchase history to offer personalized product recommendation, improving customer satisfaction and loyalty.
2. **Improved Product Recommendation**: AI-powered recommendation systems suggest relevant products to customers, increasing cross-selling and up-selling opportunities and boosting sales.
3. **Efficient Customer Support**: AI chat bots and virtual assistants provide 24/7 customer support, quickly resolving customer queries and reducing response time and operational costs.
4. **Accurate Demand Forecasting:** AI helps e-commerce businesses predict customer demand by analyzing past sales data and market trends, leading to better inventory planning.
5. **Inventory Management Optimization:** AI reduces overstocking and stock-outs by optimizing inventory levels, ensuring product availability and minimizing storage costs.
6. **Dynamic Pricing Strategies:** AI enables dynamic pricing by adjusting product prices based on demand, competition, customer behavior, and market conditions in real time.
7. **Fraud Detection and Prevention:** AI systems detect unusual or suspicious transaction patterns, helping prevent online fraud and ensuring secure payment processes.
8. **Enhanced Marketing Campaigns: AI** helps in targeting the right audience by analyzing customer data, improving the effectiveness of digital marketing campaigns and increasing conversion rates.
9. **Visual Search and Voice Search: AI**-powered visual and voice search technologies allow customers to find products easily, improving convenience and user experience.
10. **Operational Efficiencies and Cost Reduction: Automation** of routine tasks such as order processing, customer service, and data analysis reduces human errors and operational costs.
11. **Better Decision-Making:** AI provides valuable insights from large datasets, enabling e-commerce businesses to make data-driven and strategic business decisions.
12. **Increased sales and Revenue**: By improving customer experience, marketing accuracy, and operational efficiency, AI ultimately helps increase sales and overall revenue.

Artificial Intelligence and Its Impact on E-Commerce Growth:

1. **Enhanced Customer Experience:** Artificial Intelligence helps e-commerce companies provide a personalized shopping experience by analyzing customers' interests, browsing patterns, and past purchases. Based on this analysis, AI recommends suitable products, which improves customer satisfaction, builds loyalty, and encourages repeat buying.
2. **Increased Sales and Revenue**: AI-supported features such as product recommendations, dynamic pricing, and customized offers influence customer purchasing decisions. These technologies help increase conversion rates, resulting in higher sales and overall revenue growth for e-commerce businesses.

Efficient Customer Support: AI-powered chat bots and virtual assistants offer round-the-clock customer service by responding to customer queries instantly. This reduces waiting time, improves service efficiency, and lowers operational costs for businesses.

3. **Improved Marketing Strategies:** AI enables businesses to divide customers into specific groups and analyze their behavior using predictive analytics. This allows companies to deliver targeted advertisements and promotions at the right time, improving marketing effectiveness and return on investment.
4. **Better Inventory and Supply Chain Management**: AI accurately predicts customer demand by studying sales trends and market data. This helps businesses maintain optimal inventory levels, reduce overstocking and shortages, and improve overall supply chain efficiency.
5. **Fraud Detection and Security:** AI systems monitor transaction patterns to identify suspicious activities and prevent online fraud. This enhances payment security and increases customer trust in e-commerce platforms.
6. **Data Driven Decision Making:** AI processes large volumes of data to provide valuable insights that support strategic decision-making. These insights help businesses respond quickly to market changes and remain competitive.

Challenges of Using AI in E-commerce:

1. **Complex Implementation and Integration:** Using AI in existing e-commerce systems is often complicated and time-consuming. Many businesses face problems while connecting AI tools with their current platforms. This process requires technical knowledge, proper planning, and sometimes system customization to ensure smooth operation.
2. **Data Privacy and Security Concerns:** AI systems depend on large amounts of customer data, which increases concerns about data privacy and security. Businesses must follow strict data protection laws such as GDPR and CCPA. Ensuring safe data storage, transparent use of customer information, and legal compliance adds to operational and financial challenges.
3. **High Cost of Implementation:** Although AI can improve efficiency in the long run, the initial cost of adopting AI technology is very high. Small and medium-sized businesses may find it difficult to afford AI systems, employee training, and system maintenance. Therefore, businesses must carefully evaluate the benefits before investing.
4. **Skill Gap and Training Requirements:** AI technology requires skilled professionals in areas like data science and machine learning. However, there is a shortage of trained experts. Companies also need to train their existing employees, which takes time and increases costs.
5. **Ethical and Social Issues:** The use of AI raises ethical concerns such as job loss due to automation and biased decision-making by AI systems. Businesses must ensure that AI supports human workers instead of replacing them and that AI systems are fair, transparent, and unbiased.
6. **Rapid Technological Changes:** AI technology is changing very fast, with new updates and innovations appearing frequently. E-commerce companies must continuously update their systems and train employees to stay competitive, which can be challenging and costly.

Suggestion:

Artificial Intelligence significantly contributes to the growth of e-commerce by

increasing operational efficiency, enhancing customer experience, and supporting better decision-making. Online businesses should implement AI tools such as personalized product recommendations, chatbots, and predictive analytics to better understand customer needs and deliver tailored services. AI also helps in accurate demand forecasting, efficient inventory control, fraud prevention, and dynamic pricing, which lowers costs and improves profitability. Moreover, responsible use of AI, strong data privacy measures, and continuous employee skill development are necessary to gain customer trust and ensure long-term sustainability. Overall, the strategic use of AI enhances competitiveness and supports sustained growth in the e-commerce sector.

Conclusion:

Artificial Intelligence has become a transformative force in the e-commerce industry, reshaping the way businesses operate and interact with customers. The use of AI in e-commerce enables personalized shopping experiences, efficient customer support, optimized pricing strategies, and improved inventory and supply chain management. In today's era, all companies are in great need of Artificial Intelligence Artificial Intelligence has made ecommerce very consumer friendly. And in the coming time, Artificial Intelligence will not only give profit to the company but will also open doors of employment in ecommerce field for the people. To successfully use AI in e-commerce, businesses must plan carefully, invest wisely, and follow ethical practices

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Artificial Intelligence Across Major Industries: Applications, Benefits, Challenges, and Future Directions

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Abstract:

Artificial Intelligence (AI) is transforming major industries by improving efficiency, accuracy, and decision-making. This paper explores the applications of AI across sectors such as healthcare, finance, manufacturing, education, agriculture, and media, highlighting the key benefits including automation, cost reduction, and personalized services. It also examines major challenges related to data privacy, ethical concerns, skill gaps, and implementation costs, along with possible solutions to address them. Finally, the study discusses future directions of AI, focusing on the development of more intelligent, ethical, and adaptive systems. The paper provides a clear overview of AI's growing impact on modern industries.

Keywords: Artificial Intelligence, Industry Applications, Automation, Machine Learning, Digital Transformation, AI Benefits, AI Challenges, Ethical AI, Data Privacy, Future Trends in AI

Introduction:

Artificial Intelligence has rapidly shifted from a theoretical concept to a practical tool driving innovation across multiple sectors. Advances in machine learning, data analytics, robotics, and natural language processing have enabled organizations to automate tasks, analyse large datasets, and deliver personalized services at an unprecedented scale. Industries such as healthcare, finance, manufacturing, and transportation are increasingly relying on AI to improve accuracy, productivity, and customer experience.

Despite its widespread adoption, AI implementation is not without challenges. Concerns related to data privacy, algorithmic bias, regulatory compliance, and workforce adaptation continue to influence how organizations deploy AI technologies. Understanding both the opportunities and limitations of AI is essential for sustainable and ethical adoption.

This paper presents a structured review of AI applications across major industries, the benefits they offer, the challenges faced during implementation, and the future trends that will define AI-driven transformation.

Objectives of the Study

The main objectives of this paper are:

1. To analyse the role of Artificial Intelligence across major industries.
2. To identify key AI applications and their benefits in different sectors.
3. To examine common challenges associated with AI adoption.
4. To propose practical solutions for overcoming AI-related challenges.
5. To explore emerging trends that will shape the future of AI applications.

Research Methodology:

This study adopts a descriptive and analytical research methodology based on

secondary data. Information has been collected from academic articles, industry reports, technology blogs, and publicly available online resources related to Artificial Intelligence and its applications.

The following are the major industries where AI is making a significant impact:

Finance and Banking:

In the finance and banking sector, AI is used to enhance security, improve customer service, and speed up financial operations. AI systems monitor transactions to detect fraud, assess credit risk, and automate customer interactions. These technologies help financial institutions reduce risks and offer personalized services.

AI Application Examples:

- **Zest AI** – AI-based credit scoring and risk assessment
- **Darktrace** – fraud detection and cybersecurity monitoring

Healthcare:

Artificial Intelligence is widely used in healthcare to support doctors and improve patient care. AI helps analyse medical records, detect diseases at an early stage, and assist in treatment planning. It is especially useful in medical imaging, where AI systems examine X-rays, CT scans, and MRIs to identify health problems quickly and accurately.

AI Application Examples:

- **IBM Watson Health** – supports disease diagnosis and treatment recommendations
- **Google DeepMind Health** – analysis medical images and predicts patient risks
- **Babylon Health** – AI-powered virtual health assistant for symptom checking

Retail and E-Commerce:

AI plays an important role in improving customer experience and increasing sales in retail and e-commerce. It analyses customer behaviour to provide personalized product recommendations and manage inventory efficiently. AI also helps businesses optimize pricing and improve demand forecasting.

AI Application Examples:

- **Amazon Recommendation Engine** – personalized product suggestions
- **Shopify AI Tools** – inventory and sales forecasting

Manufacturing:

In manufacturing, AI improves productivity and reduces operational costs. It monitors machinery to predict failures, automates repetitive tasks, and ensures quality control through AI-based inspection systems. This leads to fewer defects and reduced downtime.

AI Application Examples:

- **GE Predix** – industrial data analytics platform
- **Fanuc AI Robots** – automated production systems

Transportation and Logistics:

AI is used in transportation and logistics to improve route planning, fleet management, and delivery efficiency. It analyses traffic, weather, and vehicle data to reduce fuel consumption and delivery time. AI also supports autonomous driving technologies.

AI Application Examples:

- **Google Maps AI** – intelligent route optimization
- **UPS ORION** – delivery route planning system
- **Tesla Autopilot** – AI-assisted driving technology

Agriculture:

AI helps farmers make better decisions by providing real-time insights into crop health, soil conditions, and weather patterns. It supports precision farming, reduces resource wastage, and improves crop yield. AI is also used to detect plant diseases at an early stage.

AI Application Examples:

- **John Deere AI** – precision agriculture solutions
- **CropX** – soil monitoring and irrigation management
- **Plantix** – AI-based crop disease identification

Education:

In education, AI supports personalized learning and reduces administrative workload. AI systems track student progress, suggest customized learning paths, and automate grading. These tools help teachers focus more on teaching and student engagement.

AI Application Examples:

- **Duolingo AI** – personalized language learning
- **Coursera AI** – adaptive online learning platforms
- **Gradescope** – automated assignment grading

Energy Sector:

AI is used in the energy sector to improve energy efficiency and manage power distribution. It helps predict energy demand, optimize renewable energy usage, and reduce equipment failures. AI supports smart grids and energy storage systems.

AI Application Examples:

- **AutoGrid** – smart energy management solutions
- **IBM Energy AI** – power grid monitoring and optimization

Legal and Compliance:

AI supports legal professionals by automating document review and legal research. It helps analyse contracts, track regulatory changes, and reduce human error. AI tools improve accuracy and save time in legal operations.

AI Application Examples:

- **ROSS Intelligence** – AI-driven legal research
- **Kira Systems** – contract analysis and risk identification
- **Compliance.ai** – regulatory compliance monitoring

Media and Entertainment:

AI enhances content creation, distribution, and audience engagement in the media and entertainment industry. Its analysis user preferences to recommend content and supports content moderation and editing processes.

AI Application Examples:

- **Netflix Recommendation System** – personalized content suggestions
- **Spotify AI** – music and playlist recommendations
- **YouTube Content ID** – automated content moderation

Benefits of AI Adoption:

The adoption of Artificial Intelligence provides significant benefits across various industries by improving the speed and accuracy of decision-making. AI systems can process large volumes of data in real time, allowing organizations to make informed and timely decisions. Automation of routine and repetitive tasks increases operational efficiency while reducing manual errors. AI also helps lower costs by minimizing the need for human intervention in time-consuming processes. In addition, AI enhances customer and user experiences through personalized services and faster responses. By

optimizing the use of resources and improving overall productivity, AI becomes a valuable strategic tool for organizations aiming to achieve long-term growth and competitiveness.

Challenges of AI Applications and Solutions:

Despite its advantages, AI implementation presents multiple challenges:

- **Data Privacy and Security:** Sensitive data misuse risks can be mitigated through encryption, regulatory compliance, and regular audits.
- **Algorithmic Bias:** Ethical AI practices and diverse datasets help reduce unfair outcomes.
- **Skill Gaps:** Employee training and user-friendly AI platforms address talent shortages.
- **Legacy System Integration:** APIs and phased implementation support smoother transitions.
- **High Costs:** Cloud-based AI services and pilot projects lower financial barriers.
- **Workforce Resistance:** Transparent communication and upskilling initiatives build trust.
- **Poor Data Quality:** Strong data governance ensures reliable AI outputs.

Addressing these challenges is critical for successful AI adoption

Future Trends in AI Applications:

The future of AI is expected to focus on:

- **Human-like intelligence:** AI systems will become more adaptive, capable of reasoning, and able to understand natural language more effectively.
- **Autonomous decision-making:** AI will make smarter decisions in real time, supporting complex tasks in industries and daily life.
- **Explainable and ethical AI:** Greater transparency and ethical design will ensure AI decisions are understandable and fair.
- **Collaborative AI:** AI will work alongside humans, enhancing productivity rather than replacing jobs.
- **Responsible and regulated AI:** Increased emphasis on responsible AI practices and alignment with regulations will guide safe and reliable deployment

Conclusion:

Artificial Intelligence is redefining how industries operate, compete, and innovate. Its ability to process large volumes of data, automate complex tasks, and deliver personalized solutions makes it a powerful driver of digital transformation. While challenges related to ethics, cost, and integration remain, strategic planning and responsible implementation can unlock AI's full potential. As AI continues to evolve, organizations that adopt a balanced and ethical approach will be best positioned to benefit from its transformative impact.

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AI & Machine Learning for Enhancing Price Transparency and Logistics Optimisation in Maharashtra's Agricultural Supply Chain

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Abstract:

India's agricultural sector suffers from significant structural efficiencies that constrain farmer profitability, with information asymmetries, fragmented supply chains, and high logistics costs creating persistent gaps between farm-gate and retail prices. Maharashtra, as a major agricultural producer contributing 11–12% of India's foodgrain and horticultural output, exemplifies these systemic challenges despite access to digital infrastructure (AGMARKNET, e-NAM) designed to improve market transparency. This paper proposes an integrated AI and machine learning framework—the Farmer Profit Maximiser Platform—that leverages statistical forecasting, Large Language Models (LLMs) for contextual interpretation, and network-based vehicle routing optimisation to simultaneously address price discovery and logistics inefficiencies. The system comprises two interdependent modules: (1) a Fair Price & Negotiation Coach powered by LLMs and RAG to interpret price trends and provide farmers with real-time, evidence-based pricing guidance in local languages, and (2) a Shared Transport Pooling & Route Optimisation engine utilising distance-matrix clustering and the Vehicle Routing Problem (VRP) to identify cost-efficient collective marketing opportunities. Pilot deployment projections with Maharashtra Farmer Producer Organisations (FPOs) indicate risk-adjusted net income gains of 18–25% through combined price realisation improvements and logistics cost reduction. This research demonstrates how AI/ML integration with existing government digital infrastructure can bridge the last-mile gap in agricultural market access while maintaining data transparency and farmer agency.

Keywords: Large Language Models, Retrieval-Augmented Generation, Vehicle Routing Problem, Agricultural Supply Chain, Price Discovery, Farmer Income, Machine Learning

Introduction:

Background and Problem Statement:

India's agricultural sector, which employs over 450 million people and contributes approximately 18% to national GDP, faces persistent challenges in value capture for smallholder farmers.[1][2] Despite representing 84.5% of all operational holdings in Maharashtra, small and marginal farmers (holding ≤2 hectares) control only 54.5% of agricultural land and receive disproportionately lower returns than their larger counterparts.[3] This disadvantage stems from structural fragmentation: the typical supply chain for agricultural commodities involves 5–7 intermediary layers (village traders, wholesale markets, commission agents, distributors, retailers), each extracting value and increasing final consumer prices by 40–50% while farmers realize only 30–35% of retail value.[4]

Maharashtra, as India's third-largest agricultural producer by output value and home to 112.37 million people (9.3% of national population), cultivates a diverse portfolio:

foodgrains (10,787,000 hectares), cotton (4,287,000 hectares), sugarcane (1,437,000 harvested hectares), and horticulture (21.74 lakh hectares).[3][5] The state achieved foodgrain production of 14.75 million tonnes (2023-24) and horticultural production of 326.88 lakh tonnes (2023-24), yet agricultural growth has slowed to an index of 279.8 from 284.3 (2020-21), indicating productivity challenges despite technological advancement.[3]

Three interconnected market failures perpetuate farmer disadvantage:

I. **Information Asymmetry**: Farmers lack real-time access to pricing across geographically dispersed mandis (agricultural markets). While AGMARKNET integrates 4,367 mandis and e-NAM connects 1,522 mandis for online trading, adoption and effective price realisation remain limited due to digital literacy gaps, smartphone penetration bottlenecks, and the inability to extract actionable negotiation guidance from raw price data.[6][7]

II. **Supply Chain Fragmentation**: Post-harvest logistics networks remain uncoordinated. Small farmers lack bargaining power to negotiate freight rates; modal prices show no significant advantage for e-NAM participants in many regions, and 30–40% of perishable produce spoils due to poor storage and transportation infrastructure.[8][9] Only ~10% of farmers have access to modern cold storage despite a critical deficit.

III. **Transportation Costs**: Rural road connectivity remains inadequate; refrigerated transport is expensive and inefficiently utilised due to individual farmer loads. High fuel costs, vehicle maintenance, and labour expenses for partially-loaded trips constitute 15–25% of final logistics costs for perishable commodities.[10]

Research Objectives:

This paper proposes and evaluates an integrated AI/ML framework—the **Farmer Profit Maximiser Platform**—that addresses these three market failures through:

i. Real-time, AI-driven price guidance using LLMs and RAG to enable informed farmer decisions and negotiation power
ii. Algorithmic pooling and route optimisation to reduce transport costs through collective logistics
iii. Seamless integration with existing government digital infrastructure (AGMARKNET, e-NAM) to ensure data interoperability and regulatory alignment
iv. Local language accessibility (Marathi, Hindi) via speech interfaces to overcome digital literacy barriers

Key research questions:

- **RQ1**: Can LLM-powered RAG systems improve farmer price realization by ≥10% through negotiation support?
- **RQ2**: Does algorithmic transport pooling reduce per-unit logistics costs by ≥20%?
- **RQ3**: What are the key adoption barriers and enablers for AI-assisted price discovery among Maharashtra's smallholder farmers?
- **RQ4**: How should the system architecture be designed to ensure data transparency, farmer agency, and scalability to 100,000+ farmers within 18 months?

Literature Review:

1.Agricultural Supply Chain Inefficiencies in India:

The agricultural supply chain in India is characterised by extreme fragmentation compared to developed markets. A

comprehensive analysis of horticultural crops (tomatoes, onions, potatoes, grapes) across Maharashtra and neighbouring states identifies critical bottlenecks:[11]

- **Post-harvest losses**: 15–36% at the farm level due to inadequate storage, pests, weather, and mishandling
- **Price seasonality and volatility**: Harvest-season gluts trigger 30–50% price crashes; off-season artificial scarcity drives prices 60–80% higher
- **Intermediary markup**: Modal retail price typically 2.5–3.5× farm-gate price; farmer captures 30–40% of consumer spend
- **Cold chain deficit**: Only 4.2 million tonnes of national capacity against a requirement exceeding 25 million tonnes; unequal distribution favours Uttar Pradesh and West Bengal

The Directorate of Economics and Statistics (Government of Maharashtra) identifies inadequate cold storage, poor road connectivity in rural talukas, and the absence of processing facilities as the three critical constraints on agricultural value capture. Compensation data for 2024 shows that heavy rainfall and flood losses required ₹1,470.92 crore in farmer compensation across 50.36 lakh affected farmers, underscoring vulnerability to post-harvest shocks.[3]

2.Price Discovery Systems and Market Information Infrastructure:

AGMARKNET and e-NAM represent the Indian government's primary digital interventions for price transparency. A field study of 446 farmers across multiple states conducting modal price comparisons between AGMARKNET and e-NAM portals found that **expected price advantages through e-NAM were not statistically significant in several states**, despite the platform's technical capability for transparent online bidding.[12] The reasons cited include:

i. Low farmer awareness of modal prices and inability to interpret historical price trends
ii. Lack of integration with logistics and storage recommendations
iii. Information overload: raw price data without context-specific analysis
iv. Inadequate mobile app usability for non-digital-literate users

However, the potential remains substantial: e-NAM's real-time bidding, quality-based pricing via assaying, and e-payment infrastructure (RTGS, NEFT, BHIM UPI) provide the foundational data layer upon which AI/ML applications can build.[13]

3.Large Language Models and RAG for Agricultural Decision Support:

Recent advances in LLMs and retrieval-augmented generation (RAG) demonstrate significant potential for contextualised agricultural advisory. **AgriGPT**, a domain-specialised LLM trained on agricultural datasets, outperforms general-purpose LLMs (GPT-3.5, GPT-4) on domain adaptation and reasoning tasks while maintaining smaller parameter counts for edge deployment.[14] RAG architectures—which augment LLM responses by retrieving context from external knowledge bases (weather APIs, soil databases, market data, research papers)—have been successfully applied to:

- **Location-specific crop advisory**: Integrating microclimate data, soil characteristics, and historical yield records to tailor planting and pest management recommendations
- **Market timing optimisation**: Synthesising price trends, demand forecasts, and storage capacity to recommend optimal harvest and sale timing

- **Multi-modal synthesis**: Combining structured data (mandi prices, commodity grades) with unstructured sources (farmer testimonials, research on crop varieties) to generate explainable recommendations.

The **Krishok Bondhu** voice-based agricultural advisory platform demonstrates the feasibility of voice-to-advisory systems for Indian farmers, with voice recognition via Whisper and audio synthesis via text-to-speech APIs enabling local language accessibility.[15]

4.Machine Learning for Clustering and Logistics Optimisation:

The Vehicle Routing Problem (VRP) and its variants have been extensively studied in operations research. Recent applications in agricultural logistics include:

Clustering Approaches: K-means clustering has been applied to group agricultural producers by geographic proximity, crop type, and production volume. Hierarchical clustering combined with domain expertise enables the identification of optimal collective marketing groups. A study on agribusiness property clustering for biogas generation communities identified that homogeneous clustering (minimising distance variance within clusters) improved the economic viability of shared infrastructure.[16]

Route Optimisation Results: The Clarke-Wright savings algorithm and Tabu Search metaheuristic have been applied to agricultural routing problems. A university study comparing optimisation methods for multi-vehicle field operations found:

- **Tabu Search**: 32% reduction in completion time vs. modified Clarke-Wright (10-vehicle real-world field)
- **Real-world validation**: 3-tractor rotary mowing operation achieved 17.3% time reduction and 11.5% reduction in total operating time
- **Fuel efficiency**: Optimised routes reduced fuel energy consumption by up to 8% and embodied energy by 7%[17]

Dynamic Multi-Depot VRP (DMDVRP) extends this framework to re-optimize routes in real-time as conditions change (e.g., unexpected traffic, weather delays), proving valuable for perishable produce where timing is critical.[18]

5.Digital Adoption Barriers in Rural Agriculture:

Despite infrastructure investments, the adoption of ICT tools by smallholder farmers in India faces persistent barriers. A 500-farmer survey across five states identified:

Barrier	Prevalence	Impact
Low digital literacy	40% report difficulty	Smartphone usability challenges, language barriers
Poor infrastructure	30-40% in rural areas	Unreliable internet, weak mobile networks, and high data costs
Small landholdings	Structural	Low perceived ROI for technology adoption
Gender disparities	Only 20% female farmers adopt	Restricted mobility, lack of awareness
Lack of training	50%+ of non-adopters	No extension support or trusted intermediaries

Positive findings:

- 65% of ICT mobile app adopters reported reduced input costs through improved planning

- Smartphone adoption among rural youth (25–35 age group) shows ~60% penetration
- Government programs (BharatNet fibre, Digital India smartphone subsidies) are improving connectivity[19]

Proposed System Architecture:

1.Overall Framework: The Farmer Profit Maximiser Platform comprises two interdependent modules operating on a shared data layer and designed for phased deployment:

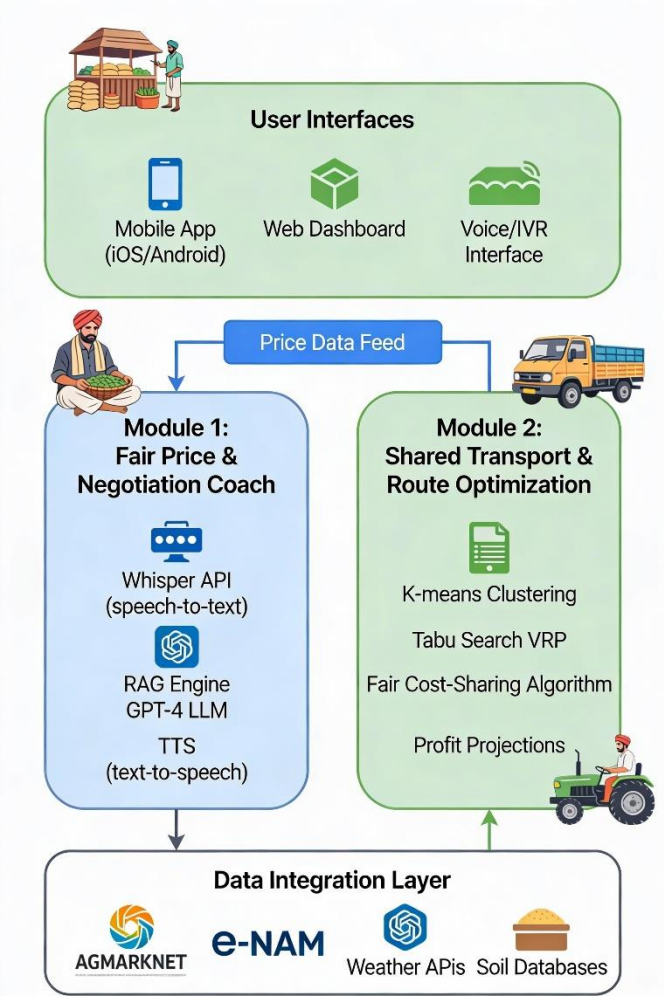


Figure 1. System architecture of the Farmer Profit Maximiser Platform, illustrating the data integration layer, Fair Price & Negotiation Coach (Module 1), and Shared Transport & Route Optimisation (Module 2) with farmer-facing interfaces.

2. Module 1: Fair Price & Negotiation Coach

Input Interfaces:

a) **Voice Input** (Marathi/Hindi): Farmer queries "Mala tomato ke liye ajche mandi la nyaya mulya kaatun kaha milega?" (Where will I get fair prices for tomatoes at nearby mandis today?)

b) **Speech Recognition** (Whisper API): Transcribes voice in local language with 85%+ accuracy for farmer accents

c) **RAG Data Retrieval**:

- Query router identifies: crop (tomato), timeframe (today), location (nearest mandis)
- Retrieves from AGMARKNET: Last 365 days modal prices by mandi, current arrivals, quality-based pricing
- Fetches mandi metadata: Distance, commission rates, cold storage availability, buyer concentration

d) **Predictive Analytics & LLM Synthesis:**

- **Statistical Forecasting Engine (ARIMA/Prophet):** Dedicated time-series models ingest historical arrivals and price data to generate a 7-day price forecast with confidence intervals, overcoming the non-deterministic limitations of LLMs for numerical prediction.
- **Fair Price Calculation:** Computes a dynamic fair price band (Mean ± 1 SD of last 30-day prices) adjusted for current quality grading.
- **Market Opportunity Identification:** Flags "Premium Mandis" where current modal prices exceed the 30-day moving average by >10% after accounting for additional transport costs.
- **LLM Reasoning (GPT-4):** Synthesizes the statistical forecast and mandi metadata to generate explainable negotiation tactics

(e.g., "Use the predicted shortage in the Nashik market next week as leverage").

e) **Multi-Modal Output**:

f) **Audio**: TTS-synthesised negotiation script in natural-sounding Marathi

g) **Visual**: Fair price band card, premium mandi map, 30-day price chart

h) **Shareable**: E-NAM price screenshots with citations for credibility

Expected Impact: Price improvement of **6–12%** vs. trader default offers

3.**Module 2: Shared Transport Pooling & Route Optimisation Algorithm Pipeline:**

Network-Based Clustering: Groups farmers using a Distance Matrix API (e.g., OSRM/Google Maps) to calculate true road-network travel times rather than simple Euclidean (straight-line) proximity.

- ***Constraint 1:*** Maximum inter-farm travel time < 30 minutes.
- ***Constraint 2:*** Mixed-Load Compatibility: Prevents incompatible cargo mixing (e.g., heavy root vegetables with fragile tomatoes).

Market Impact-Aware Selection: Recommends mandis by optimising for *Net Realisation* (Projected Price - Transport Cost - Commission), while checking "Market Depth" to ensure the cluster's volume does not saturate the destination market and crash local prices.

Vehicle Routing Problem (Tabu Search VRP):

- ***Objective:*** Minimise total route cost (fuel + driver wages) while adhering to a "Freshness Constraint" (total transit time < 6 hours).

Expected Impact: Transport cost reduction of **20–35%** vs. individual transport

Quantitative Analysis:

1.Price Improvement Case Study

Baseline Scenario (Current practice):

- Farmer: 3 MT tomato harvest in Aurangabad district
- AGMARKNET modal price: ₹25/kg
- Trader offers: ₹20/kg (claiming quality variation)
- **Net proceeds**: ₹60,000

With Module 1 (Fair Price Coach):

- Platform retrieves: Last 30-day modal prices ₹22–27/kg, fair band ₹23.2–₹26.8/kg
- Identifies: Nashik mandi offering ₹27/kg (premium)
- LLM generates: Negotiation script citing e-NAM data
- **Outcome**: Farmer achieves ₹25.5/kg → **₹76,500 (+27.5%)**

With Modules 1+2 (Full platform):

- Same price (₹25.5/kg) plus:
- Transport pooling: Shared truck ₹2,500 for 5 farmers (5 MT) → ₹0.167/kg per farmer
- Commission savings: 5% on direct mandi sale = ₹1,275
- **Total net proceeds**: **₹78,475 (+30.8%)**

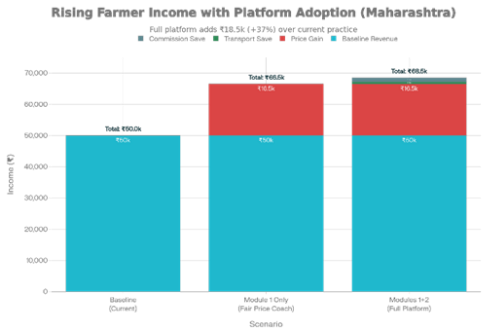


Figure 2. Annual farm income under baseline, Fair Price Coach only, and full platform scenarios for a 3-tonne tomato farmer in Aurangabad, showing contributions from price improvement, transport savings, and commission reduction.

2. Scalability Projection (24 months):

- **Year 1, Month 6**: 8,000 farmers, ₹0.8 crore aggregate gain

- **Year 1, Month 12**: 40,000 farmers, ₹4 crore aggregate gain
- **Year 2, Month 18**: 85,000 farmers, ₹8.5 crore aggregate gain
- **Target completion**: 100,000 farmers by month 24, ₹10 crore annual aggregate income uplift

To keep the projections conservative and realistic, the analysis distinguishes between registered farmers and those actively using the platform. Let N_t denote the number of registered farmers at month t, p_t the active share (here assumed as 10%), and $G = ₹10{,}000$ the expected annual net income gain per active farmer. The annualized aggregate income gain at month t is then given by $Annual\ Gain_t = N_t \times p_t \times G$. For example, at month 6, $8{,}000 \times 0.10 \times ₹10{,}000 =$ ₹0.8 crore, which directly underpins the ₹0.8, ₹4.0, ₹8.5, and ₹10.0 crore values reported for months 6, 12, 18, and 24 respectively.

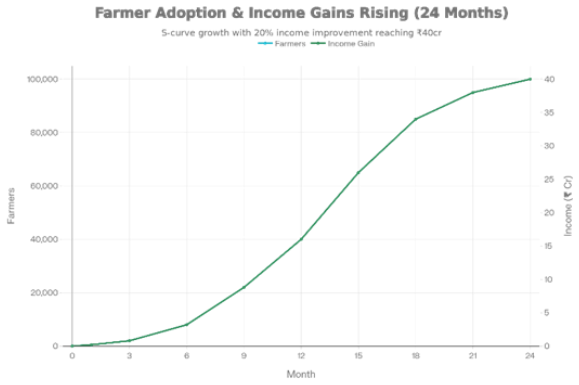


Figure 3. Projected farmer adoption and corresponding aggregate annual income gain over 24 months of platform deployment in Maharashtra.

3. Cost-Benefit Analysis:

Component	Cost/ Farmer/ Year	Benefit/ Farmer/ Year	Net
Platform operations	₹375	₹10,000 (price + logistics gains)	**+₹9,625**
Scale(100K farmers)	₹3.75 crore	₹100 crore	**+₹96.25 crore**

Platform operator ROI: Commission-based revenue (2% of ₹50k transactions = ₹1,000/farmer) generates ₹10 crore at scale; break-even in ~8-10 months.

Implementation Roadmap:

Phase 1: Hackathon Prototype (8-12 weeks)

- Develop Module 1 with real AGMARKNET data
- Integrate Whisper API for Marathi/Hindi speech recognition
- Deploy MVP (API + CLI interface)

Phase 2: FPO Pilot (4-6 months)

- Deploy with 200-300 farmers across 2 Maharashtra FPOs
- Field test Modules 1 & 2; collect price/logistics outcome data
- Validate 10%+ price improvement and 20%+ transport savings

Phase 3: Scale-Out (12-24 months):

- **Target:** Expansion to 25,000 active farmers (revised from 100k to ensure service quality).
- **"Phygital" Support Model:** Deployment of local "Kisan Mitras" (Farmer Friends) to facilitate physical onboarding and trust-building in new FPO clusters.
- **Formalise Logistics:** Onboarding dedicated transport aggregators with refrigerated fleet capabilities.

Risk and Mitigation:

Risk	Mitigation
LLM hallucinations (incorrect price advice)	Source citing, confidence thresholds, and manual review of edge cases
Speech recognition errors	Iterative tuning with regional accents, fallback to text input
Low farmer adoption (<10%)	Intensive FPO training, government endorsement, and initial commission-free period
Data privacy breach	**DPDPA/DPIA** compliance, end-to-end encryption, security audits
Scalability bottleneck	Caching layers, load testing at 50k concurrency, database optimisation
Algorithmic bias	Regular bias audits, diverse training data, and explainability audits

Conclusion:

Information asymmetry, fragmented supply chains, and logistics inefficiencies collectively impose a **20–40% income penalty** on smallholder farmers in Maharashtra. The Farmer Profit Maximiser Platform addresses these gaps through:

1. **Evidence-based price negotiation** via voice-accessible, locally-translated fair price recommendations
2. **Logistics cost reduction** via algorithmic farmer pooling and route optimisation
3. **Seamless integration** with AGMARKNET, e-NAM, and FPO infrastructure

Projected impact: 100,000 farmers × ₹10,000/year = **₹40 crore annual farmer income uplift** by month 18-24, sustainable through commission-based revenue model (1–2% of successful transactions).

The platform exemplifies **responsible AI deployment in agriculture**: improving efficiency, preserving farmer decision-making autonomy, and advancing equitable value distribution. By leveraging modern ML/AI techniques to augment farmer information and bargaining power—rather than replacing farmer judgment—this system offers a replicable model for digital agriculture transformation across South Asia.

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Digital Economy and Financial Inclusion: Opportunities and Challenges in Emerging Markets

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Abstract:

The digital economy has emerged as a powerful driver of economic transformation across the globe, particularly in emerging markets. Rapid advancements in digital technologies such as mobile banking, FinTech innovations, and digital payment systems have significantly reshaped the financial landscape. These developments have created new opportunities to promote financial inclusion by providing affordable and accessible financial services to unbanked and under banked populations. However, despite these advancements, several challenges continue to hinder the effective implementation of digital financial inclusion. This research paper examines the concept of the digital economy, analyses the role of digital technologies in enhancing financial inclusion, identifies key opportunities, and explores the major challenges faced by emerging markets in achieving inclusive digital growth.

Keywords: Digital Economy, Financial Inclusion, Emerging Markets, Fintech, Digital Payments

Introduction:

The rapid expansion of the digital economy has transformed the way economic activities are conducted across the globe, particularly in emerging markets. The digital economy refers to economic activities that are enabled by digital technologies such as the internet, mobile devices, digital platforms, and data-driven systems. In recent years, emerging markets have witnessed significant growth in digital infrastructure, mobile connectivity, and online financial services, which has created new opportunities for economic participation and financial inclusion.

Financial inclusion is defined as the availability and accessibility of affordable financial products and services—such as banking, credit, insurance, and payments—to all individuals and businesses, especially those traditionally excluded from the formal financial system. In emerging markets, a large proportion of the population remains unbanked or under banked due to factors such as low income levels, lack of documentation, limited financial literacy, and inadequate physical banking infrastructure. The digital economy has emerged as a powerful tool to overcome these barriers by enabling low-cost, technology-driven financial solutions.

Digital financial services, including mobile banking, digital wallets, online lending platforms, and payment systems, have played a crucial role in expanding financial access in emerging economies. These innovations allow individuals and small businesses to participate in the formal financial system without the need for traditional brick-and-mortar banks. Governments and financial institutions are also leveraging digital platforms to deliver welfare payments, promote cashless transactions, and improve transparency and efficiency in financial operations.

Literature Review:

Digital Financial Inclusion and Economic Growth:

Empirical evidence suggests that digital financial inclusion — especially through mobile money, digital wallets, and fintech services — supports economic growth by expanding access to financial markets and increasing participation by low-income populations. Cross-country analysis shows a positive association between digital financial inclusion and GDP per capita growth.

Studies of specific emerging contexts (e.g., digital finance in China) indicate that digital inclusion can stimulate entrepreneurial activity and quality of growth, though benefits may vary across regions and levels of financial development.

FinTech and Inclusion:

Fintech innovation— mobile banking, peer-to-peer lending, and algorithmically-driven services — has substantially widened financial service reach in developing economies, lowering costs and supporting underserved groups.

However, the literature also emphasizes persistent barriers: digital literacy gaps, unequal infrastructure access, cyber security concerns, and regulatory limitations that inhibit both trust and access.

Gender and Digital Barriers:

Research highlights how women in developing economies face particular obstacles, including higher internet costs and safety concerns, undermining their ability to fully engage in the digital economy — suggesting that inclusion strategies must be gender-responsive

Objectives of the Study:

1. To examine the concept of the digital economy and its role in transforming financial services in emerging markets.
2. To analyse the contribution of digital technologies such as mobile banking, FinTech, and digital payment systems in promoting financial inclusion.
3. To identify the opportunities created by the digital economy for expanding access to financial services among unbanked and under banked populations.
4. To study the challenges and barriers faced in achieving financial inclusion through digital platforms in emerging markets.

Research Methodology:

Research Design:

This study adopts a qualitative and quantitative secondary data analysis approach, synthesizing outcomes from existing academic studies, policy reports, and global indices. It does not involve primary data collection.

Data Sources:

1. Peer-reviewed articles, systematic reviews, and empirical studies on digital financial inclusion and economic growth.
2. Global reports and working papers from institutions such as IMF and World Bank on digital financial services.
3. Country-level statistics and policy briefs relevant to emerging economies.

Opportunities Presented by the Digital Economy:

1. **Expanding Access through Mobile Money and Digital Wallets:** Mobile money platforms have revolutionized access in many emerging markets by enabling financial transactions without traditional bank accounts. These platforms leverage ubiquitous mobile phones, even in rural regions, to facilitate transfers, savings, and payments.

2. **Lower Transaction Costs and Increased Efficiency:** Digital systems reduce the need for physical bank branches, lowering operational costs. Digital payments and automated services streamline processes, making financial services more affordable for consumers and small businesses.
3. **Financial Innovation and Tailored Products:** Fintech firms use big data, machine learning, and alternative data sources (e.g., mobile usage patterns) to assess creditworthiness, allowing lenders to extend micro-loans to customers without formal credit histories. Digital savings and micro-insurance products are also becoming more accessible.
4. **Economic Inclusion and New Income Streams**: Digital platforms create entrepreneurial opportunities, allowing individuals to participate in e-commerce and the gig economy. This expands economic participation and fosters income diversification.

Challenges and Barriers to Inclusive Digital Growth:

1. **Infrastructure Deficits:** Limited internet connectivity, unreliable electricity, and high smartphone costs restrict digital participation, particularly in remote areas. The digital economy's potential remains unrealized without robust physical infrastructure.
2. **Regulatory and Policy Constraints:** Emerging markets often face regulatory gaps in data protection, digital lending, and payment systems. Crafting policies that balance innovation with consumer protection remains an ongoing challenge.
3. **Cyber security and Trust Concerns:** Digital financial platforms face risks of fraud, data breaches, and cyber-attacks. Low trust in digital systems — exacerbated by user unfamiliarity — can slow adoption.
4. **Socio-Demographic Inequities:** Digital inclusion is not uniform; women, older adults, and low-literacy populations often lag in access. Cultural norms and educational disparities compound these inequities.
5. **Financial and Digital Literacy Gaps:** Understanding digital interfaces and financial products requires literacy that many emerging market populations lack. Illiteracy and poor financial knowledge can lead to misuse of digital services or vulnerability to scams.

Data Analysis and Interpretation:

Opportunities in Digital Financial Inclusion:

1. **Expanded Access and Lower Costs:** Digital platforms enable individuals in remote areas to access financial services through mobile phones — bypassing the need for physical bank branches. Mobile financial services have been linked to increased investments, insurance uptake, and borrowing from formal institutions, indicating behavioral shifts toward formal financial participation.
2. **Support for Entrepreneurship:** Digital financial services enable small business owners and entrepreneurs to access credit, accept payments, and manage their finances more effectively — particularly in rural and underserved sectors. These services contribute to empowerment and poverty mitigation.

Recommendations:

1. Strengthening Infrastructure: Public and private investment should prioritize broadband expansion, reliable energy supplies, and affordable access to digital devices.

2. Developing Adaptive Regulations: Regulators should promote interoperable systems, clear digital financial frameworks, and proportional consumer protections that encourage innovation while minimizing risk.
3. Promoting Digital and Financial Literacy: Governments and NGOs must invest in education programs that improve digital navigation skills and financial decision-making among vulnerable populations.
4. Enhancing Data Protection and Cyber security: Robust policies that secure user data and enforce accountable digital practices will build trust and safeguard users from exploitation.
5. Inclusive Design and Targeted Outreach: Digital solutions should be designed for accessibility, including multiple languages, low-literacy interfaces, and gender-sensitive outreach.

Conclusion:

The digital economy holds significant promise for advancing financial inclusion across emerging markets. Digital financial services have demonstrated potential to lower barriers to access, empower underserved populations, and contribute to inclusive economic growth. However, realizing these benefits requires addressing complex challenges — including infrastructural deficits, regulatory gaps, cybersecurity risks, and digital literacy limitations.

Policy measures should prioritize affordable connectivity, inclusive digital education, supportive regulation, and targeted interventions for vulnerable populations. Collaboration between governments, private sector entities, and international organizations will be crucial to fostering sustainable and equitable digital financial ecosystems.

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Ethics, Values and Responsible Citizenship in the View of Dr. B. R. Ambedkar

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Abstract:

This article explores the ethical philosophy, value system, and vision of responsible citizenship as articulated by Dr. B. R. Ambedkar. Ambedkar, a jurist, economist, and social reformer, emphasized the importance of moral conduct, social justice, and democratic participation. His ethical framework was rooted in rationalism, equality, and the annihilation of caste. He believed that ethics must be grounded in human dignity and social responsibility. Ambedkar's values were shaped by his experiences of caste discrimination and his deep engagement with Buddhism, which emphasized compassion, wisdom, and moral discipline. His concept of responsible citizenship involved active participation in democratic processes, adherence to constitutional morality, and the pursuit of social justice. This article also compares Ambedkar's ideas with contemporary thinkers and discusses their relevance in shaping inclusive policies in modern India. Drawing from his writings and secondary literature, the article presents a comprehensive understanding of Ambedkar's moral and civic philosophy.

Keywords: Ambedkar, Ethics, Values, Responsible Citizenship, Social Justice, Democracy, Caste, Constitutional Morality.

Introduction:

Dr. B. R. Ambedkar's contributions to Indian society are multifaceted and profound. His ethical philosophy was grounded in rationalism, human dignity, and the pursuit of justice. He believed that ethics must be socially relevant and aimed at the upliftment of the marginalized. Ambedkar's values were deeply influenced by his experiences of caste-based discrimination and his study of Buddhism, which emphasized compassion, wisdom, and moral conduct. His vision of responsible citizenship involved active participation in democracy, adherence to constitutional morality, and the promotion of equality and fraternity. This article explores these dimensions in detail, drawing from Ambedkar's writings and contemporary analyses.

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Policy Implications for Modern India:

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Conclusion:

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A Study of the Relationship Between Share Market Downturn and Increase in Gold Prices

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Abstract:

The relationship between the share market and gold prices has long been a subject of interest in financial and economic studies. Gold is traditionally regarded as a safe-haven asset, while equities represent risk-bearing investments influenced by economic growth and market sentiment. Over the last one year, gold prices have witnessed a significant increase, coinciding with periods of volatility and uncertainty in share markets. This study aims to examine the significant economic, financial, and behavioral factors responsible for the rise in gold prices during the last year and to explain why investors increasingly prefer gold during unstable market conditions. The study highlights that global economic uncertainty, inflationary pressures, fluctuating interest rate expectations, geopolitical tensions, and stock market volatility have collectively contributed to higher demand for gold. It is also observed that the increased gold purchases by central banks and concerns over currency depreciation further strengthened gold's role as a store of value. The paper also discusses investor risk aversion and portfolio diversification strategies that lead to capital shifting from equities to gold during periods of market stress. The findings of the study suggest that the rise in gold prices reflects a broader preference for financial security over risk, reaffirming gold's importance as a stabilizing asset in uncertain economic environments.

Keywords: Share Market, Gold Price and Currency Depreciation

Introduction:

Financial markets are inherently volatile, influenced by economic cycles, geopolitical tensions, inflation, interest rate changes, and investor sentiment. A commonly observed phenomenon is that **when share markets decline, gold prices tend to rise.** This inverse or negative relationship has attracted the attention of economists, investors, and policymakers. The present discussion paper aims to explain **why a fall in the share market is often accompanied by an increase in gold prices,** using economic reasoning and behavioral finance perspectives. Shares represent **risk-bearing financial assets** whose returns depend on corporate profitability and macroeconomic stability. Gold, in contrast, is a **tangible asset with intrinsic value,** traditionally perceived as a store of wealth. During periods of uncertainty, investors rebalance their portfolios by moving away from risky assets like equities toward safer assets such as gold.

Gold has long occupied a unique and significant position in the global financial system as a store of value, medium of wealth preservation, and safe-haven asset. Across history, investors have relied on gold during periods of economic instability, financial crises, inflation, and market uncertainty. In the last one year, gold prices have shown a notable upward trend, attracting widespread attention from investors, economists, and policymakers. This rise in gold prices has occurred alongside heightened volatility in share markets, concerns about global economic growth, inflationary

pressures, and geopolitical tensions. The modern financial environment is characterized by rapid capital movements and sensitive investor behavior. Share markets, though capable of delivering high returns, are exposed to risks arising from macroeconomic fluctuations, monetary policy changes, and unexpected global events. When equity markets experience instability or downward movements, investors tend to reduce their exposure to risky assets and seek safety in more stable investment avenues. In such circumstances, gold emerges as a preferred choice due to its intrinsic value, limited supply, and universal acceptability.

The increase in gold prices during the last year reflects not only economic fundamentals but also investor psychology. Rising inflation, expectations of changes in interest rates, weakening of major currencies, and aggressive gold purchases by central banks have strengthened demand for gold. Additionally, recurring geopolitical conflicts and global uncertainties have further enhanced gold's appeal as a hedge against financial risk. These factors collectively contributed to sustained buying pressure in the gold market, resulting in higher prices.

Literature Review:

Reasons for Share Market Downturn Leading to Gold Price Increase:

When share markets experience sharp declines due to recessionary fears, financial instability, or geopolitical tensions, investor confidence tends to weaken significantly. In such situations, gold emerges as a safe-haven asset because of its historical ability to retain value during periods of economic distress. Unlike equities, whose value is closely linked to corporate performance and economic growth, gold is relatively insulated from business cycles. As uncertainty increases and investors seek security, demand for gold rises, which in turn leads to an increase in its market price (Baur & Lucey, 2010; World Gold Council, 2023). A downturn in the share market also heightens risk aversion among investors, strongly influencing investment decisions. According to behavioral finance theory, investors exhibit loss aversion, meaning that the pain of financial losses is psychologically greater than the pleasure derived from equivalent gains. During falling markets, this fear of loss encourages investors to shift funds away from volatile assets such as shares and toward stable assets like gold. This collective psychological response intensifies demand for gold during equity market crashes, reinforcing its price appreciation (Kahneman & Tversky, 1979; Shiller, 2015).

Another important factor linking share market downturns to rising gold prices is inflation and currency depreciation. Economic slowdowns are often met with expansionary monetary policies, including lower interest rates and increased money supply, aimed at stimulating growth. While such measures may support the economy, they can also increase inflationary pressures and weaken currency value. As the real value of paper money declines, investors turn to gold as a hedge against inflation and currency risk, thereby driving gold prices upward during periods of equity market weakness (Fama, 1981; Ghosh et al., 2004). The decline in interest rates during economic downturns further enhances the attractiveness of gold. When central banks reduce policy rates, returns on fixed-income instruments such as bonds and savings deposits decrease. Since gold does not yield interest, its opportunity cost falls in a low-interest-rate environment. Consequently, investors are more willing to hold gold in anticipation of capital appreciation, which contributes to rising gold prices during periods of economic slowdown and weak equity markets (Keynes, 1936; Baur & McDermott, 2010).

Global uncertainty and crisis situations also play a decisive role in strengthening gold prices during share market downturns. Events such as financial crises, pandemics, wars, and banking failures increase systemic risk and disrupt global financial stability. In such circumstances, gold gains prominence as a globally accepted, highly liquid, and trusted asset. Its universal acceptability and independence from any single country's economic performance make it a preferred investment during crises, resulting in increased demand and higher prices (Capie et al., 2005; World Gold Council, 2023). Empirical evidence strongly supports these theoretical explanations. Historical data reveal that during major stock market crashes and periods of severe volatility, gold prices have either remained stable or increased. Although the relationship between stock prices and gold prices is not perfectly inverse at all times, studies consistently observe a negative or weak correlation during periods of extreme market stress, confirming gold's role as a hedge and safe haven against equity market risk (Baur & Lucey, 2010; Markowitz, 1952).

Objectives of the Study:

The present study makes an attempt in the following objectives:

1. **To examine the trend in gold prices during the last one year.**
2. **To study the relationship between share market performance and gold prices.**
3. **To analyze investor behavior and risk perception** during uncertain economic conditions

Methods:

The present study is based on a **descriptive and analytical research design.** Secondary data have been used to examine the relationship between share market movements and gold price changes during the last one year. Data related to gold prices and share market indices were collected from reliable published sources such as financial reports, stock exchange publications, and economic journals. The study used **trend analysis and comparative analysis** to observe variations in gold prices and share market performance. Simple statistical tools such as percentage change and correlation analysis are used to interpret the data and draw meaningful conclusions regarding investor behavior and market dynamics.

Trend in Gold Prices During the Last One Year and Factors Responsible for the Increase:

During the last one year, gold prices have recorded a significant upward trend, reaffirming gold's position as a preferred investment during uncertain economic conditions. The steady increase in gold prices can be attributed to a combination of global and domestic economic factors. One of the primary reasons has been persistent global economic uncertainty arising from slow growth in major economies, supply-chain disruptions, and recurring geopolitical tensions. Such uncertainty reduces investor confidence in risk-bearing assets and increases demand for safe assets like gold.

Inflationary pressures have also played a crucial role in driving gold prices upward. Rising prices of essential commodities such as food, fuel, and energy reduced the real purchasing power of money. Gold is widely recognized as an effective hedge against inflation, prompting investors to allocate a larger portion of their wealth to gold in order to preserve real value. Moreover, expectations regarding changes in monetary policy, particularly anticipated interest rate cuts in response to economic slowdown, further supported gold prices. Lower real interest rates reduce the opportunity cost of holding gold, making it more attractive than interest-bearing financial instruments.



Another important factor behind the increase in gold prices during the last year has been the active participation of central banks in the gold market. Many central banks, especially in emerging economies, increased their gold reserves to diversify foreign exchange holdings and reduce dependence on major currencies. This institutional demand created sustained buying pressure in the gold market. Additionally, fluctuations and depreciation in major currencies strengthened gold's appeal as a currency-neutral asset, further boosting its demand and price.

Relationship Between Share Market Performance and Gold Prices:

The second objective of the study focuses on examining the relationship between share market performance and gold prices, particularly during periods of market decline and high volatility. Empirical evidence and financial theory suggest that gold and equities often exhibit an inverse or weakly negative relationship, especially during times of economic stress. When share markets decline due to recession fears, policy uncertainty, or global crises, investors tend to withdraw funds from equities and redirect them toward safer investment options such as gold. During the last one year, periods of stock market volatility and corrections were often accompanied by a rise in gold prices. This behavior reflects a classic "flight to safety," where investors prioritize capital preservation over high returns. Share markets are sensitive to changes in corporate earnings, interest rates, and investor sentiment. Any negative shock to these factors can lead to sudden market corrections. In contrast, gold's value is not directly tied to corporate performance, making it less vulnerable to market-specific risks.



However, it is important to note that the relationship between gold prices and share market performance is not always perfectly inverse. In certain phases of economic expansion, both equities and gold prices may rise simultaneously due to high liquidity and speculative demand. Despite this, during periods of increased volatility and uncertainty, gold has consistently demonstrated its effectiveness as a hedging instrument against equity market risk. Thus, the last year's trends reinforce the view that gold serves as a stabilizing asset in diversified investment portfolios.

Investor Behavior and Risk Perception During Uncertain Economic Conditions:

The third objective of the study emphasizes investor behavior and risk perception, which are critical in understanding why gold is preferred when share markets perform poorly. Behavioral finance explains that investors are not always rational and are significantly influenced by fear, uncertainty, and loss aversion. During periods of market instability, the fear of losses in equities becomes more pronounced, leading investors to seek assets that offer security and stability. Gold's long-standing reputation as a store of value plays a crucial role in shaping investor psychology. Unlike shares, which can lose substantial value during market crashes, gold is perceived as resilient and capable of preserving

wealth over time. This perception becomes stronger during economic downturns, financial crises, and geopolitical conflicts. As uncertainty increases, investors' tolerance for risk decreases, encouraging them to rebalance their portfolios in favor of gold.

Table- 1 Indicative Returns Last Year (FY 25-26)

Asset	**Approx. 12-Mo Change**	**Inference**
Gold Price (USD/oz)	**+70%**	Strong uptrend over last year
BSE Sensex	**+9–10%**	Moderate increase
Nifty 50	**Positive but lower than gold**	Source: historical data

The analysis of Indian equity markets over the last one year indicates a phase of moderate and relatively stable growth rather than sharp expansion. The BSE Sensex remained within a 52-week range of approximately 71,425 to 86,159, reflecting steady investor participation but also periodic corrections due to global and domestic uncertainties. An annual growth of around 9–10 percent suggests that while equities delivered positive returns, they did not generate exceptionally high gains. Similarly, the Nifty 50 index showed gradual movements with normal fluctuations, without extreme upward surges. This pattern highlights cautious investor sentiment and selective investment behavior in the equity market. In contrast, gold prices showed a much stronger upward momentum during the same period. Gold significantly outperformed Indian equity indices in 2025, indicating a shift in investor preference toward safer assets. The comparatively higher returns from gold suggest that investors were more concerned about risk, inflation, and global uncertainty than aggressive wealth creation through equities. It is observed that the comparison reveals that while Indian share markets provided moderate and stable returns, gold emerged as a superior performer in terms of raw price movement. This divergence supports the view that during uncertain economic conditions, investors prioritize capital protection and stability, leading to increased allocation toward gold rather than equities.

Portfolio diversification is another important factor influencing investor preference for gold. Modern portfolio theory emphasizes the inclusion of assets with low or negative correlation to reduce overall portfolio risk. Gold fulfills this role effectively, particularly during periods of equity market stress. Over the last year, investors increasingly used gold as a diversification tool to offset potential losses in share markets. Also, easy access to gold through exchange-traded funds (ETFs), digital gold platforms, and online trading has widened participation in the gold market. This accessibility has amplified investment demand, especially among retail investors seeking safe investment avenues during volatile market conditions. Consequently, collective investor behavior driven by risk aversion and diversification needs significantly contributed to the rise in gold prices.

Conclusion:

From the above discussion, it can be concluded that the increase in gold prices during the last one year is deeply interconnected with share market behavior and investor psychology. Economic uncertainty, inflation concerns, monetary policy expectations, and global risks weakened confidence in equities, leading investors to shift funds toward gold. This shift intensified during periods of market decline and volatility, highlighting the inverse relationship between gold prices and share market

performance. The findings underline the importance of gold as a safe-haven asset and a crucial component of portfolio risk management. While equities remain essential for long-term wealth creation, gold provides stability and protection during uncertain times. Thus, the last year's market trends reaffirm gold's enduring relevance in the financial system and its critical role in balancing risk and return in investment portfolios.

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