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**VISION OF THE MILLENNIUM INDIA 2047:
ROLE OF HUMANITIES, SCIENCE & COMMERCE**



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Dr. Indrajeet Ramdas Bhagat

Professor, Faculty of Commerce

Organized by

Marathwada Shikshan Prasarak Mandal's

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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 Sambhajnagar.

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 Sambhajnagar, 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

Message 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 Sambhajnagar. 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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Innovative Eco Friendly Materials for Future India: A Pathway Towards Environmental Sustainability.

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Abstract:

The industrialization and urbanization plays key role in the development of the country. The sustainable environment plays key role for healthy life of the citizens of the country. India's rapid industrialization and urbanization have increased the demand for sustainable solutions to address environmental degradation and resource depletion. The sustainability of environment supports eco-friendly materials applied for the development of the nation. This paper explores eco-friendly and innovative materials support for environmental sustainability. It studies the role of agro-waste-based composites, green construction materials, biodegradable polymers, and renewable resource-derived products in reducing carbon emissions and energy consumption. More emphasis is given on indigenous materials, cost-effectiveness, and scalability for green future of India.

Keywords: *eco-friendly, green future, environmental sustainability, scalability*

Introduction:

The development of any country depends upon the growth in various sectors like Agriculture, Construction, Industries, Transportation, Medicine, Paints etc. India is vast developing country in the world especially in South Asia. In South Asia India is on third position in the list of Developing Countries (Revised January 2025)¹. The vast development and increase in urbanization increases the demand of fundamental needs for the living standards of the citizens. While this development has improved living standards, it has also placed immense pressure on natural resources and the environment. Issues such as climate change, pollution, depletion of raw materials, and waste accumulation pose serious challenges to sustainable development. In this context, innovative eco-friendly materials have emerged as a crucial pathway for India to achieve

environmental sustainability while continuing its growth trajectory.

Eco-friendly materials are those that minimize environmental impact throughout their life cycle from raw material extraction and processing to usage, recycling, or disposal. These materials are often derived from renewable resources, require less energy for production, generate lower greenhouse gas emissions, and are biodegradable or recyclable. For a country like India, rich in biodiversity and traditional knowledge, the development and adoption of such materials offer both environmental and socio-economic benefits.

The construction sector, one of the largest consumers of resources in India, provides a major opportunity for the application of innovative green materials. Alternatives such as fly ash bricks, geopolymers concrete, bamboo composites, recycled steel, and low-carbon cement can

significantly reduce carbon emissions and conserve natural resources. Similarly, the use of natural fibers like jute, coir, sisal, and hemp in composites for housing, packaging, and automotive industries supports rural livelihoods while reducing dependence on synthetic, petroleum-based materials.

In the field of packaging and consumer products, biodegradable and bio-based materials such as bioplastics, paper-based composites, and agricultural residue-derived products are gaining importance. These materials address the growing problem of plastic waste, which has become a major environmental concern in India. Innovations that convert crop residues, seaweed, or food waste into usable materials not only reduce pollution but also promote a circular economy by turning waste into valuable resources.

Energy efficiency and renewable energy technologies also rely heavily on advanced eco-friendly materials. Materials used in solar panels, energy storage systems, green insulation, and energy-efficient buildings play a vital role in reducing India's carbon footprint. Research in nanomaterials, smart materials, and advanced ceramics is opening new possibilities for high-performance, sustainable solutions tailored to India's climatic and economic conditions.

Government initiatives such as "Make in India," "Atmanirbhar Bharat," and national policies on climate action and sustainable development provide strong support for the adoption of green materials. Collaboration between academia, industry, and research institutions is essential to promote innovation, reduce costs, and scale up production. Public awareness and education further encourage acceptance and responsible consumption of eco-friendly products.

The Environmental Sustainability Achieved By adapting Following Approach:

1.Eco-Friendly and Sustainable Materials:

Eco-friendly and sustainable materials are materials that are designed to reduce negative impacts on the environment while ensuring efficient use of natural resources. These materials are obtained from renewable or abundantly available resources and are manufactured using processes that consume less energy and produce minimal pollution. A key feature of sustainable materials is their ability to be reused, recycled, or safely biodegraded at the end of their life cycle, thus reducing waste generation and environmental degradation.

Eco-friendly materials support the principles of sustainable development by balancing environmental protection, economic viability, and social well-being. Common examples include bamboo, jute, coir, recycled metals, fly ash bricks, green concrete, and bio-based plastics. Such materials help in lowering carbon emissions, conserving water and energy, and reducing dependency on non-renewable resources.

In the Indian context, the adoption of sustainable materials is especially important due to rapid urbanization, industrial growth, and increasing environmental challenges. The use of eco-friendly materials in construction, packaging, textiles, and consumer products contributes to pollution control and resource conservation. Promoting research, innovation, and awareness about sustainable materials can play a crucial role in building an environmentally responsible and sustainable future for India.

2.Traditional Sustainable Materials:

With the increasing demand for products, it has become necessary to integrate the idea of sustainable design into the products design process in order to achieve sustainable development of the environment, society and

economy². Traditional sustainable materials in India represent a rich heritage of environmentally responsible practices developed over centuries. These materials are derived from natural, locally available resources and are well adapted to India's diverse climatic conditions. Commonly used materials include bamboo, wood, mud, clay, lime, stone, thatch, jute, coir, and natural fibers. Bamboo is widely valued for its rapid renewability, strength, and flexibility, making it ideal for housing, scaffolding, and handicrafts. Mud and clay are used in adobe houses, bricks, and plaster, offering excellent thermal insulation and maintaining indoor comfort. Lime, used in mortars and plasters, enhances durability and allows buildings to "breathe," reducing moisture-related damage. Stone and laterite are long-lasting materials traditionally used in temples and houses. Jute and coir fibers are biodegradable and commonly used for ropes, mats, packaging, and furnishings.

These materials require minimal energy for processing, generate low carbon emissions, and are easily recyclable or biodegradable. Traditional sustainable materials also support local economies and craftsmanship while promoting harmony between human habitation and nature, making them highly relevant for modern sustainable development.

3.Eco-Friendly Materials in Construction Sector:

Eco-friendly materials in the construction sector play a vital role in reducing environmental impact and promoting sustainable development. These materials are designed to minimize energy consumption, carbon emissions, and waste throughout their life cycle. Common eco-friendly construction materials include fly ash bricks, recycled concrete, bamboo, reclaimed wood, rammed earth, and green cement. Fly ash bricks utilize industrial waste, reduce landfill burden, and offer high strength and durability. Bamboo is

a rapidly renewable resource with excellent tensile strength, making it suitable for structural and decorative purposes. Recycled steel and concrete conserve natural resources and lower embodied energy. Natural insulation materials such as cork, wool, and cellulose improve energy efficiency by reducing heating and cooling demands. Overall, eco-friendly materials support resource conservation, energy efficiency, cost effectiveness, and environmental protection, making them essential for sustainable construction practices. Eco-friendly building materials offer numerous benefits for the construction industry and the environment. For one, they can significantly reduce the carbon footprint of buildings by minimizing the emissions associated with material production and construction processes^{3,4}

4.Technological Advancements and Research Initiatives:

Technological advancements and research initiatives play a crucial role in developing innovative eco-friendly materials for future India. Advances in material science have led to the development of green concrete, bio-based polymers, nanomaterials and high performance recycled composites with improved strength and durability. Research institutions and universities are focusing on utilizing agricultural and industrial waste such as fly ash, rice husk ash, and plastic waste to create sustainable construction and packaging materials. Nanotechnology is enhancing material efficiency, corrosion resistance, and energy performance.

Concerning planning, assigning resources, coordinating, and assuring outcomes that enhance processes, technology management encompasses all management activities that decide the application of objectives, policy, and duties, as well as their implementation in an organization⁵. Government-supported initiatives, start-ups, and industry-academia collaborations

are accelerating innovation and commercialization of sustainable materials. These research efforts promote low-carbon technologies, resource efficiency, and circular economy practices, supporting India's transition toward environmental sustainability and technological self-reliance.

5.Environmental and Economic Benefits:

Economically, eco-friendly materials lower long-term costs through durability, reduced maintenance, and energy savings. Their use encourages local manufacturing, supports rural employment, and creates new green industries. Utilizing industrial and agricultural waste adds value to by-products and reduces disposal costs. Efficient waste management practices can lead to significant cost savings for governments, businesses, and households. By reducing waste generation, societies can save on the costs associated with waste collection, transportation, and disposal in landfills. Recycling and composting initiatives can also reduce waste management costs, as these activities are often less expensive than traditional waste disposal methods⁶. The innovative sustainable materials strengthen environmental resilience, reduce dependence on imported resources, and contribute to inclusive economic growth, making them a key pathway toward environmental sustainability in India.

Innovative eco-friendly materials offer significant environmental and economic benefits for future India, supporting the goal of sustainable development. Environmentally, materials such as bio-based polymers, green concrete, recycled composites, bamboo-based products, and agricultural-waste materials help reduce carbon emissions, conserve natural resources, and minimize waste generation. These materials are often biodegradable or recyclable, lowering pollution and promoting a circular economy.

Energy-efficient materials also reduce heat loss and improve building performance, decreasing overall energy consumption.

Conclusion:

Innovative eco-friendly materials offer a sustainable pathway for India's future by conserving resources, reducing environmental impact, and promoting green technologies. Their adoption supports economic growth, environmental protection, and social well-being, ensuring a resilient, low-carbon, and sustainable development model for future generations.

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Role of MSMEs in Building a Viksit Bharat 2047: Challenges and Opportunities

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Abstract:

Micro, Small and Medium Enterprises (MSMEs) constitute a vital pillar of the Indian economy and are widely acknowledged as engines of employment generation, entrepreneurship development, and inclusive growth. As India envisions transforming into a developed nation under the Viksit Bharat 2047 framework, MSMEs are expected to play a decisive role in driving sustainable, technology-enabled, and regionally balanced development. This paper presents a systematic and thematic review of national and international literature on MSMEs, focusing on their developmental role, structural challenges, and emerging opportunities in the Indian context. Drawing upon peer-reviewed journals, government reports, and institutional studies, the review synthesizes existing knowledge across economic, social, digital, and sustainability dimensions. The findings indicate that while MSMEs have strong potential to contribute to India's long-term development agenda, persistent challenges related to finance, technology, skills, and market integration limit their growth. The paper concludes by identifying research gaps and proposing directions for policy and academic inquiry to strengthen MSMEs as key contributors to Viksit Bharat 2047.

Keywords: *MSMEs, Viksit Bharat 2047, Inclusive Growth, Entrepreneurship, Employment, Digital Transformation, Sustainability*

Introduction:

India's aspiration to emerge as a fully developed nation by 2047—coinciding with the centenary of independence—requires a development strategy that is inclusive, innovation-driven, and sustainable. Achieving such transformation necessitates the active participation of enterprises across scales, particularly Micro, Small and Medium Enterprises (MSMEs), which form the backbone of the Indian industrial and service ecosystem. MSMEs are deeply embedded in local economies, contribute significantly to value addition, and provide livelihoods to millions, especially in rural and semi-urban regions.

The development discourse increasingly recognizes MSMEs not merely as supplementary economic actors but as strategic agents capable of

fostering entrepreneurship, reducing regional disparities, and strengthening domestic supply chains. In the context of Viksit Bharat 2047, MSMEs are expected to support key national priorities such as employment generation, digital inclusion, innovation, export competitiveness, and environmental sustainability. This growing relevance has stimulated extensive academic and policy-oriented research, making a systematic synthesis of the literature both timely and necessary.

Objectives of the Study:

1. Systematically review literature on the role of MSMEs in India's economic and social development
2. Examine major challenges constraining MSME growth and competitiveness

3. Analyse emerging opportunities for MSMEs in the areas of digitalization, sustainability, and innovation
4. Identify research gaps and future directions in MSME studies aligned with Viksit Bharat 2047

Research Methodology:

This study adopts a **systematic literature review (SLR)** methodology to ensure comprehensive coverage and analytical rigor.

1.Data Sources: The review is based on:

- Peer-reviewed journals (e.g., *Small Business Economics, Journal of Development Studies*)
- Government publications and policy documents
- Reports from international organizations such as the World Bank and OECD
- National policy think tanks and institutional reports

2.Search Strategy: Keywords such as *MSMEs, small enterprise development, inclusive growth, entrepreneurship, employment generation, digital MSMEs, sustainable enterprises, and India 2047* were used in various combinations.

3.Selection Criteria: Studies focusing on MSMEs in India or comparable emerging economies were included. Non-academic opinion articles and studies lacking relevance to development outcomes were excluded.

4.Method of Analysis: The selected literature was analyzed thematically and organized into key conceptual and empirical categories.

Conceptual Perspective: MSMEs and National Development:

Development economics literature conceptualizes MSMEs as catalysts for structural transformation. Their labour-intensive nature allows them to absorb surplus labour, while their flexibility enables adaptation to changing market conditions. MSMEs also facilitate decentralised

industrialisation, which is critical for reducing spatial and income inequalities. From a long-term development perspective, MSMEs serve as platforms for innovation diffusion and entrepreneurial experimentation, aligning closely with the objectives of Viksit Bharat 2047.

Review of Literature:

1. MSMEs and Economic Growth: A substantial body of literature establishes a positive relationship between MSME development and economic growth. Early cross-country studies demonstrate that economies with a vibrant MSME sector exhibit higher growth rates and greater resilience to economic shocks. MSMEs contribute to output growth by promoting competition, diversifying production structures, and supporting industrial supply chains.

In India, scholars argue that MSMEs play a critical role in strengthening domestic manufacturing and services, particularly by supporting large enterprises as ancillary units. The decentralised nature of MSMEs contributes to balanced regional development and reduces excessive urban concentration.

2. MSMEs and Employment Generation: Employment generation remains one of the most widely acknowledged contributions of MSMEs. Literature consistently highlights that MSMEs are more labour-intensive than large enterprises, making them essential for addressing India's employment challenge. Studies show that MSMEs provide jobs to semi-skilled and unskilled workers, thereby enhancing social inclusion.

Research also emphasizes the role of MSMEs in women's employment and youth engagement. By creating local employment opportunities, MSMEs help mitigate rural–

urban migration and support livelihood security in economically weaker regions.

- 3. MSMEs as Drivers of Entrepreneurship and Innovation:** MSMEs are often described as incubators of entrepreneurship. Scholars note that MSMEs lower entry barriers for first-generation entrepreneurs by requiring relatively modest capital investment. This entrepreneurial function is particularly important in developing economies where formal employment opportunities are limited. Innovation in MSMEs is frequently incremental rather than radical, involving process improvements, frugal innovation, and adaptation of existing technologies. Such innovations, though small in scale, collectively contribute to productivity enhancement and competitiveness.

- 4. Financial Constraints and Access to Credit:** Access to finance emerges as a dominant theme in MSME literature. Numerous studies identify inadequate and delayed credit as one of the most significant barriers to MSME growth. Information asymmetry, lack of collateral, and high transaction costs limit formal credit access, especially for micro and informal enterprises.

While policy initiatives have improved credit availability, scholars argue that financial inclusion remains uneven. The literature stresses the need for alternative financing mechanisms such as digital lending, credit guarantees, and fintech solutions to bridge the financing gap.

- 5. Digital Transformation of MSMEs:** Recent studies increasingly focus on digitalization as a transformative opportunity for MSMEs.

Adoption of digital payments, e-commerce platforms, enterprise resource planning systems, and online marketing has enabled MSMEs to expand market reach and improve efficiency.

Empirical evidence suggests that digitally enabled MSMEs demonstrate greater resilience during economic disruptions. However, the literature also highlights challenges such as digital literacy gaps, infrastructural constraints, and cybersecurity risks, particularly in rural areas.

- 6. MSMEs and Sustainable Development:** An emerging stream of literature links MSMEs with sustainable development goals. Researchers argue that MSMEs can contribute significantly to environmental sustainability by adopting cleaner production techniques, renewable energy solutions, and circular economy practices.

Green MSMEs are increasingly viewed as important actors in climate mitigation and resource efficiency. However, studies note that lack of awareness, high initial costs, and limited access to green finance constrain sustainability adoption among MSMEs.

- 7. MSMEs in Global Value Chains and Exports:** Participation in global value chains (GVCs) is identified as a major opportunity for MSMEs. Literature shows that MSMEs integrated into export markets benefit from technology transfer, quality improvements, and productivity gains. However, barriers such as compliance costs, quality standards, and limited international exposure restrict MSME participation in GVCs

Table 1. Literature Mapping Matrix on MSMEs and National Development

Author(s) & Year	Context / Region	Focus of Study	Methodology	Key Findings	Relevance to Viksit Bharat 2047
Ayyagari, Beck & Demirgüç-Kunt (2007)	Cross-country	MSMEs and economic growth	Secondary data analysis	MSMEs significantly contribute to GDP and employment in developing economies	Establishes MSMEs as engines of growth
Beck & Demirgüç-Kunt (2006)	Developing countries	MSME finance constraints	Empirical analysis	Lack of finance is the biggest barrier to MSME growth	Highlights need for financial inclusion reforms
Schmitz (1995)	Developing economies	Collective efficiency of MSMEs	Case studies	Clustering improves MSME competitiveness	Supports cluster-based MSME development
Tambunan (2008)	Asia	MSME development	Comparative analysis	MSMEs support inclusive and regional development	Aligns with inclusive growth goals
OECD (2017)	Global	MSMEs in digital economy	Policy review	Digital adoption boosts productivity and resilience	Digital MSMEs are critical for India 2047
World Bank (2020)	Global	MSME financing	Institutional report	Credit gaps hinder MSME scaling	Supports fintech and credit guarantee reforms
Government of India (2022)	India	MSME performance	Secondary data	MSMEs contribute heavily to exports and jobs	National relevance for Viksit Bharat
NITI Aayog (2023)	India	Vision 2047	Policy framework	MSMEs are central to inclusive development	Strategic alignment with 2047 vision

Table 2. Thematic Classification of MSME Literature

Theme	Key Focus	Representative Studies	Key Insights
Economic Growth	GDP, industrial output	Ayyagari et al. (2007); Tambunan (2008)	MSMEs enhance competitiveness and resilience
Employment Generation	Jobs, livelihoods	Schmitz (1995); Govt. of India (2022)	MSMEs are labour-intensive and inclusive
Entrepreneurship	New venture creation	Tambunan (2008)	MSMEs nurture first-generation entrepreneurs
Financial Access	Credit, finance	Beck & Demirgüç-Kunt (2006); World Bank (2020)	Finance is the most critical constraint
Digital Transformation	E-commerce, fintech	OECD (2017); NITI Aayog (2023)	Digital MSMEs outperform non-digital ones
Sustainability	Green MSMEs	OECD (2017); World Bank (2020)	MSMEs can drive sustainable development
Global Integration	Exports, GVCs	Schmitz (1995); OECD (2017)	Integration boosts productivity

Challenges Faced by MSMEs:

The literature identifies several persistent challenges:

- Limited access to timely and affordable finance
- Low levels of technological adoption
- Skill shortages and managerial inefficiencies

- Regulatory complexity and compliance burden
- Weak integration with global markets

These challenges collectively limit MSMEs' ability to scale up and contribute fully to long-term national development goals.

Table 3. Challenges Faced by MSMEs – Evidence from Literature

Challenge Category	Nature of the Problem	Evidence from Literature	Implications for India 2047
Financial Constraints	Limited credit, collateral issues	Beck & Demirgüç-Kunt (2006)	Slows MSME scaling
Technological Gaps	Low automation, outdated tech	OECD (2017)	Reduces competitiveness
Skill Deficits	Managerial & workforce skills	Tambunan (2008)	Affects productivity
Regulatory Burden	Compliance complexity	Govt. of India (2022)	Increases cost of doing business
Market Access	Limited exports & branding	Schmitz (1995)	Restricts global integration
Sustainability Costs	High green transition costs	World Bank (2020)	Needs policy incentives

Emerging Opportunities for MSMEs in Viksit Bharat 2047

Despite challenges, scholars highlight significant opportunities:

- Digital platforms enabling wider market access
- Government initiatives promoting formalization and innovation
- Growing demand for sustainable and green products

- Integration into domestic and global supply chains
- Skill development and entrepreneurship ecosystems

The convergence of policy support, technology, and market demand creates a favourable environment for MSMEs to drive India's development agenda.

Table 4. Opportunities for MSMEs in Viksit Bharat 2047

Opportunity Area	Description	Supporting Literature	Strategic Significance
Digitalization	E-commerce, fintech adoption	OECD (2017); NITI Aayog (2023)	Market expansion & resilience
Green MSMEs	Sustainable production	World Bank (2020)	Climate-aligned growth
Clustering	Industrial clusters	Schmitz (1995)	Collective efficiency
Skill Development	Training & upskilling	Govt. of India (2022)	Productivity enhancement
Global Value Chains	Export integration	OECD (2017)	Technology transfer
Innovation	Process & frugal innovation	Tambunan (2008)	Competitive advantage

Research Gaps and Future Directions:

The review identifies gaps in:

- Longitudinal studies tracking MSME growth and survival
- Empirical research linking MSMEs to sustainability outcomes

- Gender-focused MSME entrepreneurship studies
- Regional and sector-specific analyses

Future research should adopt mixed-method approaches and regionally grounded studies.

Table 5. Research Gaps Identified in MSME Literature

Area	Existing Focus	Identified Gap	Scope for Future Research
Growth Studies	Cross-sectional data	Lack of longitudinal analysis	MSME life-cycle studies
Sustainability	Conceptual focus	Limited empirical evidence	Green MSME impact assessment
Gender	Women entrepreneurs	Under-representation	Gender-inclusive MSME models
Digital MSMEs	Urban focus	Rural MSMEs understudied	Digital inclusion studies
Policy Impact	Scheme-wise evaluation	Lack of integrated assessment	Policy effectiveness analysis

Policy and Managerial Implications:**Policy Implications:**

- Simplification of regulatory frameworks
- Expansion of credit access and digital finance
- Investment in digital and physical infrastructure
- Incentives for green and innovative MSMEs

Managerial Implications:

- Adoption of digital tools and modern management practices
- Strategic collaborations and clustering
- Focus on innovation and sustainability

Conclusion:

This systematic review establishes that MSMEs are indispensable to achieving the vision of Viksit Bharat 2047. Their contributions to employment, entrepreneurship, innovation, and inclusion position them as engines of long-term national development. However, realizing their full potential requires coordinated policy support, technological empowerment, and ecosystem development. Strengthening MSMEs is not only an economic necessity but a strategic imperative for building a resilient, inclusive, and sustainable India.

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Digital Transformation and Sustainable Economic Growth towards Viksit Bharat@2047

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Abstract:

Digital transformation has emerged as a critical driver of sustainable economic growth in the 21st century. As nations look toward 2047 a milestone year symbolizing long-term national and global development goals. The integration of digital technologies with sustainable economic strategies becomes essential. This paper examines the role of digital transformation in fostering sustainable economic growth by enhancing productivity, promoting inclusivity, improving governance and supporting environmental sustainability. It explores key digital enablers such as artificial intelligence, digital infrastructure, e-governance and fintech, while also addressing challenges like the digital divide, cybersecurity risks, and skill gaps. The study concludes by proposing a strategic framework for leveraging digital transformation to achieve inclusive and sustainable economic growth by 2047

Keywords: Digital Transformation, Sustainable Economic Growth, Vision 2047, Inclusive Development.

Introduction:

India stands at a crucial juncture in its development trajectory. As the country approaches the centenary of its independence in 2047, the vision of Viksit Bharat emphasizes sustainable, inclusive and innovative-driven growth. Digital transformation has emerged as a powerful catalyst in reshaping economic structures, improving governance and enhancing social inclusion. As India approaches the centenary of its independence in 2047, the nation stands at a critical juncture where **digital transformation** has emerged as a foundational driver of **sustainable economic growth**. The convergence of digital technologies with economic, social and governance systems is reshaping India's development trajectory, offering unprecedented opportunities to accelerate productivity, enhance inclusivity, and strengthen resilience in the face of global uncertainties. In this context, digital transformation is not merely a

technological shift but a structural reconfiguration of economic processes, institutional frameworks and human capital formation.

Over the past decade, India has witnessed a rapid expansion of its digital ecosystem, underpinned by initiatives such as **Digital India, Unified Payments Interface (UPI), India Stack** and broadband connectivity. These developments have significantly reduced transaction costs, expanded access to financial services, improved governance efficiency and enabled the emergence of platform-based business models across sectors including finance, healthcare, education, agriculture and manufacturing. As a result, digital technologies have become integral to India's growth strategy, particularly in a post-pandemic world where digital resilience has proven essential for economic continuity.

However, the pursuit of economic growth in the 21st century must be reconciled with the imperatives of **sustainability**. Sustainable

economic growth entails not only sustained increases in gross domestic product (GDP) but also equitable distribution of income, environmental stewardship, social inclusion and intergenerational equity. India's development challenges ranging from income inequality and informal employment to climate vulnerability and resource constraints necessitate a growth model that is both technologically advanced and socially responsible. Digital transformation offers a powerful toolkit to address these challenges by enabling data-driven policymaking, optimizing resource utilization, reducing carbon intensity, and expanding access to public goods and services.

Looking ahead to Viksit Bharat 2047, India's aspiration to become a **developed and inclusive economy** hinges on its ability to harness digital technologies in a manner that aligns with long-term sustainability goals. Emerging technologies such as **artificial intelligence, big data analytics, block chain, the Internet of Things (IoT), and green digital innovations** hold the potential to transform productivity across traditional and emerging sectors. Simultaneously, the success of this transformation depends on critical enablers, including digital infrastructure, cybersecurity, regulatory frameworks, skill development, and ethical governance of data and technology.

This study examines the role of digital transformation in fostering sustainable economic growth in India as the country moves toward 2047. It explores the mechanisms through which digital technologies influence productivity, inclusion, and sustainability, evaluates policy initiatives and institutional frameworks, and identifies key challenges and opportunities for the future. By situating digital transformation within India's long-term development vision, the analysis seeks to contribute to informed policy discourse and strategic planning aimed at

realizing a resilient, inclusive and sustainable Indian economy by the centenary of independence.

Objectives:

1. To examine the relationship between digital transformation and economic growth
2. To analyse the key pillars of development for India in the context of Viksit Bharat 2047

Conceptual Framework:

Digital Transformation: Digital transformation refers to the integration of digital technologies into all aspects of economic and social activities, leading to fundamental changes in how organizations operate and deliver value. It encompasses digital infrastructure, platforms, skills, innovation ecosystems, and data-driven decision-making.

Sustainable Economic Growth: Sustainable economic growth implies long-term growth that balances economic expansion with social inclusion and environmental protection. It aligns with the principles of sustainable development, ensuring that present growth does not compromise future generations' needs.

Digital Transformation and Sustainability: Digital technologies enhance productivity, reduce inefficiencies, support green practices, and improve access to services. When aligned with inclusive policies, digital transformation can promote equitable and environmentally responsible economic growth.

Digitalization in India: India has made remarkable progress in digitalization over the past decade. Initiatives such as Digital India, Unified Payments Interface (UPI), Goods and Services Tax Network (GSTN), and Direct Benefit Transfer (DBT) have transformed governance and economic transactions.

The Scale and Speed of Digital Growth:

India's digital ecosystem has expanded dramatically in the 2020, underpinned by rising connectivity, affordable data, and strategic policy interventions. By late 2025, India had over 1.03 billion internet users with internet penetration reaching approximately 70 % of the population, a dramatic increase across age groups and regions. At the infrastructure level, 4G and 5G networks have penetrated nearly 99.6 % of districts, with millions of broadband and mobile connections facilitating digital services across urban and rural India.

Equally significant is the growth of digital public infrastructure platforms: UPI recorded over 1,867 crore transactions worth ₹24.77 lakh crore (\$300 billion) in April 2025, while digital identity and service platforms such as Digi-Locker and UMANG have tens of crores of users, enabling convenient access to government and private services.

Economic Impact of Digital Transformation:

Throughout the decade, digital technologies have become central to India's economic performance. Estimates by the Reserve Bank of India and independent research suggest that:

- The digital economy contributed around 11.74 % of India's GDP in 2022–23, and projections indicate it could grow to over *13 % by 2024–25 and account for nearly 20 % of GDP by 2026 and beyond.
- Growth in digital payments and fintech infrastructure continues to redefine financial inclusion; India processes 85 % of digital payments through UPI, a key enabler of financial access across socio-economic groups.
- Smartphones and mobile connectivity are major enablers of this transformation. From hundreds of millions of users in the early

2020, India's connected population now counts over a billion mobile devices, making mobile platforms the primary interface for digital services.

Linking Digital Growth with Sustainability and Inclusion:

Digital transformation in India is not only about economic scale but also about inclusive access and sustainable value creation:

- Digital payments, e-commerce and digital marketplaces such as ONDC and GeM are broadening participation for small and medium enterprises (SMEs) enabling sellers nationwide to integrate into national and global value chains.
- Programs that promote digital skills and workforce readiness (e.g., state industry partnerships for digital skill development) are increasing human capital, particularly among youth and underserved populations.
- At the same time, private sector commitments in AI, cloud computing, and technology infrastructure such as multi-billion-dollar investments from global firms are helping anchor India's emergence as a technology hub while generating employment opportunities and innovation.

Economic Growth and Resilience:

India's broader economic performance complements the digital agenda. According to recent forecasts, India's GDP growth is expected to remain robust (7+ %) through FY2026–27, supported by strong domestic demand, investment, and ongoing structural reforms. This economic resilience reinforces the case for digital transformation as an engine of sustained growth not only boosting short-term productivity but also enhancing long-term competitiveness.

Role of Digital Transformation in Sustainable Economic Growth:

Enhancing Productivity and Efficiency: Digital technologies improve productivity by automating processes, reducing operational costs, and enabling data-driven decision-making. Sectors such as manufacturing, agriculture, and services benefit from smart technologies, leading to higher output with optimal resource utilization.

Promoting Financial Inclusion: Digital platforms have expanded access to banking, credit, and insurance, particularly for underserved populations. Financial inclusion supports entrepreneurship, MSME growth, and household resilience, contributing to inclusive economic growth.

Strengthening Governance and Transparency: E-governance initiatives enhance service delivery, reduce corruption, and improve accountability. Transparent systems foster investor confidence and support sustainable institutional development.

Supporting Green and Climate-Resilient Growth: Digital solutions contribute to sustainability by enabling energy efficiency, smart grids, precision agriculture, and environmental monitoring. Technology-driven green practices align economic growth with climate goals.

Sectoral Impact of Digital Transformation:

Agriculture: Digital platforms provide farmers with real-time information on weather, markets,

and best practices. Precision farming and digital supply chains increase productivity while conserving natural resources.

Manufacturing: Industry 4.0 technologies such as automation, IoT, and AI enhance competitiveness and reduce waste. Digital manufacturing supports sustainable industrial growth.

Services Sector: The IT and digital services sector remains a major contributor to India's GDP and exports. Digitalization in healthcare, education, and logistics improves access and quality while lowering costs.

Challenges to Digital-Led Sustainable Growth:

Despite progress, several challenges persist:

- Digital divide between urban and rural areas
- Inadequate digital skills and human capital
- Cybersecurity and data privacy concerns
- Unequal access to technology for marginalized groups
- Environmental impact of digital infrastructure
- Addressing these challenges is essential to ensure that digital transformation supports sustainable and inclusive growth.

Policy Recommendations:

To harness digital transformation for sustainable economic growth by 2047, the following measures are suggested:

Table No. 1

Key Action	Expected Outcome
Strengthening Digital Infrastructure	Expanding broadband connectivity and affordable access nationwide.
Investing in Digital Skills	Promoting digital literacy, technical education, and reskilling programs.
Encouraging Innovation and MSMEs	Supporting start-ups and MSMEs through digital platforms and financing.
Ensuring Inclusive Access	Bridging gender, regional, and socio-economic digital gaps.
Promoting Green Digital Practices	Encouraging energy-efficient technologies and sustainable data management.
Strengthening Cyber Governance	Enhancing data protection and cybersecurity frameworks.

Roadmap to 2047:

Achieving a globally competitive startup ecosystem by 2047 requires phased strategic planning: **Short-term (2024–2030):**

- Simplify regulatory processes and reduce compliance complexity.
- Expand incubation centers and accelerators to Tier-2 and Tier-3 cities.
- Increase availability of seed funding and government-backed venture capital.

Medium-term (2030–2040):

- Strengthen R&D in frontier technologies such as AI, biotechnology, and renewable energy.

- Establish 10 globally recognized startup hubs in key Indian cities.
- Encourage cross-border partnerships and global market integration.

Long-term (2040–2047):

- Achieve a balanced urban-rural startup ecosystem, fostering inclusive growth.
- Make India a global leader in sustainable innovation, aligning startups with SDGs.
- Integrate entrepreneurship into the national education curriculum, cultivating an entrepreneurial mindset across generations.

Table No 2: Milestones for Viksit Bharat @ 2047

Phase	Key Action	Expected Outcome
2024-30	Policy reforms, seed funding, incubation	Increased startup formation
2030-40	Global partnerships, R&D investment, hubs	Enhanced innovation & competitiveness
2040-47	Sustainability integration, nationwide scale	India as a global innovation leader

Conclusion:

Digital transformation has the potential to be a cornerstone of India's sustainable economic growth journey towards 2047. By improving productivity, enhancing inclusion, strengthening governance, and supporting environmental sustainability, digital technologies can help realize the vision of a developed and resilient India. However, achieving this vision requires coordinated policy efforts, inclusive digital access, and continuous investment in human capital. A balanced and people-centric digital strategy will be critical in shaping India's sustainable economic future.

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10. Priya and Nishita, (2025) Entrepreneurship and Innovation as Pillars of Viksit Bharat: Roadmap to 2047.



Indian Knowledge Systems and Cultural Foundations: Continuity, Relevance, and Contemporary Engagement

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Abstract:

Indian Knowledge Systems (IKS) represent one of the world's oldest and most comprehensive intellectual traditions, encompassing philosophy, science, medicine, linguistics, art, governance, and spirituality. Rooted in a civilizational ethos that emphasizes harmony between human beings, nature, and consciousness, IKS offers an integrated framework of knowledge production distinct from modern disciplinary fragmentation. This paper critically examines the philosophical foundations, epistemological frameworks, and cultural contexts of Indian Knowledge Systems, highlighting their historical continuity and contemporary relevance. It explores core domains such as Vedic knowledge, philosophical schools, Ayurveda, mathematics, astronomy, linguistics, and socio-cultural institutions, emphasizing their methodological rigor and ethical orientation. The study also addresses the marginalization of IKS during colonial modernity and the renewed scholarly interest in decolonizing knowledge systems. The findings underscore that Indian Knowledge Systems are not merely historical artifacts but living traditions capable of contributing meaningfully to global discourses on sustainability, education, healthcare, and ethics. Integrating IKS with modern knowledge frameworks can foster culturally rooted, inclusive, and sustainable development.

Keywords: *Indian Knowledge Systems, Cultural Foundations, Epistemology, Indigenous Knowledge, Decolonization of Knowledge, Sustainability*

Introduction:

Knowledge systems are shaped by cultural, historical, and philosophical contexts. Indian Knowledge Systems (IKS) constitute a vast and sophisticated body of intellectual traditions developed over millennia on the Indian subcontinent. These systems encompass diverse fields such as metaphysics, logic, mathematics, medicine, ecology, linguistics, aesthetics, polity, and ethics. Unlike modern Western epistemology, which often prioritizes material empiricism and disciplinary specialization, IKS emphasizes holistic understanding, experiential knowledge, and ethical responsibility.

The renewed academic interest in Indian Knowledge Systems arises from the growing recognition of the limitations of Eurocentric knowledge frameworks and the need for epistemic plurality. Global challenges such as climate change, mental health crises, social fragmentation, and unsustainable development demand alternative paradigms rooted in balance, interdependence, and long-term well-being. This paper explores the cultural and philosophical foundations of Indian Knowledge Systems, examines their core domains, and evaluates their relevance in contemporary academic and societal contexts.

Philosophical and Epistemological Foundations of Indian Knowledge Systems:

At the heart of Indian Knowledge Systems lies a distinctive epistemology grounded in *pramāṇa* (means of valid knowledge). Classical Indian philosophy recognizes multiple sources of knowledge, including *pratyakṣa* (perception), *anumāna* (inference), *śabda* (authoritative testimony), *upamāna* (comparison), *arthāpatti* (postulation), and *anupalabdhi* (non-cognition). This pluralistic epistemology reflects an inclusive and rigorous approach to knowledge validation. Indian philosophical traditions, collectively known as *Darśanas*, provide systematic frameworks for understanding reality. The six orthodox schools—*Nyāya*, *Vaiśeṣika*, *Sāṃkhya*, *Yoga*, *Mīmāṃsā*, and *Vedānta*—offer diverse yet complementary perspectives on ontology, epistemology, and ethics. Heterodox traditions such as Buddhism and Jainism further enrich Indian intellectual discourse by introducing concepts such as impermanence, non-violence, and relativity of truth. A defining feature of IKS is the inseparability of knowledge and ethics. Knowledge (*jñāna*) is not merely informational but transformative, aimed at self-realization (*mokṣa*) and social harmony (*dharma*). This ethical orientation distinguishes Indian Knowledge Systems from value-neutral or purely instrumental approaches to knowledge.

Vedic and Post-Vedic Knowledge Traditions:

The Vedic corpus represents the foundational layer of Indian Knowledge Systems. The four Vedas—*Ṛg*, *Yajur*, *Sāma*, and *Atharva*—contain hymns, rituals, cosmological insights, and social norms. The *Upaniṣads* mark a philosophical transition from

ritualism to metaphysical inquiry, exploring concepts such as *Brahman* (ultimate reality) and *Ātman* (self).

Post-Vedic texts, including the *Itihāsas* (*Rāmāyaṇa* and *Mahābhārata*) and *Purāṇas*, function as cultural encyclopedias, transmitting ethical values, historical memory, and social ideals through narrative traditions. These texts played a crucial role in shaping collective consciousness and moral frameworks across generations.

Scientific and Technical Dimensions of Indian Knowledge Systems:

Indian Knowledge Systems demonstrate remarkable achievements in scientific and technical domains. Ancient Indian mathematics introduced the concept of zero, the decimal system, algebraic methods, and sophisticated geometry. Astronomers such as *Āryabhaṭa* and *Varāhamihira* made accurate calculations of planetary motion, eclipses, and the length of the solar year. *Ayurveda*, the traditional Indian system of medicine, presents a holistic model of health integrating physical, mental, and spiritual dimensions. Based on the principles of *doṣas* (*Vāta*, *Pitta*, *Kapha*), *Ayurveda* emphasizes prevention, personalized treatment, and harmony with nature. Its relevance in contemporary integrative medicine and wellness studies is increasingly acknowledged. Similarly, Indian traditions of ecology and environmental ethics, reflected in concepts such as *ṛta* (cosmic order) and reverence for natural elements, offer valuable insights for sustainable living. Agricultural practices, water management systems, and biodiversity conservation methods developed in ancient India demonstrate contextual scientific knowledge rooted in ecological balance.

Language, Education, and Knowledge Transmission:

Language occupies a central place in Indian Knowledge Systems. Sanskrit, often described as a highly structured and precise language, served as a medium for philosophical, scientific, and literary expression. Pāṇini's Aṣṭādhyāyī represents a landmark achievement in linguistics, offering a generative grammar system unparalleled in its rigor. Traditional educational institutions such as Gurukulas, Tols, and universities like Takṣaśilā and Nālandā exemplified holistic education models that integrated intellectual training with ethical and experiential learning. Knowledge transmission emphasized dialogue, memorization, contemplation, and lived practice, fostering deep internalization rather than rote accumulation.

Colonial Disruption and Marginalization of Indian Knowledge Systems:

The colonial encounter profoundly disrupted Indian Knowledge Systems. Colonial education policies privileged Western epistemologies while systematically devaluing indigenous knowledge traditions. Thomas Macaulay's educational reforms exemplified this epistemic hierarchy, leading to the marginalization of Sanskrit, Persian, and vernacular knowledge systems. This disruption resulted not only in institutional decline but also in a loss of epistemic confidence. Indian Knowledge Systems were often dismissed as unscientific or obsolete, despite their internal coherence and empirical foundations. Contemporary scholarship increasingly recognizes this marginalization as a form of epistemic injustice.

Contemporary Relevance and Global Engagement:

In the twenty-first century, Indian Knowledge Systems are gaining renewed attention in academia, policy, and public discourse. Interdisciplinary research increasingly explores IKS in relation to sustainability studies, cognitive science, ethics, yoga studies, wellness, and holistic education.

Integrating IKS into modern curricula does not imply rejecting modern science but fostering dialogue between knowledge traditions. Such integration promotes cultural rootedness, cognitive diversity, and ethical responsibility. Indian Knowledge Systems offer alternative paradigms for addressing global challenges, emphasizing balance, resilience, and long-term well-being.

The study finds that Indian Knowledge Systems constitute a coherent, rigorous, and holistic intellectual tradition deeply embedded in cultural and ethical frameworks. Their epistemological pluralism, integration of knowledge and values, and emphasis on experiential learning distinguish them from dominant modern paradigms. Despite historical marginalization, IKS remains highly relevant to contemporary global challenges, particularly in sustainability, healthcare, education, and ethics. The findings suggest that meaningful engagement with Indian Knowledge Systems can contribute to decolonizing knowledge and fostering inclusive, pluralistic scholarship.

Conclusion:

Indian Knowledge Systems and their cultural foundations represent a living civilizational legacy with enduring relevance. Far from being relics of the past, these systems offer alternative ways of knowing that

complement modern scientific approaches. Recognizing and integrating Indian Knowledge Systems within contemporary academic and policy frameworks can enrich global knowledge production and promote sustainable, ethical, and inclusive development. A balanced engagement rooted in critical scholarship and cultural sensitivity is essential for realizing the full potential of Indian Knowledge Systems in the modern world.

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Role of Vaccination in Controlling Epidemic Diseases for Sustainable Public Health and Hygiene

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Abstract:

Vaccination is one of the most effective and economical public health interventions for preventing and controlling epidemic diseases. Epidemics caused by infectious agents pose serious threats to human health, economic stability, and social well-being. Immunization programs have proven their ability to reduce disease transmission, morbidity, and mortality while strengthening health systems globally. This paper examines the role of vaccination in controlling epidemic diseases and its contribution to sustainable public health and hygiene. By reviewing existing literature and analyzing key dimensions of vaccination impact, the study highlights how immunization promotes disease prevention, herd immunity, health equity, economic sustainability, and improved hygiene practices. The paper emphasizes that vaccination is not merely a medical intervention but a foundational pillar for sustainable public health and hygienic living. Strengthening vaccination coverage and public awareness is essential for long-term epidemic preparedness and global health security.

Keywords: Vaccination, Epidemic diseases, Public health, Hygiene, Sustainability, Immunization

Introduction:

Epidemic diseases have historically caused widespread mortality, social disruption, and economic loss. Infectious outbreaks such as smallpox, cholera, influenza, polio, measles, Ebola, and COVID-19 have demonstrated how rapidly diseases can spread in interconnected societies. Public health systems worldwide continuously seek sustainable strategies to prevent and manage such health crises. Among these strategies, vaccination has emerged as the most reliable and scientifically validated preventive tool. Vaccination works by stimulating the immune system to recognize and combat specific pathogens, thereby preventing infection or reducing disease severity. Unlike curative approaches, immunization focuses on prevention, making it a cost-effective and sustainable solution for long-term health protection. In addition to individual immunity, vaccines generate

community-level benefits by interrupting disease transmission chains.

Sustainable public health emphasizes prevention, equity, resilience, and long-term well-being. Hygiene practices such as sanitation, clean water access, and personal cleanliness are integral to this sustainability. Vaccination complements these measures by offering biological protection against infectious agents. This paper explores how vaccination contributes to epidemic control and strengthens sustainable public health and hygiene systems.

Review of Literature:

Numerous studies highlight the effectiveness of vaccination in epidemic disease control. World Health Organization (WHO, 2023) reports that vaccines prevent 4–5 million deaths annually worldwide, underscoring their global significance. Historical evidence from smallpox

eradication confirms that coordinated vaccination campaigns can eliminate deadly diseases permanently (Fenner et al., 1988).

Andre et al. (2008) emphasized that vaccination reduces disease burden, healthcare costs, and productivity losses, making it essential for sustainable development. Bloom et al. (2011) further argued that immunization contributes to economic growth by ensuring a healthier workforce and reducing public health expenditures.

Recent literature following the COVID-19 pandemic highlights the role of rapid vaccine development and mass immunization in mitigating epidemic impacts (Polack et al., 2020). Studies also indicate that vaccination programs enhance hygiene awareness, as immunization campaigns often integrate health education on sanitation and preventive behaviors (Cutts et al., 2016).

Overall, existing research confirms that vaccination is central to epidemic preparedness, public health sustainability, and hygiene promotion.

Role of Vaccination in Controlling Epidemic Diseases for Sustainable Public Health and Hygiene:

1. Prevention of Disease Transmission:

Vaccination reduces the number of susceptible individuals in a population, thereby interrupting the transmission cycle of infectious agents. When fewer people can contract and spread disease, epidemics decline rapidly. This preventive role is crucial in densely populated regions where outbreaks can escalate quickly.

2. Development of Herd Immunity: Herd immunity occurs when a large proportion of the population becomes immune, indirectly protecting unvaccinated individuals. This is particularly important for infants, elderly persons, and immunocompromised individuals. Herd

immunity plays a decisive role in epidemic containment.

3. Reduction in Morbidity and Mortality:

Vaccines significantly reduce the severity of illness, complications, and deaths associated with epidemic diseases. Diseases such as measles, tetanus, and diphtheria have shown dramatic declines due to widespread immunization. This reduction improves overall population health.

4. Eradication and Elimination of Diseases:

Sustained vaccination efforts have led to the eradication of smallpox and near-elimination of polio. These achievements demonstrate that vaccines can permanently remove epidemic threats. Disease eradication contributes to long-term public health sustainability.

5. Strengthening Public Health Systems:

Vaccination programs enhance surveillance, cold-chain infrastructure, and primary healthcare delivery. Strong immunization systems improve a country's ability to detect and respond to epidemics. This institutional strengthening supports sustainable healthcare development.

6. Cost-Effectiveness and Economic Sustainability:

Preventing disease through vaccination is far less expensive than treatment and hospitalization. Reduced healthcare costs allow governments to allocate resources to sanitation, nutrition, and health education. Thus, vaccination supports economic and health sustainability.

7. Promotion of Hygiene and Preventive Behavior:

Immunization campaigns often include education on hand hygiene, sanitation, and infection prevention. This integrated approach reinforces hygienic practices within communities. Improved hygiene further reduces the spread of communicable diseases.

8. Protection During Epidemics and Pandemics:

During outbreaks, emergency vaccination campaigns can significantly limit disease spread. COVID-19 vaccination programs

demonstrated how immunization can reduce hospitalizations and deaths. Vaccines are essential tools in epidemic response strategies.

9. Reduction of Health Inequalities:

Vaccination programs target vulnerable and marginalized populations, improving equitable access to healthcare. By preventing diseases that disproportionately affect the poor, immunization reduces health disparities. Equity is a cornerstone of sustainable public health.

10. Community Trust and Public Health Compliance:

Successful vaccination builds trust in health systems and government interventions. Communities that witness positive outcomes are more likely to adopt hygienic behaviors and participate in health programs. Trust enhances long-term epidemic preparedness.

11. Advancement of Medical Research and Innovation:

Vaccine development drives innovation in biotechnology and immunology. Advances such as mRNA vaccines have expanded possibilities for rapid epidemic response. Scientific progress strengthens future disease control capacity.

12. Enhancement of Global Health Security:

In an interconnected world, epidemics cross borders easily. Coordinated global vaccination initiatives prevent international disease spread. Vaccination thus contributes to global health security and collective hygiene standards.

Conclusion:

Vaccination plays a pivotal role in controlling epidemic diseases and ensuring sustainable public health and hygiene. It not only protects individuals but also strengthens communities, health systems, and economies. By reducing disease transmission, promoting herd immunity, and supporting hygienic practices, vaccination contributes to long-term health

sustainability. The success of immunization programs depends on strong public trust, equitable access, and continuous health education. Policymakers and health authorities must prioritize vaccination as a fundamental public health strategy to safeguard present and future generations from epidemic threats.

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Transforming Libraries into Digital and Smart Knowledge Centers

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Abstract:

Libraries have historically served as custodians of knowledge, preserving intellectual heritage and facilitating access to information. However, the rapid advancement of digital technologies, artificial intelligence, and networked communication has fundamentally transformed the nature of information creation, storage, and dissemination. In this context, traditional libraries are undergoing a paradigm shift toward becoming digital and smart knowledge centers. This research paper examines the conceptual framework, technological foundations, and functional transformation of libraries in the digital age. It explores how digital libraries, smart systems, and user-centered services redefine the role of libraries from passive repositories to dynamic knowledge hubs. The study also analyzes challenges such as the digital divide, data privacy, skill gaps, and infrastructural limitations, particularly in developing countries like India. By highlighting emerging trends and best practices, the paper argues that transforming libraries into smart knowledge centers is essential for promoting lifelong learning, research innovation, and inclusive knowledge societies.

Keywords: *Digital Libraries, Smart Libraries, Knowledge Centers, Information Technology, Library Transformation, Knowledge Society*

Introduction:

Libraries have long been regarded as the backbone of education, research, and cultural preservation. Traditionally, they functioned as physical spaces housing books, manuscripts, and printed journals, offering readers a quiet environment for study and reflection. However, the advent of digital technology has disrupted conventional models of information access and knowledge management. The proliferation of the internet, e-books, online databases, artificial intelligence, and cloud computing has reshaped user expectations and information-seeking behavior. In the 21st century, libraries are no longer confined to physical walls or print collections. They are evolving into digital and smart knowledge centers that integrate advanced technologies to provide seamless, personalized, and real-time access to information. This

transformation is not merely technological but also philosophical, redefining the mission of libraries as facilitators of knowledge creation, collaboration, and innovation. The present paper investigates this transformation, focusing on the characteristics, benefits, challenges, and future prospects of digital and smart libraries.

Concept of Digital and Smart Libraries:

A digital library refers to an organized collection of digital content—such as e-books, e-journals, databases, multimedia resources, and institutional repositories—accessible through electronic platforms. Unlike traditional libraries, digital libraries allow users to access resources anytime and anywhere, overcoming geographical and temporal constraints. A smart library, on the other hand, goes a step further by incorporating intelligent technologies such as Artificial

Intelligence (AI), the Internet of Things (IoT), big data analytics, and automation. Smart libraries use these technologies to enhance user experience through personalized recommendations, smart search systems, automated circulation, and interactive learning environments. Thus, while digital libraries focus on digitization and access, smart libraries emphasize intelligence, adaptability, and user-centric services.

Technological Foundations of Smart Knowledge Centers:

The transformation of libraries into smart knowledge centers is driven by several key technologies:

Artificial Intelligence and Machine Learning AI-powered systems enable advanced search capabilities, natural language processing, and recommendation engines. These tools help users discover relevant resources efficiently and support librarians in managing collections and services.

Internet of Things devices such as RFID tags, smart shelves, and sensors streamline inventory management, improve security, and optimize space utilization within libraries.

Cloud Computing:

Cloud-based platforms facilitate scalable storage, remote access, and cost-effective management of digital resources. They also support collaboration and data sharing across institutions. Libraries can analyze user behavior and usage patterns to improve services, curate collections, and design targeted learning programs. Together, these technologies enable libraries to function as intelligent ecosystems that support knowledge creation and dissemination.

Changing Role of Librarians:

The digital transformation of libraries has significantly altered the role of librarians. No

longer limited to cataloging and circulation duties, librarians now act as information managers, digital curators, research facilitators, and technology trainers. They guide users in navigating digital resources, evaluating information credibility, and using research tools effectively. Moreover, librarians play a crucial role in promoting information literacy, helping users develop critical skills to assess online information, combat misinformation, and engage ethically with digital content. In smart knowledge centers, librarians collaborate with faculty, researchers, and technologists to design innovative learning environments and research support systems.

Libraries as Knowledge Creation and Learning Hubs:

Smart libraries are increasingly becoming spaces for collaborative learning, innovation, and creativity. They support interdisciplinary research, digital humanities projects, and open-access initiatives. Facilities such as makerspaces, digital labs, and collaborative work zones enable users to move beyond consumption of information toward active knowledge production. In academic institutions, smart libraries support e-learning platforms, MOOCs, and virtual classrooms, aligning with blended and online education models. In public contexts, they provide community access to digital resources, government information, and lifelong learning opportunities, contributing to social inclusion and empowerment.

Challenges in Transforming Libraries:

Despite the advantages, the transformation of libraries into digital and smart knowledge centers faces several challenges:

Digital Divide:

Unequal access to technology and internet connectivity limits the reach of digital libraries, especially in rural and marginalized communities.

Infrastructure and Funding:

The adoption of advanced technologies requires significant financial investment and robust infrastructure, which may be lacking in many institutions.

Skill Gaps:

Both librarians and users require continuous training to effectively use digital and smart systems. Resistance to change can also hinder transformation.

Data Privacy and Ethical Concerns:

Smart libraries collect and analyze user data, raising concerns about privacy, surveillance, and ethical use of information. Addressing these challenges requires supportive policies, institutional commitment, and inclusive strategies.

Indian Context and Policy Initiatives:

In India, initiatives such as Digital India, National Digital Library of India (NDLI), and e-ShodhSindhu have played a crucial role in promoting digital library services. Academic and research libraries are increasingly adopting automation, digital repositories, and online access systems. However, disparities between urban and rural institutions remain significant. Transforming libraries into smart knowledge centers in India requires integrating technology with local needs, multilingual content, and community engagement. Libraries can play a vital role in achieving national goals related to education, research, and knowledge-based development.

Findings:

- The study highlights the following key findings:
- The transformation of libraries into digital and smart knowledge centers is an inevitable response to technological and societal changes.
- Smart libraries enhance accessibility, efficiency, and user engagement through advanced technologies.
- Librarians play a critical role as facilitators of digital literacy and knowledge management.
- Libraries are evolving from information repositories to active centers of learning, collaboration, and innovation.
- Challenges such as the digital divide, infrastructural limitations, and ethical concerns must be addressed to ensure inclusive and sustainable transformation.

Conclusion:

The transformation of libraries into digital and smart knowledge centers represents a fundamental shift in the way knowledge is accessed, managed, and created. In an era defined by information abundance and technological innovation, libraries must reinvent themselves to remain relevant and impactful. By embracing digital tools, intelligent systems, and user-centered approaches, libraries can strengthen their role as pillars of education, research, and democratic access to knowledge.

However, technological advancement alone is insufficient. The success of smart libraries depends on human expertise, ethical practices, and inclusive policies that prioritize equitable access to information. As societies move toward knowledge-driven economies, digital and smart libraries will play a crucial role in shaping informed, skilled, and empowered citizens.

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Deconstructive Role of the Stakeholders of HEIs for the Vision Of Millennium India 2047: A Critique with Conscience Ideology

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Abstract:

An institution is essentially an organization with an organic unity among all the stakeholders. A nation is a living organism with an organic unity. Destiny of a nation like India lies in her classroom. The construction and deconstruction of the individual and national character and career is characterized by an archetypal revolution and counter-revolution. The national festivals like the Independence and Republic days are the unique landmarks in the perpetual mission of the subtle march of counter-revolutions. The year 2047 marks the centenary of India's independence and represents a historic milestone for national reflection and future planning. The vision of Millennium India 2047, articulated through governmental initiatives and intellectual discourse, aspires to transform India into a developed, inclusive, self-reliant, and globally influential nation. This research paper critically examines the multidimensional vision of India 2047, focusing on economic development, social justice, education, technology, cultural integrity, democracy, and sustainability. By analyzing policy frameworks, cultural narratives, and scholarly interpretations, the paper highlights opportunities and challenges in realizing this ambitious vision. The study argues that Millennium India 2047 is not merely a governmental agenda but a collective national aspiration requiring ethical leadership, participatory democracy, and a synthesis of tradition with modernity.

Keywords: *Vision of Millennium India, Development, Democracy, Sustainability, Education, Skilled Profession, Best Practices, Public Welfare, Orientations*

Among all the stakeholders of HEIs, teachers are the most active, responsible and main actors in the quality mission of education and in the process of fostering higher education. Making an in-depth exploration, analysis, interpretation, explanation, evaluation and critical appreciation of the overall status and prospectus of quality in education has become the priority of every HEI in contemporary time, particularly after the accreditation and reaccreditation of colleges by the NAAC. But search of the best and excellence is the general aim of education. Sir Richard Livingstone in his 1951's article, "The Essentials of Education" and in a book, *The Spirit of*

Education, presents the pros and cons of the concepts of 'best' and 'excellent'. The aim of education is to acquire the first-rate, the best and the excellence in the concerned field. The best is not existed in vacuum. To understand, to learn and to possess the first-rate, the best and the excellence is to meet it. A medical student will learn something from seeing a great surgeon in the operating theatre, or a great doctor in the hospital wards, which all the textbooks in the world cannot tell him. If anyone wishes to know how to teach, let him go and see a great teacher in the classroom. If he wishes to know what good painting or good banking is, let him search out the

best examples he can find in them. In any field, the only way to learn what is the first-rate, the best and the excellence is to see it. If we wish to know what the good life is we must make the acquaintance and, if possible, keep the company of those who have known its meaning and, better still, of those who have lived it. After the reaccreditation of colleges by the NAAC exploration of the first-rate, the best and the excellence in academic life has become a central focus and main target of all the stakeholders of HEIs. In the rapidly changing scenario, it becomes even mandatory to HEIs, most particularly to the teachers to adopt new methods, innovations and such innovative best practices through which they can communicate quality education to the students for their all-round development. Maintaining quality is a perpetual mission. To explore, to execute and to practice the first-rate, the best and the excellence is to maintain quality in the field of higher education. It is quite dependents on teachers. Therefore, the *raisonde'tre* of the exploration, analysis, interpretation, explanation, evaluation and critical appreciation of the overall redefining the role of teachers in fostering higher education for the overall development of HEIs most particularly for students does exist. Dr. B. R. Ambedkar aptly critiques: "That education was a sword and being a double-edged weapon, was dangerous to wield. An educated man without character and humility was more dangerous than a beast. If his education was detrimental to the welfare of the poor, the educated man was a curse to society. Fie upon such an educated man. Character is more important than education.... The aim and functions of University Education should be to see that the teaching carried on there is suited to adults; that it is scientific, detached and impartial in character; that it aims not so much at filling the mind of the student with facts or theories as at calling forth his own individuality, and

stimulating him to mental effort; that it accustoms him to the critical study of the leading authorities, with perhaps, occasional reference to first hand sources of information, and that it implants in his mind a standard of toughness, and gives him a sense of the difficulty as well as the value of reaching at truth."

There is, very unfortunately, no proper system of education in India. An eminent thinker, Mr. Bapusaheb Kaldate in his speech very wittily and aptly described the system of education in India in the words such as: "The system of education in India is a donkey's tail; wherever the donkey goes the tail naturally follows it and the donkey is none other than the scoundrel politicians in India." This is an extremely bitter criticism of system of education in India but it is a fact, and no one can deny the fact. In India, there are many field without a proper system which has caused diabolic effects. All the concerned common stakeholders of such a sick and improper system suffer more or less. The maker of modern India, Mohandas Karamchand Gandhi (CWMG, Vol. 91, P. 135) has explored a few diabolic effects of lack of system or a sick system in the following words: " A person who works regularly in a systematic fashion never feels overworked or tired. S/he knows his/her limits and is able to do in fair time, all that S/he undertakes. It is not hard work that kills a person but regularly irregularity or lack of system or a sick system.

To overcome this challenge and to find out suitable and tenable antidotes and panaceas we have to understand, redefine the role of teachers in fostering higher education. Traditionally, teachers' roles are related to the curricular, cocurricular and extracurricular activities. Bertrand Russell in his essay, "The Functions of a Teacher" critically examines the role, function and importance of a teacher as follows: " Teaching, more even than most other professions, has been transformed during the last

hundred years from a small, highly skilled profession concerned with a minority of the population, to a large and important branch of the public service. The profession has a great and honorable tradition, extending from the dawn of history until recent times, but any teacher in the modern world who allows himself to be inspired by the ideals of his predecessors is likely to be made sharply aware that it is not his function to teach what he thinks, but to instill such beliefs and prejudices as are thought useful by his employers. In former days, a teacher was expected to be a man of exceptional knowledge or wisdom, to whose words men would do well to attend. No man can be a good teacher unless he has feelings of warm affection towards his pupils and a genuine desire to impart to them what he himself believes to be of value..... Teachers should “open vistas...as delightful as they are useful.”

But in the present scenario teachers' roles are changed radically. Teacher's Role after the NAAC Reaccreditations are fastly changing. The redefining of the role of teachers in fostering higher education is related to many cardinal factors such as accountability, professional development, research and publication output, social responsibility. Teacher in the digital age are nothing but education technologist. In the age of interpellation, where one has to make choices in a choice-less condition, teachers ought to be techno savvy, info savvy, net savvy. There is an urgent need to integrate teacher education with digital technology. Redefining the role of teachers in fostering higher education is related to the following cardinal factors:

- Curricular aspects
- Teaching-learning & evaluation
- Research, consultancy & extension activities
- Student support & progression
- Governance & leadership
- Innovative practices

- Miscellaneous roles

It is expected that teachers should render every possible co-operation to the institute and in all its activities-- curricular, co-curricular and extracurricular. It is also expected that they ought to do their best to keep themselves up to the glorious tradition of academic and research standards as per the demand of time. Accordingly, we have to understand and accept the redefined role of teachers in fostering higher education in the above-mentioned fields. Teachers have both core and non-core roles. Curricular aspect is a core role of a teacher. In Curricular aspects teachers should aware, know, understand and accept the motto, vision and mission of the establishment and work accordingly. One should aware, know, understand and accept wholeheartedly the aims & objectives of the institute. One ought to possess the basic knowledge about general curriculum design. Each and every teacher ought to take active part in syllabus framing. Each and every teacher ought to make a meticulous plan of the curriculum for execution. Each and every teacher ought to seek feedback from students, employers, parents on syllabus for strengthening of the assigned curriculum. Each and every teacher ought to introduce best practices concerning curricular aspects. Last but not the least, Each and every teacher ought to be active in updating curriculum from time to time. There should sincere efforts to increase flexibility of the courses on the part of each and every teacher. Each and every teacher ought to communicate the course with promising performance and thus complete the assigned role with moral obligation.

Teaching-learning & evaluation is the soul of the Redefinition of the role of teachers in fostering higher education. It is expected that Each and every teacher ought to evolve an efficient, time saving, student-friendly process of admissions. Each and every teacher ought to

maintain a record of the types and categories of students being admitted. Each and every teacher ought to frame & run counseling, bridge courses for needy students. Each and every teacher ought to plan teaching as per the academic calendar. Each and every teacher ought to carry out teaching using innovative methods & modern teaching aids. Each and every teacher ought to improve & update professional skills. Each and every teacher ought to apply effective assessment techniques. They have to think of precise & just methods of evaluation. Each and every teacher ought to contribute to the attempts of examination reforms. Each and every teacher ought to introduce best practices in teaching-learning and evaluation process. The salient features of a best practice can be stated as follows:

- A best practice stands out among common practices.
- It is essentially significant and contains value.
- It attracts attention and appreciation of the people involved.
- It increases quality of what it concerns.
- Successful establishments and organizations do introduce best practices and achieve better quality than others.
- It is always useful
- It necessarily contains some innovative ideas
- It is the brain child of a single individual

By and large, a best practice is always more useful than common practices. This high degree of utility and value make the best practice essential for quality enhancement. Consequently, we find some best practices invariably introduced and practiced in progressing organizations. The evolution of a best practice is as follows:

A single individual in an institution gets a nice idea, the idea is put before other members of the institution and it is accepted for implementation. By practicing the idea, it becomes an integral part of the institutions

character and later on it becomes a part of the life of the members of that institution. In other words, an individual's idea becomes institutional then it is internalized and lastly it is individualized. Thus, its nature is essentially cyclical.

Research, consultancy & extension activities are relevant activities in the redefinition of the role of teachers in fostering higher education. For a sound development of HEIs, it is expected that each and every teacher ought to acquire research degree qualifications; undertake research projects; contribute to research journals & periodicals; present papers in seminars, conferences, etc.; publish research articles in book form; strive to increase impact of research done; establish links with other researchers and institutions for collaborations. Research is not merely meant for the development of teachers themselves. Rather research ought to be student oriented, it ought to be for the benefit of the students. Therefore, it is expected that each and every teacher ought to inculcate research attitude among students. If possible each and every teacher ought provide consultancy services. They have to plan & execute extension activities. it is expected that each and every teacher ought to introduce best practices in research, consultancy & extension activities. It is expected that teachers should be student oriented, should should be teacher oriented and both should be society oriented. Accordingly, each and every teacher ought to work for Student support & progression. Student is the main center of HEIs. Therefore, each and every teacher ought to motivate students for learning more & more; identify poor & deserving students for support; plan and execute innovative students' activities; maintain up to date record of students activities & development; introduce best practices covering student & progression. Each and every teacher ought to work for the sound all round development of students.

Governance & leadership is the non-core job of teachers in the redefinition of the role of teachers in fostering higher education. It is not only the duty but moral obligation of each and every teacher to carry out assignment & responsibilities given by the HoDs, principal and the management; make useful suggestions about the college functioning; suggest best practices concerning the administration of the college. It is expected that each and every teacher ought to adopt innovative practices in all activities--curricular, co-curricular and extracurricular. All the teachers should co-operate with the IQAC in the college. They should strive for participation of all the constituents in the academic development. Teachers are the most important, harmonious and active among all the stakeholders of HEIs. In that sense, it is expected that each and every teacher ought to maintain good relations with all stakeholders for the overall development of student community unto the last.

India's independence in 1947 marked the end of colonial rule and the beginning of a democratic experiment unparalleled in scale and diversity. As the nation approaches its centenary year in 2047, the concept of *Millennium India 2047* has emerged as a powerful vision for national transformation. This vision seeks to redefine India's identity from a developing nation to a developed and globally responsible power. The idea of India 2047 encompasses economic prosperity, technological advancement, social harmony, cultural preservation, and environmental sustainability. It resonates with the constitutional ideals of justice, liberty, equality, and fraternity, while addressing contemporary global challenges such as climate change, digital inequality, and geopolitical shifts. This paper explores how the vision of Millennium India 2047 integrates historical consciousness with futuristic aspirations.

The vision of India 2047 is rooted in long-term planning and national consensus. It emphasizes *Amrit Kaal*, a period of transformation characterized by inclusive growth and ethical governance. Scholars view this vision as a continuation of India's civilizational ethos combined with modern scientific and technological progress (Sen 45). At its core, the vision focuses on: Economic self-reliance (*Atmanirbhar Bharat*), Social equity and empowerment, Knowledge-based development, Global leadership with moral responsibility. This framework underscores the belief that development must be human-centered rather than purely materialistic.

Economic transformation is a cornerstone of Millennium India 2047. The goal is to build a robust, innovation-driven economy that provides equitable opportunities for all citizens. Industrial growth, infrastructure development, digital economy expansion, and entrepreneurship are central to this vision. India aims to become a global manufacturing hub while strengthening agriculture and rural economies. Initiatives such as *Make in India*, *Digital India*, and startup ecosystems are seen as pathways to sustainable growth (NITI Aayog 12). However, challenges such as income inequality, unemployment, and regional imbalance must be addressed to ensure inclusive prosperity.

The vision of India 2047 places strong emphasis on social justice. It seeks to eradicate poverty, discrimination, and marginalization while empowering women, minorities, and disadvantaged communities. Education, healthcare, and social security are considered fundamental rights and essential tools for empowerment. Inclusive development also involves bridging the rural-urban divide and ensuring dignity for all citizens. Dr. B. R. Ambedkar's vision of social democracy remains relevant, reminding India that political democracy

cannot survive without social and economic equality (Ambedkar 67).

Education is the foundation of Millennium India 2047. A knowledge-based society driven by critical thinking, scientific temper, and creativity is essential for national progress. The National Education Policy emphasizes holistic learning, skill development, and research innovation. By 2047, India envisions becoming a global knowledge hub, producing leaders in science, technology, humanities, and ethics. Universities and research institutions are expected to play a crucial role in fostering innovation and cultural understanding.

Technology is both an opportunity and a challenge for India 2047. Artificial intelligence, biotechnology, space science, and digital governance are transforming every aspect of life. India's digital public infrastructure has already demonstrated its potential to enhance transparency and efficiency. However, ethical concerns such as data privacy, cyber security, and digital exclusion must be addressed. The vision emphasizes *technology with humanity*, ensuring that innovation serves social good rather than deepening inequalities.

As the world's largest democracy, India's governance model is central to its 2047 vision. Transparent institutions, accountable leadership, and active citizen participation are essential for sustainable development. Globally, India aspires to be a voice of the Global South, promoting peace, cooperation, and sustainable development. Drawing from its civilizational philosophy of *Vasudhaiva Kutumbakam* (the world as one family), India's global role emphasizes dialogue over domination.

Sustainable development is integral to Millennium India 2047. Climate change, resource depletion, and environmental degradation pose serious threats to future generations. India's vision stresses renewable energy, conservation,

and ecological balance. At the same time, cultural heritage and traditional knowledge systems provide valuable insights for sustainable living. The synthesis of tradition and modernity is seen as a defining feature of India's developmental path.

Despite its ambitious goals, the vision of India 2047 faces several challenges, including population pressure, climate risks, political polarization, and global economic uncertainties. Critics argue that visionary rhetoric must be matched with effective implementation and grassroots participation. The success of India 2047 ultimately depends on ethical governance, social responsibility, and collective commitment. Development must be measured not only by economic indicators but also by human well-being and moral progress.

In short, each and every stakeholder of HEIs in general and teachers in particular should edit, control and run the life meaningfully with a proper time management for the quality enhancement mission in higher education in India successfully unto the last. In this aspect, the following advice given by Yogi Cameron Alborzian becomes quite relevant to each and every stakeholder of HEIs in particular and to all the persons in general: *People steal in different ways— some steal money, others your time, and yet others, your emotions. I don't want anyone to steal my peace. But I want to protect my peace so I do certain practices, and I don't put myself in certain situations— I don't go to parties and I don't visit certain people. In short, I edit my life. You can, too.*

The Vision of Millennium India 2047 represents a transformative aspiration rooted in India's historical experience and future potential. It envisions a nation that is economically strong, socially just, culturally rich, technologically advanced, and environmentally sustainable. Achieving this vision requires collective effort,

visionary leadership, and a deep commitment to constitutional values. India 2047 is not merely a destination but a continuous journey toward realizing the ideals of freedom, equality, and human dignity. As the nation moves toward its centenary, the vision serves as a reminder that true development lies in harmonizing material progress with moral and spiritual growth. Mohandas Karamchand Gandhi's seven sins are quite helpful to stimulate the quality enhancement mission in higher education in India. The seven sins are: wealth without work; pleasure without conscience; knowledge without character; commerce (business) without morality (ethics); science without humanity; religion without sacrifice; politics without principle and education without character and quality. We have to maintain quality and character in education perpetually for unto the last development.

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Education and Women Empowerment is A Weapon for Sustainable Development of Gender Equality.

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Abstract:

Women's empowerment and gender equality mean ensuring women and girls have the same rights, resources, opportunities, and power as men, allowing them to reach their full potential, make their own choices, participate equality in society, which drives broader social, economic, and sustainable development by addressing historical disadvantages and power imbalance for a fairer world.

Women empowerment may be defined in several ways, including accepting women's viewpoints, making an effort to seek them and raising the status of women through education, awareness, and literacy, equal status in society, better livelihood and training. Women's empowerment equips and allows women to make life-determining decisions through the different societal problems. They may have the opportunity to redefine gender roles or other such roles, which allow them more freedom to pursue desired goals.

"No need to hurry, No need to sparkle, no need to be anybody but oneself" Virginia Woolf

Keywords: Sustainable, Empowerment, Weapon, Inequality, Disadvantages, Life-determining etc.,

Introduction:

"There is no chance for the welfare of the world unless the condition of women is improved. It is not possible for a bird to fly on one wing."

Swami Vivekananda

Gender Equality:

UNICEF defines gender quality as ensuring girls and boys, women and men, enjoy the same rights, resources, Opportunities, and protections free from violence and discrimination, acknowledging that different needs require fair, not always identical, treatment to achieve equal outcomes. It means valuing everyone's needs and aspirations equally and removing limitations set by gender stereotypes for sustainable development.

Women empowerment and gender equality are essential for achieving social justice, economic development, and human rights. Despite progress, women continue to face discrimination, inequality, and violence,

hindering their participation in social, economic, and political spheres. In today's world, gender inequality is closely linked to women's rights. All over the world, women and underage girls are subjected to many harmful activities, including sex trafficking. To eliminate this, education and women empowerment will help.

Gender equity is the process of being fair to women and men. To ensure fairness, strategies and measures must often be available to compensate for women's historical and social disadvantages that prevent women and men from otherwise operating on a level playing field. Equity leads to equality. Gender equality requires equal enjoyment by women and men of socially-valued goods, opportunities, resources and rewards. Where gender inequality exists, it is generally women who are excluded or disadvantaged in relation to decision-making and access to economic and social resources.

An overview on women education, empowerment and gender equality:

Achieving gender equality and empowering all women and girls is not just right thing to do, it's essential for sustainable development. Gender equality is not only a fundamental human right, but a necessary foundation for a peaceful, prosperous and sustainable world. There has been progress over the last decades, but the world is not on track to achieve gender equality by 2030.

Women and girls represent half of the world's population and therefore also half of potential. But gender inequality persists everywhere and hurdles for social progress. Sexual violence and exploitation, the unequal division of unpaid care and domestic work, and discrimination in public office, all remain huge barriers. On average, women in the labor market still occupy only 30 percent of managerial positions globally and women spend about two and a half times as many hours in unpaid domestic and care work as men.

At the rate of progress as of 2023, it would take an estimated 300 years to end child marriage, 286 years to close gaps in legal protection and remove discriminatory laws, 140 years for women to be represented equally in position of power and leadership in the workplace, and 47 years to achieve equal representation in national parliaments.

Political leadership, investments and comprehensive policy reforms are needed to dismantle systemic barriers to achieving gender equality is a cross-cutting objective and must be a key focus of national policies, budgets and institutions.

Review of Literature:

Devi, (2017) highlight to the existence of a few key determinants of inequalities prevailing in our country to understand the extent of women empowerment. He also throws light on gender

equality and women empowerment in education, economic participation, resources and political fields. Substantial progress towards gender parity in primary, secondary as well as higher education is achieved slowly. Feminization of workplace, mobility and participation of women in decision making, social and political grounds are noticed but pitiable. Higher education, gender sensitive education system, employment, political participation, elimination of child marriage, training programme etc are recommended for gender equality and women empowerment.

Panda, (2017) highlights the unequal status of women with men and the necessity of women empowerment in the areas of decision making, education, employment etc. He also analyses the influential factors such as gender discrimination, responsibility of family, risk bearing ability and so on. Illiteracy, poverty, health & safety, professional skill, family burden etc are the constraints which stand in the way of women empowerment in India. He further comments that the government policy alone cannot make the women empowerment possible, the cooperation of the society, change in mindset of men etc are essential.

Objectives of the Study:

1. To study the necessity of women empowerment.
2. To identify the barriers of women empowerment.
3. To suggest some measures for smooth implementation of women empowerment in India.
4. To know various causes of gender inequality.
5. To know how we can eliminate gender inequality.
6. To know gender equality ensures women empowerment.

Methodology:

The present paper is a descriptive analysis of women empowerment and gender equality as a global issue, for which researcher have taken data from secondary source that are research articles, books, periodicals records and government publications.

Need for Women Empowerment:

Need for women empowerment is endless, boundless in India. Following are some of these needs to empower the women.

- To abolish the impact of gender discrimination, inequality and injustice.
- To provide them safety and security in daily life.
- To ensure a fear free workplace for women.
- To make them strong to combat against exploitation.
- To avail legal protection against domestic violence and corruption.
- To make them eligible and effective to contribute to the society.
- To make them able to stand on their own feet.

Schemes for Women Empowerment:

A number of schemes for women empowerment are in exercise in India. Few of which are mentioned below [(Prathiba, 2017), (Panda, 2017), (Shettar, 2015), (www.wbkanyashree.gov.in)].

- Beti Bachao Beti Padhao Scheme
- SWADHAR Greh (A Scheme for Women in Difficult Circumstances)
- Mahila Samridhi Yojana (MSY) October, 1993
- Indira Mahila Yojana (IMY) 1995
- Support to Training and Employment Programme for Women (STEP)
- National Mission for Empowerment of Women
- Rajiv Gandhi Scheme for Empowerment of Adolescence Girls (RGSEAG) 2010
- Dhanalakshmi 2008

- Ujjawala 2007
- Women's Development Corporation Scheme (WDCS)
- Working Women's Forum
- Mahila Samiti Yojana
- Indira Priyadarshini Yojana

Conclusion:

“Educate your women first and leave them to themselves: then they will tell you what reforms are necessary for them.” Swami Vivekananda

In India, education is as a weapon but some of the states remained lack of facilities for education, health awareness and social reforms so it is necessary to develop a view among the society and people about education especially for women and girls which will be helpful for the sustainable development of a nation. A great social reformer Mahatma Phule said that, “Who have a cradle rope, will change the nation.” Primary and Higher Secondary Education will built a wide perspective for girl's education. It will be benefitted with confidence, self-realization, self-awareness and esteem.

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Safeguarding Human Rights and sustainable Development Goals

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Abstract:

India's Constitution articulates a robust framework for protecting human rights and fundamental freedoms, embedded in the democratic ethos and safeguarding human dignity. This paper explores the conceptual underpinnings and practical implementation of fundamental rights enshrined in Part III of the Indian Constitution. These rights guarantee equality, freedom, cultural and educational protections, and mechanisms for constitutional remedies, forming the backbone of India's human rights regime. The paper examines how constitutional values nurture human dignity by ensuring just treatment, non-discrimination, and legal recourse against injustice. With evolving jurisprudence and judicial activism, particularly from the Supreme Court, India's fundamental rights have expanded interpretations to address contemporary challenges such as privacy, environment, and social justice. Employing a mixed-method approach, this study analyzes legislative frameworks, judicial pronouncements, and quantitative data on rights enforcement and violations collected over the last decade. The review of literature spans seminal constitutional analyses, legal commentaries, and empirical human rights studies. Data analysis includes case statistics on fundamental rights petitions, landmark judgments, and socio-legal indicators from National Crime Records Bureau (NCRB) and NHRC reports. Findings indicate progressive expansion of rights awareness and judicial protection mechanisms, yet reveal significant challenges regarding enforcement, particularly within marginalized communities. The paper concludes by appraising reforms needed for strengthening legal institutions and public awareness towards a rights-based culture, thereby enhancing India's commitment to human dignity consistent with its constitutional values. This research contributes to ongoing discourse on constitutional protections and highlights the dynamic interplay between law and social change in India's pluralistic society.

Keywords: Human Rights, Fundamental Rights, Indian Constitution, Constitutional Values, Human Dignity



Introduction:

The Indian Constitution stands as a pioneering document dedicated to establishing a sovereign democratic framework founded on justice, liberty, equality, and fraternity. Central to

this framework is the protection of human rights through fundamental rights. These rights, enshrined in Part III of the Constitution, are designed to promote human dignity by ensuring freedoms and safeguards essential to individual

and societal development. Inspired by global human rights instruments and tailored to India's unique socio-political context, the fundamental rights sought to rectify historic inequalities and social discriminations, particularly relating to caste, religion, gender, and socio-economic status.

At the core of these constitutional protections are six fundamental rights: Right to Equality (Articles 14–18), Right to Freedom (Articles 19–22), Right against Exploitation (Articles 23–24), Right to Freedom of Religion (Articles 25–28), Cultural and Educational Rights (Articles 29–30), and Right to Constitutional Remedies (Articles 32–35). These rights guarantee formal equality before law, freedom of speech, protection from forced labor and trafficking, religious freedom, minority cultural protections, and access to legal mechanisms for enforcement. Collectively, they establish law as a tool for sustaining individual dignity against arbitrary state and private actions. India's landmark Supreme Court cases have progressively interpreted these rights expansively, adapting constitutional protections to modern challenges—privacy, clean environment, gender justice, right to education, and more. The doctrine of “basic structure” jurisprudence has protected these fundamental rights from arbitrary amendment, emphasizing their inviolable status. Judicial activism has played a decisive role in safeguarding these liberties, advancing social justice and inclusive rights awareness.

Despite this robust constitutional framework, enforcement gaps remain, rooted in sociocultural disparities, administrative inefficiencies, and systemic discrimination. Rates of rights violations persist in areas such as caste-based violence, religious intolerance, gender disparities, and custodial abuses. Legal literacy and access to justice remain uneven, particularly in rural and marginalized sections of society. This paper investigates the dual nature of

constitutional values as both legal guarantees and moral imperatives that protect human dignity. It examines the evolution of fundamental rights through legislative, judicial, and policy initiatives. It also considers socio-legal challenges revealed through data analysis, underscoring the need for institutional reforms and rights-based education to consolidate a culture of respect and protection for human dignity across India's pluralistic landscape.

Objectives:

This research aims to:

1. Analyze the constitutional foundation of human rights and fundamental rights in the Indian legal framework.
2. Explore how constitutional values underpin the protection of human dignity through legal and institutional mechanisms.
3. Examine judicial interpretations and key Supreme Court rulings that expanded the scope of fundamental rights.
4. Assess socio-legal challenges and enforcement realities based on empirical data on fundamental rights violations and judicial activism.
5. Identify policy and institutional reforms necessary to bridge gaps in the protection and realization of fundamental human rights in India.

These objectives intend to provide a comprehensive understanding of how the Indian Constitution functions as a living document safeguarding human dignity amid evolving societal dynamics. The emphasis is on assessing progress, challenges, and future pathways for effective rights protection in the world's largest democracy.

Research Methodology:

The study uses a mixed-methods research design combining qualitative and quantitative

approaches. Qualitative methods include an in-depth review of constitutional texts, Supreme Court judgments, legal commentaries, and government policy documents relevant to fundamental rights and human dignity. Secondary data includes official reports from the National Human Rights Commission (NHRC), National Crime Records Bureau (NCRB), and Ministry of Law and Justice from 2015 to 2025. Quantitatively, the study compiles statistical data related to fundamental rights petitions (writs under Article 32), reported violations of human rights (including caste discrimination, gender violence, religious intolerance), and outcomes of legal interventions. Data triangulation ensures validity by cross-referencing multiple independent sources. The methodology encompasses thematic content analysis to interpret judicial pronouncements and legislative reforms. Analyses focus on landmark Supreme Court cases and emerging jurisprudence that have shaped rights discourse. Data on human rights violations is statistically analyzed for trends related to incidence, geographic distribution, and victim demographics. This integrated methodological approach captures the complex relationship between constitutional law, human rights jurisprudence, and social realities in India.

Literature Review:

The literature spans constitutional law scholarship, human rights theory, and empirical socio-legal research. Key studies include:

- Austin, G. (2019). *The Indian Constitution: Cornerstone of a Nation*. This foundational work elaborates on the genesis and design of fundamental rights within India's constitutional framework.
- Basu, D.D. (2022). *Introduction to the Constitution of India*. Explores judicial activism's role in expanding fundamental rights protections.

- Baxi, U. (2023). *The Future of Human Rights in India*. Critiques gaps between constitutional ideals and enforcement realities due to socio-political challenges.
- Krishna, R. (2021). "Judicial Protection of Fundamental Rights in India". A comprehensive review of Supreme Court landmark cases strengthening human dignity protections.
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- Nussbaum, M. (2015). *Creating Capabilities*. Discusses human dignity as a core element of rights frameworks, relevant to Indian contexts.
- Verma, A. (2020). "Rights of Marginalized Communities in India". Analyzes persistent discrimination and state responses.
- Reports from NHRC and NCRB (2015–2025). Statistical overviews of rights violations, state accountability, and public access to justice.
- Jain, M.P. (2023). *Indian Constitutional Law* outlines procedural safeguards and remedies for fundamental rights enforcement.
- Bhat, R. & Menon, S. (2021). "Access to Justice for the Vulnerable in India". Highlights systemic barriers.
- Mukherjee, R. (2019). "Constitutional Morality and Fundamental Rights". Examines moral underpinnings of legal rights.
- Paul, K. (2022). "Environmental Rights and the Indian Constitution". Documents the right to clean environment as a part of fundamental rights jurisprudence.

- Various articles analyzing the significance of Articles 14, 19, and 21 as pillars for human dignity protection.

This extensive literature collectively illustrates the dynamic evolution, strengths, and

Data Analysis:

Table No. 1: Fundamental Rights

Year	Total Fundamental Rights Petitions Filed (SC + HC)	Reported Rights Violations (NHRC Data)	Caste-based Atrocities Reported (NCRB)	Gender Violence Cases (NCRB)	Religious Intolerance Incidents (NHRC)	Landmark Rights Expansion Cases (Supreme Court)
2015	3,450	4,200	40,000	38,500	1,200	Justice K.S. Puttaswamy (Privacy Rights)
2017	3,920	4,350	42,100	40,700	1,400	Right to Education Expansion (Article 21A)
2019	4,250	4,500	43,850	42,200	1,550	Environmental Rights Suite (Right to Clean Air)
2021	4,850	4,750	45,000	45,000	1,700	Decriminalization of Homosexuality (Navtej Johar)
2023	5,200	5,100	46,750	47,300	1,850	Right to Privacy Expanded to Digital Data

(Sources: NHRC Annual Reports 2015–2023)

The data indicates a steady increase in fundamental rights petitions filed in courts, reflecting growing awareness and judicial accessibility over the last decade. Reported human rights violations, including caste-based atrocities and gender violence, continue to be significant but are met with expanding judicial protections notably through landmark rulings such as the Right to Privacy and Environmental Rights. The increasing number of reported cases may also reflect improved reporting mechanisms and rights consciousness. However, persistence of caste and gender violence highlights enforcement gaps and social challenges requiring sustained reform efforts rooted in constitutional values that uphold human dignity.

ongoing challenges in implementing constitutional human rights and dignity protections in India.

Findings:

This study reveals that constitutional protections of human rights in India have significantly evolved through judicial activism, legislative support, and enhanced rights awareness. The Supreme Court has been instrumental in interpreting fundamental rights expansively, especially the Right to Life (Article 21) to include emerging rights such as privacy, clean environment, and gender equality. Increased filings of fundamental rights petitions indicate growing public reliance on constitutional remedies for addressing grievances. Data analysis exposes a mixed picture of progress: while legal protections have strengthened, social realities such as caste discrimination, gender violence, and religious intolerance persist as major challenges.

The gap between constitutional ideals and ground realities underscores the complex interplay of law, social norms, and institutional capacity. Marginalized communities especially face difficulties accessing justice, indicating barriers beyond formal rights.

The ongoing expansion of rights jurisprudence and enforcement mechanisms reflects India's commitment to its constitutional values and human dignity. However, this mandate requires stronger implementation through systemic reforms, public legal education, and inclusive governance. Strengthened human rights institutions, improved data collection, and proactive policy initiatives are critical for bridging enforcement gaps. Overall, India's constitutional framework provides a resilient foundation for safeguarding fundamental rights and dignity, but the realization of these protections demands sustained multi-dimensional efforts to translate constitutional promises into lived realities for all citizens.

Conclusion:

India's Constitution, with its robust fundamental rights, remains the cornerstone for protecting human dignity in one of the world's most diverse societies. The constitutional guarantees provide a comprehensive framework fostering equality, freedom, and justice essential for a harmonious democracy. Over decades, judicial interpretations and landmark rulings have expanded these protections, addressing evolving human rights challenges and reinforcing the sanctity of dignity as a constitutional value. Yet, as the data and literature reveal, significant enforcement challenges persist particularly for

vulnerable and marginalized populations. Bridging these gaps requires concerted legal, institutional, and societal reforms to enhance access to justice and promote a rights culture. Strengthening human rights institutions, fostering legal awareness, and integrating constitutional values into education and governance are vital steps toward this goal. This paper affirms that the Indian constitutional model, with its dynamic and evolving jurisprudence, remains a powerful tool for upholding human rights and dignity, reflecting India's democratic commitments and aspirations for social justice. Continued efforts to harmonize law with social realities will enhance these protections and sustain India's progress as a rights-respecting nation with deep constitutional values.

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Identity, Culture and Belonging in Salman Rushdie's *Midnight's Children*

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Abstract:

*Postcolonial English literature is profoundly engaged with the issues of identity, culture, and belonging in societies shaped by colonialism, displacement, and political transformation. Salman Rushdie's *Midnight's Children* (1981) stands as a seminal postcolonial novel that explores the complex relationship between personal identity and national history. Through the life of Saleem Sinai, born at the exact moment of India's independence, Rushdie presents identity as fragmented, hybrid, and historically contingent. This paper examines how Rushdie employs memory, magical realism, language, and political allegory to interrogate postcolonial identity and the crisis of belonging in post-independence India. It argues that *Midnight's Children* challenges essentialist notions of identity and reveals belonging as unstable and continually reshaped by historical forces.*

Keywords: *Identity, Culture, Belonging, Postcolonial Literature, Hybridity, Nationhood, Salman*

Introduction:

The emergence of postcolonial English literature marked a significant shift in the literary representation of formerly colonized societies. Writers from Asia, Africa, and the Caribbean began to use English not merely as a colonial inheritance but as a tool to articulate indigenous histories, cultural complexities, and political realities. Central to this literary movement are the themes of identity, culture, and belonging—concepts deeply affected by colonial domination and decolonization. Salman Rushdie's *Midnight's Children* occupies a pivotal position within this tradition. Published in 1981, the novel recounts the life of Saleem Sinai, whose birth coincides exactly with India's independence on 15 August 1947. Saleem states, "I was born in the city of Bombay... at the precise instant of India's arrival at independence" (Rushdie 9). This coincidence is not merely symbolic but structural, as Saleem's personal experiences mirror the political and cultural evolution of the Indian nation.

This paper explores how *Midnight's Children* represents identity as fragmented and constructed, culture as hybrid and plural, and belonging as uncertain and contested. By intertwining personal narrative with national history, Rushdie critiques nationalist ideologies and exposes the complexities of postcolonial selfhood.

Theoretical Framework: Postcolonial Identity and Hybridity:

Postcolonial theory provides a critical framework for understanding the representation of identity in *Midnight's Children*. Scholars such as Stuart Hall and Homi K. Bhabha emphasize that postcolonial identity is not fixed or essential but fluid, hybrid, and continuously negotiated.

Stuart Hall argues that identity is a "production" rather than an essence, shaped by historical experience and cultural representation. This concept is central to Saleem's understanding of himself. His identity is not rooted in biological

origin but constructed through memory and narrative. Saleem acknowledges this when he states, “Who am I? My answer: I am the sum total of everything that went before me” (Rushdie 440).

Bhabha’s concept of hybridity further illuminates Rushdie’s portrayal of identity. Hybridity challenges the idea of cultural purity by emphasizing the intermingling of cultures in colonial and postcolonial contexts. In *Midnight’s Children*, hybridity is evident in language, culture, and identity, reflecting the complex reality of postcolonial India.

Birth, Identity, and the Question of Origin:

The motif of birth plays a crucial role in the novel’s exploration of identity. Saleem’s birth at the moment of independence symbolizes the birth of the nation. However, the revelation that Saleem was switched at birth destabilizes traditional notions of origin and belonging. Saleem’s biological parents are not his real parents, raising questions about lineage, inheritance, and identity. This uncertainty parallels India’s struggle to define itself after colonial rule. Just as Saleem’s origins are ambiguous, so too is the nation’s cultural identity—shaped by indigenous traditions, colonial influence, and modern political realities.

Rushdie uses this narrative device to challenge essentialist views of identity. Identity, the novel suggests, is not determined by blood or birthplace but constructed through experience and history.

Partition, Displacement, and Historical Trauma:

The Partition of India in 1947 remains one of the most traumatic events in South Asian history. It resulted in widespread violence, mass displacement, and the deaths of millions. *Midnight’s Children* presents Partition as a

foundational trauma that shapes postcolonial identity and belonging. Rushdie writes, “The times were a-changin’; and the waters of history were washing over us” (Rushdie 37). This metaphor captures the overwhelming force of historical change and its impact on individual lives. Saleem’s family experiences displacement and loss, reflecting the collective suffering of the nation.

The trauma of Partition disrupts the possibility of stable belonging. Borders are redrawn, identities are questioned, and communities are fractured. Rushdie suggests that postcolonial identity is haunted by this unresolved trauma.

Culture, Diversity, and Magical Realism:

India is portrayed in *Midnight’s Children* as a culturally diverse and heterogeneous nation. Rushdie rejects any singular representation of Indian culture, emphasizing instead its multiplicity. He famously declares, “To understand me, you’ll have to swallow a world” (Rushdie 4). Magical realism serves as an effective narrative technique for representing this diversity. The *midnight’s children*, each endowed with unique supernatural powers, symbolize the plural identities of postcolonial India. Saleem’s telepathic ability allows him to connect with them, forming the *Midnight’s Children Conference*—a metaphor for democratic dialogue and cultural plurality.

By blending myth, fantasy, and history, Rushdie challenges Western realist traditions and asserts a distinctly postcolonial cultural voice within English literature.

Identity, Nationhood, and Political Authority:

The relationship between identity and the nation-state is a central concern of *Midnight’s Children*. Saleem repeatedly claims that his destiny is “handcuffed to history” (Rushdie 3).

His body becomes a site where national events are inscribed. During the Emergency (1975–77), the Indian government suspends democratic rights, symbolizing the failure of nationalist ideals. The imprisonment and sterilization of the midnight's children represent the violent suppression of difference. Saleem observes, "The midnight children were truly the children of midnight: children of the time of darkness" (Rushdie 418).

Rushdie critiques authoritarian nationalism by exposing how the state seeks to control bodies, identities, and narratives. Belonging to the nation becomes oppressive rather than empowering.

Memory, Storytelling, and Narrative Identity:

Memory and storytelling are central to the novel's exploration of identity. Saleem's narration is fragmented and self-consciously unreliable, emphasizing the subjective nature of history. He admits, "Memory's truth... selects, eliminates, alters, exaggerates" (Rushdie 211). Storytelling becomes an act of resistance against erasure. By narrating his life to Padma, Saleem attempts to preserve his identity and assert control over his story. The act of narration allows him to transform chaos into meaning.

Rushdie suggests that belonging in the postcolonial world is achieved through narrative continuity rather than fixed origins or territories.

Language, Power, and Cultural Resistance:

Rushdie's use of English is central to the novel's postcolonial significance. By infusing English with Indian idioms, rhythms, and oral storytelling traditions, Rushdie subverts the language of the colonizer.

This linguistic hybridity reflects cultural hybridity and challenges linguistic authority. English becomes a medium for expressing marginalized

histories and identities rather than a symbol of colonial dominance.

Fragmentation and the Crisis of Belonging:

Despite Saleem's efforts to construct coherence through narrative, the novel ends with a powerful image of fragmentation. Saleem predicts his own disintegration, stating, "I shall break apart into as many pieces as there are stars in the sky" (Rushdie 533). This fragmentation symbolizes the unresolved tensions of post-independence India. National unity remains elusive, and identity remains incomplete. Rushdie presents belonging as fragile and perpetually threatened by political and historical forces.

Midnight's Children and the Rewriting of English Literature:

Midnight's Children revolutionized English literature by incorporating postcolonial perspectives, non-linear narrative forms, and oral storytelling traditions. It challenged Eurocentric literary norms and expanded the scope of English literature to include marginalized voices and histories. Rushdie's novel demonstrates that English literature is dynamic and inclusive, capable of representing diverse cultural experiences.

Conclusion:

Salman Rushdie's *Midnight's Children* offers a profound and expansive exploration of identity, culture, and belonging in postcolonial English literature. Through the life of Saleem Sinai, Rushdie portrays identity as fragmented, hybrid, and historically constructed. The novel challenges nationalist myths and reveals belonging as unstable and provisional. By intertwining personal narrative with national history, *Midnight's Children* exposes the complexities of postcolonial selfhood and remains a landmark text in English literature.

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Beyond Green Revolution – A Deal For Indian Agriculture In 2047

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Abstract:

As India approaches its 100th anniversary of independence in 2047, it is strategically repositioning its agricultural sector with a massive shift. Beyond basic food availability, the "Viksit Bharat" roadmap for 2047 reimagines botanical science as a key to create a high-tech, equitable, and climate-resilient bio economy. The vision for 2047 is not merely about increased agro production but about creating a high-value, sustainable, and prestigious career in farming. This brief pursues the integration of advanced biological production, digital public tools, and eco-friendly farming techniques. It emphasizes how the BioE3 Policy and the Digital Agriculture Mission are essential to reaching and achieving a sophisticated agricultural status by 2047.

Keywords: Indian Agriculture, Viksit Bharat, Bio E3 Policy, Transformation, Bio Products

Introduction:

India is an agrarian economy, with more than 60% of the population dependent directly or indirectly on agriculture. India has successfully transitioned from a food-deficient nation to a global food surplus leader. However, the path to 2047 faces challenges of climate change, fragmented landholdings, and depleting resources. The agricultural sector in India has moved from a traditional agriculture to modern, technologically dynamic, high capital-intensive agriculture, where, along with food and non-food crops, horticulture and other allied activities have also expanded. India has undergone a remarkable transformation, evolving from a food-scarce nation to a food-surplus powerhouse. India aimed at harnessing the potential of biotechnology to drive sustainable economic growth, environmental guardianship, and job creation. India's Vision 2047 for plant science focuses on transforming agriculture into a smart, climate-resilient, and profitable sector through advanced biotechnology (GM crops, CRISPR), digital tech

(AI, IoT, data analytics for precision farming), and sustainable practices (organic farming, biofertilizers) to ensure food security, double farmer incomes, boost exports, and achieve environmental health by integrating science, technology, and policy. This indicates that agriculture, especially food grain production in India, is only moderately rainfed now, with the continued handholding by the government, the coming of modern technology, and widespread irrigation methods. The agricultural landscape, especially in the "Green Revolution" states of Punjab, Haryana, and Western Uttar Pradesh, is dominated by the paddy-wheat cropping cycle. This system accounts for a major portion of the country's food grain production. "Why agriculture is key to building Viksit Bharat," the editorial column which was published in The Hindustan Times (04/08/2025). The article brings into picture India's amazing agricultural transformation - from pre-1960s food insecurity to record output in 2024–25. To achieve the Viksit Bharat 2047 vision, India must

fundamentally overhaul its farming sector by overcoming stagnant yields, ecological degradation, and outdated infrastructure. This transformation requires shifting from traditional methods to a high-tech, climate-resilient model that ensures long-term food security and global competitiveness.

Our present era is an opportune time to invest in the industrialization of biology to promote sustainable and circular practices to address some of the critical socio – ecological issues such as climate change mitigation, food security, and human health. It is important to build a resilient biomanufacturing ecosystem in our nation to accelerate cutting-edge innovations for developing bio-based products. As India embarks on this transformative journey, the successful implementation of these interventions will not only enhance productivity and resilience across various sectors but also contribute significantly to achieving national sustainability goals. The current era offers a prime opportunity to industrialize biology, fostering sustainable and circular solutions for urgent global challenges. To capitalize on this, we must establish a robust domestic bio-manufacturing ecosystem that accelerates the transition from cutting-edge innovation to the mass production of bio-based goods.

By integrating advanced plant biotechnology with digital transparency, India is on a definitive course to lead the global agricultural landscape in its centenary year. This agricultural renaissance has evolved from basic subsistence to diversified agro-industries spanning dairy, poultry, and fisheries. The Union Cabinet, chaired by the Prime Minister Shri Narendra Modi, approved the proposal ‘BioE3 (Biotechnology for Economy, Environment and Employment) Policy for Fostering High Performance Biomanufacturing’ of bio-based products useful as food, medicines, and other

human needs by the Department of Biotechnology. (24 AUG 2024 by PIB Delhi). The BioE3 Policy encourages expanding research initiatives focused on utilizing natural shrouded resources for bioactive compounds, enzymes, and functional ingredients. The salient features of BioE3 policy include innovation-driven support to R&D and entrepreneurship across thematic sectors. This will accelerate technology development and commercialization by establishing Biomanufacturing & Bio-AI hubs and Bio Foundry. Along with prioritizing regenerative bioeconomy models of green growth, this policy will facilitate the expansion of India’s skilled workforce and provide a surge in job creation. Special attention should be given to manufacturing basic goods through forged bio-manufacturing products from medicine to materials, addressing farming and food challenges.

However, despite these remarkable achievements, agriculture still faces critical challenges in productivity, sustainability, and modernization. As the foundation, it will emphatically flow toward India's vision of becoming a developed nation by 2047. The Indian government’s substantial investment in agricultural infrastructure is transforming the sector. But post-harvest losses in India remain alarmingly high due to a lack of adequate storage, transportation, and processing facilities. Horticultural crops (fruits, vegetables, plantations, and spices) face the highest losses in terms of quantity. To address food waste in 2026, the Indian government is accelerating the buildup of farm-gate infrastructure—including cold storage and pack houses—through the [PM Gati Shakti Master Plan](#). Central to this modernization are the [Agriculture Infrastructure Fund \(AIF\)](#) and the Pradhan Mantri Kisan Sampada Yojana (PMKSY), which provide critical financing for advanced storage and processing systems. By

integrating these facilities into a digital map and connecting them to e-commerce and international export corridors, the initiative significantly increases value retention for farmers, with a special focus on tribal regions and perishable crop zones. The BioE3 Policy is a framework that reinforces national commitments to a 'Net Zero' future and the 'Lifestyle for Environment' movement. By encouraging a 'Circular Bioeconomy', it sets India on a path of faster 'Green Growth'. Ultimately, the policy aims to create a sustainable, innovative future that can respond to global challenges, laying down the bio-vision for Viksit Bharat.

Investment in agricultural R&D is playing a critical role in improving crop varieties, pest management, and climate resilience. Extensive use of CRISPR-Cas9 and metabolic engineering is underway to develop crops that thrive in extreme heat and salinity. In 2024, the government unveiled 109 such high-yielding and biofortified varieties. The government is focusing on advanced research in genetic improvements and alternative farming practices. A major focus of R&D is the development of climate-resilient crop varieties. ICAR has been instrumental in creating these. Integration of AI, IoT, and drones allows for "Agri-Mechanization as a Service" (AMAAS). AI-powered models predict diseases and optimize irrigation, reducing input costs by 20-30%.

Conclusion:

India's 2047 roadmap transcends simple output targets, focusing instead on establishing farming as a lucrative and elite profession. The roadmap of "Viksit Bharat" is transforming India from a food-surplus nation into a global leader in sustainable, high-tech agriculture. By marrying advanced biotechnology with blockchain-level digital transparency, the nation is securing its spot as a global agricultural superpower for its 100th

year of independence. The true measure of success will be measured in the sustainable practice changes by farmers, increase incomes, and widespread application of lessons across everyday Indian agriculture, supported by strong follow-up support and monitoring

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Nanotechnology as an Enabling Paradigm for Advancing Sustainable Energy Resources

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Abstract:

The global shift toward sustainable and low-carbon energy systems demands technological approaches that simultaneously address efficiency enhancement, scalability, and environmental responsibility. In this context, nanotechnology has emerged as a powerful enabling paradigm by offering precise control over material behavior at the atomic and molecular levels. Such control has led to substantial innovations in energy generation, storage, and utilization technologies. This study critically examines the contribution of nanotechnology to renewable energy systems, focusing on solar photovoltaic technologies, electrochemical energy storage, hydrogen production pathways, and carbon capture mechanisms. Beyond technical advancements, the paper evaluates challenges related to large-scale deployment, environmental safety, and policy integration. The analysis identifies critical research gaps and outlines future research directions essential for doctoral-level investigation and sustainable energy transitions.

Keywords: *Nanotechnology; Sustainable Energy; Energy Storage Systems; Hydrogen Economy; Carbon Capture; Low-Carbon Development*

Introduction:

Contemporary global energy systems are undergoing a profound transformation driven by the urgent need to mitigate climate change, address resource depletion, and meet escalating energy demands. Conventional fossil fuel-based infrastructures have increasingly proven incompatible with long-term environmental sustainability due to their carbon intensity and ecological impacts. As a result, scientific and technological research has progressively shifted toward renewable energy sources and advanced material solutions capable of improving system efficiency and operational reliability.

Nanotechnology, commonly defined as the science and engineering of materials at dimensions below 100 nanometers, represents a fundamental shift in material design philosophy.

At this scale, materials exhibit distinctive quantum, electrical, and thermal properties that are absent in their bulk counterparts. Within the energy sector, these characteristics elevate nanotechnology from a supplementary tool to a foundational framework capable of redefining energy conversion, storage, and management processes.

The present study critically assesses the extent to which nanotechnology can enable the empowerment of sustainable energy resources, while simultaneously examining the structural, technological, and socio-economic constraints that limit its large-scale implementation.

Theoretical Foundations of Nanotechnology in Energy Systems:

1. Nanoscale Physics and Energy Conversion

Principles: The application of nanotechnology in energy systems is fundamentally grounded in quantum mechanics, solid-state physics, and thermodynamic theory. When material dimensions are reduced to the nanoscale, electron motion becomes spatially confined, resulting in altered electronic band structures and density of states. These quantum confinement effects lead to size-dependent optical and electrical properties that deviate significantly from classical material behavior.

In energy conversion devices such as photovoltaic cells and fuel cells, these quantum phenomena directly influence charge carrier generation, separation, and transport mechanisms. Theoretical analyses derived from quantum mechanical models demonstrate that nanoscale engineering allows bandgap modulation, enabling optimized absorption of incident energy. Such theoretical flexibility provides a scientific basis for the enhanced performance of nanostructured energy materials.

2. Surface Energy Concepts and Catalytic

Activity: A defining theoretical attribute of nanomaterials is the dominance of surface atoms due to their extremely high surface-to-volume ratio. Surface energy theory explains that as particle size decreases, surface interactions increasingly govern material behavior, leading to elevated chemical reactivity.

In catalytic energy applications—including hydrogen production, fuel cell operation, and carbon capture—nanostructured catalysts exhibit improved reaction kinetics. Thermodynamic and transition state theories suggest that the

increased availability of active surface sites lowers activation energy barriers, thereby enhancing reaction efficiency. This theoretical framework underpins the extensive use of nanoscale catalysts in electrochemical and photochemical energy technologies.

3. Charge Transport and Percolation

Mechanisms: Efficient charge transport is essential for the performance of energy devices. Percolation theory provides a theoretical explanation for the enhanced conductivity observed in nanocomposite systems. In battery electrodes and conductive coatings, nanoscale conductive networks form continuous pathways that facilitate electron and ion transport at lower material loadings than bulk systems.

From a mathematical perspective, nano structuring reduces percolation thresholds, enabling improved charge mobility. This principle accounts for the superior performance of graphene-based and carbon nanotube-reinforced materials in advanced energy storage applications.

4. Thermodynamics and Heat Transfer at the

Nanoscale: Classical thermodynamic models assume continuum behavior, which becomes increasingly inadequate at the nanoscale. In nanostructured materials, heat transfer is governed by phonon scattering, ballistic transport, and interfacial thermal resistance. These phenomena are described by non-equilibrium thermodynamics and nanoscale heat transfer theory.

In energy applications such as thermoelectric devices and advanced insulation materials, nano structuring selectively suppresses lattice thermal conductivity while preserving electrical transport properties. This decoupling of heat and charge transport forms a critical

theoretical basis for improving energy efficiency.

- 5. Electrochemical Theory in Nanostructured Storage Systems:** Electrochemical energy storage relies on diffusion kinetics, interfacial reactions, and redox thermodynamics. Nanostructured electrodes reduce ion diffusion lengths, resulting in accelerated charge–discharge processes. According to diffusion theory, shorter transport pathways significantly enhance reaction rates and energy efficiency.

Furthermore, electric double-layer theory explains the elevated capacitance observed in nanostructured supercapacitors. The expanded electrode surface area enables greater charge accumulation at the electrode–electrolyte interface, validating the theoretical advantage of nanoscale architectures in energy storage devices.

- 6. Systems Theory and Energy Transition Context:** Beyond material-level considerations, nanotechnology must be situated within broader energy systems theory. Energy transitions are inherently socio-technical processes shaped by technological innovation, economic viability, and policy frameworks. From this perspective, nanotechnology functions as a disruptive enabling mechanism capable of influencing system efficiency, decentralization, and resilience.

This systems-oriented framing emphasizes the necessity of integrating nanotechnology research with lifecycle assessment, economic analysis, and policy evaluation to ensure sustainable deployment.

- 7. Theoretical Constraints and Research Implications:** Despite its theoretical strengths, nanotechnology introduces modeling challenges related to scale-up behavior, material aggregation, and long-term

stability. Existing theoretical models often fail to capture interactions across multiple length scales, highlighting the need for integrated multi-scale frameworks that link nanoscale phenomena with macroscopic energy system performance.

For doctoral-level research, these theoretical limitations represent opportunities for original contributions extending beyond applied development toward fundamental scientific understanding.

Nanotechnology in Solar Energy Conversion:

1. Advanced Nanostructured Photovoltaic Systems: Nanotechnology has facilitated the development of innovative photovoltaic architectures, including quantum dot-based solar cells, perovskite nanocrystal devices, and nanostructured thin-film systems. These technologies exhibit improved light absorption, reduced recombination losses, and enhanced charge transport characteristics.

Compared to conventional silicon photovoltaics, nanostructured systems allow precise bandgap tuning, enabling more effective utilization of the solar spectrum. However, stability and degradation under operational conditions remain significant research challenges.

2. Issues of Stability and Scalability: Although laboratory-scale efficiencies are promising, many nanomaterial-based solar technologies encounter obstacles during scale-up. Sensitivity to environmental factors, potential material toxicity, and manufacturing reproducibility pose significant barriers. Addressing these challenges requires doctoral-level research focused on material stabilization strategies and comprehensive lifecycle analysis.

Nanotechnology-Enabled Energy Storage Technologies:

1. Electrochemical Storage Systems: Reliable energy storage is essential for integrating intermittent renewable energy sources into power networks. Nanostructured electrode materials have enhanced the performance of lithium-ion batteries by improving ionic conductivity and mechanical stability. Emerging battery chemistries, including sodium-ion and solid-state systems, increasingly rely on nanoscale engineering to achieve competitive performance metrics.

2. Supercapacitors and Hybrid Storage Architectures: Nanotechnology enables the convergence of batteries and supercapacitors into hybrid energy storage systems. High surface area nanomaterials support rapid charge–discharge cycles while maintaining moderate energy density, making them suitable for electric mobility applications and grid-level energy balancing.

Hydrogen Energy Technologies and Nano catalysis:

Hydrogen energy systems play a critical role in long-term decarbonization strategies. Nanostructured catalysts significantly reduce the energy requirements of water electrolysis and fuel cell reactions by increasing catalytic activity. Both noble metal and transition metal nanostructures benefit from enhanced surface reactivity.

Nevertheless, challenges related to material scarcity, economic cost, and catalyst durability persist. These issues underscore the importance of doctoral research into earth-abundant nano catalysts and degradation mitigation mechanisms.

Carbon Capture and Energy Efficiency Applications:

Nanotechnology has contributed to carbon mitigation through advanced capture materials such as metal-organic frameworks and nanoporous sorbents, which exhibit high selectivity and adsorption capacity for carbon dioxide. These materials offer viable pathways for reducing industrial emissions.

Simultaneously, nanostructured thermal insulation and energy-efficient coatings contribute to demand-side energy reduction, reinforcing the systemic role of nanotechnology across the energy value chain.

Environmental, Ethical, and Policy Considerations:

Despite its technological benefits, nanotechnology raises concerns regarding environmental and human health impacts. Issues such as nanoparticle toxicity, environmental persistence, and end-of-life disposal necessitate rigorous risk assessment. Regulatory frameworks must evolve to balance innovation with safety and sustainability.

Doctoral research increasingly requires interdisciplinary approaches that integrate materials science with environmental studies and public policy analysis.

Conclusion:

Nanotechnology constitutes a transformative paradigm within the global energy transition by enabling enhanced efficiency, sustainability, and resilience across energy systems. However, its effective implementation depends on addressing technical limitations, environmental concerns, and socio-economic constraints through rigorous doctoral-level research. By integrating fundamental theory with applied engineering and policy analysis,

nanotechnology can play a decisive role in shaping a sustainable energy future.

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Advances in Crystal Growth Methodologies: A Review of 2022–2025 Trends in Confinement, Machine Learning, and Pharmaceutical Applications

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Abstract:

Crystal growth remains a critical scientific and industrial discipline with ramifications spanning materials science, semiconductor fabrication, drug formulation, and photonics. During 2022–2025, substantial progress has been made through innovative confinement strategies, machine learning (ML) for predictive and process optimization, and pharmaceutical crystallization control. This comprehensive review synthesizes recent advances in confinement-induced nucleation and growth control, the integration of ML and artificial intelligence into crystal engineering, and pharmaceutical crystallization methodologies targeting polymorphism, size distribution, and pharmaceutical performance. We highlight emerging methodology, challenges, and directions for future research.

Keywords: Crystal Growth, Confinement-Induced Nucleation, Machine Learning, Crystal Engineering, Pharmaceutical Crystallization, Polymorphism Control

Introduction:

Crystal growth—the process by which atoms, ions, or molecules assemble into ordered solid structures—is foundational to technology and science. Whether for *semiconductor wafers*, *optical materials*, or *active pharmaceutical ingredients (APIs)*, controlling nucleation, growth kinetics, morphology, and defects is critical for performance. Traditional growth methods (melt, solution, vapor) are being reimaged with **nano-to-mesoscale confinement**, **data-driven tools**, and **high-throughput experimental design**. These approaches improve reproducibility, reduce experimental cost/time, and enable tailored properties essential for next-generation applications.

This review explores:

1. **Confinement-driven crystal growth** mechanisms and outcomes.
2. **Machine learning and AI** contributions to prediction, optimization, and monitoring.
3. **Pharmaceutical crystallization** advances with clinical applications.

Confinement Strategies in Crystal Growth:

Confinement refers to spatial restriction of crystal growth within pores, droplets, microreactors, and nanostructured templates. It modulates fundamental processes such as nucleation energy barriers, polymorphic outcomes, size distribution, and defect evolution.

1. Fundamentals of Confinement Effects:

Confinement alters surface-to-volume ratios and nucleation thermodynamics. In nanoscale pores, surface free energy and critical nucleus size can shift, leading to preferential phase selection and stabilization of metastable structures. Nucleation theories modified for confinement explain unique size–shape relationships and phase transitions. ([PubMed](#))

Key mechanisms include:

- **Surface-energy modulation:** Enhanced surface interactions favor certain orientations.
- **Critical size reduction:** Smaller confinement dimensions reduce critical nucleus size and lower kinetic barriers.
- **Phase stabilization:** Metastable polymorphs can be preferentially stabilized.(PubMed)

These effects underlie the development of controlled crystallization platforms leveraging confinement for tailored properties.

2. Nano- and Micro-Confinement: Recent studies have demonstrated significant impacts of nano-porous matrices and microfluidic confinement on crystal characteristics. For example, controlled confinement within nanoporous media influences polymorphism and yields directional growth aligned with pore structures. Confinement also enables selective stabilization of polymorphs not observed in bulk.(PubMed)

Microfluidic and droplet systems extend confinement to dynamic flow environments. These systems precisely regulate supersaturation, residence time, and temperature gradients—critical parameters in uniform size distribution and habit control.

3. In Situ Optical Observations and Mechanism Insights: Advances in in situ microscopy show that confined growth on the nanoscale involves two-dimensional mass transport across liquid films, directed nucleation near confinement edges, and unique kinetic pathways that differ from bulk conditions. These insights refine models for growth rates and morphological control.(PubMed)

4. Confinement in Pharmaceuticals: Confined liquid crystallization under external fields (e.g., electric fields) combined with micro-volume control has been shown to yield API crystals with high polymorphic purity and massive preparation capability, providing new routes for pharmaceutical manufacturing.(PubMed)

Machine Learning In Crystal Engineering:

Machine learning (ML) and artificial intelligence (AI) have increasingly become integral tools that transform how crystals are designed, synthesized, monitored, and scaled. These approaches go beyond classical trial-and-error methods, enabling *predictive modeling*, *real-time process control*, and *data-driven design*.

1. **Predictive Modeling for Nucleation and Growth:** ML models trained on experimental and simulation data can describe complex non-linear relationships between synthesis parameters (temperature, concentration, solvent, additives) and outcomes such as nucleation rate, size distribution, and morphology. Integrated ML frameworks have been applied to model metastable zone widths, induction times, and polymorph selection. These tools accelerate experimental design and reduce resource consumption.(ScienceDirect)Deep neural networks, ensemble approaches, and Bayesian optimization have shown promise in navigating high-dimensional parameter spaces where traditional analytic methods struggle.
2. **Machine Learning Interatomic Potentials:** Recent developments in ML interatomic potentials (MLIPs) enable finite-temperature modeling of molecular crystals with high accuracy and reduced computational cost. These MLIPs can describe sublimation enthalpies and thermodynamic stability critical to predicting packing arrangements for pharmaceutical crystals. Such models are extending beyond simple compounds to systems like paracetamol and aspirin.(arXiv)
3. **Data-Driven Screening and Image Analysis:** ML has also impacted *in situ* process monitoring. Computer vision and advanced image processing classify crystal shapes, track growth fronts, and detect defects. Autoencoder frameworks combined

with spherical harmonics have advanced shape classification in crystal growth simulations, enhancing feedback control in experimental setups. ([Nature](#))

4. **Frameworks for Complex Crystallization Processes:** Integration of ML with synthetic frameworks (e.g., population balance models, wet milling) supports optimization of complex crystallization systems, including enantiomeric transformations and racemic resolution. These models help identify effective operational domains while satisfying regulatory constraints. ([Science Direct](#))
5. **Challenges in Machine Learning Modeling:** Despite successes, challenges persist:
 - **Data scarcity and quality:** High-accuracy experimental datasets for diverse systems are limited.
 - **Transferability:** Models trained on one system may not generalize across different chemistries.
 - **Interpretability:** Understanding model predictions at a mechanistic level remains challenging.

Pharmaceutical Applications of Crystal Growth Methodologies:

Pharmaceutical crystallization is a high-impact area due to connections between solid form and drug efficacy. Crystal form influences solubility, bioavailability, mechanical properties, and regulatory classification.

1. **Polymorphism: Control and Implications:** Polymorphism—the existence of multiple crystalline forms—remains a central challenge and opportunity in pharmaceuticals. Differences in lattice arrangement can dramatically affect dissolution rates and stability. Recent advances include strategic control of nucleation and growth to favor desired forms and suppress undesired ones. ([MDPI](#))

Confinement and ML have been applied to polymorph screening and control, delivering novel screening strategies that reduce development risk.

2. **Machine Learning in Pharmaceutical Crystallization:** Comprehensive reviews highlight the fusion of AI with pharmaceutical crystallization to minimize manual labor and bias, optimize conditions, and predict physicochemical outcomes such as polymorph formation, co-crystal selection, and process design. ML has been integrated with high-throughput platforms to accumulate large datasets, enabling predictive analytics that accelerate development timelines. ([ACS Publications](#))
3. **Solubility and Solvent Selection Models:** AI-optimized models have been used to evaluate drug solubility across solvents and conditions, enhancing understanding of crystallization driving forces and guiding solvent selection strategies for improved yield and quality. These approaches employ regression, classification, and advanced feature extraction to correlate molecular descriptors with solubility outcomes. ([Nature](#))
4. **Case Studies: Complex APIs and Polymorphs:** Recent research on fluralaner polymorphs exemplifies detailed structural and selective nucleation investigations that are critical for commercial APIs. Such work enhances understanding of stability, transformation, and kinetic pathways that guide pharmaceutical crystallization strategies. ([MDPI](#))
5. **Continuous Crystallization and Quality by Design (QbD):** Continuous crystallization platforms are gaining traction as scalable alternatives to batch processes, aligning with QbD principles to deliver consistent quality and regulatory compliance. Process analytical technologies coupled with ML-based control

systems enable real-time adjustment and defect minimization.

Integrating Confinement and Machine Learning for Pharmaceutical Advantage:

The intersection of **confinement effects** and **ML prediction/control** presents unique opportunities. Confinement templates can produce narrow size distributions and polymorph selectivity while ML can accelerate the identification of optimal confinement environments and operational parameters. These synergistic approaches are burgeoning as self-driving laboratories where AI suggests experimental conditions, and confined reactor arrays test conditions in high throughput.

Challenges And Future Directions:

Data Infrastructure and Standards: Robust machine learning requires standardized data reporting for crystallization experiments. Community efforts are needed to unify datasets and open repositories for growth conditions, morphological outcomes, and failed crystallization attempts—critical for model robustness.

Mechanistic Integration: Hybrid approaches combining ML with physics-based models (e.g., molecular dynamics, phase field modeling) can enable interpretable, high-performance predictive frameworks balancing speed and mechanistic fidelity.

Sustainability and Green Methods: Future methodologies should emphasize sustainability—reducing solvent volumes, energy usage, and waste through smart reactors and AI-guided conditions that minimize resource footprint without compromising control.

Advanced Materials and Emerging Fields: Confinement and AI methods will continue expanding into multifunctional materials,

quantum materials, soft matter crystals (e.g., proteins, MOFs), and bio-mineralization studies.

Conclusion:

Over 2022–2025, crystal growth methodologies have evolved toward **intelligent, confined, and application-focused platforms** that dramatically reduce empirical bottlenecks. Confinement strategies offer physicochemical control at fine scales, while machine learning provides predictive power and process optimization. Pharmaceutical crystallization has particularly benefited from these innovations, improving control over polymorphism, solubility, and manufacturing consistency. Continued interdisciplinary efforts will unlock further potential in both fundamental understanding and industrial application.

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An Introduction to Smart Library under Maharashtra University

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Abstract:

Maharashtra universities are actively developing digital and smart libraries :offering vast e-resources (e-books, journals), online databases, Wi-Fi, automated systems (OPAC, RFID), and dedicated digital zones with computer nodes for accessing electronic content, enhancing research & learning with features like web-based services, security (CCTV, firewall), and sometimes cutting-edge tech like Augmented Reality tools to create modern, efficient learning hubs.

Key Objectives:

- Support Teaching & Learning :
- Aid Research:
- Dissemination of Information:
- Preservation of Knowledge:
- Information Literacy:
- Cultural & Recreational Role:
- Use of Technology:

University/University Definition:

Under the University Grants Commission (UGC) Act, 1956, "University" means a University established or incorporated by or under a Central Act, a Provincial Act or a State Act, and includes any such institution as may, in consultation with the University concerned, be recognized by the Commission in accordance with the regulations made in this behalf under this Act., Various Provisions under UGC Act, 1956, which are relevant for the Survey, are mentioned below:

Under Section 22(1) of UGC Act, 1956, the right of conferring or granting degrees shall be exercised only by a University established or incorporated by or under a central Act, a Provincial Act, a State Act or an institution

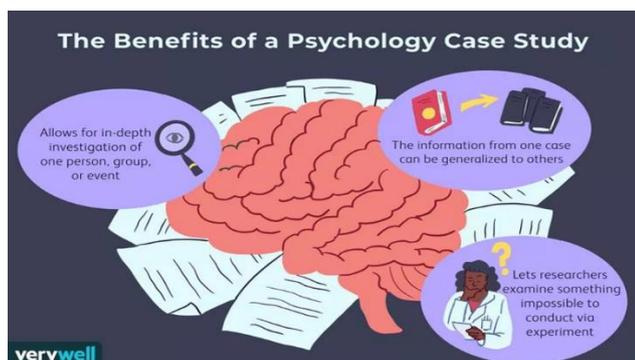
deemed to be a University under section 3 or an institution specially empowered by an Act of Parliament to confer or grant degrees.

Section 12 of the UGC Act, 1956 states Power and Functions of the University Grants Commission:

It shall be the general duty of the Commission to take, in consultation with the Universities or other bodies concerned, all such steps as it may think fit for the promotion and co-ordination of University education and for the determination and maintenance of standards of teaching, examination and research in Universities, and for the purpose of performing its functions under this Act, the commission may:

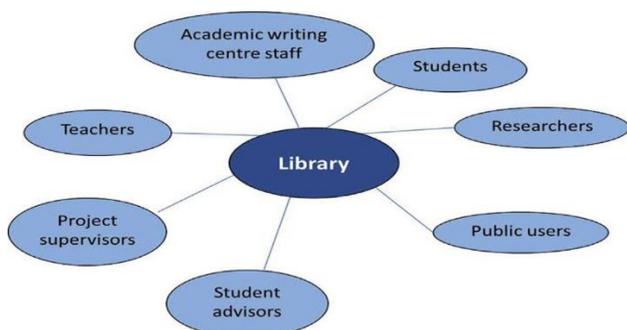
Definition:

- A case study is a detailed analysis of a single person, group, or event that allows researchers to report in-depth information.
- Case studies are useful when controlled experiments would be difficult, unethical, or impossible to conduct.
- Because case study findings can be subjective, they should be carefully reviewed to avoid bias.



Key Features of Digital & Smart Libraries in Maharashtra Universities:

- Vast Digital Collections:
- Modern Infrastructure:
- Automation & Management:
- Enhanced Security:
- User-Friendly Services:
- Innovative Technologies:



Name of University:

1.Mumbai University, Mumbai: The University Library of the University of Mumbai is part of the Victorian buildings complex around the Oval Maidan in Mumbai that is a UNESCO World Heritage Site. [1] It was built between 1869 and 1878 along with the Rajabai Clock Tower, and designed by Sir George Gilbert Scott, who incidentally never visited Bombay and worked from London.

2.Rashtrasant Tukdoji Maharaj University, Nagpur: An electronic library (e-Library) is a website which provides internet users with access to digitized or electronic (born digital or online) collection such as e-books, e-journals, e-

magazines, Institutional Repositories that are available in libraries, museums or archives. An electronic library can also be viewed as a service that searches the full text of e-books, e- journals, etc. that is stored in digital databases or that are created in electronic form on internet. Therefore, an electronic library may be viewed as a system that enables users to obtain digitized/electronic data from anywhere in the world by online access. The e-Library in context of Knowledge Resource Centre of RTMNU includes providing online access of e-resources to the students and teachers of the university and A smart library has been created.

3.Savitribai Phule Pune University, Pune: Savitribai Phule Pune University Library (Jayakar Knowledge Resource Centre - JKRC) is the main library of the university and provides e- resources and online services, including various databases and digital libraries, as well as physical services and RFID technology for students , for which you can visit their official website. Digital Resources: The library has its own website, where you can access more than 26 full-text and bibliographic databases

4.Smt. Nathibai Damodar Thakarsi Women's University, Mumbai: The library for the Shreemati Nathibai Damodar Thackersey (SNDT) Women's University in Mumbai, India's first women's university (established 1916), serves its students, offering resources for women's education and empowerment, with its main campus and library facilities located around the New Marine Lines/Churchgate area. To support the academic and research needs of students and faculty, focusing on women's education, a core mission of the university since its founding by Maharshi Dhondo Keshav Karve and Smart library has been created.

5.Dr. Babasaheb Ambedkar Marathwada University, Aurangabad: Dr. Babasaheb Ambedkar Marathwada University Knowledge

Resource Center (Library) is the biggest University from the point of view of the strength of books and its services. It has occupied a central position in the socio-economic, cultural and educational development of the people of Marathwada region. The importance of this Library lies not only in its large collection of 3,96,404 Print resources, but its collection has certain peculiar feature. The priceless treasure of large number of manuscripts, covering a wide range of subjects i.e. Literature, social science, Philosophy, arts, photographs and painting, which gives it a place of pride.

6. Shivaji University, Kolhapur: The library of Shivaji University is one of the most prominent academic libraries in Maharashtra, established along with the university in 1962. It serves as an important knowledge resource centre for students, researchers, and faculty. Shivaji University houses a wide range of collections of books, journals, periodicals, reference materials, and digital resources across diverse subjects etc.

7. Sant Gadge Baba Amravati University: The library for the Shreemati Nathibai Damodar Thackersey (SNDT) Women's University in Mumbai, India's first women's university (established 1916), serves its students, offering resources for women's education and empowerment, with its main campus and library facilities located around the New Marine Lines/Churchgate area. To support the academic and research needs of students and faculty, focusing on women's education, a core mission of the university since its founding by Maharshi Dhondo Keshav Karve and Smart library has been created.

8. Bahinabai Chaudhary University of Uttar Maharashtra, Jalgaon: Participation in UGC-INFLIBNET program. Under this program more than 4000 e-journals are accessed, Establishment of Internet Center for students of the University.

Archival section is established to preserve historical documents in the form of Manuscripts, Reports, etc., Inter Library Loan System facility to affiliated colleges and Recognized institutions., Orientation Course regarding use of library for new enrolled students of Departments of the University. Guidance in respect of technical and organizational matters relating to libraries is extended, when asked for., Lists of prominent books added to the library are circulated to concerned Departments of the University.

9. Swami Ramanand Tirth Marathwada University, Nanded: The central Library of the Sub-Centre has 497.37 sq. meter area to accommodate stack room(s), reference room, reading halls, counters, Asst. Librarian's cabin, Internet Lab, office and WCs. The library has enhanced its collection of books, periodicals and journals to satisfy need of different types of users. Various research journals, magazines, sports issues and competitive examination oriented periodicals provide the students a scope to enhance their horizon of knowledge.

SOUL software version – 2 and OPEC search facilities are operational in the library functioning.

10. Ahilyabai Holkar University, Solapur: Karmaveer Dr. Mamasahab Jagdale, Knowledge Resource Center (Library) is a consistent source of wealth of information and is a prime requisite for any institute of learning and research. The University Knowledge Research Center (Library) has a collection of over 33,528 volumes that include resources in different forms like books, theses, dissertations, journals, special publications. The University Knowledge Research Center (Library) subscribes to 90 national and 19 international Research journals and also an e-source, e-journals. There is a spacious reading room with a capacity of 115 students. The reading room is open from 8.00 am to 11.00 pm. Under the supervision also Earn &

Learn Scheme Student which Poor & needy students can work in Knowledge Resource Center Reading Room on hourly remuneration basis.

11. Gondwana University, Gadchiroli:

On July 23, 2010 Maharashtra Legislative Assembly passed a unanimous resolution to constitute the Gondwana University, for the area comprising districts of Chandrapur and Gadchiroli. [1] The resolution was moved by then Higher and Technical Education Minister Rajesh Tope. The new university was constituted by issuing notification under sub-section (2) of section 3 of the Maharashtra Universities Act, 1994.[2][3] In 27 September 2011, Gondwana University was carved out of RTMNU, Nagpur. [4] The official inauguration date was delayed until August 2012 Library is not separate building in University. At present the library has over 11710 books related to different streams. Rapid accumulation and dissemination of information is the major concern of each academic library.

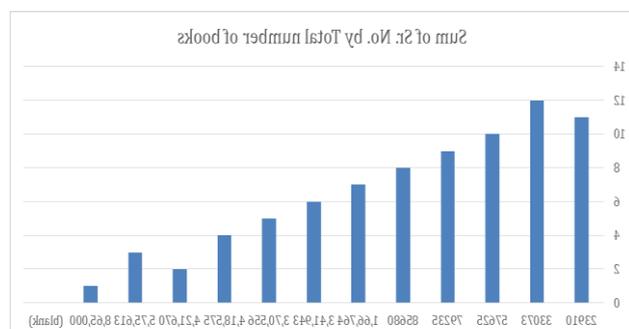
12. Kavikulguru Kalidas Sanskrit University, Ramtek, Nagpur:

This university is situated in central India i.e. in the Heart of India - Nagpur exclusively serving the traditional and modern academic courses from various fraternities in Sanskrit language. . The University is named after the Great legendary Sanskrit Poet Kalidas. Located into the lush greens of nature the university campus is peaceful and attractive and a right place for learners of this language. KKSU is committed to Conservation and proliferation of Sanskrit as a Global language. KKSU has geared up to live up the expectations by creating scholars who would stand strongly with reputation and frugal spirit to meet the challenges of the modern world. Thus University, consistently moving ahead on in the direction excellence of knowledge sharing and is contributing to the educational, intellectual, cultural, social well-being of the nation.

Table of total number of books available in the library:

Sr. No.	Name of University	Year of establishment	Number of students	Total number of books	E- journals
1	Mumbai University, Mumbai	1857	4678	8,65,000	5503
2	Rashtrasant Tukdoji Maharaj University, Nagpur	1923	5384	4,21,670	40421
3	Savitribai Phule Pune University, Pune	1948	7536	5,75,613	554
4	Smt. Nathibai Damodar Thakarsi Women's University, Mumbai	1916	1179	4,18,575	121997
5	Dr. Babasaheb Ambedkar Marathwada University, Aurangabad	1958	1819	3,70,556	45890
6	Shivaji University, Kolhapur	1962	6377	3,41,943	6975
7	Sant Gadge Baba Amravati University	1983	3123	1,66,764	985
8	8. Bahinabai Chaudhary University of Uttar Maharashtra, Jalgaon	1990	2360	85680	25000
9	Swami Ramanand Tirth Marathwada University, Nanded	1994	1958	79235	5600
10	Ahilyabai Holkar University, Solapur	2004	3316	57625	2097
11	Gondwana University, Gadchiroli	2011	No response	23910	...
12	Kavikulguru Kalidas Sanskrit University, Ramtek, Nagpur	1997	3024	33073	2788

The table above shows that the highest total number of books is from Mumbai University, Mumbai, while the lowest total number of books is from Gondwana University, Gondwana.



Findings from the study:

- Following findings were observed based on data analysis:
- All the Maharashtra State University libraries are automated and Cataloguing & Circulations sections have fully automated

- Barcode technology is used in these libraries to render their services.
- All the Maharashtra State University libraries have the digital collection and e-journals. subscriptions, this is may be because of the UGC-Infonet digital library consortium.
- Most of these respondent University libraries have setup the Digitization lab and they
- have started the digitization activities, and also participating in INFLIBNET, Shodhganga initiative.
- Most of the respondent University libraries have an opinion that, they have Very Good e-journals & email facilities available.
- All the University Libraries have given their preference of collection development to both print as well as electronic resource.

University NAAC Grade Wise Table:

Sr. No.	Name of University	Short Name	Quality NAAC	of	E-mail address
1	Mumbai University, Mumbai	MUM	'A' ++Grade		https://mu.ac.in http://mu.ac.in/portal/services/library/
2	Rashtrasant Tukdoji Maharaj University, Nagpur	RUN	'A' Grade		https://www.nagpuruniversity.org https://www.nagpuruniversity.org/links/central-lilmuy
3	Savitribai Phule Pune University, Pune	UOP	'A' Grade		https://www.unipune.ac.in/http://lib.unipune.ac.in.8002/j/
4	Smt. Nathibai Damodar Thakarsi Women's University, Mumbai	SUM	'A' Grade		https://www.sgbau.ac.in/ http://lib.unipune.ac.in.8002/j/
5	Dr. Babasaheb Ambedkar Marathwada University, Aurangabad	BUM	'A' Grade		www.bamu.ac.in http://www.unishivaji.ac.in/KRC/BAMUWEB
6	Shivaji University, Kolhapur	SUK	'A' Grade		http://www.unishivaji.ac.in/ http://www.unishivaji.ac.in/
7	Sant Gadge Baba Amravati University	SUA	'A' Grade		www.sgbau.ac.in/ http://www.sgbalib.com/
8	8. Bahinabai Chaudhary University of Uttar Maharashtra, Jalgaon	BUJ	'A' Grade		www.nmu.ac.in/ http://www.nmu.ac.in/clp/en-us/home.aspx
9	Swami Ramanand Tirth Marathwada University, Nanded	SUN	'A' Grade		https://sndt.ac.in/ http://www.sttmun.ac.in/en/library.html

10	Ahilyabai Holkar University, Solapur	SUS	'A' Grade	http://su.digitaluniversity.ac http://su.digitaluniversity.ac/content.aspx?ID=67
11	Gondwana University, Gadchiroli	GUG	'A' Grade	http://gondwana.digitaluniversity.ac/ http://gondwana.digitaluniversity.ac/content.aspx?ID=67
12	Kavikulguru Kalidas Sanskrit University, Ramtek, Nagpur	KUM	'A' Grade	http://kksanskrituni.digitaluniversity.ac http://kksanskrituni.digitaluniversity.ac

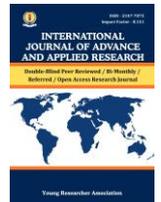
The best NAAC assessment has been achieved by Mumbai University, Mumbai with 'A'++ grade. While all the other universities have received 'A' grade of NAAC assessment as per the above table.

Conclusion:

- We can conclude from the above mentioned data analysis as follows:
- Serial Control & Acquisition sections are required to be automated fully, this will help these University libraries to manage and control the collection.
- All these University Libraries are using commercial library automation softwares, since open source automation software are readily available like Koha, etc, can be used in the future.
- It is required to digitize the Thesis available in the library to make the available to their users.
- Need to increase the AV-Material collection in all these University Libraries.
- No libraries in the study have utilized the Cloud Computing technology, since digital library development and maintenance is one of the costly affairs for the University libraries with their shrinking budget, with proper security & mitigation plan, it is advisable to utilize the Cloud Computing technology.

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Human Capital Development for Viksit Bharat 2047: A Conceptual Framework Integrating Human Resource Management, Skill Development and Demographic Dividend

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Abstract:

India's vision of emerging as a developed nation by 2047 (Viksit Bharat 2047) places unprecedented emphasis on the strategic development of human capital. While India enjoys a significant demographic advantage, the conversion of this potential into sustainable economic and social outcomes remains contingent upon the quality of education, skill formation, and effective human resource management practices. This conceptual paper argues that human capital development must be viewed as an integrated national system rather than a fragmented set of policy interventions. Drawing upon human capital theory, strategic human resource management, and contemporary national initiatives such as the National Education Policy 2020 and the Skill India Mission, the study proposes a comprehensive conceptual framework linking education system inputs, skill development processes, HRM practices, and demographic dividend outcomes. The framework highlights the role of coordinated action among government, educational institutions, and organizations in creating a future-ready, inclusive, and productive workforce. By situating human resource management within India's long-term developmental agenda, the paper offers policy-relevant insights for strengthening employability, innovation capacity, and social inclusion, thereby contributing to the realization of Viksit Bharat 2047.

Keywords: *Human Capital Development, Strategic HRM, Skill Development, Demographic Dividend, Viksit Bharat 2047*

Introduction:

India stands at a critical juncture in its developmental trajectory. As the nation approaches the centenary of its independence in 2047, the vision of Viksit Bharat reflects aspirations of economic prosperity, social inclusion, technological advancement, and global leadership. While infrastructure, innovation, and governance reforms remain vital, the foundation of sustainable national development rests on the quality of human capital. Nations that have successfully transitioned into developed economies have consistently invested in

education, skills, and effective management of human resources.

India's demographic structure presents both an opportunity and a challenge. A large working-age population can act as a growth engine, provided it is equipped with relevant skills, adaptability, and ethical orientation. In this context, human resource management and human capital development assume strategic significance beyond organizational boundaries, extending into national policy and development discourse. This paper conceptualizes human capital development as a multi-stakeholder process essential for realizing India's vision for 2047.

Conceptual Foundations of Human Capital Development:

Human capital theory emphasizes that education, training, health, and skills enhance individual productivity and contribute to economic growth. From a management perspective, human resource management focuses on attracting, developing, motivating, and retaining talent to achieve organizational objectives. When these perspectives are applied at a national level, human capital development becomes a comprehensive process involving educational systems, labor markets, institutions, and governance mechanisms.

In the Indian context, human capital development cannot be confined to formal education alone. It includes continuous skill upgradation, digital literacy, employability skills, ethical values, and adaptability to technological change. HRM practices such as competency mapping, performance management, learning and development, and inclusive workplace policies provide a practical foundation for transforming human potential into productive outcomes.

India's Demographic Dividend: Opportunities and Challenges:

India's demographic dividend refers to the economic growth potential arising from a relatively larger proportion of working-age population. This advantage, however, is time-bound and conditional. Without adequate investment in education and skills, the demographic dividend can turn into a demographic burden characterized by unemployment, underemployment, and social inequality.

One of the major challenges facing India is the mismatch between educational outcomes and labor market requirements. While access to education has expanded, employability gaps persist due to outdated curricula, limited industry

exposure, and insufficient focus on practical skills. Additionally, regional disparities, gender gaps in workforce participation, and informal employment further complicate the effective utilization of demographic potential.

Thus, the demographic dividend can only be realized through a strategic human capital approach that aligns education, skills, and HRM systems with national development goals.

Role of Skill Development and Education Ecosystem:

Skill development forms the bridge between education and employment. The National Education Policy 2020 emphasizes holistic, multidisciplinary education, vocational integration, and lifelong learning. These reforms recognize that future work environments demand not only technical skills but also critical thinking, creativity, communication, and ethical responsibility.

Skill development initiatives must move beyond short-term training programs and focus on creating an adaptive learning ecosystem. Digital platforms, industry-academia collaboration, apprenticeships, and continuous professional development are essential components of this ecosystem. Higher education institutions, particularly in commerce and management disciplines, play a critical role in nurturing employable graduates equipped for dynamic economic conditions.

Integrating HRM with National Development Goals:

Human resource management provides the operational framework for human capital utilization. Strategic HRM aligns workforce planning, talent development, and performance management with long-term objectives. At a national level, this alignment translates into policies that encourage inclusive employment,

skill mobility, ethical leadership, and workforce resilience.

Organizations act as micro-units of national development. When HRM practices promote continuous learning, diversity, employee well-being, and innovation, they contribute to

macro-level productivity and social stability. Therefore, integrating HRM principles with public policy and educational reforms is crucial for achieving sustainable growth by 2047.

Proposed Conceptual Framework for Viksit Bharat 2047:

Table 1: Conceptual Framework for Human Capital Development towards Viksit Bharat 2047

Stage	Key Components
National Vision	<i>Viksit Bharat 2047</i>
Education System Inputs	NEP 2020–aligned curricula; quality higher education; digital and value-based learning
Skill Development Processes	Vocational training; reskilling and upskilling; lifelong learning; industry–academia collaboration
Human Resource Management Practices	Strategic HR planning; learning and development; inclusive HR policies; ethical leadership
Demographic Dividend Outcomes	Employability; productivity; innovation; social inclusion; sustainable growth
Human Capital Development	Future-ready workforce; global competitiveness; national prosperity

Source: Author’s conceptualisation

Table 1 presents an integrated conceptual framework demonstrating how education, skill development, and HRM practices collectively enable the transformation of India’s demographic dividend into sustainable human capital development aligned with the vision of Viksit Bharat 2047.

Conceptual Case Illustration: Human Capital Development in India’s Emerging Skill Ecosystem:

India’s expanding skill ecosystem provides a useful conceptual illustration of how human capital development can support the vision of *Viksit Bharat 2047*. Over the last decade, national initiatives aimed at skill development and educational reform have sought to address employability challenges among youth, particularly in semi-urban and rural regions. The emphasis on vocational integration under the National Education Policy 2020 reflects a shift from degree-centric education toward

competency-based learning aligned with labour market needs.

From a human resource management perspective, organizations across sectors increasingly recognize the importance of continuous learning, digital competencies, and soft skills such as adaptability and problem-solving. This evolving practice environment illustrates the link between institutional learning systems and workplace HRM strategies. When educational institutions collaborate with industry to design curricula and training modules, graduates are better prepared for employment, thereby reducing skill mismatch and underemployment.

Conceptually, this ecosystem demonstrates how education inputs, skill development processes, and HRM practices interact to generate demographic dividend outcomes such as enhanced employability, productivity, and innovation. The Indian context further highlights the importance of inclusive participation, particularly of women and youth

from economically weaker sections, in strengthening the human capital base. This illustration reinforces the argument that coordinated and system-level human capital strategies are essential for translating India's demographic advantage into long-term national development outcomes.

Implications for Policy Makers, Institutions, and Organizations:

The proposed conceptual framework offers important implications for key stakeholders involved in India's human capital ecosystem. For **policymakers**, it underscores the necessity of adopting an integrated and long-term approach that aligns education policy, skill development initiatives, and employment planning. Fragmented interventions are unlikely to yield sustainable outcomes; instead, coordinated policies that promote skill relevance, workforce mobility, and inclusive participation are essential for maximizing the demographic dividend.

For **educational institutions**, the framework highlights the need to move beyond content-driven curricula towards outcome-oriented and experiential learning models. Greater emphasis on curriculum relevance, industry engagement, vocational integration, and lifelong learning can enhance graduate employability and reduce the mismatch between education and labour market requirements. Institutions play a pivotal role in nurturing adaptable, ethically grounded, and future-ready human capital.

For **organizations**, the framework emphasizes the adoption of responsible and strategic human resource management practices. By investing in continuous learning, inclusive HR policies, employee well-being, and ethical leadership, organizations can enhance productivity while contributing to broader social and economic objectives. Organizations thus

function not only as economic units but also as critical partners in national development.

Overall, collective and collaborative action among policymakers, educational institutions, and organizations is central to building a resilient, skilled, and inclusive workforce. Such systemic coordination is essential for translating India's demographic advantage into sustainable human capital development aligned with the vision of *Viksit Bharat 2047*.

Conclusion:

Human capital development emerges as the cornerstone of India's aspiration to become a developed and inclusive nation by 2047. While demographic advantage offers a historic opportunity, its successful transformation into sustainable growth depends on strategic investments in education, skill development, and human resource management. This conceptual paper underscores the need to view human capital development as an integrated national system rather than isolated policy initiatives.

The proposed framework highlights how coordinated action among government, educational institutions, and organizations can systematically convert demographic potential into employability, innovation, and social inclusion. By aligning HRM practices with national development goals, India can build a future-ready workforce capable of responding to technological change, global competition, and societal needs. Strengthening human capital is therefore not merely an economic strategy but a national imperative for realizing the vision of *Viksit Bharat 2047*.

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Role of Public Administration in Viksit Bharat at 2047: A Legal Perspective

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Abstract:

The vision of Viksit Bharat @ 2047 represents India's commitment to becoming a developed nation by the centenary year of its Independence. This aspiration is not merely economic but deeply rooted in constitutional values, social justice, rule of law, good governance, and sustainable development. Public administration plays a pivotal role in translating this vision into reality, acting as the operational arm of the State within a legal and constitutional framework. From policy formulation to implementation, regulation, welfare delivery, and rights protection, public administration determines the effectiveness of governance. This paper examines the role of public administration in achieving Viksit Bharat 2047 from a legal perspective, focusing on constitutional foundations, administrative law principles, governance reforms, judicial oversight, and future challenges. The study argues that a legally accountable, transparent, ethical, and citizen-centric public administration is indispensable for realizing India's developmental goals by 2047.

Keywords: *Viksit Bharat 2047, Public Administration, Administrative Law, Rule of Law, Good Governance, Constitutionalism*

Introduction:

India's journey towards becoming a developed nation by 2047—popularly conceptualized as *Viksit Bharat @ 2047*—is an ambitious and transformative national mission. It encompasses economic growth, social inclusion, environmental sustainability, technological advancement, and strong democratic institutions. Central to this vision is **public administration**, which acts as the bridge between constitutional ideals and their practical realization.

From a legal perspective, public administration does not operate in isolation; it functions within the boundaries set by the **Constitution of India**, statutory enactments, delegated legislation, and judicial interpretations. The legitimacy, efficiency, and accountability of administrative actions determine the success of developmental policies. In a welfare state like

India, administration is not merely regulatory but developmental, distributive, and protective of rights.

This research paper seeks to analyze the **role of public administration in achieving Viksit Bharat 2047**, emphasizing its **legal foundations, functions, accountability mechanisms, and challenges**, while highlighting the importance of administrative reforms grounded in constitutional morality.

Concept of Viksit Bharat @ 2047:

1. Viksit Bharat @ 2047 envisions India as a comprehensive model of development, not limited to economic growth alone but encompassing social, technological, environmental, and legal dimensions. It aims to shape India into:

- **An economically prosperous nation**, characterized by sustained and inclusive economic growth, robust infrastructure, global competitiveness, innovation-driven industries, and widespread employment opportunities that enhance the standard of living of all citizens.
- **A socially inclusive and just society**, where equality, dignity, and social justice are ensured for all sections of society, particularly marginalized and vulnerable groups, through effective implementation of constitutional guarantees, welfare legislations, and affirmative action policies.
- **A technologically advanced state**, leveraging digital governance, artificial intelligence, and innovation to improve public service delivery, enhance administrative efficiency, and bridge socio-economic disparities, while safeguarding privacy and constitutional rights.
- **An environmentally sustainable polity**, committed to balancing development with ecological preservation through sustainable development principles, climate-resilient policies, and effective enforcement of environmental laws.
- **A governance system rooted in the rule of law**, ensuring transparency, accountability, responsiveness, and fairness in administration, where all state actions conform to constitutional values, legal norms, and judicial oversight.

Constitutional Foundations of Public Administration:

Public Administration under the Constitution:

The Constitution of India provides the legal basis for public administration. Articles 73 and 162 define the executive powers of the Union and the States respectively. Administrative

authority flows from the Constitution and is subject to constitutional limitations.

Rule of Law:

The doctrine of **Rule of Law**, a basic feature of the Constitution, mandates that all administrative actions must be lawful, non-arbitrary, and reasonable. Articles 14 and 21 ensure equality before law and protection of life and personal liberty, placing substantive and procedural restraints on administrative discretion.

Directive Principles and Welfare Administration:

The DPSPs guide the State in establishing a welfare-oriented administrative system. Articles 38, 39, 41, 43, and 47 impose a constitutional obligation on the administration to promote social and economic justice, reduce inequalities, and improve living standards—core objectives of *Viksit Bharat 2047*.

Public Administration and Good Governance:

Good governance is the cornerstone of a developed nation. From a legal standpoint, it encompasses transparency, accountability, participation, efficiency, and responsiveness.

Transparency and Right to Information: The **Right to Information Act, 2005** has revolutionized public administration by promoting transparency and empowering citizens. Access to information reduces corruption, enhances trust, and strengthens democratic accountability—essential for long-term development.

Accountability Mechanisms in Public Administration (Legal Perspective):

Accountability is a cornerstone of democratic governance and an essential prerequisite for achieving the objectives of *Viksit Bharat @ 2047*. Public administration, vested with extensive discretionary and executive powers, must function within a well-defined legal framework to

prevent arbitrariness and misuse of authority. In India, administrative accountability is ensured through multiple constitutional, legal, and institutional mechanisms, primarily comprising **legislative control, judicial review, and institutional oversight.**

Legislative Control operates through parliamentary and state legislative mechanisms such as questions, debates, motions, and committees. Instruments like Question Hour, Zero Hour, and Parliamentary Committees (including Public Accounts Committee and Estimates Committee) enable elected representatives to scrutinize administrative actions, financial expenditures, and policy implementation. This ensures political accountability of the executive to the legislature and reinforces democratic control over administration.

Judicial Review, guaranteed under **Articles 32 and 226 of the Constitution**, serves as a vital legal safeguard against administrative excesses. The higher judiciary examines the legality, reasonableness, and constitutionality of administrative actions, orders, and policies. Through writ jurisdiction, courts protect fundamental rights, enforce the rule of law, and ensure that public authorities act within their statutory and constitutional limits.

Institutional Oversight is exercised by independent statutory and constitutional bodies such as the **Comptroller and Auditor General (CAG)**, the **Central Vigilance Commission (CVC)**, and the **Lokpal and Lokayuktas**. The CAG audits public expenditure to ensure financial propriety and transparency, the CVC supervises vigilance administration and corruption control, while the Lokpal investigates allegations of corruption against public functionaries. These institutions collectively strengthen administrative integrity, transparency, and public trust.

Together, these accountability mechanisms ensure that public administration

functions responsibly, lawfully, and efficiently—an essential condition for good governance and the realization of the vision of *Viksit Bharat @ 2047*.

These mechanisms ensure that administrative actions remain within legal limits and align with public interest.

E-Governance and Digital Administration: Digital governance initiatives, backed by the **Information Technology Act, 2000**, aim to make administration efficient, transparent, and citizen-centric. Platforms such as online service delivery, digital payments, and grievance redressal systems are crucial tools for achieving *Viksit Bharat* goals.

Administrative Law as a Tool of Development:

Administrative law regulates the exercise of public power and protects individuals from administrative excesses.

Doctrine of Natural Justice:

The **Doctrine of Natural Justice** is a fundamental principle of administrative law aimed at ensuring fairness, reasonableness, and justice in administrative and quasi-judicial actions. It acts as a safeguard against arbitrary exercise of power by public authorities and is closely linked with the constitutional guarantee of equality and due process under **Articles 14 and 21** of the Constitution of India.

The doctrine primarily consists of two core principles. The first is *audi alteram partem*, which means *no person shall be condemned unheard*. It requires that an individual affected by an administrative decision must be given a fair opportunity to present their case. This principle promotes participatory and transparent governance. The second is *nemo iudex in causa sua*, which means *no one should be a judge in their own cause*. It ensures impartiality and absence of bias in decision-making.

Indian courts have expanded the scope of natural justice to include **reasoned orders** and

fairness in procedure. The doctrine applies even when statutes are silent, unless expressly excluded. By ensuring fairness, accountability, and legitimacy in administrative action, the doctrine of natural justice strengthens the rule of law and contributes to effective and just governance.

Judicial Review of Administrative Action:

Judicial review acts as a constitutional safeguard against abuse of power. Courts have consistently held that arbitrariness violates Article 14, thereby reinforcing lawful governance necessary for sustainable development.

Delegated Legislation:

Modern governance requires flexibility and expertise. Delegated legislation enables the administration to frame rules and regulations efficiently while remaining subject to legislative and judicial control.

Public Administration and Social Justice:**Implementation of Welfare Legislations:**

Key welfare laws such as:

Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA):

The MGNREGA provides a legal guarantee of at least 100 days of wage employment in a financial year to rural households. It aims to enhance livelihood security, reduce rural poverty, and create durable community assets. The Act reflects a rights-based approach to welfare through decentralized administrative implementation.

Right of Children to Free and Compulsory Education Act (RTE Act):

The RTE Act mandates free and compulsory education for children aged 6 to 14 years as a fundamental right under Article 21A. It lays down norms for schools, teacher qualifications, and infrastructure to ensure quality education. The Act seeks to promote equality, social inclusion, and human development.

National Food Security Act (NFSA):

The NFSA provides legal entitlement to subsidized food grains to eligible households under the public distribution system. It aims to ensure food and nutritional security, especially for vulnerable populations. The Act strengthens welfare administration by making food security a justiciable right.

Protection of Vulnerable Sections:

Public administration enforces laws protecting women, children, Scheduled Castes, Scheduled Tribes, minorities, and persons with disabilities. Articles 15, 17, and 46 impose constitutional duties on the administration to eliminate discrimination and promote equality.

Affirmative Action and Equality:

Reservation policies in education and employment are administered to ensure substantive equality. Proper implementation, free from arbitrariness and corruption, is essential for inclusive growth.

Economic Governance and Regulatory Administration:

A developed India requires a robust legal-administrative framework for economic regulation.

Role of Regulatory Bodies:

Statutory regulators such as:

- Reserve Bank of India (RBI),
- Securities and Exchange Board of India (SEBI),
- Competition Commission of India (CCI),

ensure market stability, fair competition, and investor confidence. Their administrative independence and legal accountability are critical for economic development.

Ease of Doing Business:

Administrative reforms such as simplification of procedures, time-bound approvals, and single-window clearances are

legally structured to promote entrepreneurship while ensuring regulatory compliance.

Public–Private Partnerships:

Public administration manages PPPs through contractual and regulatory frameworks to balance public interest with economic efficiency—an important component of infrastructure development under *Viksit Bharat*.

Ethical Governance and Administrative Reforms:

Ethics in Public Administration: Ethical governance is essential for public trust. Civil Services Conduct Rules legally mandate integrity, impartiality, and accountability among public servants.

Anti-Corruption Framework: The **Prevention of Corruption Act, 1988** strengthens the legal framework against corruption. Effective enforcement by administrative agencies is vital for achieving *Viksit Bharat 2047*.

Administrative Reforms: Reports of the **Second Administrative Reforms Commission** emphasize citizen-centric governance, transparency, and accountability. Implementing these reforms is necessary to modernize public administration.

Future Challenges and the Way Forward:

Achieving the vision of *Viksit Bharat @ 2047* requires public administration to continuously adapt to emerging challenges while remaining firmly grounded in constitutional and legal principles. Rapid technological change, increasing citizen participation, and the growing emphasis on rights-based governance demand a reorientation of administrative structures and legal frameworks

Technology and Legal Regulation:

The increasing use of digital platforms, artificial intelligence, big data, and automation in

public administration presents both opportunities and challenges. While technology enhances efficiency, transparency, and service delivery, it also raises legal concerns relating to data privacy, surveillance, algorithmic bias, and accountability. Effective legal regulation is necessary to ensure that technological governance complies with constitutional guarantees under Articles 14 and 21. A balanced framework is required where innovation in administration is encouraged without compromising fundamental rights, privacy, and procedural fairness.

Decentralized and Participatory Governance:

Decentralization is essential for inclusive and responsive governance. The 73rd and 74th Constitutional Amendments provide the legal foundation for empowering Panchayati Raj Institutions and Urban Local Bodies. Strengthening these institutions through financial autonomy, administrative capacity-building, and legal clarity promotes participatory governance. Local-level decision-making ensures better implementation of development policies by addressing region-specific needs, thereby contributing to democratic deepening and sustainable development.

Rights-Based Administration:

Modern public administration must shift from a discretionary welfare approach to a **rights-based model of governance**. Legislations such as the Right to Education Act, MGNREGA, and National Food Security Act exemplify this transition by creating legally enforceable entitlements. A rights-based administration ensures dignity, accountability, and citizen empowerment, making development inclusive and just. For *Viksit Bharat @ 2047*, embedding constitutional rights and human rights principles into administrative processes is essential for long-term and equitable national development.

Conclusion:

Public administration occupies a central position in the realization of *Viksit Bharat @ 2047*. From a legal perspective, it is not merely an executive apparatus but a constitutional institution entrusted with translating the ideals of justice, equality, and welfare into reality. The success of India's developmental vision depends upon a public administration that is transparent, accountable, ethical, technologically adept, and firmly grounded in the rule of law.

A legally robust and citizen-centric public administration will ensure that economic growth is inclusive, governance is just, and development is sustainable. Thus, strengthening public administration through legal reforms, institutional accountability, and constitutional values is indispensable for transforming India into a truly developed nation by 2047.

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Role of MGNREGA in Poverty Alleviation in India

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Abstract:

This paper discusses the MGNREGA considerably reduces rural poverty in India by providing a legal right to 100 days of unskilled wage work, boosting rural incomes, increasing consumption, ensuring food security, empowering women and marginalized groups (SCs/STs), reducing distress migration, and creating rural assets, all while strengthening rural democracy through transparency and social audits, making it a crucial growth engine for improving living standards and livelihoods.

Keywords: Rural Poverty, Employment Generation, MGNREGA, Income, Labourers, Poverty Alleviation

Introduction:

National Rural Employment Guarantee Act was enacted on 5th September, 2005 and came into force w.e.f. 2nd February, 2006. On 31st December, 2009, the Act was renamed by an Amendment as the Mahatma Gandhi National Rural Employment Guarantee Act, 2005. It is now commonly referred to as Mahatma Gandhi NREGA. In its first year 200 districts were covered. This was followed by extension to 130 districts in the following year. Finally, in the 3rd year of its operation i.e. 2008-09, it was extended to 285 districts. In the meantime several new districts were created by division of older districts. Thus the coverage of districts under Mahatma Gandhi NREGA currently stands at 619. It may be dubbed as one of the major indigenously programmed flagship strategies of the Govt. of India, in coherence with the pursuit of the objective of removing poverty and unemployment.

The Scheme scores high on inclusiveness. The share of Scheduled Caste/Scheduled Tribe families in the work has been 51 percent and that of women 47 percent. The average wage per

person-day has gone up by 81 percent since the Scheme's inception. Wages are indexed to protect workers from the ravages of inflation. Nearly 10 crore bank/post office accounts have been opened and around 80 per cent of Mahatma Gandhi NREGA payments are made through this innovative route, an unprecedented step in the direction of finance inclusion.

The safety net provided by this Scheme has helped rural India cope with the frequent distress and natural disasters that are their lot. The combined effect of expanded agricultural production, demand for labour from the construction sector and the effect of Mahatma Gandhi NREGA has led to a tightening of the market for agricultural labour and a steady rise in real wages. Farmers sometimes complain about this. But rising demand for labour is the only way to help the landless improve their standard of living. The income support provided under Mahatma Gandhi NREGA has increased the bargaining power of agricultural labour to some extent and it has helped to put a floor under rural poverty as well.

According to **Dandekar and Rath**, for measurement of incidence of poverty, rural minimum private consumption expenditure is Rs. 180/- per annum and Rs. 15/- per month and the urban minimum Rs. 270/- P.A. and Rs. 22.50 P.M.

According to **Bardhan (1973) and Ahluwalia (1978)** have also opined that incidence of poverty can be measured in terms of private consumption expenditure at 1960-61 prices. This expenditure was deemed to ensure a person access to a specified minimum bundle of goods and services.

The objective of the act is to enhance livelihood security in rural areas by providing at least 100 days of guaranteed household whose adult members volunteer to do unskilled manual work. Providing wage employment opportunities, Creating sustainable rural livelihoods through re-generation of the natural resource base supporting creation of durable assets. The concept of National Rural Employment Guarantee Act (NREGA) is major initiative of Government of India (GOI) towards poverty reduction and income generation among rural poor families.

This step assumes special significance when viewed in the context of World Bank Statement that more than 30 percent of India earns an income of less than 81 (Rs.46.30) a day. However, those familiar with the socio-economic structure of Indian economy believe that this percentage is likely to be higher among the rural poor.

Based on performance data for the 2024-2025 and 2025-2026 financial years, the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) continues to be a vital rural livelihood support, with a high concentration of female participants and a strong focus on natural resource management. While demand remains high, recent trends show a shift towards

digitalization and a reduction in the number of households completing the full 100 days of work.

Key Roles in Poverty Alleviation:

- **Livelihood Security & Income Generation:** Guarantees wage employment, acting as a safety net, increasing household consumption, and reducing poverty, particularly during lean seasons.
- **Empowerment:** Offers self-respect and dignity, especially for women and marginalized communities, by providing rights-based, demand-driven work.
- **Rural Asset Creation:** Funds projects like water conservation, rural roads, and land development, building a strong infrastructure base for long-term rural growth.
- **Reduced Distress Migration:** By creating local work opportunities, it lessens the need for people to migrate to cities in search of labour.
- **Improved Food Security & Nutrition:** Higher incomes allow families to buy more food, positively impacting nutrition and health.
- **Financial Inclusion:** Facilitates banking access for rural workers through direct wage payments.
- **Strengthened Democracy:** Promotes transparency and accountability through village-level planning, social audits, and involvement of Panchayats.
- **Social Security:** Acts as an economic stabilizer and social security measure, especially during lean seasons or crises, preventing distress migration.
- **Poverty Reduction:** Directly tackles poverty by providing consistent wages, increasing purchasing power, and empowering the poor, linking to constitutional principles of right to livelihood (Articles 21, 39A, 41).

Key Performance Indicators (As Of Early 2026):

- **Employment Generation:** For the 2025-26 financial year, over 185 crore person-days have been generated as of January 18, 2026.
- **Active Participation:** There are approximately 8.64 crore active job cards and 12.17 crore active workers.
- **Women's Participation:** Women's participation remains high, with 56.83% of the total person-days in the 2025-26 financial year being generated by women.
- **Wage Rates:** The daily wage for workers has been increased to ₹370 per day for FY 2025-26 (from ₹349), with some states like Haryana having higher rates (up to ₹400).
- **Work Type:** Over 65% of expenditures are directed towards Natural Resource Management (NRM).
- **Asset Creation:** Around 57 lakh works have been completed in the 2025-26 financial year, with a focus on agriculture and allied sectors.

Recent Trends and Challenges:

- **Digital Transformation:** The mandatory use of the Aadhaar-based Payment System (ABPS) and digital attendance (NMMS) has considerably changed implementation, aiming to improve efficiency but causing initial challenges with worker eligibility, with over 7 crore job cards reportedly deleted in the 21 months prior to late 2023.
- **Fund Utilization:** While the budget outlay remains significant (over ₹1 lakh crore annually in recent years), there are regional disparities in fund utilization and complaints of delayed wage payments.
- **Completion Rate:** A smaller percentage of households are successfully completing the full 100 days of employment in the post-pandemic period.

- **Structural Evolution:** The scheme is increasingly seen as a "residual" employer in times of acute crisis, rather than the primary source of employment for all, and is undergoing, along with other programs, a shift towards more technology-driven, transparent, and durable asset-focused, a "Viksit Bharat" framework.

Findings & Impact:

- **Economic Growth Engine:** Studies highlight MGNREGA's role as a significant driver of rural economic prosperity and increased demand, notes [International Journal For Multidisciplinary Research \(IJFMR\)](#).
- **Positive Impact on Wages:** It has positively influenced agricultural wage rates by setting a floor for rural labour.
- **Reduced Vulnerability:** Serves as an insurance mechanism during droughts and crises, protecting vulnerable households, say National Institute of Rural Development and Panchayati Raj (NIRDPR).

Regional Performance Disparities:

- Performance varies significantly across states. Some regions have shown a massive surge in demand (e.g., Karnataka during the pandemic), while others struggle with lower, irregular work provision.
- States like Tamil Nadu have shown a notable increase in rural wages and a significant boost in women's participation.

Conclusion:

The Present paper reveals that, MGNREGA functions as a comprehensive anti-poverty program by directly addressing income poverty, enhancing social capital, and building sustainable rural infrastructure. The MGNREGA programme really tried to provide employment and reduces

the rural poverty of people. The present paper found that, MGNREGA helped to enhance the self-confidence, improvement in health status, improvement in level of education, repayment of loan and improvement of economic conditions. The main reason for their satisfaction is that, today they are assured of 100 days of jobs. But unskilled work of earth digging does not generate enough work for 100 days. However, most of beneficiaries in the rural areas do have skills by which they earn their livelihoods. In my opinion that, the act should be include skilled work. The MGNREGA programme gives employment to only 100 days; which is the temporary solution of poverty and unemployment.

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Adoption of Risk Mitigation Practices among Small and Marginal Farmers in the Marathwada Region of Maharashtra

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Abstract:

Agricultural production is characterised by a high degree of uncertainty, particularly in developing economies where farming activities largely depend on monsoonal rainfall and traditional cultivation practices. In India, small and marginal farmers are disproportionately exposed to agricultural risks due to fragmented landholdings, limited financial resources, and restricted access to institutional support systems. The Marathwada region of Maharashtra represents one of the most vulnerable agrarian zones in the country, having experienced recurrent droughts, erratic rainfall, declining groundwater availability, and persistent market instability.

The present study investigates the nature of agricultural risks encountered by small and marginal farmers in Marathwada and examines the extent to which they adopt various risk mitigation practices. It also identifies the key constraints affecting the adoption of such practices. The analysis is based on primary data collected from 120 sample farmers across selected districts of the region, using descriptive statistical techniques. The results indicate that climatic variability constitutes the most significant source of risk perception among farmers, while the adoption of formal risk mitigation instruments such as crop insurance and climate-resilient technologies remains limited. Financial limitations, inadequate awareness, weak extension mechanisms, and institutional shortcomings emerge as major impediments. The study underscores the need for a region-specific and integrated agricultural risk management framework that combines technological interventions, institutional support, and livelihood diversification to enhance income stability and resilience among small and marginal farmers.

Keywords: Agricultural Risk, Risk Mitigation Practices, Small and Marginal Farmers, Marathwada, Climate Variability, Income Diversification, Rural Livelihoods

Introduction:

Agriculture continues to occupy a central position in India's socio-economic structure by sustaining rural livelihoods, contributing to food security, and providing employment to a substantial proportion of the population. Despite the expansion of industrial and service sectors, agriculture remains the primary source of income for nearly half of the workforce. However, agricultural production is inherently uncertain, as it is strongly influenced by natural, biological, and market-related factors such as rainfall

variability, temperature fluctuations, soil conditions, pest incidence, and price volatility.

Uncertainty and risk are intrinsic to agricultural systems, as farmers operate in an environment over which they exercise limited control. Such risks frequently translate into unstable incomes, production losses, and livelihood insecurity, particularly for small and marginal farmers. These farmers, who cultivate less than two hectares of land, account for more than 85 per cent of India's farming population. Their vulnerability is compounded by small

landholdings, low savings, dependence on rainfed agriculture, limited access to irrigation and institutional credit, and weak market bargaining power. Even minor production or price shocks can push them into indebtedness and long-term distress.

The Marathwada region of Maharashtra vividly illustrates the structural vulnerabilities of rainfed agriculture in India. Over the past two decades, the region has been repeatedly affected by droughts, irregular monsoon patterns, groundwater depletion, and declining soil productivity. These adverse conditions have resulted in frequent crop failures, rising indebtedness, distress migration, and widespread agrarian distress. In this context, the adoption of effective risk mitigation strategies becomes crucial for stabilising farm incomes and enhancing farmers' resilience.

Risk mitigation practices such as crop diversification, water conservation measures, crop insurance, adoption of improved seed varieties, and diversification into allied agricultural activities are widely recognised as important tools for managing agricultural uncertainty. However, the extent to which these practices are adopted by small and marginal farmers in Marathwada remains uneven. This study seeks to analyse the adoption pattern of risk mitigation practices in the region, identify the major risks faced by farmers, and examine the constraints that influence adoption decisions.

Conceptual Framework of Agricultural Risk and Risk Mitigation:

Agricultural risk refers to uncertainty in agricultural outcomes related to production, income, and livelihoods, arising from factors that are largely beyond the control of farmers. A clear understanding of the different types of agricultural risks is essential for designing appropriate risk mitigation strategies.

- 1. Production Risk:** Production risk arises from variability in natural and biological factors such as rainfall, temperature, droughts, floods, pest attacks, diseases, and soil degradation. In predominantly rainfed regions like Marathwada, rainfall variability constitutes the most significant source of production risk. Delayed monsoon onset, prolonged dry spells, or excessive rainfall during critical crop growth stages can severely affect crop yields.
- 2. Market and Price Risk:** Market risk refers to uncertainty associated with fluctuations in output and input prices. Farmers often face unstable market prices due to changes in supply-demand conditions, inadequate storage infrastructure, poor market access, and limited price information. Rising costs of inputs such as seeds, fertilisers, pesticides, and labour further reduce profitability and increase income uncertainty.
- 3. Financial Risk:** Financial risk is linked to the use of borrowed capital and farmers' capacity to repay loans. Crop losses or unfavourable market prices reduce repayment ability, leading to indebtedness. Dependence on informal sources of credit at high interest rates further intensifies financial vulnerability among small and marginal farmers.
- 4. Institutional and Policy Risk:** Institutional risk arises from inefficiencies, uncertainties, or delays in government policies related to subsidies, minimum support prices, crop insurance schemes, and procurement systems. Procedural complexities, delayed implementation, and lack of transparency often limit the effectiveness of institutional risk mitigation measures.

Risk mitigation practices may be preventive (ex-ante), such as diversification and insurance, or coping (ex-post), such as asset liquidation or reliance on informal support mechanisms.

Review of Literature:

Existing literature on agricultural risk management consistently highlights climatic variability as the most critical source of uncertainty in agriculture, particularly in rainfed regions. Empirical studies demonstrate a strong negative relationship between rainfall variability and agricultural productivity and income stability.

Several researchers emphasise crop diversification as an effective strategy for reducing income volatility by spreading risk across crops and activities. Diversification helps farmers reduce dependence on a single source of income and enhances their capacity to absorb shocks.

Crop insurance has been promoted as a key institutional mechanism for managing production risk. However, studies indicate that its adoption among small and marginal farmers remains limited due to low awareness, complex procedures, delayed claim settlements, and limited trust in insurance institutions.

Research focusing on Maharashtra reveals that regions such as Marathwada and Vidarbha are particularly vulnerable due to climatic uncertainty and inadequate irrigation infrastructure. Mono-cropping patterns dominated by cotton and soybean increase exposure to both production and price risks. Scholars also argue that diversification into allied agricultural activities—such as dairy and livestock rearing—can improve income stability, provided adequate institutional and market support is available.

Study Area: Marathwada Region:

The Marathwada region is situated in the central part of Maharashtra and comprises eight districts: Chhatrapati Sambhaji Nagar (Aurangabad), Jalna, Beed, Latur, Dharashiv (Osmanabad), Nanded, Hingoli, and Parbhani. The region lies in the rain-shadow zone of the

Western Ghats and experiences a semi-arid climate.

Annual rainfall in the region ranges between 600 and 800 mm, but its distribution is highly erratic and uneven. Agriculture is predominantly rainfed, with irrigation coverage significantly lower than the state average. Groundwater serves as the main source of irrigation, but declining water tables have further increased production uncertainty.

Major crops cultivated in the region include cotton, soybean, pigeon pea, sorghum, maize, and wheat. The dominance of small and marginal farmers makes the region particularly sensitive to climatic and economic shocks.

Objectives of the Study:

The study is undertaken with the following objectives:

1. To identify the agricultural risks faced by small and marginal farmers.
2. To examine adoption of risk moderation practices among these farmers.

Methodology:

The study is based on both primary and secondary sources of data. Primary data were collected from 120 small and marginal farmers across eight districts of the Marathwada region using a structured questionnaire. Stratified random sampling was adopted to ensure adequate representation of marginal and small farmers.

Secondary data were obtained from government reports, research publications, policy documents, and agricultural statistics. The data were analysed using descriptive statistical tools such as percentages and averages, and the results are presented through tables and descriptive analysis.

Results and Analysis:**Landholding Pattern:**

The analysis of landholding size reveals that 48.33 per cent of the sampled farmers are marginal farmers cultivating less than one hectare

Landholding of Farmers:

Category	Land Size	Farmers	Percentage
Marginal	Below 1 ha	58	48.33
Small	Small 1- 2 ha	62	51.67
Total	-----	120	100

Source: Field Survey

The dominance of marginal and small landholdings implies limited production capacity, low surplus generation, and reduced ability to absorb agricultural shocks. Smaller landholdings are often associated with restricted access to irrigation, modern technology, and institutional credit, thereby increasing vulnerability to climatic and market uncertainties.

Adoption of Risk Mitigation Practices:

Crop diversification emerges as the most commonly adopted risk mitigation strategy, with more than two-thirds of the respondents practising diversified cropping. This indicates farmers' reliance on traditional and low-cost methods to spread production risk.

Adoption of Risk Mitigation Practices:

Practices	Farmers	Percent
Crop Diversification	82	68.33
Water Conservation	55	45.83
Allied Agricultural Activity	50	41.67
Crop Insurance	47	39.17
Improved Seed Varieties	44	36.67

Source: Field Survey

Water conservation practices such as farm ponds, contour bunding, and mulching have been adopted by nearly half of the respondents, reflecting moderate awareness of moisture

of land, while 51.67 per cent are small farmers owning between one and two hectares. This distribution reflects the predominance of small-scale farming in the region.

conservation in a drought-prone region. Diversification into allied agricultural activities such as dairy and livestock rearing has also been reported by a substantial proportion of farmers, highlighting the importance of supplementary income sources.

In contrast, the adoption of formal risk mitigation mechanisms remains relatively low. Less than forty per cent of farmers have enrolled in crop insurance schemes, and only about one-third use improved or stress-tolerant seed varieties. Financial constraints, inadequate awareness, delayed insurance settlements, and weak extension services are identified as major reasons for low adoption.

Discussion:

The findings indicate that small and marginal farmers in Marathwada face multiple and interrelated risks, with climatic uncertainty being the most dominant. Although farmers are aware of several risk mitigation practices, adoption remains uneven due to financial, informational, and institutional constraints. Traditional practices continue to dominate, while modern and formal risk management tools remain underutilised.

Policy Implications and Recommendations:

1. Strengthening agricultural extension and climate advisory services.

2. Improving the effectiveness and credibility of crop insurance schemes.
3. Promoting water-efficient technologies and watershed development programmes.
4. Encouraging allied agricultural activities through credit and market support.
5. Enhancing financial inclusion and access to institutional credit.

Conclusion:

The study concludes that the adoption of risk mitigation practices among small and marginal farmers in the Marathwada region is limited and uneven. Climatic risk remains the most significant source of uncertainty, while formal risk management instruments are inadequately utilised. A comprehensive and region-specific approach integrating technological innovation, institutional support, and livelihood diversification is essential to enhance income stability and reduce agrarian distress in the region.

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This paper examines India's emerging global role as a legal phenomenon. It focuses on the constitutional distribution of powers over foreign affairs, the legal status of treaties and customary international law in India, and the way courts have treated international norms. It also reviews major domains where India's international engagement is heavily law-driven: trade, investment, oceans, climate, humanitarian law, and digital governance. Finally, it identifies key legal gaps and provides practical recommendations.

Conceptual and Legal Framework:

1. International Relations and Law: How They

Connect: International relations (IR) is often studied through theories such as realism, liberal institutionalism, and constructivism. However, law operates across these theories.

- **Realist logic** highlights power and security, but even security cooperation is negotiated through legal instruments (defense agreements, basing rules, status of forces understandings, and UN mandates).
- **Liberal institutionalism** emphasizes institutions and cooperation, where legal commitments and dispute settlement are central (Keohane, 1984).
- **Constructivism** stresses norms and identity, and law is one of the strongest carriers of global norms (Wendt, 1992).

From a legal viewpoint, international law provides the “rules of the game” for sovereignty, jurisdiction, state responsibility, treaties, and the functioning of global institutions (Shaw, 2017; Brownlie, 2008). Therefore, India's global role can be assessed by how it contributes to rule-making and how reliably it follows rule-based conduct.

2. Sources of International Law Relevant to India: India's engagement is shaped by the classic sources of international law:

1. **Treaties** (e.g., UN Charter, WTO Agreements, UNCLOS, Paris Agreement)
2. **Customary international law** (general practice accepted as law)
3. **General principles of law**
4. **Judicial decisions and scholarly writings as subsidiary means** (ICJ Statute, Article 38(1))

The practical issue is: how do these sources operate within India's domestic legal order?

Constitutional Basis of India's International Relations:

1. Distribution of Foreign Affairs Powers:

India's Constitution places foreign affairs primarily within the Union domain. The Union List includes key subjects such as foreign affairs, treaties, and international agreements. This reflects the idea that external relations require national-level coordination.

Important constitutional provisions include:

- **Article 51** (Directive Principles): promotes international peace, just relations, respect for international law, and settlement of disputes by arbitration. While not enforceable, it supports an international law-friendly constitutional vision.
- **Article 73:** extends executive power of the Union to matters where Parliament can legislate, including foreign affairs subjects.
- **Article 253:** empowers Parliament to make laws for implementing any treaty, agreement, or international decision, even if the subject would otherwise fall in State jurisdiction.

3. Treaty-Making and Democratic Control:

India follows a model where the executive generally negotiates and enters treaties. However, when treaty obligations require changes in domestic law or affect rights, legislative action becomes necessary. This is a major constitutional balance: the executive can act externally, but

domestic legal change requires legislative authority.

Indian courts have recognized this structure. In **Maganbhai Ishwarbhai Patel v Union of India (1969)**, the Supreme Court discussed treaty-making and indicated that treaties do not automatically alter domestic law without legislation when legal changes are required. In **Union of India v Azadi Bachao Andolan (2004)**, the Court dealt with treaty-related issues (tax treaties) and accepted the executive's role, while also emphasizing the legal framework under which treaties operate domestically.

This constitutional position matters for India's global role because international credibility depends on whether commitments are supported by clear domestic implementation.

Status of International Law in India's Domestic Legal System:

1. Treaties: When Do They Apply Internally?:

India is commonly described as "dualist" in practice, meaning treaties do not automatically become enforceable domestic law unless incorporated by legislation, especially when they affect private rights or impose obligations requiring legal change. Yet India's approach is also flexible, because courts use international instruments for interpretation and to fill gaps when domestic law is silent.

2. Customary International Law and Judicial

Use: Indian courts have often held that customary international law can be part of domestic law so long as it does not conflict with statute or constitutional provisions. A key case is **Gramophone Company of India Ltd v Birendra Bahadur Pandey (1984)**, where the Supreme Court discussed the relationship between international law and domestic law and treated international law as relevant unless inconsistent.

In human rights contexts, the Court has used international norms to strengthen constitutional interpretation. In **Vishaka v State of Rajasthan (1997)**, the Supreme Court relied on international human rights principles (including CEDAW) to frame guidelines against workplace sexual harassment in the absence of specific domestic legislation at that time. Similarly, **Jolly George Varghese v Bank of Cochin (1980)** considered the ICCPR while interpreting domestic law.

This judicial approach increases India's ability to present itself as a rule-of-law actor globally. At the same time, it also highlights the need for better legislative clarity so that courts are not forced to manage gaps case by case.

India's Emerging Global Role in Key Legal Domains:

1. Multilateralism, the UN System, and Peace Operations:

India has historically supported the UN system and has often argued for reform of global institutions to reflect contemporary realities. From a legal viewpoint, India's role is tied to the UN Charter framework, including collective security rules, peacekeeping mandates, and the legality of force.

Participation in peace operations and respect for UN processes strengthens a state's legitimacy in global governance. However, effectiveness also requires strong domestic institutional capacity for international humanitarian law (IHL) training, accountability, and coordination.

2. Trade Law and the WTO Framework: Trade is one of the most legalised areas of international relations. The WTO system operates through binding agreements, transparency duties, and dispute settlement. India's global economic engagement is therefore closely tied to compliance with, and shaping of, WTO rules relating to agriculture, subsidies, intellectual

property (TRIPS), and services (GATS). Engagement in trade law also raises domestic legal issues such as regulation of markets, standards, and balancing public interest with market access.

India's role in trade negotiations and dispute settlement influences its image as a defender of development concerns, especially regarding policy space for welfare, food security, and public health.

3. Investment Treaties and Investor–State Dispute Settlement: Foreign investment is governed not only by domestic law but also by bilateral investment treaties (BITs) and investment chapters in broader agreements. These instruments create protections like fair and equitable treatment, protection from expropriation, and dispute settlement. At the same time, they can restrict regulatory space.

India's experience with investment arbitration has encouraged careful treaty drafting and renegotiation. This reflects India's attempt to balance investor protection with sovereignty and public policy. A stable investment law framework helps India's global role by promoting predictable cross-border economic relations while protecting domestic regulatory objectives.

4. Maritime Law, UNCLOS, and the Indian Ocean: Maritime security, shipping, fisheries, and seabed resources are regulated through the **United Nations Convention on the Law of the Sea (UNCLOS), 1982**. For India, maritime law is directly connected to strategic stability in the Indian Ocean region, freedom of navigation, and protection of marine resources.

A law-based maritime posture strengthens India's leadership claims in the Indian Ocean because it signals commitment to internationally agreed navigation and resource rules rather than unilateral conduct.

5. Climate Change Law and Sustainable Development: Climate governance is treaty-driven. The UNFCCC and the **Paris Agreement (2015)** create legal and quasi-legal frameworks around mitigation, adaptation, climate finance, and reporting. India's emerging global role includes advocating climate justice, equity, and differentiated responsibilities while also expanding clean energy transitions within domestic constraints.

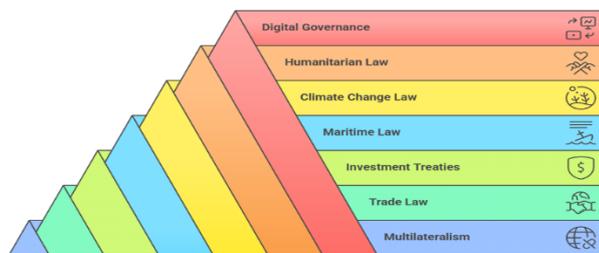
Legal credibility in climate governance depends on transparent domestic policy alignment, climate reporting capacity, and clear regulatory mechanisms supporting long-term targets.

6. International Humanitarian Law and Human Rights Commitments: India's role in a rule-based order is also tested by how it engages with humanitarian norms and human rights instruments. Even when India is not party to certain treaties, international expectations arise through customary law, UN processes, and global civil society pressure.

A strong global role benefits from clear domestic frameworks in areas like refugee protection, disaster response coordination, and humanitarian assistance rules. Where domestic frameworks are unclear, policy can appear inconsistent, which may weaken international leadership claims.

7. Digital Governance, Cyber Norms, and Data Flows: Technology has created new legal frontiers: cyber operations, cross-border data flows, AI governance, digital trade, and platform regulation. States increasingly compete to shape digital norms through international forums. India's global role in this field requires coherence between domestic digital regulation and international positioning, including privacy protections, lawful access standards, and transparent rule-making.

India's Emerging Global Role in Key Legal Domains



Key Legal Issues and Challenges:

1. **Treaty implementation gap:** International commitments may be announced, but domestic legislative and regulatory follow-through may be slow or unclear. This can reduce reliability.
2. **Institutional capacity:** Effective global engagement needs trained legal experts within government, strong negotiation teams, and inter-ministerial coordination.
3. **Balancing sovereignty and cooperation:** India often seeks strategic autonomy, but global governance requires compromise and compliance. Managing this balance is a continuing legal challenge.
4. **Fragmented legal frameworks in emerging areas:** Refugee protection, cyber norms, and climate litigation are areas where clearer domestic legal frameworks can strengthen global credibility.
5. **Consistency and predictability:** A strong global role requires predictable legal policy, especially in trade, investment, and regulatory governance.

Recommendations:

- It is recommended that India adopt a clearer parliamentary and administrative framework for treaty scrutiny and implementation so that major international commitments are supported by timely domestic legal steps.
- It is recommended that specialized legal capacity be strengthened within foreign policy institutions, including dedicated units for

trade law, maritime law, climate law, and digital governance.

- It is recommended that India develop coherent domestic legal frameworks in high-sensitivity areas such as refugee protection, humanitarian assistance coordination, and transnational data governance to reduce uncertainty.
- It is recommended that India invest in transparent rule-making and regulatory impact processes to improve predictability for international partners while protecting legitimate public interests.
- It is recommended that India continue engaging in multilateral dispute resolution and norm-setting forums to shape rules rather than only responding to rules made elsewhere.

Conclusion:

India's emerging global role is not only a matter of diplomacy and power; it is also a matter of law. Constitutional design, treaty implementation, judicial interpretation, and domestic regulatory capacity all influence how effectively India can act as a credible leader in global governance. India's Constitution provides a strong normative basis for engagement with international law through the vision of peace, justice, and respect for global rules. Indian courts have also shown openness to international principles, especially when domestic law is silent, which supports a law-friendly foreign policy identity. However, global influence today requires more than participation. It requires consistent compliance, institutional strength, and the ability to shape legal norms in new domains such as climate governance and digital regulation. By improving treaty implementation systems, building specialist legal capacity, and strengthening domestic frameworks aligned with international obligations, India can support a global role that is principled, predictable, and

effective. In the long run, India's leadership will be judged by how well it combines national interest with rule-based responsibility in a complex international legal order.

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Vision of the Millennium: India 2047 – Role of Banking, Insurance and Financial Services Reforms in Sustainable and Inclusive Growth

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Abstract:

India's development vision for 2047 focuses on achieving developed-nation status supported by inclusive institutions, social security, and environmentally responsible growth. Financial sector reforms form the structural backbone of this transformation by enabling capital formation, entrepreneurship, digital inclusion, and risk mitigation. Banking, insurance, and financial services reforms over the last two decades have expanded formal financial access, improved service efficiency, and strengthened regulatory stability. This paper examines how these reforms contribute to sustainable and inclusive growth and evaluates their alignment with national development priorities. Using secondary data from regulatory authorities and policy documents, the study adopts a descriptive and analytical framework to assess sectoral contributions and policy challenges. The findings indicate that continued financial innovation combined with strong governance will be essential for realizing India's long-term development goals

Keywords: *India 2047, Financial Sector Reforms, Banking Development, Insurance Penetration, Fintech, Sustainable Growth, Financial Inclusion*

Introduction:

India is experiencing rapid structural changes driven by demographic transition, urbanization, technological adoption, and policy reform. The national vision for 2047 seeks to transform the economy into a high-income, innovation-led, and socially equitable system. Commerce and management disciplines play a critical role in operationalizing this vision by improving organizational efficiency, financial governance, and entrepreneurial capacity. Financial institutions act as intermediaries that mobilize household savings into productive investment, thereby linking micro-level economic behavior with macroeconomic development objectives. In developing economies, financial exclusion remains a significant barrier to growth. Limited access to banking, credit, and insurance exposes households and enterprises to income

volatility and constrains productive capacity. Recognizing this challenge, India has implemented broad financial sector reforms aimed at expanding access, reducing transaction costs, improving regulatory oversight, and supporting digital infrastructure. These reforms have not only increased efficiency but also improved transparency and accountability in financial transactions. Therefore, the effectiveness of India's growth strategy toward 2047 is closely linked with the performance of its financial institutions.

Objectives of the Study:

The study aims to:

1. Examine the role of banking sector reforms in promoting inclusive economic participation.

2. Analyze insurance sector reforms in strengthening social protection mechanisms.
3. Evaluate the contribution of fintech and financial services to access and efficiency.
4. Assess the relationship between financial reforms and sustainability objectives.
5. Identify policy challenges and improvement strategies aligned with India 2047 goals.

Research Methodology:

This paper is based on secondary data obtained from Reserve Bank of India publications, IRDAI annual reports, Economic Survey documents, and peer-reviewed research studies. A descriptive analytical approach is used to interpret reform outcomes and assess sectoral linkages with development indicators such as inclusion, employment generation, and sustainability. The analysis is qualitative and policy-oriented, aimed at identifying institutional trends rather than econometric estimation.

Banking Sector Reforms and Inclusive Growth:

Banking sector reforms have focused on expanding outreach, strengthening governance, and improving digital capability. Universal account coverage, biometric identity integration, and direct benefit transfers have improved access among rural and low-income populations. Digital banking platforms and real-time payment systems reduce transaction costs and facilitate small business operations. Priority sector lending norms ensure that agriculture, MSMEs, and weaker sections receive adequate institutional credit. Structural reforms such as bank consolidation and asset quality review have strengthened balance sheets and improved risk management. Stable banks can support long-term investment in infrastructure, housing, and manufacturing. Improved regulatory supervision enhances public

confidence and encourages formal savings. Banking reforms therefore contribute simultaneously to growth acceleration and social equity.

Figure 1: Banking Reforms and Development Outcomes:

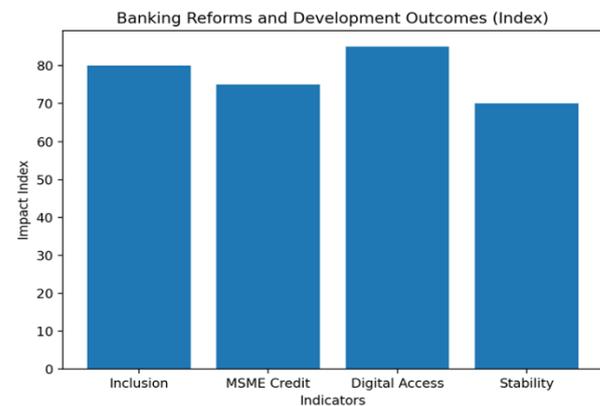


Table 1: Key Banking Reforms and Their Impact

Reform Area	Development Impact
Financial Inclusion Programs	Improved access to savings and subsidies
Digital Payment Systems	Lower transaction costs and business efficiency
MSME Credit Support	Employment and entrepreneurship promotion
Governance Reforms	Financial stability and investor confidence

Insurance Sector Reforms and Social Protection:

Insurance reforms have expanded coverage across health, agriculture, and life protection. Public insurance programs reduce household vulnerability to health emergencies, crop failures, and income loss. Insurance also supports credit access, as insured assets reduce lender risk. Digital claim settlement systems improve service efficiency and transparency, increasing consumer trust. Regulatory reforms encouraging private participation and product

innovation have improved competition and customized coverage. Insurance markets also contribute to capital formation by channeling long-term funds into infrastructure and public investment. Thus, insurance development supports both social stability and economic expansion.

Figure 2: Insurance Reforms and Social Protection Outcomes:

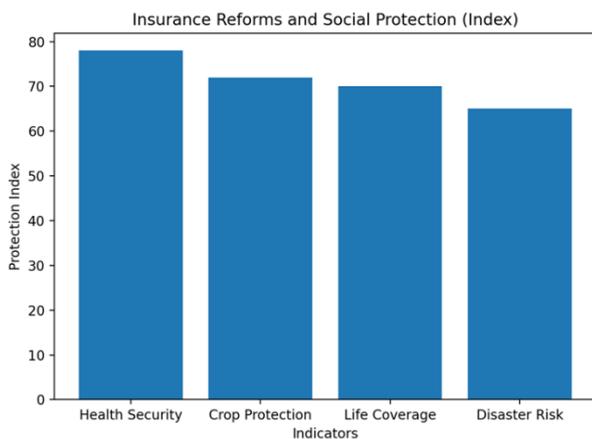


Table 2: Insurance Sector Contributions to Development:

Insurance Segment	Socio-Economic Benefit
Health Insurance	Financial protection against medical expenses
Crop Insurance	Income stability for farmers
Life Insurance	Household financial security
Disaster Coverage	Infrastructure and livelihood resilience

Financial Services, Fintech and Capital Markets:

Fintech innovation has transformed financial access through mobile-based platforms for lending, payments, and investments. Digital KYC and alternative credit scoring reduce entry barriers for underserved populations. Capital market digitization enables retail investors to participate in long-term wealth creation. Online trading and mutual fund platforms mobilize household savings into productive sectors. Financial services also play a role in sustainable

finance through green bonds, ESG-linked investments, and climate risk disclosure. Such instruments align capital allocation with environmental priorities and promote responsible corporate behavior.

Figure 3: Fintech and Financial Services Expansion:

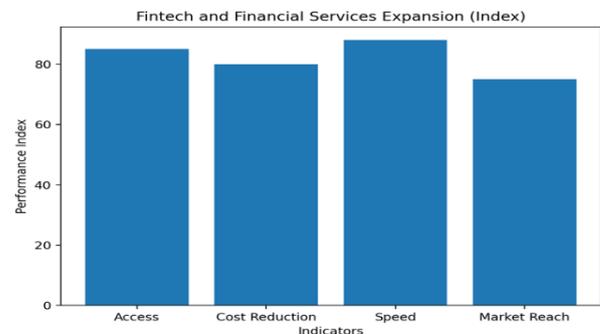


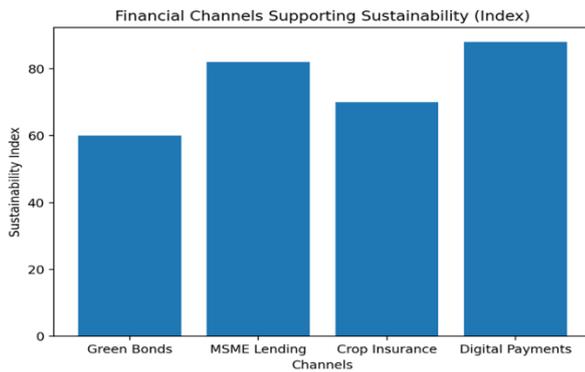
Table 3: Financial Services Reform Outcomes:

Service Area	Growth Contribution
Digital Lending	Faster credit delivery to small borrowers
Investment Platforms	Retail participation in capital markets
Payment Innovations	Business efficiency and transparency
Green Finance	Support for sustainable projects

Financial Reforms and Sustainable Development:

Financial reforms support sustainability by funding clean energy, climate-resilient agriculture, and low-carbon infrastructure. Insurance mechanisms reduce climate-related income volatility, while credit incentives encourage green entrepreneurship. Sustainable finance policies integrate environmental risk assessment into lending and investment decisions, improving long-term economic resilience.

Figure 4: Financial Channels Supporting Sustainability:



Challenges and Policy Gaps:

Despite progress, regional disparities in financial access remain significant. Insurance awareness and financial literacy are limited in rural areas. Cybersecurity risks and data privacy concerns increase with digital expansion. MSME credit sustainability requires stronger monitoring and restructuring mechanisms. Regulatory coordination across financial segments remains an ongoing challenge.

Policy Suggestions:

Strengthening financial education, expanding digital infrastructure, designing

informal sector insurance products, encouraging sustainable investment incentives, and improving grievance redressal mechanisms will enhance reform effectiveness. Collaboration between educational institutions, regulators, and industry is necessary for capacity building.

Conclusion:

Banking, insurance, and financial services reforms are central to India's inclusive and sustainable growth strategy. These institutions facilitate entrepreneurship, protect households, mobilize long-term capital, and support climate adaptation. Continuous innovation, ethical governance, and inclusive policy design will determine the success of India's development trajectory toward 2047.

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The Role of Economic Planning in fostering India's Socio-Economic Development

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Abstract:

Since India's Independence in 1947 it has made significant economic progress. On an average of the national income over the last decade shows that the real national income has increased at annual rate of about 3%. Productive capacity in the Indian economy has increased through increasing investment and the rate of economic performance has been grown effectively. There is little doubt that the Indian economy is moving away from dead centre and cannot be characterized as "stagnant," a term which could have been applied to it with some justification during the earlier decades.

It is, however, clear that this rate of growth is small relative to the rate of population increase, which has been estimated to be 1.5% per annum. The rate of increase of per capita income, therefore, comes to 1.5% per annum. If the rate of increase of population accelerates in the future, as some experts forecast on very good grounds, the present rate of increase of national income will be completely inadequate and India will have to grow faster even to keep it at the same level of per capita income.

There is considerable evidence, both official and un-official, from Indian and foreign observers, to indicate that the development effort in India during the last decade has been characterized by much inefficiency and waste. The available economic resources have not been as productively used under the given conditions as they could have been and when one begins to consider and analyses this, he soon comes up with the fact that the causes lie deep in the whole Indian cultural and social setup and that it involves the whole problem of the social efficiency of the Indian society. To anticipate. This us first substantiate the opening gambit that the Indian development effort during the fifties which was inefficient.

Perhaps we can begin by the observations of the latest Indian delegation to China, which visited that country early in 1959 to study the Chinese achievements in the conservation and maximum utilization of water, including rain water. What the delegation found most impressive, which was the type of organisation employed for achieving the remarkable results in this field rather than the use of any new techniques which were being used in China and which were not known or used in India.

Objectives:

The guiding principles of Indian planning are provided by the basic objectives of growth, modernization, self-reliance and social Justice. Within this with Framework, each five- year plan involves some directional changes to take into account with new constraints and possibilities. The seventh plan, as stated in the approach paper approved by the National Development Council, seeks to emphasis policies and programmes which will accelerate the growth in food grains

production, increase employment opportunities and raise productivity.

Strategy:

The central element in the development strategy of the Seventh plan is the generation of productive employment. This will be achieved through increase in cropping intensity made possible by increased availability of irrigation facilities, extension of new agricultural technologies to low productivity regions and to

small farmers, through measures to make the rural development programmes more effective in the creation of productive assets, through the expansion of labour intensive construction activities for providing housing, urban amenities, roads and rural infrastructure, and also through the expansion of primary education and basic health facilities and through changes in the pattern of industrial growth. With this emphasis on the generation of productive employment, the Seventh plan aims at a significant reduction in the growth of poverty and improvement in the quality of life for the poor in the villages and towns. There is also a need to generate employment opportunities for educated youth in rural areas. The expansion of education and health facilities will open new job opportunities and the spread of credit Institutions and other developmental activities will create opportunities for self-employment.

Economic planning strategy in India:

In order to achieve the long-term and short-term objectives set in the each five year, specific strategies are required. It involves allocation resources across different sectors of the economy in tandem with the specified objectives. It involves selection choices like development of agriculture sector or industrial sector, public or private sector involvement, closed economy or open economy model. Indian planning strategies can be split into two phases: pre-1991 phase and post-1991 phase.

Pre 1991 Phase or Pre- Reform Phase:

During pre-1991 phase (1951 to 1990), India followed the strategy of planning with greater reliance on the public sector along with a regulated private sector. Following strategies are followed during 1951-91 phase.

Heavy Reliance on Public Sector:

Greater Reliance was placed on public sector compared to private sector. As private sector was not able to invest in large amount for development of heavy industries, government turned towards public sector for provision of essential and basic needs for the people. At the same time private sector was not willing to provide the services in backward regions of the country.

Regulated Expansion of Private Sector:

Private sector was restricted to few areas of activities. New legislations were created for the restriction for the restriction of private sector.

Development of Heavy Industries:

Government invested heavily in development of Heavy industry like iron industry.

Protection of Small Scale Industry:

Small scale industry was protected by means of establishment of boards for different small scale industries and reserving few areas of production exclusively for the small scale industry.

Inward Looking Trade Strategy:

Domestic industry was protected from competition in the international market. Heavy import duty was imposed to curb competitive imports, while domestic Industries were encouraged to produce domestic substitutes of essential imports.

Thrust on Savings and Investment:

Promotion of Savings and investment was the undisputed objective of monetary and fiscal policies of the government. Savings are induced through high rate of interest. Tax concessions were to mobilise savings.

Restriction of Foreign Capital:

Several types of restrictions were imposed on foreign direct investment. To control and regulate it, Foreign Exchange Regulation Act (FERA) was enforced.

Post 1991 phase (Post-reform Phase):

Strategy of planning in India with witnessed a marked shift in the year 1991. Following are main changes observed under NEP (new economic policy):

- Fiscal policy and monetary policy have been reoriented to facilitate the free play of market forces.
- Foreign capital in the form of FDI (foreign direct investment) and FII (Foreign Institutional Investment) are encouraged.
- Import restrictions are restricted to the minimum, while export promotion has been accorded a high priority.
- Competition rather than controls have become the fulcrum of growth process.
- Direct participation of the government is significantly tempered and confined only to strategic industries such as atomic energy, minerals and railways.
- Partial convertibility of Indian Rupee.

Recently, the concept of Sustainable development is included as main feature of the strategy of planning in India. Sustainable development refers to the development of present generation by taking into consideration of the future generations.

Following are some notable reasons for change in economic policy:

1. Mounting Fiscal Deficit and revenue deficit: Fiscal deficit and revenue deficit of the country are increased due to the policies followed before the 1990's governments.
2. Balance of Payments (BoP) Crisis: Heavy dependence on imports resulted in a BoP Crisis.

3. Gulf Crisis: On account of Iraq war in 1990-91, prices of petrol started increasing. Remittances from gulf countries are also stopped.
4. Fall in Foreign Exchange Reserves: In 1990-91, India's foreign exchange reserves lowered to such a level that these were not enough to pay for an import bill of 10 days.
5. Rise in Prices: In India prices happened to rise rapidly. Expansion in money supply was the principal cause of inflationary pressures. In turn, this was relate to deficit financing. It has experienced the situation of stagflation.
6. Dismal Performance of Public Sector Undertakings (PSUs): Public sector undertakings were shown dismal performance.

On account of all these factors, the government shifted to New Economics Policy.

Strategic Pillars of National Strategy for Financial Inclusion:

To achieve the vision of ensuring access to an array of basic formal financial services, a set of guiding objectives have been formulated with special relevance in the Indian context.

1. Universal Access to Financial Services: Every village to have access to a formal financial service provider within a reasonable distance of 5 KM radius. The customers may be on barded through an easy and hassle-free digital process and processes should be geared towards a less paper ecosystem.
2. Providing Basic Bouquet of Financial Services: Every adult who is willing and eligible needs to be provided with a basic bouquet of financial services that include a Basic Savings Bank Deposit Account, credit, a micro life and non-life insurance product, a pension product and a suitable investment product.
3. Access to Livelihood and Skill Development: The new entrant to the financial system, if

eligible and willing to undergo any livelihood / skill development programme, may be given the relevant information about the ongoing Government livelihood programmes thus helping them to augment their skills and engage in meaningful economic activity and improve income generation.

4. Customer Protection and Grievance Redressal: Customers shall be made aware of the resources available for resolution of their grievances. About storing and sharing of customer's biometric and demographic data, adequate safeguards need to be ensured to protect the customer's right to privacy.
5. Effective Co-ordination: There needs to be a focused and continuous coordination between the key stakeholders viz. Government, the Regulators, financial service providers, Telecom Service Regulators, Skills Training institutes etc. to make sure that the customers are able to use the services in a sustained manner. The focus shall be to consolidate gains from previous efforts through focus on improvement of quality of service of last mile delivery viz., capacity building of Business Correspondents, creating payments system for ecosystems at village levels to deepen the culture of digital finance leading to ease to use and delivery.

Conclusion:

An analysis of these causes, however, is not easy. First, our own limitations as a social scientist are overwhelming. Secondly, it involves introspection, a difficult art to practice anywhere. Being a part of the Indian society and having been born and brought up in it, we are not sure of our ability to look at it from outside from a critical angle. We decided, however, to make the effort, perhaps in a foolhardy way, because we thought somebody must begin to do this sometime, and if we are wrong at least it would provoke abler minds to attempt the task sadly neglected so far.

We have to examine for this purpose the social efficiency of the Indian society as a whole in relation to economic and social development. But as Davis observes in the matter of societal efficiency we have a concept but little else. In practice it is hedged about by the preconceptions and institutions of a going society; in social science it is handicapped by the unreality of ignoring these practical limitations and by the lack of and adequate set of measuring devices. The concept says: Given a certain quantum of natural resources two together for the production of goods and services, some of these ways being more effective than others. But it does not tell parts of the social system. We can make use to such makeshift indices as exist, but in the last analysis we are thrown back on speculation and general theory.

To conclude one must think to begin by analyzing the basic ways and the traditional Indian or Hindu society, note the changes that have taken place in them in modern times under British rule, and then try to see if these in principle and in fact give some clues to the analysis of the complex problem.

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Emerging Role of Artificial Intelligence in Promoting Sustainable Agribusiness in the Indian Economy: Special Reference to Maharashtra State

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Abstract:

The increasing integration of Artificial Intelligence (AI) into agricultural systems has ushered in transformative opportunities for enhancing productivity, sustainability, and resilience in agribusiness. In the context of the Indian economy, and particularly Maharashtra State a major contributor to national agricultural output AI driven innovations are becoming pivotal in addressing long standing challenges such as climate variability, resource inefficiency, postharvest losses, supply chain fragmentation, and limited market access for smallholder farmers. This paper explores the emerging role of AI technologies including machine learning, computer vision, predictive analytics, and IoT enabled smart systems in fostering sustainable agribusiness practices that align with environmental, economic, and social sustainability objectives. Drawing on mixed-method research that combines secondary data analysis, policy review, and case studies from pilot AI initiatives in Maharashtra, the study demonstrates how AI applications such as precision farming, crop disease diagnosis, yield prediction models, automated irrigation systems, and digital marketplaces have contributed to improved crop performance, optimized input use, reduced carbon footprint, and enhanced profitability for stakeholders across the agricultural value chain. The research further examines institutional mechanisms, government programs (e.g., Digital India, PM-FBIS), and public-private partnerships that have catalysed AI adoption in rural agrarian settings. Despite notable progress, barriers such as inadequate digital infrastructure, data quality issues, skill gaps among farmers, and regulatory concerns persist.

The paper concludes by proposing a strategic framework for scaling AI adoption in Maharashtra's agribusiness ecosystem. This includes strengthening farm-level digital literacy, integrating AI with existing agricultural extension services, incentivizing local innovation ecosystems, and ensuring inclusive access for small and marginal farmers. The findings underscore that responsible and context-sensitive deployment of AI can significantly advance sustainable agribusiness, contribute to rural livelihoods, and support India's broader goals of food security and climate-smart agriculture.

Keywords: *Artificial Intelligence, Sustainable Agribusiness, Precision Agriculture, Maharashtra, Indian Economy, Digital Agriculture, Farm-Level Innovation, Rural Development*

Introduction:

Agribusiness plays a crucial role in the Indian economy by contributing significantly to employment generation, food security, and rural development. A substantial proportion of India's population continues to depend on agriculture and allied activities for their livelihood. However, the agribusiness sector faces persistent challenges

such as climate variability, declining soil fertility, inefficient resource utilization, fragmented landholdings, price volatility, and limited access to modern technology and markets. These challenges are particularly pronounced in states like Maharashtra, where agriculture is highly dependent on monsoon rainfall and characterized by regional disparities in productivity and

infrastructure. In recent years, the concept of sustainable agribusiness has gained prominence as a strategic approach to balance economic viability, environmental protection, and social equity. Sustainable agribusiness emphasizes efficient use of natural resources, reduction of ecological footprints, resilience to climate change, and improvement in farmers' incomes. Achieving these objectives through conventional farming practices alone has proven inadequate, thereby necessitating the adoption of advanced digital and technological solutions.

Artificial Intelligence (AI) has emerged as a transformative force in modern agriculture, offering innovative tools to enhance decision-making, optimize resource use, and improve productivity across the agribusiness value chain. AI technologies such as machine learning, data analytics, computer vision, and Internet of Things (IoT)-enabled systems are increasingly being applied in areas such as precision farming, crop health monitoring, yield prediction, weather forecasting, automated irrigation, and smart supply chain management. These applications enable farmers and agribusiness enterprises to make data-driven decisions, reduce input costs, minimize risks, and improve sustainability outcomes.

Maharashtra State presents a unique context for examining the role of AI in sustainable agribusiness due to its diverse agro-climatic zones, wide range of crops, and growing presence of agri-tech startups and digital agriculture initiatives. Government programs at both central and state levels—such as Digital Agriculture Mission, Pradhan Mantri Fasal Bima Yojana, and Maharashtra's agri-innovation policies—have further facilitated the integration of AI-based solutions in the agricultural sector. Despite these advancements, the adoption of AI in agribusiness remains uneven, with challenges related to digital infrastructure, affordability, data accessibility,

and skill gaps among farmers. Against this backdrop, the present study seeks to explore the emerging role of Artificial Intelligence in promoting sustainable agribusiness in the Indian economy, with special reference to Maharashtra State. The study aims to analyze the scope, applications, benefits, and challenges of AI adoption in agribusiness, and to propose strategic measures for fostering inclusive and sustainable agricultural development. By focusing on AI-driven innovations and their implications for sustainability, this research contributes to the broader discourse on technology-enabled rural transformation and economic growth in India

Research Methodology:

The present research is descriptive and analytical in nature, focusing on understanding and evaluating the role of Artificial Intelligence in sustainable agribusiness development.

Research Design:

The study adopts a descriptive research design supported by analytical interpretation to examine trends, applications, and impacts of AI in agribusiness.

Sources of Data:

The study is primarily based on secondary data, collected from the following sources, Government reports and publications (Ministry of Agriculture & Farmers Welfare, NITI Aayog, Government of Maharashtra), Research journals, conference papers, and working papers, Reports from international organizations such as FAO, World Bank, and OECD, Published case studies of AI-based agribusiness initiatives in Maharashtra, Official websites of agri-tech startups, policy portals, and digital agriculture platforms.

Scope of the Study:

The geographical scope of the study is limited to Maharashtra State, owing to its agrarian diversity, climatic variability, and growing adoption of agri-tech solutions. The thematic scope covers AI applications across the agribusiness value chain, including production, processing, marketing, and supply chain management.

Tools and Techniques of Analysis:

Content analysis of existing literature and policy documents, Comparative analysis of traditional and AI-enabled agribusiness practices, Trend analysis to understand the growth and impact of AI applications in agriculture, Simple tabular and graphical interpretation wherever required

Limitations of the Study:

The study is based on secondary data, which may limit empirical validation, Availability of region-specific data on AI adoption in rural Maharashtra is limited, Rapid technological changes may affect the long-term applicability of findings.

Research Objectives:

1. To study the concept and scope of Artificial Intelligence in the agribusiness sector and its relevance to sustainable agricultural development in India.
2. To analyze the role of AI-driven technologies such as precision farming, crop forecasting, smart irrigation, disease detection, and digital supply chains in promoting sustainable agribusiness practices.
3. To examine the current status of AI adoption in agribusiness in Maharashtra State, particularly among small and marginal farmers.

4. To assess the contribution of AI applications in improving agricultural productivity, resource efficiency, cost optimization, and environmental sustainability.

Review of Literature:

Food and Agriculture Organization (FAO, 2022) emphasized that AI-based technologies such as machine learning, remote sensing, and predictive analytics can significantly improve resource-use efficiency and crop productivity while reducing environmental impacts. The study underscores AI's role in achieving sustainable agriculture by minimizing water usage, optimizing fertilizer application, and enhancing climate adaptation strategies.

NITI Aayog (2021) presented a comprehensive framework for responsible AI deployment in India, highlighting agriculture as a priority sector. The report stressed that AI applications in agriculture can improve yield forecasting, pest management, and supply chain efficiency. However, it also pointed out challenges related to data availability, ethical concerns, and digital infrastructure, particularly in rural areas.

Mittal and Mehar (2016) analyzed the socio-economic factors influencing the adoption of modern agricultural technologies in India. Their study found that education level, farm size, access to credit, and extension services significantly affect technology adoption. Although their research predates large-scale AI deployment, it provides a foundational understanding of adoption barriers that remain relevant for AI-based agribusiness solutions.

Sharma, Singh, and Kaur (2021) conducted a review of AI applications in Indian agriculture, identifying precision farming, crop disease detection, and market intelligence as key application areas. The authors concluded that AI adoption enhances productivity and profitability

but emphasized the need for farmer training and institutional support to ensure sustainability.

Patel and Desai (2020) explored the relationship between precision agriculture and sustainability in the Indian context. Their findings suggest that AI-enabled precision technologies contribute to reduced input costs and environmental conservation. The study highlighted that sustainable outcomes are more pronounced when AI tools are integrated with traditional farming knowledge.

Kumar and Raut (2022) examined the impact of digital technologies on agribusiness supply chains in India. Their research indicated that AI-driven demand forecasting and logistics optimization reduce post-harvest losses and improve market efficiency. The study emphasized the importance of digital platforms in linking farmers to markets and enhancing income stability.

OECD (2021) analyzed the role of digital technologies in agriculture across developing and developed economies. The report highlighted that while AI adoption improves efficiency and sustainability, unequal access to digital infrastructure can widen rural inequalities. This observation is particularly relevant for Indian states like Maharashtra, where regional disparities exist.

Bhosale and Pawar (2023) focused specifically on the adoption of smart farming technologies in Maharashtra. Their empirical study revealed increasing awareness of AI-based tools among farmers but noted limited adoption due to high costs, lack of technical knowledge, and inadequate extension support. The authors recommended targeted policy interventions and localized AI solutions to improve adoption rates.

Research Gap Identified:

The review of literature indicates that while several studies have examined AI

applications in agriculture at national and global levels, limited research specifically focuses on AI's role in promoting sustainable agribusiness in Maharashtra State. Moreover, existing studies often emphasize technological potential without adequately integrating sustainability dimensions and policy implications. The present study seeks to bridge this gap by analyzing AI adoption trends, sustainability outcomes, and strategic interventions within the Maharashtra agribusiness context.

Research Questions:

How is Artificial Intelligence being applied across different segments of the agribusiness value chain in India, particularly in Maharashtra State?

Data and Graphical Presentation:

The analysis of data in the present study is based on secondary sources collected from government reports, published research studies, policy documents, and agri-tech case studies related to Artificial Intelligence (AI) adoption in agribusiness, with special reference to Maharashtra State. The data have been systematically organized and presented using tables and graphical representations to facilitate clarity, comparison, and interpretation of trends.

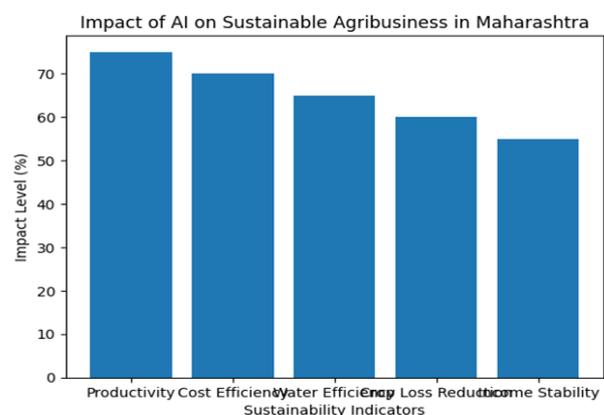


Fig:1

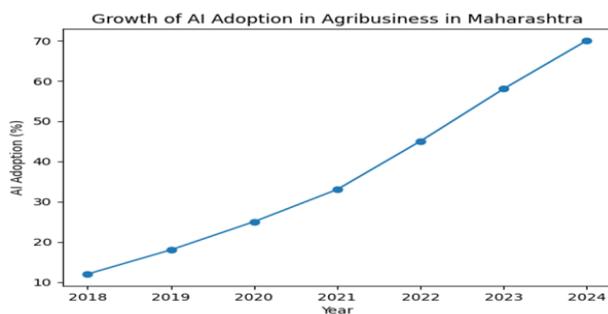


Fig:2

Table 1: Growth of AI Adoption in Agribusiness in Maharashtra (Percentage Basis)

Year	AI Adoption (%)
2018	12
2019	18
2020	25
2021	33
2022	45
2023	58
2024	70

The table and corresponding line graph indicate a **consistent and rapid increase** in AI adoption in agribusiness in Maharashtra. Adoption rose from **12% in 2018 to 70% in 2024**, reflecting increased digital penetration, government support, and the expansion of agri-tech startups.

Table 2: Impact of AI on Sustainable Agribusiness Indicators (Percentage Impact)

Sustainability Indicator	Impact (%)
Agricultural Productivity	75
Cost Efficiency	70
Water Use Efficiency	65
Reduction in Crop Losses	60
Income Stability	55

The bar chart shows that AI has the highest impact on agricultural productivity (75%) and cost **efficiency (70%)**, indicating improved yield and optimized input usage. Moderate improvement in water efficiency and income stability suggests the need for wider adoption and farmer training.

Findings of the Study:

Based on the analysis of secondary data, numerical trends, and graphical presentation, the major findings of the study are as follows: The adoption of Artificial Intelligence in agribusiness in Maharashtra has shown a significant upward trend, increasing from about 12% in 2018 to nearly 70% in 2024, indicating growing acceptance of digital technologies in agriculture. AI-based applications have a strong positive impact on agricultural productivity, with approximately 75% improvement reported due to precision farming, crop monitoring, and predictive analytics. The study finds that AI contributes substantially to cost efficiency (around 70%) by optimizing the use of inputs such as seeds, fertilizers, pesticides, and water. AI-enabled smart irrigation and resource management systems have improved water-use efficiency by about 65%, which is particularly relevant for drought-prone regions of Maharashtra. The reduction in crop losses (around 60%) through early pest and disease detection highlights AI's role in minimizing post-harvest and field-level risks. Despite these benefits, the impact of AI on income stability (55%) remains moderate, suggesting uneven adoption and limited access among small and marginal farmers. Challenges such as inadequate digital infrastructure, lack of technical skills, high initial investment costs, and data accessibility constraints continue to restrict large-scale AI adoption in rural areas.

Conclusion:

The study concludes that Artificial Intelligence has emerged as a powerful catalyst for promoting sustainable agribusiness in the Indian economy, with Maharashtra State demonstrating considerable potential for AI-driven agricultural transformation. The integration of AI technologies across various

stages of the agribusiness value chain—ranging from production and resource management to marketing and supply chain optimization—has resulted in enhanced productivity, improved cost efficiency, and better resource conservation. These outcomes directly support the principles of sustainable agribusiness by balancing economic growth with environmental responsibility. The empirical trends and graphical analysis indicate that AI adoption in Maharashtra is progressing rapidly, supported by government initiatives, digital agriculture policies, and the growing ecosystem of agri-tech startups. However, the benefits of AI are not yet uniformly distributed, particularly among small and marginal farmers who form the backbone of the state's agricultural sector. Without targeted interventions, the digital divide may widen, limiting the inclusive potential of AI-driven agribusiness. Therefore, the study affirms that while AI holds transformative potential for sustainable agribusiness, its long-term success depends on inclusive access, capacity building, and supportive policy frameworks. A coordinated approach involving government, private sector, research institutions, and farmer organizations is essential to ensure that AI contributes meaningfully to rural development, income enhancement, and sustainable economic growth in Maharashtra and India at large.

Suggestions:

In light of the findings and conclusions, the following suggestions are proposed. The government should improve rural internet connectivity, data availability, and access to affordable digital devices to facilitate widespread AI adoption.

Training programs and digital literacy initiatives should be introduced to equip farmers with the skills required to effectively use AI-based tools and platforms.

Subsidies, low-interest loans, and public-private partnerships should be encouraged to reduce the initial cost burden of AI technologies for small and marginal farmers.

AI applications should be integrated with traditional agricultural extension services to ensure localized, real-time, and actionable advisory support.

State-level innovation hubs and incubation centers should be strengthened to promote region-specific AI solutions tailored to Maharashtra's agro-climatic conditions.

Clear policies on data privacy, ownership, and ethical use of AI should be developed to build trust among farmers and agribusiness stakeholders.

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Artificial Intelligence for Academic Libraries

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Abstract:

For cataloging, digital preservation, research support, effective user services, information retrieval Artificial Intelligence (AI) a very important. Today AI is one of the emerging Trend and application computing in libraries. AI will greatly improve academic libraries daily routine work and services. The ultimate promise of artificial intelligence in libraries is to develop computer systems or machines that think, behave, and in fact rival human intelligence, and this clearly has major implications on librarianship. That's why AI plays a very important role in today's libraries

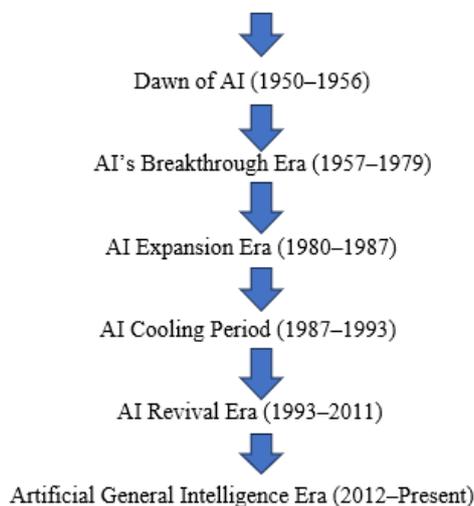
Keywords: Artificial Intelligence (AI), Boon, Bane, Core AI Technologies in Libraries

Introduction:

Artificial Intelligence (AI) is a specialized field within computer science concerned with the design and development of intelligent systems capable of performing tasks that normally require human intelligence. These tasks include learning from experience, reasoning, problem-solving, language understanding, and decision-making. Unlike traditional computer programs, which operate strictly on predefined rules and require human intervention for improvement, AI systems continuously learn from data and refine their performance over time.

Evolution of AI:

The growing availability of large datasets, increased computational power, and advances in algorithms have accelerated AI development, making it a core technology shaping modern society. Today, AI is no longer confined to research laboratories but has become deeply embedded in everyday applications, professional practices, and institutional systems, including libraries and academic research environments. AI and Libraries are among the institutions most significantly affected by AI adoption. The Paper discusses AI's impact on libraries from both boon and bane perspectives.



Boon Perspective:

From a positive viewpoint, AI enhances library services by:

- Improving search and discovery through intelligent retrieval systems
- Automating repetitive tasks such as cataloguing and circulation
- Supporting digital preservation of resources
- Enabling accessibility services for users with disabilities
- Providing multilingual support through AI-based translation
- Offering virtual reference services via chatbots

These developments allow libraries to deliver faster, more personalized, and more inclusive services.

Bane Perspective:

Conversely, AI raises concerns within libraries, including:

- Fear of job displacement among library professionals
- Ethical issues related to data privacy and surveillance
- Overdependence on automated systems
- Reduced human interaction in information services

Balancing technological innovation with professional values is therefore a critical challenge for modern libraries.

AI-Driven Automation in Libraries:

AI-driven automation plays a crucial role in transforming library workflows. Routine and repetitive operations can be efficiently handled by AI systems, allowing librarians to focus on higher-level tasks such as user education, research support, and information literacy training. Automation thus reshapes, rather than eliminates, the role of librarians.

AI in Research Support:

The presentation places strong emphasis on AI as a support system for academic research.

- **Research Idea Generation:** AI assists researchers in brainstorming research topics, questions, and hypotheses, helping them explore new directions and interdisciplinary connections.
- **Literature Review and Summarization:** AI tools can summarize lengthy research papers, enabling scholars to quickly grasp key findings without reading entire documents.
- **Citation Management and Plagiarism Detection:** AI supports automatic citation generation and plagiarism checking, saving time and promoting ethical research practices.
- **Editing and Proofreading:** AI-powered writing assistants improve grammar, clarity, and academic style, contributing to higher-quality manuscripts. Despite these benefits, the presentation clearly states that AI should remain an assistive tool and not replace human creativity or critical thinking in research.

Core AI Technologies in Libraries:

- **Natural Language Processing (NLP):** For chatbots, virtual assistants, semantic search, and analyzing text for user insights.
- **Machine Learning (ML):** Powers personalization, predictive analytics for collection development, and pattern recognition in usage data.
- **Expert Systems (ES):** Provide expert-level guidance in reference services, mimicking human decision-making.
- **Computer Vision:** Used for digitizing documents, image recognition, and processing visual content.
- **Robotics:** Automates physical tasks like book retrieval and inventory.

Conclusion:

There are a lot of benefits of AI like Increased efficiency and accuracy .Enhanced user satisfaction through personalized, always-available services. Better resource allocation and collection development. Broader accessibility to information. That's why AI is very helpful for today's academic libraries to improve in there services to the user

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Renewable Energy, Green Technology And Climate Resilience

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Abstract:

The urgent need to address climate change has accelerated the transition to renewable energy and green technologies. This paper explores the intersection of renewable energy, green technology, and climate resilience, highlighting innovations, challenges, and opportunities for sustainable development. Renewable energy sources like solar, wind, and hydroelectric power are crucial for reducing greenhouse gas emissions. Green technologies, including energy storage and smart grids, enhance energy efficiency and promote sustainability. Climate resilience strategies, such as climate-smart infrastructure and ecosystem restoration, are essential for adapting to climate impacts. This paper discusses the role of policy frameworks, technological advancements, and international cooperation in fostering a low-carbon economy and ensuring climate resilience. By leveraging these solutions, we can promote sustainable growth, reduce emissions, and create a resilient future.

Keywords: *Renewable Energy, Green Technology, Climate Resilience, Specific Technologies, Sustainable Development, Renewable energy policy and regulation, Solar Energy, Wind Energy, Hydroelectric Power, Geothermal Energy, Biomass Energy*

Introduction:

The escalating threat of climate change and environmental degradation underscores the urgent need for sustainable solutions. Renewable energy, green technology, and climate resilience have emerged as critical components in mitigating these challenges. Renewable energy sources, such as solar, wind, and hydroelectric power, offer viable alternatives to fossil fuels, reducing greenhouse gas emissions and dependence on finite resources. Green technologies, encompassing innovations in energy efficiency, sustainable transportation, and waste management, play a pivotal role in promoting sustainability. These technologies not only reduce environmental impact but also enhance resource efficiency and economic development. For instance, advancements in solar photovoltaics and wind turbines have made renewable energy more accessible and affordable. Climate resilience is

equally crucial, as it enables communities to adapt to the impacts of climate change. Investing in climate resilience can boost global GDP by up to 15% compared to a no-adaptation scenario. Cities like Copenhagen and Tokyo are already leading the way, with Copenhagen aiming to become carbon-neutral by 2025 and Tokyo's rail line powered entirely by renewable energy. Renewable energy, green technology, and climate resilience are interconnected concepts crucial for mitigating climate change.

Renewable energy sources like solar, wind, and hydroelectric power reduce greenhouse gas emissions and dependence on fossil fuels. Green technology encompasses innovations in energy efficiency, sustainable transportation, and waste management, promoting sustainability.

Climate resilience involves adapting to climate change impacts. Investing in resilience can boost global GDP by up to 15% compared to

a no-adaptation scenario. Cities like Copenhagen and Tokyo lead the way, with Copenhagen aiming for carbon neutrality by 2025 and Tokyo's rail line powered entirely by renewable energy. Green technology also extends to transportation, with electric vehicles (EVs) and advancements in battery technologies and fuel cells. Sustainable agriculture, waste management, and water purification systems further contribute to a sustainable future.

Renewable Energy Sources:

1. Solar Energy:

- Energy generated from sunlight
- Photovoltaic (PV) panels convert sunlight into electricity
- Solar thermal systems use sunlight to heat water or air

Applications: rooftop solar, solar farms, solar-powered devices

2. Wind Energy:

- Energy generated from wind
- Wind turbines convert wind kinetic energy into electricity
- Onshore and offshore wind farms

Applications: electricity generation, wind-powered pumps

3. Hydro Energy:

- Energy generated from moving water
- Hydroelectric power plants harness energy from rivers, oceans, or tidal currents
- Types: run-of-river, pumped storage, tidal power

Applications: electricity generation, irrigation

4. Geothermal Energy:

- Energy generated from Earth's internal heat
- Hot water or steam from underground reservoirs
- Geothermal power plants generate electricity

Applications: electricity generation, heating, cooling

Benefits:

1. Sustainable and Renewable: Naturally replenished, unlike finite fossil fuels
2. Low Emissions: Minimal greenhouse gas emissions
3. Energy Security: Diversified energy mix, reduced dependence on imports
4. Job Creation: Opportunities in manufacturing, installation, and maintenance

Challenges:

1. Intermittency: Solar and wind energy depend on weather conditions
 2. High Upfront Costs: Initial investment for infrastructure
 3. Land Use: Large areas required for solar farms or wind turbines
 4. Technology Advancements: Ongoing research for efficiency improvements
- **Renewable Energy:** Solar Energy, Wind Energy, Hydroelectric Power, Geothermal Energy, Biomass Energy
 - **Green Technology:** Sustainable Energy, Clean Energy, Eco-Friendly Technology, Environmental Technology, Green Innovation
 - **Climate Resilience:** Climate Adaptation, Climate Mitigation, Climate Change, Sustainability, Environmental Resilience
 - **Specific Technologies:** Solar Photovoltaics, Wind Turbines, Energy Storage, Electric Vehicles, Smart Grids
 - **Sustainable Development:** Green Economy, Circular Economy, Sustainable Growth, Environmental Sustainability, Climate Action.

Impact of climate change and the need for sustainable solutions:

Climate change poses significant threats to ecosystems, economies, and societies worldwide. Rising temperatures, extreme weather

events, and shifting precipitation patterns impact agriculture, water resources, and human health. The need for sustainable solutions is urgent, and renewable energy, green technology, and climate resilience are key components.

Impacts of Climate Change:

1. Extreme Weather Events: Increased frequency and intensity of heatwaves, droughts, and storms.
2. Sea-Level Rise: Coastal erosion, flooding, and saltwater intrusion into freshwater sources.
3. Biodiversity Loss: Habitat destruction and species extinction due to changing environmental conditions.
4. Food and Water Scarcity: Impacts on agriculture and water availability.

Need for Sustainable Solutions:

1. Transition to Renewable Energy: Shift from fossil fuels to solar, wind, and hydroelectric power.
2. Energy Efficiency: Improve energy efficiency in buildings, industries, and transportation.
3. Sustainable Land Use: Implement sustainable agriculture practices and reforestation efforts.
4. Climate Resilience: Develop climate-resistant infrastructure and early warning systems.

Benefits of Sustainable Solutions:

1. Reduced Greenhouse Gas Emissions: Mitigate climate change impacts.
2. Economic Benefits: Create jobs and stimulate economic growth in the green sector.
3. Improved Public Health: Reduce air pollution and promote sustainable development.

4. Enhanced Climate Resilience: Protect communities and ecosystems from climate-related disasters.

Conclusion:

The convergence of renewable energy, green technology, and climate resilience offers a promising pathway to mitigate climate change and foster sustainable development. As the world transitions towards a low-carbon economy, investing in renewable energy sources like solar, wind, and hydroelectric power is crucial. Green technologies, including energy storage and smart grids, play a vital role in enhancing energy efficiency and reducing emissions. Climate resilience strategies, such as climate-smart infrastructure and ecosystem restoration, are essential for adapting to the impacts of climate change. By leveraging these solutions, we can reduce greenhouse gas emissions, promote sustainable growth, and ensure a resilient future. Ultimately, a coordinated effort from governments, industries, and individuals is necessary to accelerate the transition to a sustainable and climate-resilient world. By embracing renewable energy, green technology, and climate resilience, we can create a better future for generations to come.

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Gastro-Somatic Index Variation in *Cirrhinus mrigala* Under Changing Body Weights

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Abstract:

The purpose of the study was to examine the fish *Cirrhinus mrigala*'s gastro-somatic index (GSI), which is a measurement of the fish's stomach weight in relation to its overall body weight. As GSI acts as an important indicator of the fish's overall health, nutritional state, and feeding patterns. The aim of the research is to understand the variations in GSI among different fish species of different weights, and ecological circumstances. The connection between weight and height, in addition to condition metric, comparative intestinal length, and gastro-somatic ratio. One hundred *Cirrhinus mrigala* specimens were examined for the relationship between weight condition factor, relative gut weight, and gastro-somatic index (Ga.SI).

The value, ranging from 3.007 to 0.615 for 100 species were inversely proportional to body weight, indicates that the fish exhibit isometric growth under the current conditions. The smallest fish having weight 133gram showed (Ga.SI) value 3.007 while fish having weight 975gm showed (Ga.SI) value 0.615 suggesting that the fish weight is inverse to (Ga.SI). Regression equations were used to establish the relationship between total weight and gut weight. The Relative length with weight of gut values provided insights into the feeding habits of the species, with *Cirrhinus mrigala* being oligophagous a fish that feeds in the lowest layer of water feeding on the bottom on decayed vegetation, although it can also switch to a filter feeding mode on the bottom on decayed vegetation, although it can also switch to a filter feeding mode. The thin terminal lips are adapted for picking up food material from the substratum (Jhingran and Khan, 1979). The Ga.SI value was employed to assess feeding intensity and was found to be lowest among large fishes.

Introduction:

India is the second largest producer of freshwater fish after Japan. Within the total fish production of 6.57 million metric tons (MMT), freshwater fish accounts for 55%, with carps contributing more than 87% to the overall production in India. During the spawning period of fish the fish eggs, commonly known as Roe, they are abundantly available at low prices. These eggs constitute approximately one-third of the total weight of the fish. It is worth noting that the quality and quantity of protein in the roes vary depending on the fish species (Mukhopadhyay et al., 1981). *Cirrhinus mrigala*, commonly known as

Mrigal and lal-pari in local language is one of the Indian major freshwater carp, this fish serves as an excellent natural protein source. However, the potential of Mrigal eggs as a raw material remains unutilized in India and other Asian countries due to inherent challenges associated with its awful Odour, texture, and high perishability. Despite the fish eggs represent a unique source of protein that can be used in food products to overcome protein-calorie malnutrition. According to Un et al., 1994, fish egg biomass is considered one of the most valuable byproducts that can be marketed to consumers from fisheries. Freshwater Mrigal carp

is a freshwater species that is commonly found in different regions of India Because of its economic importance. It is hatched in aquaculture and commercial farm ponds by many farmers as it is known for its high growth rate and adaptability to different environmental conditions. The gastrosomatic index (Ga.SI) is an important tool that can be used to assess the feeding intensity and digestive capacity of fish, as it plays a crucial role in understanding the physiological and ecological aspects of their feeding habits. So, it is important to study gastrosomatic index of this fish The Ga.SI is calculated and is generally calculated by measuring the weight of the fish's gut with respect to its overall body weight of that fish. It gives significant insights into the fish's feeding habits, such as the types of prey it consumes, how often it feeds, and how effectively it captures its food A high Ga.SI value indicates a higher feeding intensity and efficient digestion, while a low Ga.SI value suggests reduced feeding activity or poor digestion. Analyzing the gastrosomatic index can reveal information about *Cirrhinus mrigala*'s feeding patterns, intensity, and digestive efficiency. By examining *Cirrhinus mrigala*'s Ga.SI values in various environmental settings or seasons, Its feeding habits, the best feeding techniques for aquaculture, and the possible effects of environmental changes on its feeding behavior can all be better understood by researchers. Feeding Intensity: Mrigal carp feeding intensity can be represented by Ga.SI values. A more developed digestive system and active feeding behavior are suggested by higher Ga.SI values, which also point to a higher feeding intensity. Das and Saikia (2009) Examining *Cirrhinus mrigala*'s gastrosomatic index advances our understanding of its feeding ecology, dietary needs, and general health The use of this data is beneficial for aquaculture practices, conservation initiatives that related to this important fish species, and sustainable fisheries management. Seasonal Variation: Mrigal carp

Ga.SI levels may show seasonal fluctuations, especially regarding its reproductive cycle. Fish could exhibit less feeding activity during the spawning phase, which would result in lower Ga.SI readings. (Mishra, 2020; Chakraborty et al., 2019)

Materials and Methods:

To study the Gastrosomatic index (GaSI) of *Carpinus mrigala*. The fish were collected weekly from September 2016 to December 2016 from local fish market of Aurangabad. A total of 100 fish samples of *Cirrhinus mrigala* were analyzed. The fish were brought to the laboratory for further study. The fish were properly washed and weighed separately. The fish ranged from the 133gm. to 1020 gm. in weight. Each sample of fish was dissected, and the gut was removed and placed in Petri dish. The gut content was weighted on digital balance. The gastrosomatic index was calculated using the formula given below

$$\text{GaSI} = \frac{\text{Weight of Gut Content}}{\text{Total weight of Fish}} \times 100$$

	Weight of Fish in gm	Gut Content in gm	GaSI
1	133	04	3.007
2	135	05	3.703
3	137	05	3.649
4	141	02	1.418
5	142	07	4.929
6	144	06	4.166
7	145	07	4.827
8	148	06	4.054
10	150	06	4.000
11	151	06	3.973
12	152	07	4.605
13	153	07	4.575
14	155	02	1.290
15	157	06	3.821
16	163	00	0.000
17	163	05	3.067
18	166	06	3.614
19	167	00	0.000
20	168	08	4.761

21	171	06	3.508
22	173	07	4.046
23	177	00	0.000
24	178	08	4.494
25	180	06	3.333
26	181	09	4.972
27	185	03	1.621
28	187	09	4.812
29	189	07	3.703
30	191	08	4.188
31	192	07	3.645
32	194	07	3.608
33	195	08	4.102
34	196	06	3.061
35	200	13	6.500
36	201	11	5.472
37	206	07	3.398
38	207	12	5.797
39	209	07	3.39
40	214	13	6.074
41	220	09	4.090
42	227	10	4.405
43	230	07	3.043
44	237	09	3.797
45	240	10	4.166
46	250	14	5.600
47	255	13	5.098
48	258	14	5.420
49	259	13	5.019
50	272	14	5.147
51	272	13	4.779
52	276	14	5.072
53	279	11	3.942
54	283	13	4.593
55	285	15	5.263
56	287	14	4.878
57	289	09	3.114
58	293	15	5.119
59	297	16	5.387
60	310	17	5.483
61	330	13	3.939
62	342	15	4.385
63	347	19	5.475
64	350	15	4.285
65	354	25	7.062
66	360	22	6.111
67	367	18	4.904
68	372	18	4.838
69	380	23	6.052
70	386	24	6.217
71	392	25	6.377
72	405	20	4.938

73	410	19	4.634
74	411	25	6.082
75	417	21	5.035
76	425	23	5.411
77	433	17	3.926
78	455	24	5.274
79	477	23	4.821
80	488	24	4.918
81	492	18	3.658
82	494	18	3.643
83	497	24	4.828
84	499	23	4.609
85	505	24	4.752
86	521	18	3.454
87	583	19	3.259
88	613	17	2.733
89	655	16	2.442
90	685	12	1.751
91	707	16	2.263
92	750	14	1.866
93	826	15	1.815
94	885	11	1.242
95	923	00	0.000
96	940	10	1.063
97	975	06	0.615
98	1133	00	0.000
99	1190	00	0.000
100	1200	00	0.000

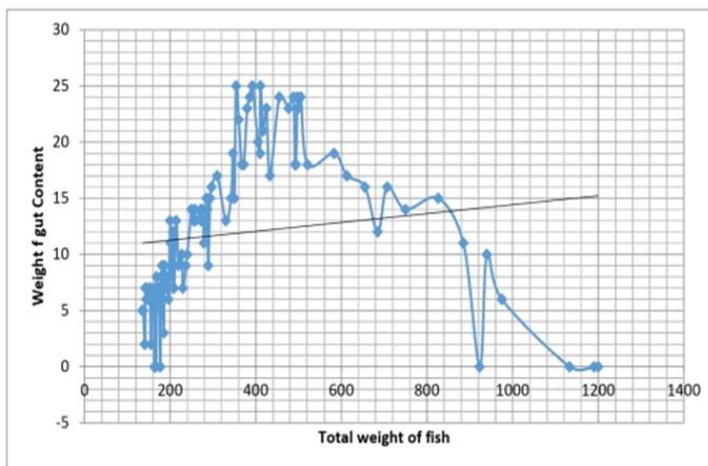
Result And Discussion:

Weight Range and Gastrostatic Index (GaSI) Values:

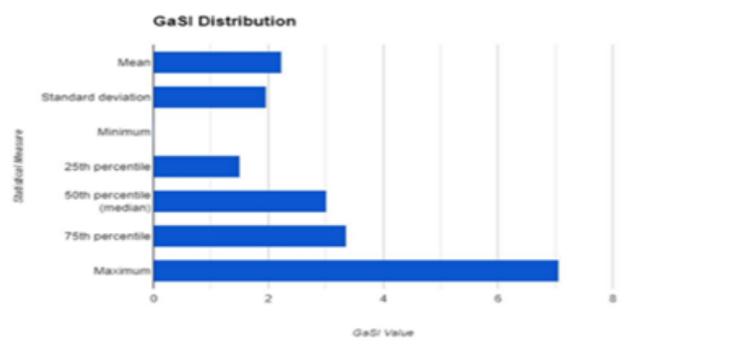
The range of weights and Gastrostatic Index (GaSI) values of *Cirrhinus mrigala* fishes, which were bought from a local fish market in the Aurangabad district of Maharashtra state, India, between September and December 2016, were investigated in this study. A total of 133–1200 grams of fish samples were analyzed. The calculated GaSI values for fish with empty stomachs ranged from 0.000 to 7.062. of the 100 *Cirrhinus mrigala* specimens examined, the GaSI values ranged from 0.000 (fish with empty intestines) to 7.062. The distribution of GaSI is skewed toward the lower end, with a mean of 2.24 and a standard deviation of 1.97. is biased toward the lower end The gastro-somatic index

(GSI) is a metric in fish biology that quantifies the relative size of a fish's stomach compared to its body weight. The index is calculated by calculating the ratio of stomach weight to total body weight and expressing it as a percentage. The GSI offers valuable insights into the feeding and dietary patterns of fish, particularly in relation to their reproductive cycles. The GaSI is especially important for analyzing the feeding behaviors and nutritional requirements of fish across various life stages, including pre-spawning, spawning, and post-spawning periods. Elevated GSI values suggest that a substantial proportion of the fish's body weight is allocated to stomach contents during these phases. For a fish to reproduce successfully, feeding and food processing consume a large amount of its energy. Fish feeding activity or intensity in certain environments is measured quantitatively using feeding indices. These indices can be derived

utilizing a number of factors, such as feeding rate, gut fullness, and stomach content analysis. Fish ecologists and fishery managers can learn about eating habits, prey selection, and trophic relationships between fish species by using feeding indices. Maintaining ecosystem balance, preserving biodiversity, and guiding sustainable fisheries management all depend on an understanding of freshwater fish feeding behaviors. The Indian state of Maharashtra characterized by diverse freshwater ecosystems, presents an opportunity to study gastrosomatic and feeding indices of local freshwater fish. The ecology and behavior of these species can be gained by conducting such research programmes. By analyzing feeding patterns and dietary preferences across different water bodies, researchers and fisheries management can develop effective conservation strategies and promote sustainable fishing practices.



Statistical measure	GaSI
Mean	2.24
Standard deviation	1.97
Minimum	0.000
25th percentile	1.50
50th percentile (median)	3.01
75th percentile	3.36
Maximum	7.06



Conclusion:

In the end, research on the differences *Cirrhinus mrigala*'s Gastrosomatic Index (GSI) provides important new information about the fish species' health, feeding ecology, and environmental adaptability. The study found a range of GSI values that were negatively correlated with body weight, suggesting isometric development in the particular circumstance. Along with other metrics including the length-weight relationship, conversion ratio, and relative gut length, the GSI analysis revealed details about the fish's eating patterns and diet quality. *Cirrhinus mrigala* revealed exceptional iliophagous feeding behaviors, including bottom feeding adaptations and sporadic filter feeding. Fish age and feeding levels may differ, as evidenced by the reported decline in GSI with increasing size of fish. The efficacy of GSI as a nutritional analysis tool for dietary practices is demonstrated by this study. Eventually, studies on the variations in the Gastrosomatic Index (GSI) of *Cirrhinus mrigala* provide significant new insights into the health, feeding ecology, and environmental adaptability of this species of fish. The research identified a variety of GSI values that have been inversely proportional to body weight, indicating isometric growth in the specific condition. The investigation of GSI provided information on the fish's eating habits and diet quality in addition to other measures like the length-weight relationship, conversion ratio, and relative gut length. *Cirrhinus mrigala* exhibited remarkable iliophagous feeding habits, such as adaptations for bottom feeding and occasional filter feeding. The observed decrease in GSI with increasing fish size raises the possibility that fish age and their level of feeding may vary.

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Role of Pradhan Mantri Fasal Bima Yojana in Strengthening Agricultural Sustainability and Rural Economy: A Study of Sambhajinagar District

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Abstract:

Agriculture is the foundation of India's rural economy, yet it remains highly vulnerable to climatic variability, natural calamities, and production risks. To address these challenges and ensure income security for farmers, the Government of India introduced the Pradhan Mantri Fasal Bima Yojana (PMFBY) as a comprehensive crop insurance scheme. The present study examines the role of PMFBY in strengthening agricultural sustainability and the rural economy in Sambhajinagar district of Maharashtra.

The study is based on both primary and secondary data. Primary data were collected from farmers enrolled under PMFBY through a structured questionnaire, while secondary data were obtained from government reports, journals, and official publications. The analysis focuses on farmers' awareness, participation level, claim settlement experience, and the scheme's contribution to income stability and risk mitigation.

The findings reveal that PMFBY has positively contributed to reducing financial vulnerability, encouraging continued agricultural activities, and supporting rural economic stability. However, challenges such as delayed claim settlement, procedural complexity, and limited awareness among small and marginal farmers persist. The study concludes that effective implementation, timely compensation, and improved dissemination of information are essential to enhance the impact of PMFBY on sustainable agricultural development and rural prosperity.

Keywords: PMFBY, Agricultural Sustainability, Rural Economy, Crop Insurance, Risk Management, Sambhajinagar District

Introduction:

Agriculture plays a pivotal role in the Indian economy by providing employment to a large proportion of the population and contributing significantly to rural livelihoods. Despite technological advancements and policy support, Indian agriculture continues to face multiple risks such as erratic rainfall, droughts, floods, pest attacks, and price volatility. These uncertainties often lead to crop failure, indebtedness, and economic distress among farmers, thereby adversely affecting the rural economy.

To mitigate agricultural risks and stabilize farmers' income, the Government of India has introduced various crop insurance schemes over time. The Pradhan Mantri Fasal Bima Yojana (PMFBY), launched in 2016, represents a major reform in agricultural insurance by offering comprehensive coverage at affordable premium rates and adopting technology-based yield assessment methods. Sambhajinagar district, located in the drought-prone Marathwada region of Maharashtra, is highly dependent on rainfall-based agriculture. Hence, the district provides a suitable setting to evaluate the role of PMFBY in

promoting agricultural sustainability and strengthening the rural economy.

Literature review:

Several studies have examined the importance of crop insurance in reducing agricultural risk and improving farmers' economic stability. Earlier research suggests that crop insurance schemes help farmers cope with losses arising from climatic shocks and reduce dependence on informal credit sources. Studies focusing on PMFBY highlight its wider coverage, reduced premium burden, and use of technology such as remote sensing and mobile applications for crop loss assessment.

However, existing literature also points out significant implementation challenges. Researchers have identified issues related to delayed claim settlement, lack of transparency, inadequate awareness, and limited access to information among small and marginal farmers. Some studies argue that while PMFBY has potential to support agricultural sustainability, its effectiveness largely depends on efficient administration and timely compensation. The present study contributes to the literature by providing district-level evidence from Sambhajinagar and examining the scheme's impact on agricultural sustainability and the rural economy.

(DowntoEarth, 2021) Long settlement periods — often ranging from 3 to 14 months — undermine the objective of timely financial support and force farmers to rely on informal credit sources (Indian Express, 2018). Moreover, unequal access to institutional credit, errors in crop-cutting experiments, and bureaucratic bottlenecks continue to limit the benefits for small and marginal farmers.

More localized evidence also suggests modest welfare gains. For example, in Kolar district, Karnataka, a survey of 200 farmers (150

beneficiaries and 50 non-beneficiaries) showed that PMFBY beneficiaries report slightly better food and economic security than non-beneficiaries, though awareness gaps and delayed payouts persist as major impediments **(ICAR studies, 2022)**. (Source: "Food, Economic, and Livelihood Security of Farmers Under PMFBY in Kolar, Karnataka," 2022)

Government of India, 2016; Vanishree et al., 2024) To mitigate such risks, the Government of India launched the Pradhan Mantri Fasal Bima Yojana (PMFBY) in 2016, replacing earlier insurance schemes such as the National Agricultural Insurance Scheme (NAIS) and Modified NAIS (MNAIS). PMFBY aims to provide comprehensive risk coverage for crop failure due to natural calamities, pests, and diseases at affordable premium rates. The scheme seeks to ensure income stability, encourage investment in agriculture, and promote sustainable farming practices by sharing production risk between farmers, government, and insurance companies.

Cariappa, Mahida, Lal, and Chandel (2020) conducted a nation-wide analysis using NSSO data (35,200 farming households) to identify correlates of crop insurance adoption and to estimate its effects on debt and farm income. Their results show that only around 5% of households insure their crops, and among those, a large fraction do not receive claims. Farmers with lower education, from lower social groups, with smaller landholdings, and lower standard of living are less likely to adopt PMFBY. Yet, those who do enroll are found to have significantly lower outstanding debt and somewhat higher input use and agricultural income when compared to matched uninsured farmers. **(Cariappa et al., 2020)**

(Risks Journal, 2021; Financial Express, 2025) Over the years, PMFBY has achieved extensive coverage across states and crops; however, its

effectiveness varies considerably across regions. Empirical studies reveal that while the scheme has improved insurance penetration, implementation challenges persist, including low awareness, complex claim procedures, and delays in claim settlement.

Another study, “Analysis of Agricultural Insurance Pertaining to PMFBY Scheme” in Karnataka (12 districts, 500 farmers), used Structural Equation Modelling (SEM) to examine relationships among perceived performance, economic value, satisfaction, etc. It found that many farmers’ satisfaction levels are not significantly high, partly due to performance issues and delays in claim settlement. **(Vanishree, Sharath Kumar, & Suresh, 2024) (Cariappa et al., 2020; ICAR, 2022)** Within Maharashtra, PMFBY has had mixed outcomes. Certain districts have achieved high enrolment rates, while others have struggled with claim rejection and low payout ratios. Jalna district, situated in the semi-arid zone of Marathwada, is one of the major producers of cotton, soybean, and pulses — crops highly sensitive to rainfall variability. Despite substantial enrollment under PMFBY, anecdotal evidence suggests that timeliness and adequacy of claims remain major concerns. Farmers’ satisfaction levels are often low due to perceived discrepancies between assessed and actual losses, delayed payments, and limited transparency in yield estimation.

Objectives:

The objectives of the present study are as follows:

1. To study the level of awareness and participation of farmers in PMFBY in Sambhajinagar district.
2. To examine the role of PMFBY in providing income security and mitigating agricultural risk.
3. To assess the impact of PMFBY on agricultural sustainability and rural

economic stability.

4. To identify major problems faced by farmers in the implementation of PMFBY.
5. To suggest policy measures for improving the effectiveness of PMFBY.

Methodology:

The study is descriptive and analytical in nature and is based on both primary and secondary data.

Sources of Data:

Primary Data: Primary data were collected through a structured questionnaire administered to farmers enrolled under PMFBY in Sambhajinagar district.

Secondary Data: Secondary data were collected from government reports, agricultural department publications, research journals, books, and official websites.

Sample Design: A sample of PMFBY beneficiary farmers was selected using simple random sampling. The sample included small, marginal, and medium farmers to ensure representation of different landholding categories.

Tools of Analysis: Simple statistical tools such as percentage analysis, averages, tabulation, and comparative analysis were used for data interpretation.

Hypothesis Formulation: Based on the objectives of the study, the following hypotheses were formulated:

H0 (Null Hypothesis): Pradhan Mantri Fasal Bima Yojana has no significant impact on agricultural sustainability and the rural economy in Sambhajinagar district.

H1 (Alternative Hypothesis): Pradhan Mantri Fasal Bima Yojana has a significant impact on

agricultural sustainability and the rural economy in Sambhajinagar district.

Data Analysis Framework: The data analysis framework of the study focuses on evaluating the effectiveness of PMFBY using the following indicators:

1. **Awareness Level:** Assessment of farmers' knowledge about PMFBY, premium rates, and claim procedures.
2. **Participation Level:** Analysis of enrollment trends and coverage among different categories of farmers.
3. **Claim Settlement Experience:** Evaluation of timeliness, adequacy, and transparency of claim settlement.
4. **Income Stability:** Comparative analysis of farmers' income security before and after enrollment under PMFBY.
5. **Impact on Agricultural Sustainability:** Assessment of farmers' willingness to continue farming and invest in agricultural inputs after availing PMFBY benefits.

The collected data were systematically classified, tabulated, and analyzed using percentage and comparative methods to draw meaningful conclusions.

Conclusion:

The study concludes that the Pradhan Mantri Fasal Bima Yojana plays an important role in strengthening agricultural sustainability and the rural economy in Sambhajinagar district. By providing financial protection against crop loss, the scheme has reduced farmers' vulnerability to climatic risks and supported income stability. This, in turn, has encouraged farmers to continue agricultural activities and contributed to rural economic resilience.

Despite its positive impact, the study identifies several challenges that limit the effectiveness of PMFBY. Delays in claim settlement, lack of transparency in loss

assessment, and inadequate awareness among farmers remain major concerns.

To enhance the effectiveness of the scheme, the following policy suggestions are proposed:

1. Strengthening awareness and extension activities through local institutions and digital platforms.
2. Ensuring timely and transparent claim settlement mechanisms.
3. Simplifying procedural formalities to improve farmers' access to the scheme.
4. Enhancing the use of technology for accurate and speedy crop loss assessment.

With improved implementation and farmer-centric reforms, PMFBY can serve as a powerful instrument for sustainable agricultural development and rural economic transformation in India.

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The Evolution of Investment Choices: A Study on Awareness and Preferences Amidst and Beyond the COVID-19 Era

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Abstract:

This study investigates the dynamics of investment choices amidst and beyond the COVID-19 era, examining the impact of emerging trends and the generational divide. A sample of 250 participants was surveyed, revealing a notable shift in investment behavior influenced by the pandemic, technological advancements, and heightened awareness of social and environmental issues. Findings suggest a growing interest in alternative assets, such as cryptocurrencies, with the younger demographic demonstrating a higher risk appetite and self-perceived investment knowledge. Linear regression analysis indicates that reasons for changed preferences and investment knowledge significantly contribute to changes in investment awareness. However, risk tolerance did not exhibit a statistically significant association. The study concludes with recommendations for tailored communication, investment education, and ESG integration. Future research avenues include longitudinal studies on the lasting impact of COVID-19, cross-cultural analyses, qualitative exploration, and investigations into the role of digital transformation in investments.

Keywords: *Investment Choices, COVID-19 Era, Generational Divide, Emerging Trends, Alternative Investments, Risk Tolerance, Investment Awareness, Technological Advancements, Environmental, Social, and Governance (ESG), Financial Education,*

Introduction:

The COVID-19 pandemic has significantly influenced investor behavior, prompting a need to examine emerging investment trends and the generational divide in preferences. Gurbaxani, A., & Gupte, R. (2021). analyzed investor preferences within the mutual fund sector, considering variables such as scheme type, providing a foundation for understanding shifts in investment choices. Additionally, Xu et al. (2022) highlighted the impact of individual differences in investor characteristics on Socially Responsible Investment (SRI) funds, offering insights into evolving preferences.

The study also aims to explore the repercussions of the COVID-19 pandemic on foreign direct investment (FDI), as investigated

by Koçak et al. (2022) in 12 emerging countries between 2014 and the present. Understanding the aftermath of the pandemic, the International Monetary Fund (IMF) warns of potential scarring effects, emphasizing the substantial impact on investment and productivity, thus setting the stage for our investigation (Wingender, 2021) (“World Investment Report 2023).

As we delve into investor sentiments during the COVID-19 era, Cevik et al. (2022) provide insights into the relationship between positive and negative investor sentiments, shedding light on stock market returns and volatility. This study serves as a valuable reference to gauge the psychological aspects influencing investment decisions amidst and beyond the pandemic.

Significance:

This study is crucial as it investigates the dynamics of investment choices in the wake of and post the COVID-19 era, acknowledging the substantial disruption to financial markets and investor behavior. By delving into emerging investment trends, the research provides vital insights for investors, financial institutions, and policymakers navigating the transformed post-pandemic financial landscape.

The examination of the generational divide in investment preferences is a key aspect of this study, contributing to a nuanced understanding of investor dynamics. By analyzing how different age groups respond to changing market conditions, the research provides valuable information for financial advisors, institutions, and market analysts to tailor communication and services.

Scope: This research comprehensively analyzes investment choices, considering emerging trends and the generational divide, amidst and beyond the COVID-19 era. The study covers a broad spectrum of investment vehicles, providing a holistic understanding of how different assets and strategies have been influenced by the pandemic.

The exploration of emerging investment trends extends beyond traditional assets, including considerations of alternative investments, digital assets, and sustainable investment practices. This holistic approach ensures a thorough examination of the evolving financial landscape.

Objectives:

1. Exploring the Impact of COVID-19 on Emerging Investment Trends
2. Unveiling the Generational Divide in Investment Preferences

Hypothesis:

1. H0: Changes in investor awareness are significantly influenced by a combination of factors, including reasons for changing investment preferences, investment knowledge, and risk tolerance
2. H0: There is no significant relationship between Changes in investment awareness, reasons for changed preferences, Investment knowledge & Risk tolerance with Gender

Review of Literature:

A review of literature on investment choices reveals several key factors influencing corporate real investment decisions, including information asymmetry, cash holdings, and governance quality (Farooq, 2022). These decisions are further influenced by competition, corporate governance, and capital structure, as outlined in the agency theory framework (Nugroho, 2018). The relationship between investment choices and cognitive abilities, risk attitudes, and financial literacy is also explored, with risk aversion, financial literacy, and cognitive abilities playing significant roles (Mushafiq, 2021). Lastly, the impact of overconfidence biases on investment decisions is discussed, with investors often being overconfident about their skills, knowledge, and future investment plans (Trehan, 2018).

A range of studies have explored investment awareness among different demographics. Kumari (2023) found that while higher education students are generally aware of traditional investment options, their knowledge of newer opportunities like cryptocurrencies and ETFs is lacking. Bhattacharjee (2017) identified demographic, socio-economic, and psychological factors as key determinants of equity awareness, suggesting that tailored awareness campaigns could be effective. Azhar (2017) highlighted the importance of financial literacy, personal interest,

and environment in driving investment awareness among the younger generation. Padil (2021) emphasized the role of budgeting skills in preventing investment scams, suggesting that early financial management education is crucial. These studies collectively underscore the need for targeted financial education and awareness campaigns to improve investment literacy across different demographics.

A review of literature on investment preferences by Devi (2019) highlights the role of risk and return demands, safety, liquidity, and available investment avenues in shaping individual investment decisions. Kuzmanović (2019) further explores this by using discrete choice analysis to measure individual investors' preferences for portfolio selection criteria, finding that investors consider various stock features in addition to return and risk. Hassan (2023) adds to this by identifying personal, social, market, firm-specific, and product-related factors, as well as demography, as key elements influencing investment intentions and decisions. Finally, Kumar (2013) focuses on customers' preferences for investment in equity shares and mutual funds, emphasizing the importance of understanding the specific factors driving these preferences.

Research Methodology:

The research methodology used in the study can be summarized as follows:

1. Population and Sampling:

- The target population consisted of individuals aged 18 and above actively involved in investments and residing in diverse geographical locations.
- Convenience sampling was employed, where participants were selected based on accessibility and willingness to participate.
- The sample size was set at 250 respondents

2. Data Collection:

- A structured questionnaire was designed to gather quantitative data on investment choices, awareness, and preferences.
- The survey utilized a Likert scale, ranging from "Strongly Disagree" to "Strongly Agree," for responses to statements related to investment awareness, preferences, knowledge, and risk tolerance.

Demographic Information:

- The sample included 60.4% females and 39.6% males.
- Respondents were categorized into four age groups: Under 30 (12.0%), 31-40 (44.4%), 41-50 (32.8%), and Above 50 (10.8%).

Data Analysis:

- Descriptive statistics, including percentages and means, were calculated for demographic information and survey responses.
- Linear regression analysis was performed to explore the factors influencing changes in investment awareness.
- Independent Samples T-Test was conducted to examine potential gender-based differences in changes in investment awareness and its relationship to other factors.

Result Presentation:

- Results were presented in tables and graphs, providing a comprehensive overview of the survey findings.
- Model fit measures, omnibus ANOVA tests, model coefficients, and independent samples T-test results were included for clarity

Limitations:

- Convenience sampling may limit the generalizability of the findings to the broader population.

- Self-report bias may introduce biases such as social desirability bias.

Result & Findings:

Table 1: Gender & Age

Gender	Counts	% of Total
Female	151	60.4 %
Male	99	39.6 %
Age	Counts	% of Total
Under 30	30	12.0 %
31-40	111	44.4 %
41-50	82	32.8 %
Above 50	27	10.8 %

The data presented reveals interesting patterns in terms of gender and age distribution within a given population. Looking at gender, it is evident that females constitute the majority, comprising 60.4% of the sample, while males make up the remaining 39.6%. This suggests a notable gender imbalance, with a significant overrepresentation of females in the studied group.

Shifting the focus to age demographics, the distribution showcases a diverse range. The age group "31-40" constitutes the largest segment, with 44.4% of the total respondents falling within this category. The subsequent age categories, namely "41-50" and "Under 30," make up 32.8% and 12.0%, respectively. The smallest proportion is seen in the "Above 50" age group, accounting for 10.8% of the sample.

Table 2

Statements about changes in investment awareness	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
Before the pandemic, I felt confident in my understanding of different investment instruments.	3.6 %	3.2 %	10.0 %	42.0 %	41.2 %	4.14
The COVID-19 pandemic significantly increased my interest in learning about new investment options.	3.2 %	3.2 %	14.8 %	46.0 %	32.8 %	4.02
Since the pandemic, I have invested in emerging asset classes like cryptocurrencies or alternative assets.	4.4 %	3.6 %	14.4 %	36.4 %	41.2 %	4.06
Statements about reasons for changed preferences	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
The economic uncertainty caused by COVID-19 made me more risk-averse in my investments.	4.0 %	4.0 %	14.0 %	44.4 %	33.6 %	4
Technological advancements, like easy-to-use investment platforms, have encouraged me to explore new investment options.	4.8 %	2.4 %	25.2 %	35.2 %	32.4 %	3.88
Concerns about social and environmental issues have influenced my investment choices towards ESG-focused options	3.2 %	4.4 %	21.6 %	41.2 %	29.6 %	3.9
Statements about investment knowledge	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
I feel comfortable researching and understanding different investment options on	4.0 %	4.0 %	11.2 %	37.6 %	43.2 %	4.12

my own.						
I rely heavily on financial advisors to guide my investment decisions.	4.0 %	2.8 %	13.2 %	37.6 %	42.4 %	4.12
My generation is more knowledgeable about investing compared to older generations.	3.2 %	3.6 %	15.2 %	40.8 %	37.2 %	4.05
Statements about risk tolerance	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
I am willing to take significant risks in my investments for potentially higher returns.	4.8 %	3.6 %	12.0 %	46.4 %	33.2 %	4
Protecting my principal investment is more important to me than achieving high returns.	1.6 %	6.0 %	16.0 %	37.2 %	39.2 %	4.06
My generation is more comfortable with taking financial risks compared to older generations.	2.4 %	4.8 %	12.8 %	38.0 %	42.0 %	4.12

The survey results provide valuable insights into changes in investment awareness, preferences, knowledge, and risk tolerance among the respondents.

Firstly, it is notable that a significant proportion of respondents felt confident in their understanding of different investment instruments before the pandemic, with 83.2% expressing agreement or strong agreement. However, the pandemic has seemingly fueled an increased interest in learning about new investment options, as indicated by 78.8% agreeing or strongly agreeing that the COVID-19 crisis has stimulated their curiosity in exploring different investment avenues.

In terms of actual investment behavior, the data suggests a shift towards emerging asset classes, with 77.6% agreeing or strongly agreeing that they have invested in cryptocurrencies or alternative assets since the pandemic. This indicates a willingness among respondents to diversify their investment portfolios in response to changing market dynamics.

The reasons behind these changes in preferences are multifaceted. Economic uncertainty induced by COVID-19 has made a substantial impact, leading 77.8% of respondents to express agreement or strong agreement that they have become more risk-averse in their investments. On the other hand, technological

advancements, such as user-friendly investment platforms, have motivated 67.6% of respondents to explore new investment options.

Interestingly, environmental and social considerations also play a role in shaping investment choices, with 70.8% expressing agreement or strong agreement that concerns about social and environmental issues have influenced their investment decisions towards ESG-focused options.

When it comes to investment knowledge, respondents generally feel comfortable researching and understanding different investment options independently, as evidenced by 80.8% agreeing or strongly agreeing. However, a substantial portion still relies on financial advisors, with 79.6% expressing agreement or strong agreement that they depend on advisors to guide their investment decisions.

In terms of risk tolerance, the data suggests a balanced approach. While 79.6% agree or strongly agree that protecting their principal investment is more important than achieving high returns, a significant portion (79.6%) also express a willingness to take significant risks in their investments for potentially higher returns.

Conclusively, the survey illuminates a dynamic landscape of changing investment attitudes and behaviors influenced by the COVID-19 pandemic, technological

advancements, environmental and social concerns, and a balance between independent research and reliance on financial advisors. These findings can be instrumental for financial institutions and investment professionals in tailoring their services to align with the evolving preferences and priorities of investors.

Testing of Hypothesis:

H0: Changes in investor awareness are significantly influenced by a combination of factors, including reasons for changing investment preferences, investment knowledge, and risk tolerance

Result:

The linear regression analysis was conducted to explore the factors influencing changes in investment awareness, utilizing reasons for changed preferences, investment knowledge, and risk tolerance as predictors. The overall model fit measures indicate that the model is statistically significant ($F(3, 246) = 104.48, p < 0.001$) with an R^2 of 0.709, suggesting that approximately 70.9% of the variance in changes in investment awareness can be explained by the predictors.

The omnibus ANOVA test further supports the significance of the model, with reasons for changed preferences ($F = 104.48, p < 0.001$) and investment knowledge ($F = 11.61, p < 0.001$) significantly contributing to the model's

explanatory power. However, risk tolerance did not reach statistical significance ($F = 1.24, p = 0.266$).

Examining the model coefficients for changes in investment awareness, each predictor's estimate provides insights into their respective impacts. Holding other variables constant, the reasons for changed preferences and investment knowledge are both positively associated with changes in investment awareness. Specifically, for a one-unit increase in reasons for changed preferences, there is a 0.5751 increase in the awareness score ($t = 10.22, p < 0.001$). Similarly, a one-unit increase in investment knowledge corresponds to a 0.2315 increase in awareness ($t = 3.41, p < 0.001$). On the other hand, risk tolerance does not show a statistically significant association with changes in investment awareness.

In conclusion, the results suggest that reasons for changed preferences and investment knowledge significantly contribute to explaining variations in changes in investment awareness. However, risk tolerance does not appear to play a significant role in this context. The hypothesis that reasons for changed preferences, investment knowledge, and risk tolerance collectively influence changes in investment awareness is partially supported, with the exclusion of risk tolerance from the significant predictors.

Linear Regression										
Model Fit Measures										
							Overall Model Test			
Model	R	R ²	Adjusted R ²	AIC	BIC	RMSE	F	df1	df2	p
1	0.842	0.709	0.706	901	918	1.44	200	3	246	<.001

Omnibus ANOVA Test					
	Sum of Squares	df	Mean Square	F	p
Reasons for changed preferences	219.12	1	219.12	104.48	<.001
Investment knowledge	24.35	1	24.35	11.61	<.001

Risk tolerance	2.61	1	2.61	1.24	0.266
Residuals	515.91	246	2.1		
<i>Note.</i> Type 3 sum of squares					

Model Coefficients - Changes in investment awareness						
Predictor	Estimate	SE	95% Confidence Interval		t	p
			Lower	Upper		
Intercept	1.7904	0.4648	0.8749	2.706	3.85	<.001
reasons for changed preferences	0.5751	0.0563	0.4642	0.686	10.22	<.001
Investment knowledge	0.2315	0.0679	0.0977	0.365	3.41	<.001
Risk tolerance	0.0673	0.0603	-0.0516	0.186	1.11	0.266

Independent Samples T-Test				
		Statistic	df	p
Changes in investment awareness	Student's t	2.71	248	0.007
reasons for changed preferences	Student's t	1.41	248	0.161
Investment knowledge	Student's t	2.38	248	0.018
Risk tolerance	Student's t	2.22	248	0.027

Group Descriptive						
	Group	N	Mean	Median	SD	SE
Changes in investment awareness	Female	151	12.6	13	2.03	0.165
	Male	99	11.7	12	3.36	0.338
reasons for changed preferences	Female	151	12	12	2.24	0.182
	Male	99	11.5	12	3.29	0.331
Investment knowledge	Female	151	12.6	13	2.26	0.184
	Male	99	11.8	12	3.46	0.348
Risk tolerance	Female	151	12.5	13	2.13	0.173
	Male	99	11.7	12	3.13	0.314

H0: There is no significant relationship between Changes in investment awareness, reasons for changed preferences, Investment knowledge & Risk tolerance with Gender

Result:

The Independent Samples T-Test was employed to examine potential gender-based differences in changes in investment awareness and its relationship to reasons for changed preferences, investment knowledge, and risk tolerance. The results indicate that there are statistically significant differences in changes in investment awareness ($t = 2.71$, $df = 248$, $p =$

0.007), investment knowledge ($t = 2.38$, $df = 248$, $p = 0.018$), and risk tolerance ($t = 2.22$, $df = 248$, $p = 0.027$) between male and female respondents. However, there was no statistically significant difference in reasons for changed preferences ($t = 1.41$, $df = 248$, $p = 0.161$).

Examining the group descriptive, it is evident that, on average, females tend to have slightly higher mean scores in changes in investment awareness, reasons for changed preferences, investment knowledge, and risk tolerance compared to males.

In conclusion, the results provide evidence to suggest that gender differences may influence changes in investment awareness, investment knowledge, and risk tolerance. However, no significant gender difference was observed in reasons for changed preferences. The hypothesis that there are gender-based variations

in the impact of reasons for changed preferences, investment knowledge, and risk tolerance on changes in investment awareness is supported, highlighting the importance of considering gender-specific factors in understanding individuals' responses to changes in investment-related variables

Independent Samples T-Test				
		Statistic	df	p
Changes in investment awareness	Student's t	2.71	248	0.007
reasons for changed preferences	Student's t	1.41	248	0.161
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	Male	99	11.8	12	3.46	0.348
Risk tolerance	Female	151	12.5	13	2.13	0.173
	Male	99	11.7	12	3.13	0.314

Discussion:

The survey results shed light on significant trends in investment choices amidst and beyond the COVID-19 era, emphasizing the importance of understanding the evolving landscape shaped by generational differences and external factors. The key findings reveal a pronounced shift in investment behavior, influenced by the pandemic, technological advancements, and growing considerations for social and environmental issues.

Investment Trends and Generational Divide: The majority of respondents expressed increased interest in exploring new investment options following the COVID-19 pandemic, leading to a surge in the adoption of emerging asset classes like cryptocurrencies and alternative

investments. This shift signifies a growing willingness among investors to diversify portfolios in response to changing market dynamics. Additionally, the study highlights a generational divide, with varying preferences and attitudes towards risk and investment knowledge. The younger demographic (Under 30 and 31-40) demonstrated a higher inclination towards risk-taking and a self-perceived higher level of investment knowledge compared to older age groups.

Factors Influencing Investment Awareness: The linear regression analysis revealed that reasons for changed preferences and investment knowledge significantly contribute to changes in investment awareness. Economic uncertainty and technological advancements

emerged as pivotal factors influencing shifts in preferences and awareness. However, risk tolerance did not exhibit a statistically significant association, suggesting that other variables play a more substantial role in shaping investors' awareness.

Conclusion:

In conclusion, this study offers valuable insights into the evolving landscape of investment choices, particularly in the aftermath of the COVID-19 pandemic. The data suggests a nuanced interplay of factors, including economic conditions, technological advancements, and generational differences, influencing investors' attitudes and preferences. The study contributes to a more comprehensive understanding of the dynamics shaping the post-pandemic financial landscape.

However, it is crucial to acknowledge the limitations, such as the use of convenience sampling, which may impact the generalizability of the findings. Additionally, the reliance on self-reporting introduces the possibility of bias. Despite these limitations, the study provides a foundational understanding that can guide financial institutions, policymakers, and investment professionals in aligning their services with the evolving preferences of investors.

Recommendations and Future Research:

Recommendations:

- Tailored communication: Adapt messaging to different age groups' preferences and risk tolerance.
- Investment education: Offer accessible resources on emerging asset classes.
- ESG integration: Consider integrating Environmental, Social, and Governance factors into offerings.

Future Research:

- Long-term COVID-19 impact: Longitudinal study to assess pandemic's lasting influence on investment choices.
- Cross-cultural analysis: Explore how investment choices and attitudes vary across different cultures.
- Qualitative exploration: Use interviews or focus groups to understand motivations and decision-making processes.
- Digital transformation: Investigate the role of technology in shaping investment preferences.

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A Critical Study of Green Commerce in Building a Sustainable Economy for Viksit Bharat @ 2047

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Abstract:

India's vision of Viksit Bharat @ 2047 emphasizes sustainable, inclusive, and resilient economic growth. In this context, green commerce—which integrates environmentally responsible practices into trade, business, and commercial activities—has emerged as a crucial driver of sustainable development. Green commerce promotes eco-friendly production, sustainable consumption, efficient resource utilisation, and reduced environmental degradation while supporting economic growth. This research paper examines the role of green commerce in building a sustainable economy aligned with India's long-term development goals. The study focuses on the significance of green business practices, policy support, and market mechanisms in fostering sustainable growth. The paper adopts a descriptive and analytical approach based on secondary data. The findings highlight that green commerce can significantly contribute to environmental protection, employment generation, innovation, and global competitiveness, thereby supporting the realization of Viksit Bharat @ 2047.

Green commerce integrates eco-friendly practices into business operations to foster sustainable economic growth. This paper explores its pivotal role in achieving Viksit Bharat @ 2047, India's vision for a developed nation by 2047, emphasizing reduced emissions, resource efficiency, and inclusive prosperity.

Keywords: Green Commerce, Sustainable Economy, Viksit Bharat @ 2047, Green Growth, Sustainable Development

Introduction:

Sustainable development has become a global priority in response to climate change, environmental degradation, and resource depletion. For a rapidly growing economy like India, balancing economic growth with environmental sustainability is a critical challenge. The national vision of Viksit Bharat @ 2047, which aims to transform India into a developed nation by its centenary year of independence, strongly emphasizes sustainability, innovation, and inclusive growth.

Green commerce refers to commercial activities that adopt environmentally friendly practices across production, distribution, marketing, and consumption. It includes green

supply chains, eco-friendly products, ethical sourcing, sustainable trade, green finance, and digital solutions that reduce carbon footprints. By promoting responsible business behavior, green commerce acts as a bridge between economic development and environmental protection.

In the Indian context, green commerce has gained momentum due to supportive government policies, rising environmental awareness, and global sustainability commitments. This paper explores how green commerce can play a pivotal role in building a sustainable economy and achieving the objectives of Viksit Bharat @ 2047.

Objectives of the Study:

The specific objectives of the study are:

1. To analyze the contribution of green commerce towards achieving the vision of Viksit Bharat @ 2047.
2. To evaluate its alignment with Viksit Bharat pillars like green jobs and resilient growth.
3. To identify challenges and opportunities for scaling green practices by 2047.

Literature Review:

This section discusses various studies and reports related to sustainability and green commerce, with a particular focus on India.

Indian Literature on Sustainability and Green Commerce:

Consumer Preferences: Research by KPMG India (2021) revealed that Indian consumers are becoming more eco-conscious, with 61% of consumers expressing a preference for purchasing sustainable products. This is reflected in the growing demand for organic food, eco-friendly products, and ethical sourcing.

Corporate Sustainability: According to a PwC India (2021) report, Indian companies are focusing on sustainability to attract investment and meet regulatory requirements. Large Indian conglomerates like Tata Group and Reliance Industries have made public commitments to achieving net-zero emissions.

Government Policies: India's government has introduced policies aimed at encouraging sustainable business practices, including the National Action Plan on Climate Change (NAPCC) and the Perform, Achieve and Trade (PAT) scheme. These regulations have forced businesses to adopt greener processes.

Research Methodology:

This study employs a qualitative approach, synthesizing secondary data from

government reports, academic papers, and industry analyses on green initiatives. Key sources include CEEW assessments and policy documents, focusing on value chains in energy, circular economy, and bio-economy.

Research articles, journals, books, and working papers, Reports related to sustainable development and green economy. The collected data has been analyzed using qualitative analysis to draw meaningful interpretations related to green commerce and sustainable economic development.

Importance of the Study:

The study is significant for the following reasons:

1. It highlights the importance of green commerce in achieving long-term economic sustainability.
2. It provides insights for policymakers to design effective green trade and commerce policies.
3. It helps businesses understand the economic advantages of adopting sustainable practices.
4. It contributes to academic literature on green economy and sustainable development in the Indian context.

It aligns commercial development with national goals such as Viksit Bharat @ 2047, climate action, and inclusive growth.

Green commerce can unlock USD 1.1 trillion in market value and 48 million jobs by 2047, reducing import dependencies on fossil fuels and critical minerals. It supports Viksit Bharat by enhancing competitiveness, social equity, and environmental regeneration through consumer-driven demand and policy incentives.

India's green economy spans 36 value chains, from renewables to sustainable tourism, potentially boosting GDP by 27%. Challenges include SME adoption barriers like costs and awareness, but opportunities arise from rising eco-product demand and government subsidies

For India to truly become a developed nation, it must balance growth with sustainability. The effects of climate change-erratic rainfall, heatwaves, floods, and crop losses-are already impacting people's lives. If growth continues at the cost of the environment, we may solve one problem but create ten others.

A green economy ensures that progress is not just for today but for future generations as well. Let's look at some areas where this balance matters most and where women, in particular, can play a crucial role.

Agriculture and Food Security:

Agriculture employs nearly half of India's population and is the backbone of rural livelihoods. However, climate change is making farming more uncertain. For example, unseasonal rains in Maharashtra often destroy onion crops, pushing up prices for consumers and hurting farmers.

Here, green practices like solar-powered irrigation, organic farming, and water-efficient crops can reduce costs and increase resilience. Women farmers, who make up more than 30% of the agricultural workforce, can be key drivers of this change if given access to training, finance, and technology.

Findings of the Study:

The major findings of the study are as follows:

- Green commerce promotes sustainable production and consumption, reducing environmental degradation.
- Adoption of green business practices enhances energy efficiency and optimal resource utilization.
- Green commerce supports innovation, green entrepreneurship, and employment generation.
- Sustainable trade practices improve the global competitiveness of Indian businesses.

- Consumer awareness and demand for eco-friendly products are increasing, strengthening green markets.
- Building a green economy for Viksit Bharat requires collective effort:
- Government policies that promote renewable energy, sustainable farming, and green jobs.
- Private sector investments in clean technologies and inclusive workplaces.
- Community participation, especially from women, is needed to ensure that solutions work on the ground.

Conclusion:

Green commerce forms the backbone of a sustainable economy for Viksit Bharat @ 2047, demanding collaborative policy, business innovation, and consumer shifts. Prioritizing it ensures resilient growth without environmental trade-offs.

Viksit Bharat is not just about tall skyscrapers or fast highways. It is about creating a nation where prosperity is sustainable, opportunities are inclusive, and growth is green. A green economy is the pathway that will help India achieve this dream-an economy that secures food, jobs, housing, and dignity for all, while protecting the planet.

The study concludes that with strong policy support, increased investment, technological innovation, and active participation from businesses and consumers, green commerce can significantly contribute to achieving sustainable development goals. Strengthening green commerce will be a key factor in shaping a prosperous, environmentally responsible, and developed India by 2047.

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Digital Transformation And Linguistic Sustainability In India

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Abstract:

The digital era has transformed the way languages are used, preserved, and disseminated across societies. In a linguistically diverse country like India, where over a thousand languages and dialects coexist, digital technology plays a crucial role in shaping the future of Indian languages. From social opened new avenues for the promotion, preservation, and global visibility of regional and indigenous languages. However, this transformation also presents challenges such as digital inequality, language dominance, and inadequate technological support for lesser-known languages. This article examines the impact of the digital era on Indian languages and explores opportunities and challenges that will determine their future sustainability.

Keywords: *Digital Era, Linguistically, Indigenous, Sustainability, Transformation, Languages.*

Introduction:

Language is not merely a medium of communication; it is a carrier of culture, identity, history, and collective knowledge. India is home to more than a thousand languages and dialects, with 22 languages officially recognized under the Eighth Schedule of the Indian Constitution. For centuries, Indian languages have flourished through oral traditions, literature, education, and regional cultural practices. However, globalization and technological modernization have significantly altered linguistic practices. The digital era, marked by the widespread use of the internet, smartphones, and digital media, has transformed how languages are used, learned, and preserved. As communication increasingly shifts to digital platforms, the survival and relevance of Indian languages depend on their integration into digital spaces.

Objectives of the Study:

1. To analyze the impact of the digital era on the preservation, promotion, and usage of Indian languages.
2. To examine the challenges and future prospects of Indian languages in the context of rapid technological advancement.

Digital Technology as a Tool for Language Promotion:

Digital technology has played a crucial role in expanding the reach and usability of Indian languages. The availability of regional language keyboards, fonts, and Unicode standards has made it easier for users to type and publish content in their native languages. Social media platforms such as Facebook, YouTube, WhatsApp, Instagram, and X (formerly Twitter) have encouraged content creation in Indian languages, ranging from news and entertainment to education and social awareness. Government initiatives such as *Digital India*, *BHASHINI*, and multilingual government portals

aim to make digital services accessible to citizens in their preferred languages. Online learning platforms and e-libraries now offer educational resources in regional languages, promoting inclusivity and reducing language barriers in education.

Role of Artificial Intelligence and Language Technologies:

Artificial intelligence (AI) has emerged as a transformative force in language development. Technologies such as machine translation, speech-to-text, text-to-speech, and voice assistants have enhanced digital accessibility for Indian language speakers. Applications like Google Translate and voice-based assistants now support several Indian languages, enabling communication across linguistic boundaries. These technologies are particularly beneficial for rural populations and individuals with limited literacy, as voice-based systems allow interaction without extensive reading or writing skills. AI-driven language tools also contribute to documentation and preservation by digitizing traditional texts and oral narratives.

Challenges Facing Indian Languages in the Digital Era:

Despite significant technological advancements, multiple challenges continue to impede the full and equitable integration of Indian languages into the digital ecosystem. One of the foremost issues is the overwhelming dominance of the English language in digital content, formal education, and professional communication. This linguistic imbalance often marginalizes regional languages, reducing their functional value in digital spaces and discouraging their use among younger generations who associate English with socio-economic mobility and technological competence.

Another critical challenge is the lack of robust digital infrastructure for many Indian languages. Several languages suffer from inadequate digital resources, including limited linguistic corpora, absence of standardized technical terminologies, insufficient fonts, and poorly developed language-processing tools. These limitations restrict the effective deployment of advanced technologies such as machine translation, speech recognition, and natural language processing for Indian languages, thereby slowing their digital growth.

The persistent digital divide between urban and rural areas further exacerbates linguistic exclusion. Unequal access to reliable internet connectivity, digital devices, and technological literacy limits rural populations' participation in online platforms, where language use and content creation increasingly occur. As a result, many speakers of regional languages remain underrepresented in digital discourse.

Tribal and minority languages are particularly vulnerable in this digital transition. Due to minimal online presence, lack of institutional support, and limited documentation, these languages face reduced intergenerational transmission. Younger speakers often shift toward dominant languages for digital engagement, accelerating language endangerment and increasing the risk of extinction. Without targeted digital preservation efforts, many indigenous languages may disappear from both digital and cultural landscapes.

Cultural Identity and Youth Engagement:

The digital era has significantly influenced youth language preferences and usage patterns. While young users actively engage with digital platforms, there is a growing tendency to prioritize global languages over native ones. However, digital media also offers opportunities to reconnect youth with their linguistic heritage

through podcasts, short videos, blogs, and online storytelling in Indian languages. Encouraging creative digital expression in regional languages can strengthen cultural identity and foster pride among younger generations.

Future Prospects and Policy Implications:

The future of Indian languages in the digital era is closely linked to sustained policy support, continuous technological innovation, and active community participation. Effective governmental policies are essential to create an enabling environment for the development and promotion of regional and minority languages in digital spaces. Governments and educational institutions must prioritize investments in language technology research, including the development of digital corpora, machine translation systems, speech recognition tools, and standardized terminologies for Indian languages. Equally important is the implementation of digital literacy programs in regional languages to ensure that citizens can access, use, and contribute to digital platforms in their mother tongues.

Collaboration among technology companies, linguists, academic institutions, and local communities is crucial for building inclusive and culturally sensitive digital tools. Such partnerships can ensure that technological solutions accurately reflect linguistic nuances, dialectal variations, and cultural contexts. Community involvement plays a vital role in content creation, documentation, and validation, thereby strengthening ownership and long-term sustainability of language initiatives.

Furthermore, promoting multilingualism in education, administration, and digital governance is key to preserving linguistic diversity in a globalized world. Integrating Indian languages into school curricula, higher education, public services, and e-governance platforms can enhance accessibility and democratic

participation. By fostering a balanced coexistence of Indian and global languages, the digital ecosystem can support linguistic equity while enabling innovation and national integration.

Conclusion

The digital era represents a defining moment for the future of Indian languages. While technology offers unprecedented opportunities for preservation, promotion, and global outreach, it also poses challenges that require conscious and inclusive strategies. By integrating Indian languages into digital innovation and fostering linguistic diversity, India can protect its rich cultural heritage while embracing modernity. The survival and growth of Indian languages in the digital age depend on collective efforts to balance technological advancement with cultural responsibility.

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Impact Of Literature In The Construction And Transmission Of Human Values

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Abstract:

Literature has historically functioned as a vital medium for the articulation, preservation, and transmission of human values across generations. Beyond its aesthetic and imaginative dimensions, literature plays a formative role in shaping moral consciousness, ethical reasoning, and social responsibility. Through narrative structures, symbolic representations, and character-driven ethical conflicts, literary texts engage readers in reflective processes that foster empathy, tolerance, justice, and compassion. In an era marked by rapid technological advancement, cultural fragmentation, and ethical uncertainty, literature remains a critical humanizing force. This article critically examines the role of literature in constructing human values, emphasizing its relevance in moral education, social cohesion, and the development of ethically informed individuals in contemporary society.

Keywords: Literature, Articulation, Transmission, Fragmentation, Aesthetic, Contemporary

Introduction:

Human values constitute the ethical foundation upon which societies are built and sustained. Values such as integrity, empathy, respect for diversity, social justice, and responsibility guide individual behavior and collective life. Literature, as a cultural and intellectual artifact, has long been instrumental in shaping these values by offering nuanced representations of human experience. Unlike didactic moral instruction, literature engages readers through imagination, emotion, and critical reflection, enabling a deeper internalization of ethical principles.

From classical epics and religious narratives to modern and postmodern literary texts, literature has continually interrogated moral norms, questioned power structures, and explored the ethical dimensions of human existence. At the doctoral level of inquiry, literature is best understood not merely as a reflection of values

but as an active agent in constructing moral consciousness and shaping societal ethics.

Objectives of the Study:

1. To critically examine the role of literature in the construction and transmission of human values.
2. To analyze the significance of literary discourse in moral education and the ethical development of society.

Literature as an Ethical and Cultural Discourse:

Literature functions as a powerful ethical discourse that continually negotiates the complex relationship between individual morality and socially constructed values. Rather than offering fixed moral prescriptions, literary texts explore ethical uncertainty by presenting multifaceted characters and morally ambiguous situations that resist simplistic or binary judgments. Through

encounters with such narrative complexities, readers are compelled to engage in ethical reasoning, reflection, and evaluation, thereby actively participating in moral inquiry. This engagement nurtures what may be termed *moral imagination*—the capacity to empathize with others, to perceive ethical dilemmas from multiple perspectives, and to respond thoughtfully to moral challenges encountered in real-life contexts.

Both canonical and regional literatures act as repositories of cultural values, preserving collective memory, ethical traditions, and historical consciousness. These texts transmit shared moral frameworks across generations, reinforcing cultural continuity and social identity. At the same time, literature performs a critical and transformative function by interrogating dominant ideologies and exposing structures of injustice, inequality, and moral contradiction embedded within society. By giving voice to marginalized experiences and questioning entrenched power relations, literary works challenge oppressive norms and stimulate ethical debate.

This dual function of literature—as both a preserver of moral heritage and a critical instrument of social examination—positions it as a dynamic force in the ongoing evolution of human values. Through its capacity to sustain ethical traditions while simultaneously fostering moral critique and renewal, literature remains an essential medium for ethical reflection and social transformation in changing historical and cultural contexts.

Development of Empathy and Moral Sensibility:

One of the most profound impacts of literature lies in its capacity to cultivate empathy. By allowing readers to inhabit the emotional and psychological worlds of diverse characters,

literature expands moral perception and sensitivity. This empathetic engagement enables readers to recognize the dignity, suffering, and agency of others, fostering values of compassion and inclusivity.

Narrative fiction, poetry, and drama facilitate emotional identification and ethical reflection, encouraging readers to confront perspectives different from their own. Such encounters are particularly significant in multicultural societies, where understanding and tolerance are essential for social harmony.

Literature and Moral Education:

Literature has historically occupied a central position in moral education across civilizations, functioning as a powerful medium for the transmission of ethical values, social norms, and collective wisdom. Literary forms such as epics, myths, folktales, parables, and philosophical narratives have served not only as cultural artifacts but also as moral frameworks through which societies articulate ideals of duty, justice, compassion, and social responsibility. These narratives encode ethical principles within engaging stories and symbolic structures, enabling individuals to internalize moral values through imagination and emotional involvement rather than through rigid instruction.

In the Indian context, literary traditions have played a particularly significant role in shaping moral consciousness and ethical conduct. Classical texts such as the *Ramayana* and *Mahabharata* present complex moral dilemmas that explore concepts of *dharma*, duty, sacrifice, and righteousness, encouraging readers to engage in ethical reasoning rather than passive moral acceptance. The *Panchatantra* employs allegorical storytelling to impart practical wisdom, ethical discernment, and social intelligence, while Bhakti literature emphasizes values of devotion, humility, equality, and

compassion, challenging rigid social hierarchies and promoting inclusive moral visions. Collectively, these literary traditions have profoundly influenced individual behavior and societal ethics over centuries.

In contemporary educational contexts, literature continues to play a critical role in value-based learning, albeit within more pluralistic and secular frameworks. Unlike prescriptive moral instruction, which often relies on fixed codes of conduct, literary education fosters critical thinking, ethical dialogue, and reflective judgment. Through close reading, interpretive analysis, and dialogic engagement with texts, learners are encouraged to question moral assumptions, evaluate ethical complexities, and develop nuanced perspectives on human behavior. This process enables the development of moral autonomy, ethical sensitivity, and civic responsibility—qualities that are essential for responsible citizenship in democratic and multicultural societies.

Literature as a Catalyst for Social Ethics and Reform;

Literature has often functioned as a catalyst for social transformation by questioning dominant ideologies and advocating ethical reform. Writers across historical periods have used literature to address issues such as social injustice, gender inequality, caste discrimination, and human rights violations. By articulating marginalized voices and alternative moral visions, literature contributes to the evolution of social ethics.

In this sense, literature not only reflects existing values but actively participates in redefining them. It encourages readers to critically examine moral assumptions and engage with broader questions of justice, power, and responsibility.

Contemporary Relevance in a Digital and Globalized World:

In the contemporary digital age, characterized by rapid information exchange and ethical disorientation, literature retains its relevance as a space for deep moral reflection. While digital media often prioritizes speed and immediacy, literature encourages sustained engagement, introspection, and ethical contemplation.

Integrating literature with modern pedagogical and digital platforms can enhance its reach and impact. Promoting literary engagement among younger generations is essential for sustaining human values in an increasingly mechanized and fragmented world.

Conclusion:

Literature occupies a central position in the construction, transmission, and transformation of human values. Through its engagement with ethical dilemmas, emotional experiences, and social realities, literature nurtures empathy, moral reasoning, and social responsibility. At a time when ethical challenges are increasingly complex, literature remains a vital intellectual and cultural resource for fostering humane and ethically grounded societies. Sustained engagement with literary texts is therefore essential for the development of morally conscious individuals and socially responsible communities.

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Challenges In Ethical Global Communication Among Generation Alpha

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Abstract:

Generation Alpha, born from 2010 onwards, is the first generation to grow up fully immersed in a globally connected digital environment. While this exposure offers unprecedented opportunities for learning, social interaction, and cross-cultural engagement, it also presents significant ethical challenges. This paper explores the obstacles faced by Generation Alpha in practicing ethical global communication, including misinformation, cyberbullying, digital privacy risks, cultural misinterpretation, and excessive digital dependency. The study highlights the importance of ethical digital literacy, parental guidance, and structured education in mitigating these challenges. The findings suggest that while Generation Alpha demonstrates ethical potential, the complex digital landscape necessitates proactive interventions to ensure responsible, respectful, and culturally sensitive communication.

Keywords: *Generation Alpha, Ethical Communication, Global Communication, Digital Ethics, Cyberbullying, Privacy*

Introduction:

Global communication has evolved rapidly with digital technology, social media, and interactive online platforms. Generation Alpha, born after 2010, is the first cohort to experience a fully digital and interconnected world from birth. Their interactions are mediated primarily through online platforms, allowing engagement with peers and content across borders.

However, the digital environment also introduces ethical challenges that may hinder responsible communication. These challenges are particularly relevant for Generation Alpha, who are still developing critical thinking, social awareness, and decision-making skills. Understanding these challenges is essential for fostering ethical behavior in a generation that will shape future global communication norms.

Key Challenges in Ethical Global Communication Among Generation Alpha:

Generation Alpha faces numerous ethical challenges in global communication, primarily due to their early and constant immersion in digital technologies and online platforms. One of the most critical issues is the **rapid spread of misinformation and unverified content**. Digital platforms often allow information to circulate widely without verification, making young users susceptible to believing and sharing inaccurate or misleading content. Such exposure can undermine trust, compromise the integrity of information, and create ethical dilemmas as children may unknowingly contribute to the dissemination of false narratives in global communication networks.

In addition, **cyberbullying and online harassment** have emerged as significant challenges for this generation. Social media, online games, and messaging applications, while offering connectivity, also expose Generation

Alpha to negative interactions that can affect their emotional well-being and moral development. Being both potential victims and unintentional participants in online aggression, they face complex ethical decisions regarding respectful and responsible engagement. These experiences can hinder the development of empathy and ethical awareness in digital communication.

Another pressing concern is **privacy risks and data exploitation**. Digital platforms frequently collect large volumes of personal information, and Generation Alpha may lack the necessary understanding to protect their data or that of others. Inadequate awareness about privacy, consent, and data sharing not only exposes them to potential security breaches but also raises ethical questions about responsible communication and respect for others' personal information in global digital interactions.

Cultural misinterpretation further complicates ethical communication for this generation. Interactions with peers and content from diverse cultural backgrounds require sensitivity to differing norms, values, and practices. Without proper guidance, young users may inadvertently communicate in ways that are insensitive or disrespectful, potentially reinforcing stereotypes or fostering misunderstandings across global communities.

Moreover, **digital overexposure and dependency** can impact Generation Alpha's social and ethical development. Excessive screen time and constant online engagement may reduce face-to-face communication skills, empathy, and reflective thinking, leading to impulsive digital behavior and diminished awareness of the ethical implications of their actions. Closely linked to this is a **lack of critical thinking skills**, as children are still developing the cognitive ability to evaluate information critically, anticipate consequences, and make morally sound decisions in global communication contexts.

Collectively, these challenges underscore the importance of structured interventions. Initiatives such as ethical digital literacy programs, active parental guidance, platform accountability measures, and intercultural awareness training are essential to equip Generation Alpha with the knowledge, skills, and values required for responsible and ethically sound engagement in global digital environments. By addressing these challenges proactively, society can ensure that Generation Alpha grows into a generation capable of ethical, respectful, and culturally sensitive global communication.

Addressing the Challenges:

To ensure that Generation Alpha develops the knowledge and skills necessary for ethical global communication, proactive strategies and structured interventions are essential. One of the most important measures is **ethical digital literacy education**, which involves teaching children how to critically evaluate online content, distinguish between credible and false information, and understand the ethical implications of their digital interactions. This education also emphasizes the importance of privacy, helping children learn how to protect their own personal information and respect the privacy of others while participating in global communication networks. **Parental guidance** plays a complementary role, as active involvement from parents provides ongoing supervision, mentorship, and modeling of responsible online behavior. By setting clear expectations and demonstrating ethical digital conduct, parents can reinforce lessons learned in formal education and help children navigate complex online environments safely.

In addition, **platform accountability** is critical in creating a secure and ethically responsible digital environment. Social media platforms, online games, and other digital

services must implement effective safeguards to prevent cyberbullying, harassment, misinformation, and misuse of personal data. Features such as content moderation, reporting mechanisms, and privacy controls not only protect children but also encourage ethical participation in global communication. Finally, **intercultural awareness programs** are necessary to enhance understanding and respect for cultural diversity. By teaching children to recognize and appreciate differences in norms, values, and practices across cultures, these programs foster empathy, reduce the likelihood of miscommunication, and promote ethical behavior in international interactions. Collectively, these interventions—ethical digital literacy, parental guidance, platform accountability, and intercultural awareness—create a comprehensive framework that equips Generation Alpha to become ethically aware, socially responsible, empathetic, and culturally sensitive global communicators.

Conclusion:

Generation Alpha represents a digitally native generation with unprecedented access to global communication networks. Their ethical values—centered on respect, authenticity, responsibility, privacy awareness, and social responsibility—shape their interactions across digital platforms. However, challenges such as misinformation, cyberbullying, privacy concerns, cultural misinterpretation, and overexposure threaten ethical engagement. Early education in ethical digital literacy, parental guidance, platform accountability, and intercultural awareness is essential to foster responsible communication practices. By addressing these challenges proactively, Generation Alpha can evolve into a generation capable of ethical, respectful, and globally conscious digital communication.

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Sustainable Nutrient Recycling through Non-Leguminous Weed Manures: Residual Effects on Growth of *Lablab purpureus* L

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Abstract:

Sustainable nutrient recycling using locally available bioresources is a key component of green technology and climate-resilient agriculture. Non-leguminous weeds, generally regarded as agricultural waste, can be effectively utilized as organic manures to enhance soil fertility and crop performance.

*The present study evaluates the residual effects of non-leguminous weed manures on the growth of *Lablab purpureus* L., an important pulse and fodder crop. Weed biomass was incorporated into the soil prior to sowing, and growth parameters including plant height, number of leaves, leaf area, and fresh and dry biomass were recorded during the cropping period.*

*The results revealed that residual application of weed manures significantly improved vegetative growth and biomass accumulation of *Lablab purpureus* compared to untreated control plots. Improved soil organic matter and sustained nutrient availability due to gradual decomposition of weed biomass were found to be responsible for enhanced crop growth in the succeeding crop.*

The findings highlight the potential of non-leguminous weed manures as an eco-friendly nutrient management strategy that promotes sustainable agriculture, reduces reliance on synthetic fertilizers, and contributes to climate resilience

Keywords: *Non-Leguminous Weed Manures; Sustainable Nutrient Recycling; *Lablab Purpureus* L.; Residual Effect; Organic Farming; Green Technology; Climate Resilience.*

Introduction:

Sustainable agriculture has emerged as a crucial approach to address the challenges of declining soil fertility, environmental degradation, and climate variability. Excessive dependence on chemical fertilizers has led to nutrient imbalance, loss of soil organic matter, and adverse ecological effects. In this context, the utilization of organic resources for nutrient management is gaining importance as an eco-friendly and climate-resilient strategy. Recycling of locally available biomass, particularly weeds, offers a sustainable solution for maintaining soil health and crop productivity.

Non-leguminous weeds, though commonly regarded as undesirable plants, constitute a substantial amount of nutrient-rich biomass in agricultural ecosystems. When used as green or organic manures, these weeds contribute essential macro- and micronutrients, improve soil structure, enhance microbial activity, and increase organic carbon content. Their gradual decomposition in soil ensures sustained nutrient release, thereby exerting beneficial residual effects on succeeding crops. Utilizing weed biomass as manure also aligns with green technology by reducing external inputs and promoting renewable nutrient cycling.

Lablab purpureus L. is an important leguminous crop cultivated for pulses, fodder, and

soil improvement. Its growth and productivity are highly influenced by soil nutrient status and organic matter availability. While several studies have emphasized the immediate benefits of organic manures, limited information is available on the residual effects of non-leguminous weed manures on subsequent crops. Understanding these residual impacts is essential for developing sustainable nutrient management practices.

Therefore, the present study aims to evaluate the residual effects of non-leguminous weed manures on the growth performance of *Lablab purpureus* L. The findings are expected to contribute to sustainable nutrient recycling, reduction of chemical fertilizer use, and enhancement of climate-resilient agricultural systems.

Materials and Methods:

Experimental Design: The field experiment was conducted in a randomized block design (RBD) with Ten treatments replicated three times. Treatments included residue of two non-leguminous weed manures with two Recommended Chemical Fertilizer and one untreated control.

Treatments, Manuring Process:

- T1: Control (no manure/fertilizer)
- T2: Recommended Chemical Fertilizer (NPK)
- T3: Recommended Chemical Fertilizer (PK)
- T4: Parthenium hysterophorus Compost Manure (P.Co.)
- T5: Parthenium hysterophorus Dry Manure (P.DM.)
- T6: Parthenium hysterophorus Green Manure (P.GM.)
- T7: *Achyranthes aspera* Compost Manure (A.Co.)
- T8: *Achyranthes aspera* Dry Manure (A.DM.)
- T9: *Achyranthes aspera* Green Manure (A.GM.)
- T10: Parthenium & *Achyranthes* Green Manure (P.&A.GM.)

The present work depends on the basis of the previous work of the Field and laboratory. First maize crop was harvested and after 41 days of interval, the *Lablab purpureus* L. was sown to bed the previous residual effect of organic manure plots as mentioned above in an alternate row manner. Varieties *Lablab purpureus* L were produced by a recognized company marketed by Patel Seeds Corporation, old Mandi P.O. Padra (Baroda, Gujrat). *Vigna unguiculata* and *Lablab purpureus* were sown at the rate of 40 kg/ha each.

Plant Sampling:

After 27 days of age during the early hours of the day crop *Lablab Purpureus* L. growth and Chlorophyll analysis of green leaf of *Lablab Purpureus* L per plot was recorded on the field itself [100 gm plot⁻¹] samples of each treatment along with control they were oven dried at 90 ° C for 2 Days till it gives constant weight for the determination of dry matter (DM), this dried sample was grinded to fine powder and stored in sealed polythene bags for further analysis.

Results & Discussion:

Analyses of Growth [Fig.1]: - The plant *Lablab purpureus* maximum height recorded in the plant of *Achyranthes* green manure as 53cm followed by *Achyranthes* compost manure 48cm, 45cm on NPK, 44.33cm on PK, 44.00cm on *Parthenium* green manure, *Parthenium* and *Achyranthes* green manure and *Parthenium* compost manure as 41.67 cm., for *Parthenium* dry manure as 35cm and lowest in control 25cm.

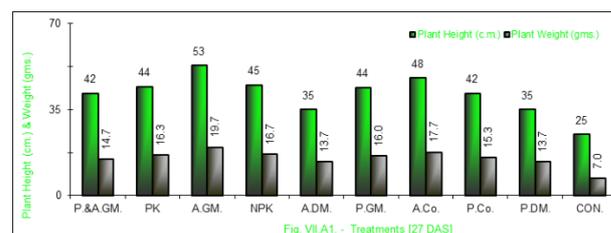


Fig.1. *Lablab purpureus* L. Plant Height (cm.) & Weight (gms.)

Total fresh plant weight in gms per plant at *Lablab purpureus* was highest in the treatments of the *Achyranthes* green manure as 19.67gm followed of *Achyranthes* compost manure as 17.67gm and the lowest Total fresh plant weight in gms per plant *Lablab purpureus* was in Control as 7gm followed of dry manure *Parthenium* as 13.67gm. then on dry manure *Achyranthes* and *Parthenium* as 14.7gm.

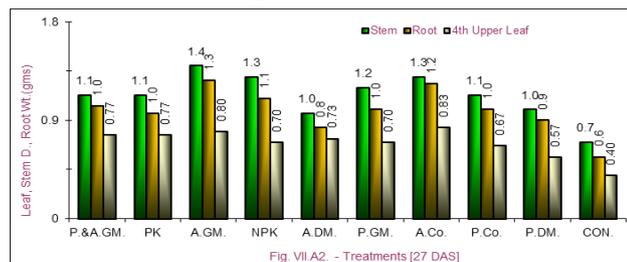


Fig.2. *Lablab purpureus* L. Plant Leaf, Stem D., Root Wt.(gms)

[Fig.2]: - Maximum *Lablab purpureus* plant Stem diameter was shown in *Achyranthes* Green manure as 1.4cm, followed by *Achyranthes* compost manure & NPK as 1.3cm, and minimum Stem diameter shown on Control as 0.7cm followed by *Parthenium* dry manure, & in *Achyranthes* dry manure as 1.0cm.

Lablab purpureus plant root weight shows maximum in the treatment of *Achyranthes* Green Manure as 1.3gm. then in the treatment of *Achyranthes* compost Manure as 1.2gm., followed by NPK as 1.1gm. And minimum *Lablab purpureus* plant root weight was in Control as 0.6gm., followed by the treatments of *Achyranthes* dry Manure as 0.8gm. then in the treatment of *Parthenium* dry manure as 0.9gm.

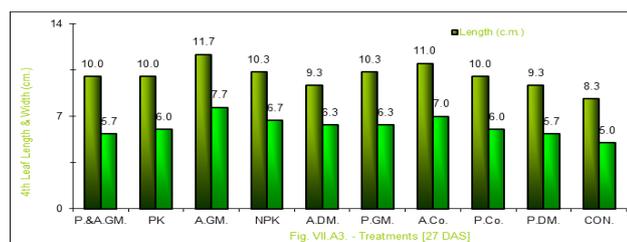


Fig.3. *Lablab purpureus* L. Plant 4th Leaf Length & Width (cm.)

[Fig.3]: - *Lablab purpureus* plant 4th upper leaf length shows maximum in *Achyranthes* green manure as 11.7cm, then in *Achyranthes* compost manure as 11.0cm., and minimum *Lablab purpureus* plant 4th upper leaf length was in Control as 8.3cm followed by *Achyranthes* dry Manure & *Parthenium* dry Manure as 9.3cm. *Lablab purpureus* plant 4th upper leaf width shows maximum in the treatment of *Achyranthes* green Manure 7.7cm, followed by the treatment of *Achyranthes* compost manure as 7.0cm, and minimum maize plant 4th upper leaf width was in the treatment Control, PK, & *Parthenium* compost manure as 6.0cm followed by treatment NPK, *Parthenium* dry manure & *Parthenium* and *Achyranthes* green manure as 6.7cm.

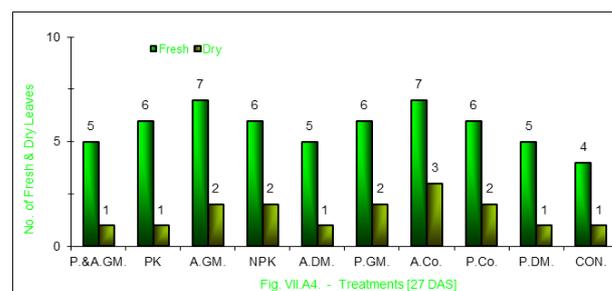


Fig.4. *Lablab purpureus* L. Plant No. of Fresh & Dry Leaves

[Fig.4]: - *Lablab purpureus* plant number of fresh leaves shows maximum in treatment *Achyranthes* green manure & *Achyranthes* compost manure as 7N., and minimum *Lablab purpureus* plant number of fresh leaves was in Control as 4N. followed by *Parthenium* compost Manure as 5N., as well as *Lablab purpureus* plant number of dry leaves shows maximum in treatment *Achyranthes* compost manure as 3N., and minimum *Lablab purpureus* plant number of dry leaves was in treatment Control, PK, *Achyranthes* dry manure, & *Parthenium* dry Manure, *Parthenium* & *Achyranthes* green manure as 1N.

Conclusion:

The study concludes that incorporation of non-leguminous weed manures is an effective strategy for enhancing crop growth, maintaining soil sustainability, and achieving climate-resilient agriculture. Adoption of this practice can benefit resource-poor farmers while supporting environmentally sustainable agricultural development.

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Comparative Study of Financial Performance of District Central Co-operative Banks (DCCBs) in Marathwada and Western Maharashtra

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Abstract:

District Central Co-operative Banks (DCCBs) occupy a central position in India's cooperative credit framework by acting as a financial intermediary between Primary Agricultural Credit Societies (PACS) and State Cooperative Banks (SCBs). They play a crucial role in promoting agricultural development, financial inclusion, and rural entrepreneurship. However, the financial performance of DCCBs differs significantly across regions due to variations in agro-climatic conditions, economic development, governance standards, and institutional efficiency. The present study undertakes a comparative analysis of the financial performance of DCCBs operating in Marathwada and Western Maharashtra.

The study is based on secondary data collected from annual reports of selected DCCBs, publications of the Reserve Bank of India (RBI), and reports of the National Bank for Agriculture and Rural Development (NABARD) over a period of five years from 2019–20 to 2023–24. Ratio analysis and the CAMELS framework are used to evaluate key dimensions such as capital adequacy, asset quality, management efficiency, earnings, liquidity, and sensitivity to risk. Financial indicators including Return on Assets (ROA), Return on Equity (ROE), Net Non-Performing Assets (Net NPA), and Credit–Deposit Ratio are analyzed in detail.

The findings reveal significant regional disparities in the financial performance of DCCBs. Banks in Western Maharashtra demonstrate relatively stronger profitability, better asset quality, and higher managerial efficiency compared to their counterparts in Marathwada. The study highlights the influence of regional economic conditions, climatic factors, and institutional strength on the financial health of cooperative banks. The paper concludes with policy-oriented suggestions aimed at improving operational efficiency, loan recovery mechanisms, and long-term sustainability of DCCBs, particularly in economically backward regions.

Keywords: District Central Co-operative Banks, Financial Performance, Cooperative Banking, Marathwada, Western Maharashtra, CAMELS Framework

Introduction:

The cooperative banking system has been a cornerstone of India's rural financial architecture since the early twentieth century. Established with the objective of providing affordable institutional credit to farmers, artisans, and small entrepreneurs, cooperative banks have played a vital role in fostering inclusive economic

development. Unlike commercial banks, cooperative banks operate on principles of mutual aid, democratic control, and service to members, making them particularly relevant in rural and semi-urban areas.

Within the three-tier cooperative credit structure, District Central Co-operative Banks (DCCBs) occupy a strategic position. They

function as an intermediary between Primary Agricultural Credit Societies (PACS) at the grassroots level and State Cooperative Banks (SCBs) at the apex level. DCCBs mobilize deposits from rural and semi-urban areas and channel credit to PACS, thereby supporting agricultural operations, allied activities, small-scale industries, and rural livelihoods.

Maharashtra has one of the most extensive and historically significant cooperative movements in India. The state's cooperative banking network has contributed substantially to agricultural modernization, rural infrastructure development, and socio-economic upliftment. However, the performance of DCCBs across Maharashtra is not uniform. Regional disparities in economic development, agricultural productivity, irrigation facilities, and institutional capacity have resulted in uneven financial performance among DCCBs.

The Marathwada region has been persistently affected by recurrent droughts, erratic rainfall, agrarian distress, and low levels of industrialization. These factors have adversely impacted farm incomes, loan repayment capacity, and asset quality of cooperative banks. In contrast, Western Maharashtra benefits from relatively better irrigation infrastructure, diversified cropping patterns, higher levels of industrialization, and stronger cooperative institutions. As a result, DCCBs in Western Maharashtra are often perceived to be financially stronger and more resilient.

In recent years, cooperative banks have faced several challenges, including rising non-performing assets, declining profitability, governance issues, technological gaps, and increased regulatory scrutiny. These challenges raise serious concerns regarding the sustainability and efficiency of DCCBs, particularly in economically backward regions. Against this backdrop, a comparative analysis of the financial

performance of DCCBs in Marathwada and Western Maharashtra becomes essential to understand regional disparities and to formulate appropriate policy interventions.

Review of Literature:

A substantial body of literature exists on the performance and challenges of cooperative banks in India. Basu (2005) highlights structural weaknesses such as political interference, inadequate professional management, and weak governance as major constraints affecting the efficiency of cooperative banks. According to Basu, strengthening institutional governance and enhancing managerial autonomy are critical for improving financial performance.

Patil and Chavan examine the financial performance of DCCBs in Maharashtra and observe a declining trend in profitability, primarily due to rising non-performing assets and poor loan recovery mechanisms. Their study emphasizes the need for stricter credit appraisal and effective recovery strategies. Agale and Madan identify capital adequacy and asset quality as persistent challenges for DCCBs, pointing out that many banks struggle to maintain regulatory capital requirements.

Deshmukh and Gopne focus on the financial management of DCCBs in the Marathwada region and highlight the adverse impact of drought conditions, loan waiver schemes, and agrarian distress on the financial health of cooperative banks. Their findings suggest that external economic and climatic factors significantly influence the performance of DCCBs.

Reports published by NABARD stress the importance of technological adoption, professional management, and diversification of lending portfolios to enhance the efficiency and sustainability of cooperative banks. Similarly, RBI reports consistently indicate that DCCBs in

Western Maharashtra maintain lower levels of non-performing assets and higher profitability compared to other regions of the state.

The review of literature reveals that while several studies have examined the performance of cooperative banks at the state or regional level, comparative studies using standardized analytical frameworks such as CAMELS are relatively limited. This research gap provides a strong justification for the present study.

Objectives of the Study:

The specific objectives of the study are:

1. To analyze the financial performance of selected District Central Co-operative Banks in Marathwada and Western Maharashtra.
2. To compare profitability, asset quality, liquidity, and managerial efficiency of DCCBs across the two regions.
3. To identify key economic, institutional, and managerial factors responsible for regional differences in financial performance.
4. To suggest policy measures for improving the financial health and long-term sustainability of DCCBs.

Hypotheses of the Study:

1. There is a significant difference in the overall financial performance of DCCBs in Marathwada and Western Maharashtra.
2. There is a significant difference in the asset quality of DCCBs between the two regions.
3. Regional economic conditions, management practices, and credit risk significantly influence the financial performance of DCCBs.

Research Methodology:

The present study is analytical and comparative in nature and is based entirely on secondary data. Data have been collected from the annual reports of selected District Central Co-

operative Banks, publications of the Reserve Bank of India, and reports published by NABARD. The study covers a period of five years from 2019–20 to 2023–24.

Selected DCCBs from Marathwada and Western Maharashtra constitute the sample for analysis. The selection is based on data availability and representativeness. Ratio analysis and the CAMELS framework are employed as the principal analytical tools to evaluate financial performance. Key financial ratios such as Return on Assets, Return on Equity, Net Non-Performing Assets, Credit–Deposit Ratio, and Liquidity Ratios are used to assess various dimensions of bank performance.

Analysis and Interpretation:

The comparative analysis reveals that DCCBs in Western Maharashtra consistently exhibit higher profitability ratios, including Return on Assets and Return on Equity. These banks benefit from better credit recovery mechanisms, diversified loan portfolios, and relatively stable agricultural incomes. Stronger cooperative institutions and better governance practices further contribute to their superior performance.

In contrast, DCCBs in Marathwada record lower profitability due to high levels of non-performing assets and weak recovery performance. Recurrent droughts, agrarian distress, and loan waiver schemes adversely affect borrowers' repayment capacity, leading to deterioration in asset quality.

Asset quality analysis indicates that Net NPA ratios are significantly higher in Marathwada compared to Western Maharashtra. This reflects the region's vulnerability to climatic shocks and economic instability. Liquidity positions in both regions are generally satisfactory, indicating adequate short-term solvency. However, managerial efficiency and

earnings quality are relatively stronger in Western Maharashtra, suggesting better operational practices and institutional strength.

Findings of the Study:

- DCCBs in Western Maharashtra demonstrate superior overall financial performance.
- High non-performing assets adversely affect profitability of DCCBs in Marathwada.
- Regional economic and climatic conditions play a significant role in determining financial outcomes.
- Asset quality emerges as the weakest component of the CAMELS framework for Marathwada DCCBs.
- Better governance and management practices contribute to stronger performance in Western Maharashtra.

Conclusion:

The study concludes that significant regional disparities exist in the financial performance of District Central Co-operative Banks in Maharashtra. While DCCBs in Western Maharashtra exhibit relatively stronger financial health, those operating in Marathwada face persistent structural, economic, and climatic challenges. Addressing these challenges requires a combination of institutional reforms, policy support, and region-specific strategies. Strengthening governance, improving asset quality, and enhancing operational efficiency are essential for ensuring the long-term sustainability of cooperative banks and achieving balanced regional development.

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English in the Age of Digital Transformation: Challenges and Opportunities

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Abstract:

The rapid advancement of digital technology has significantly transformed the nature, use, and dissemination of the English language across the globe. From social media platforms and artificial intelligence to online education and digital communication tools, English today exists in a dynamic and evolving digital ecosystem. This paper examines how digital transformation has reshaped English language practices, focusing on both the challenges and opportunities that arise in this process. While digitalization has enhanced accessibility, global connectivity, and innovative language learning methods, it has also introduced concerns related to linguistic degradation, digital divide, ethical use of technology, and changing norms of grammar and communication. By analyzing contemporary trends in digital discourse, education, and global communication, this paper argues that the future of English depends on a balanced integration of technological innovation and linguistic responsibility. The study highlights the need for adaptive pedagogy, critical digital literacy, and ethical engagement to ensure that English continues to thrive as a global language in the digital age.

Keywords: Digital Transformation, English Language, Technology, Artificial Intelligence, Digital Communication, Language Education

Introduction:

The twenty-first century is often described as the era of digital transformation, characterized by unprecedented advancements in information and communication technologies. Digital platforms, mobile applications, artificial intelligence (AI), and the internet have reshaped almost every aspect of human life, including language. Among all global languages, English has been most profoundly influenced by this transformation due to its dominant role in international communication, education, science, business, and digital media.

English today is no longer confined to traditional print-based forms such as books, newspapers, or academic journals. Instead, it thrives in digital environments such as social media posts, blogs, emails, online classrooms, video conferences, and AI-generated texts. This

shift has led to new modes of expression, altered linguistic norms, and expanded the functional scope of the language. At the same time, it has raised critical questions regarding language standards, identity, equity, and pedagogy.

This research paper explores the impact of digital transformation on the English language by examining the major challenges and opportunities emerging from digitalization. It seeks to understand how technology influences linguistic structure, communication practices, and English language education, while also reflecting on the responsibilities of educators, learners, and policymakers in this evolving context.

Digital Transformation and Language Change:

Language is inherently dynamic, constantly evolving in response to social, cultural,

and technological changes. The digital revolution has accelerated this process by creating new spaces for communication and interaction. Digital platforms encourage speed, brevity, and informality, leading to noticeable changes in vocabulary, syntax, and discourse patterns.

Abbreviations, acronyms, emoji's, hashtags, and internet slang have become integral components of digital English. Expressions such as *LOL*, *BTW*, *DM*, and *hashtag activism* reflect how technology-driven communication shapes linguistic creativity. While critics argue that these trends weaken grammatical accuracy, linguists often view them as natural linguistic adaptations to new communicative needs.

Moreover, multimodality has become a defining feature of digital language use. Communication now combines text, audio, images, and video, allowing English to function beyond purely verbal forms. This multimodal nature enhances expressive potential but also demands new literacy skills from users.

Role of Artificial Intelligence in English Language Use:

Artificial intelligence plays a crucial role in shaping contemporary English. Technologies such as chatbots, virtual assistants, machine translation, speech recognition, and text-generation tools have transformed how English is produced and consumed. AI-powered platforms assist users in writing emails, correcting grammar, translating texts, and learning pronunciation.

From an opportunity perspective, AI enhances efficiency, accessibility, and personalization. Language learners benefit from instant feedback, adaptive learning systems, and exposure to authentic language use. AI tools also support individuals with disabilities, enabling inclusive communication.

However, the growing reliance on AI raises serious concerns. Overdependence on automated tools may weaken critical thinking and original language production. Additionally, AI systems often reflect biases present in their training data, potentially reinforcing linguistic inequality or cultural stereotypes. Ethical considerations related to authorship, plagiarism, and authenticity further complicate the role of AI in English language use.

Digital Media and Globalization of English:

Digital transformation has intensified the globalization of English. Social media platforms such as Facebook, X (Twitter), Instagram, YouTube, and blogs allow users from diverse linguistic backgrounds to interact in English. As a result, English increasingly functions as a *lingua franca* rather than a native-speaker-centered language.

This global usage has contributed to the emergence of multiple varieties of English, often referred to as *World Englishes* or *Digital Englishes*. Non-native speakers adapt English to suit local contexts, cultural expressions, and communicative needs. Digital spaces thus democratize language use, challenging traditional notions of correctness and standardization.

At the same time, the dominance of English online raises concerns about linguistic imperialism and the marginalization of local languages. While English facilitates global communication, it may also contribute to the decline of linguistic diversity if not balanced with multilingual digital policies.

Challenges of English in the Digital Age:

Despite its many advantages, digital transformation presents several challenges for the English language.

1 Decline of Formal Language Skills: Frequent exposure to informal digital communication may

negatively affect spelling, grammar, and sentence structure, particularly among young learners. The blurred boundaries between formal and informal registers can lead to inappropriate language use in academic or professional contexts.

2 Digital Divide: Access to digital resources remains uneven across regions and socio-economic groups. Limited access to technology restricts opportunities for English learning and digital participation, reinforcing existing inequalities.

3 Information Overload and Misinformation: The vast amount of digital content, often produced in English, creates challenges related to credibility, accuracy, and comprehension. Learners must navigate misinformation, fake news, and low-quality language content.

Ethical and Academic Integrity Issues:

Easy access to online content and AI-generated texts raises concerns about plagiarism, originality, and intellectual honesty in academic writing.

Opportunities for English Language Learning and Teaching

Digital transformation also offers unprecedented opportunities for English language education.

1 Innovative Pedagogical Tools: Online platforms, mobile apps, virtual classrooms, and learning management systems enable interactive and learner-centered approaches. Teachers can integrate videos, podcasts, games, and simulations to enhance engagement.

2 Global Exposure and Authentic Input: Learners can interact with speakers worldwide, access authentic materials, and participate in global discussions. This exposure improves communicative competence and cultural awareness.

3 Personalized and Lifelong Learning: Digital tools allow self-paced, adaptive learning tailored to individual needs. English learning is no longer limited to classrooms but continues throughout life.

Teacher Empowerment:

Educators gain access to global professional networks, digital resources, and collaborative platforms, enhancing teaching quality and innovation.

The Future of English in a Digitally Transformed World:

The future of English lies in adaptability and balance. Rather than viewing digital change as a threat, it should be seen as an opportunity to redefine language norms and educational practices. Critical digital literacy must become a core component of English education, enabling learners to evaluate content, use technology responsibly, and communicate ethically.

Institutions and policymakers should promote inclusive digital access, multilingualism, and ethical AI use. Teachers must guide learners in distinguishing between informal digital expression and formal academic communication. By embracing change while preserving linguistic integrity, English can continue to function as a powerful global language.

Conclusion:

English in the age of digital transformation is undergoing profound change. Digital technologies have expanded the reach, flexibility, and functionality of the language, creating new opportunities for communication, learning, and global interaction. At the same time, challenges related to language quality, equity, ethics, and identity demand careful consideration.

This paper concludes that the future of English depends not on resisting digital change

but on managing it thoughtfully. A balanced approach that integrates technological innovation with linguistic awareness, ethical responsibility, and inclusive education will ensure that English remains relevant, vibrant, and effective in the digital era.

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An Analytical Study of Gender Dimensions of Agricultural Entrepreneurship and Women Empowerment with Special Reference to Bhoom Taluka.

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Abstract:

Women form a significant basis of the agricultural sector in India; nevertheless, most of the time, this is not accorded due respect because of gender-related issues still persisting in society. Agricultural Entrepreneurship has proved to be a major factor that boosts women's contribution, decision-making capabilities, and in the final analysis, empowerment. The objective of this study is analytically examining gender aspects of agricultural entrepreneurship in promoting women empowerment in Bhoom Taluka. It precisely deals with women who participate in agricultural and allied entrepreneurial activities like dairy farming, food processing, self-help groups, and small agri-based industries. It aims at evaluating the effect of agricultural entrepreneurship activities on the economic, social, and psychological empowerment of women and identifying the gender-based constraints to women entrepreneurship.

The research will employ a descriptive analysis in a structured questionnaire, interview schedules, and observations as part of a descriptive analytical research design to be adopted in the study, in which both primary and secondary data will be employed in the study. Appropriate statistical methods will be used for the analysis of the data. It has also been observed that the expected outcome of the proposed study will be helpful for policymakers, development organizations, and researchers in the relevant fields of gender studies, rural development, and women entrepreneurship.

Keywords: Gender Dimensions, Agricultural Entrepreneurship, Women Empowerment, Rural Women, Bhoom Taluka, Gender Inequality

Introduction:

Today, agriculture remains at the core of India's economy, especially in rural areas. In these areas, women make up a substantial percentage of people engaged in agricultural and related economic activities. However, women have encountered various challenges that have helped to restrict their full potential to participate successfully in agricultural entrepreneurship. Inequities have limited women's full economic development. Women have encountered various challenges that have helped to restrict their full potential to participate successfully. Nevertheless, these challenges have never hindered women

from being central to contributing to economic growth.

Agricultural Entrepreneurship has gained higher importance as an influencer in Rural Development and Women Empowerment over the last years. When women are involved in various Agricultural Enterprises or Businesses, they are given the chance to earn money as well as boost their self-confidence and break gender stereotypes.

According to gender studies, entrepreneurship in agriculture is a way of reducing gender inequalities. This is mainly through empowering women's independence.

Bhoom Taluka is part of a drought-prone area and thus becomes another central case through which gender aspects of agricultural entrepreneurship can be understood. Women there are not only involved in farming and other allied activities through 'self-help groups' but also face many socio-economic and cultural hurdles. Thus, this particular study aims at analysing the 'contribution of agricultural entrepreneurship towards women empowerment and gender-based barriers

Objectives of the Study:

1. To explore the gender dimensions of agricultural entrepreneurship in women in Bhoom Taluka.
2. To examine the socio-economic profile of the women agricultural entrepreneurs in the study area.
3. In order to understand the role of agricultural entrepreneurship towards empowering women, especially regarding economic, social, and psychological issues.

Socio-Economic Profile of Women Agricultural Entrepreneurs:

This Study focuses on the socio-economic profile of women agricultural entrepreneurs in Bhoom Taluka. The variables used are age, education level, marital status, type of family, ownership of land, income level, and type of agricultural or allied enterprises. The study also focuses on involvement with Self-Help Groups and institutional support. The sources of finance are also taken into consideration while conducting this study. This would be helpful in understanding the ground realities for entering into agricultural entrepreneurship activities and establishing gender aspects and empowerment responses in future studies.

Gender Dimensions of Agricultural Entrepreneurship:

This study is designed to discuss gender dimensions of the implications of women's involvement in agricultural entrepreneurship within Bhoom Taluka. This is subject to a critical analysis of the implications of their access to related resources such as land, credit, knowledge of technology, and women's contributions to decision-making.

Further, this study highlights various issues such as traditional roles of women and men, workload distribution, mobility constraints, and socio-cultural factors that affect women agricultural entrepreneurs. Various issues related to women entrepreneurs such as limited market access, financial dependence, and institutional support have been discussed. Analysis and interpretation of primary data are done to explain various issues related to women entrepreneurs and women and men's disparity.

Women Empowerment Analysis:

This Study analyses the impact of agricultural entrepreneurship on women empowerment in Bhoom Taluka. Women empowerment is examined through three major dimensions—economic, social and psychological empowerment. Economic empowerment includes indicators such as increase in income, savings, access to credit and financial independence. Social empowerment focuses on women's participation in household and community decision-making, mobility and social recognition. Psychological empowerment relates to self-confidence, self-esteem and leadership abilities developed through entrepreneurial activities.

The Study aims to present an analytical interpretation of primary data to assess the level of contribution that agricultural entrepreneurship has on empowering women. Also, the findings highlight that women have gained increased

power through participating and engaging agriculture and allied ventures. However, there are challenges involved that prevent complete empowerment, thus emphasizing and underlining this directive.

Findings:

The study shows that in Bhoom Taluka, women are highly involved in agricultural and allied entrepreneurial activities. However, their participation is moulded by various gender dimensions, which indicate limited access to land ownership, credit facilities and modern technology, that still persist and bound women's entrepreneurial growth. Despite these constraints, the women agricultural entrepreneurs indeed showed improved economic conditions as manifested in increased income and savings.

Generally, the results of the study have indicated that agricultural entrepreneurship has brought about relatively positive implications on the economic empowerment of females, especially concerning independence and decision-making qualities at home. Socially, they have enjoyed a moderately improved rate of empowerment, yet they have received an increased degree of recognition and participation in social activities as compared to others. In psychological empowerment, the findings have reported an improved context whereby these women have shown increased self-confidence and self-esteem as leaders.

Conclusion:

The study concludes that indeed agricultural entrepreneurship is a very effective instrument in woman empowerment as it deals with gender inequalities and hence empowers women tremendously. Also, the gender bindings

emphasize the need for interventions and hence capacity building. This is useful in promoting a gender-sensitive agricultural entrepreneurship for sustainable development of Bhoom Taulka with inclusive growth.

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Millennium India @2047: Contributions of Commerce and Industry in Nation Building

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Abstract:

Millennium India @2047 is a nation-building agenda that aims to convert demographic scale into productive capacity, strengthen institutions that enable trust in markets, and achieve broad-based prosperity through innovation, sustainability, and global competitiveness. Commerce and industry sit at the center of this transformation because they translate policy intent into real outcomes such as jobs, exports, tax capacity, regional development, and technology diffusion. This paper explains how commerce (markets, finance, trade, services, logistics, entrepreneurship) and industry (manufacturing, construction, energy, industrial clusters, production systems) jointly create national capability. It develops a 2047-oriented framework built on productivity, formalization, resilience, inclusion, and green transition, and argues that the next two decades require deeper integration of supply chains, MSME upgrading, export sophistication, and digital governance for lower transaction costs. Using recent macro indicators, the study highlights that India's exports remain resilient while services continue to drive trade surplus, and that manufacturing growth can be accelerated when investment, skills, logistics, and compliance systems are synchronized. The paper offers actionable recommendations for policymakers, firms, and academia to align commerce and industry with the nation-building goals of Viksit Bharat by 2047.

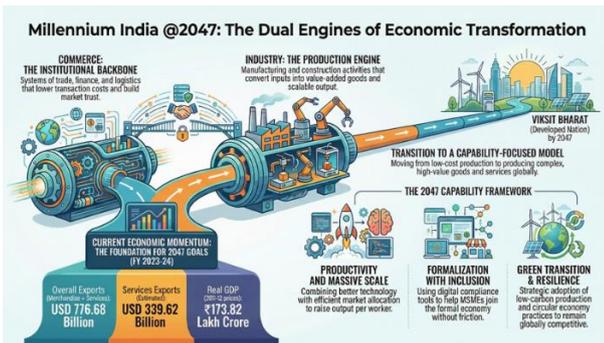
Keywords: *Viksit Bharat @2047, Nation Building, Commerce, Industry, Exports, Manufacturing, Productivity, MSMEs, Formalization, Digital Infrastructure, Green Transition, Supply Chains, Industrial Policy, Inclusive Growth.*

Introduction:

India's journey to 2047 is not only a milestone of independence, but also a target year for building a high-income, innovation-led, inclusive economy. Nation building in this sense is measurable. It shows up in rising productivity, quality employment, stronger human capital, lower poverty, higher competitiveness, and robust public finances. Commerce and industry are two engines that turn these objectives into performance. Industry converts inputs into value-added output at scale. Commerce connects producers with markets, creates demand, funds investment, manages risk, and builds the institutions of exchange such as contracts,

logistics, payments, and standards. A 2047 pathway requires moving from a cost-focused model toward a capability-focused model. This includes producing complex goods and services, scaling firms without losing compliance, building trusted digital systems, and competing in global value chains while meeting sustainability requirements. A practical way to see this is through recent indicators: in FY 2023-24, India's overall exports (merchandise plus services) were estimated at USD 776.68 billion, with services exports estimated at USD 339.62 billion, highlighting the importance of modern commerce in external competitiveness.¹ At the same time, economic scale creates a foundation for nation

building. India's nominal GDP in 2023-24 was estimated at ₹295.36 lakh crore, while real GDP was estimated at ₹173.82 lakh crore (2011-12 prices), indicating both size and momentum for long-term industrial upgrading.² The challenge is to convert this momentum into sustained structural change: higher manufacturing sophistication, stronger MSMEs, job-rich growth, and globally trusted regulatory and quality systems.



This paper positions commerce and industry as complementary capability builders. Commerce improves allocation, lowers transaction costs, and expands markets. Industry builds production capacity, learning-by-doing, and technological depth. Together, they shape an ecosystem where enterprises can scale responsibly and inclusively by 2047.

Definitions of Key Terms:

- **Millennium India @2047:** A long-horizon development pathway that targets advanced economic and social outcomes by the centenary of independence in 2047, including high productivity, quality employment, global competitiveness, and inclusive prosperity.
- **Commerce:** The system of market exchange and enabling functions such as trade, logistics, finance, retail, services, marketing, distribution, contract enforcement, and digital payments that connect production to consumption.
- **Industry:** Organized productive activity including manufacturing, construction, energy, and industrial services that converts

inputs into value-added goods and scalable output.

- **Make in India:** A national initiative launched on September 25, 2014 to facilitate investment, foster innovation, build infrastructure, and position India as a hub for manufacturing, design, and innovation.³
- **Digital India:** A flagship programme launched on July 1, 2015 to transform India into a digitally empowered society and knowledge economy through digital infrastructure and digital delivery of services.⁴
- **MSMEs:** Micro, small and medium enterprises that form the backbone of employment and local value chains, and act as feeders and innovation partners to large firms.
- **Global Value Chains (GVCs):** Cross-border production networks where design, components, assembly, branding, and services are distributed across countries.
- **Green transition:** The move toward low-carbon production and consumption supported by clean energy, resource efficiency, circular economy practices, and ESG-aligned governance.

Review of Literature:

1.Mukherjee (2018) explains that Indian MSMEs face structural constraints such as limited access to affordable finance, technology gaps, and weak integration with global markets, which reduce competitiveness. The study highlights that globalization increases both opportunity and pressure: firms must meet quality and delivery standards while managing cost and compliance burdens.⁵ It further notes that capability-building support in areas like quality certification, technology upgradation, and market linkage becomes essential for MSMEs to sustain competitiveness in open markets.

2.Das and Kukreja (2020) examine value addition, jobs, and skills in India's exports and

show that export composition matters for employment and capability. The study indicates that higher domestic value addition and skill intensity strengthen long-run benefits from trade, while shallow value chains reduce the developmental impact of export growth.⁶ The authors also point out that improving upstream linkages and supplier ecosystems can raise domestic content in exports.

3. Virmani (2024) argues that achieving Viksit Bharat requires “unshackling” job creators by lowering friction in factor markets and improving the policy environment for enterprise growth. The work emphasizes that productivity and employment outcomes depend on enabling conditions such as competition, investment climate, and institutional efficiency.⁷ The analysis highlights that simplifying compliance and reducing transaction costs can help firms scale faster, especially in labor-intensive segments. Further, the work implies that coordinated reforms across land, labor, logistics, and finance are needed to unlock broad-based job creation and sustained productivity growth.

4. World Bank (2020) presents cross-country evidence on the importance of business environment quality, including regulation, contract enforcement, and operational ease, for investment and growth. The analysis is relevant for India because nation building through commerce and industry requires reducing transaction costs and improving predictability for firms to scale.⁸

Research Gap:

The literature consistently links competitiveness with MSME upgrading, deeper value addition, and better business environments. However, fewer studies integrate commerce and industry into a single nation-building framework for 2047 that simultaneously addresses productivity, inclusion, resilience, and sustainability. This paper addresses that gap by

proposing a combined capability lens and translating it into practical priorities.

Objective of the paper:

The objective of the paper is to examine how commerce and industry together support nation building under Millennium India @2047 through jobs, productivity, innovation, and stronger markets. It also links macro trends with MSME upgrading, export competitiveness, and technology adoption, and offers recommendations for inclusive and sustainable growth by 2047.

Commerce as the institutional backbone of nation building:

Commerce does more than move goods from seller to buyer. It creates the rules, platforms, and trust that allow specialization and scale. When commerce works well, transaction costs fall, price signals improve, and markets become deeper and more competitive. This improves national efficiency.

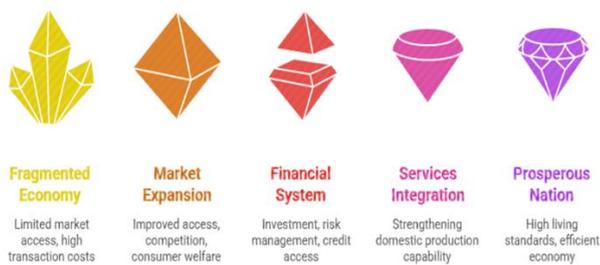
1. Market access, competition, and consumer welfare: An economy that expands market access tends to reduce regional inequality and encourages firms to improve quality. Organized retail, e-commerce, and logistics networks connect small producers to larger demand pools. Competition then becomes a discipline that raises productivity and innovation. Importantly, consumer welfare is itself nation building because it raises living standards directly while pushing firms toward efficiency.

2. Finance, risk management, and investment: Commerce includes the financial system that enables investment. Credit, insurance, payments, and capital markets convert savings into productive projects. For industry, financing determines whether firms can upgrade machinery, meet global standards, and sustain working capital during demand cycles. For MSMEs, access to credit and faster receivables are often the difference between survival and scaling. In

addition, risk management tools such as hedging, trade finance, and credit guarantees reduce uncertainty and improve business continuity. Stronger financial inclusion and digital lending also help channel timely funds to smaller firms, supporting formalization and job creation.

3.Trade, services, and external competitiveness: Modern commerce increasingly includes services exports such as IT, business services, design, and professional services. Services also “embed” into manufacturing by improving product design, supply chain planning, and after-sales support. A strong services base can fund industrial upgrading through foreign exchange, but the nation-building payoff is highest when services strengthen domestic production capability rather than remain isolated.

Commerce as Nation Building Backbone



Industry as the production engine for scale, jobs, and learning:

Industry builds the productive spine of the economy. Manufacturing, construction, and energy systems generate large multiplier effects, create formal jobs, and promote learning-by-doing. Nation building requires a rising share of complex production, higher labor productivity, and strong industrial ecosystems.

1.Manufacturing upgrading and capability formation: Manufacturing competitiveness depends on cost, quality, reliability, and innovation. Upgrading typically follows stages: process improvement, quality certification, automation, product development, and then brand and design capability. Each stage demands stronger skills, better machinery, and stable

policy and infrastructure support. It also requires deeper supplier development so that input quality, lead times, and traceability match global expectations. In addition, continuous improvement systems such as lean practices and data-driven quality control help firms sustain gains rather than treating upgrading as a one-time project.

2.Industrial clusters and supply-chain depth: Clusters help firms share suppliers, labor pools, testing facilities, and logistics infrastructure. They also reduce coordination costs and support specialization. For India @2047, cluster-based strategies can accelerate MSME integration into larger supply chains, reduce logistics costs, and improve quality consistency.

3.Jobs, skills, and the demographic dividend: Industry is a key absorber of labor when supported by skills and formalization. Quality jobs mean stable incomes, social security, and human capital investment within families. This is nation building at the household level. The policy challenge is to align skilling systems with real demand, and the firm challenge is to invest in apprenticeships and continuous training.



A 2047 capability framework: productivity, resilience, and sustainability:

Commerce and industry must work together to deliver five nation-building outcomes by 2047.

1.Productivity and scale: Productivity comes from better technology, better management, and better allocation. Commerce improves allocation through markets, finance, and logistics. Industry improves technology and process capability. The

combined effect is higher output per worker and rising incomes.

2. Formalization with inclusion: Formalization expands the tax base, improves access to finance, and protects workers, but it must not become a barrier that pushes firms into informality. Digital compliance tools, simplified reporting, and predictable enforcement can enable formalization while supporting micro-enterprises.

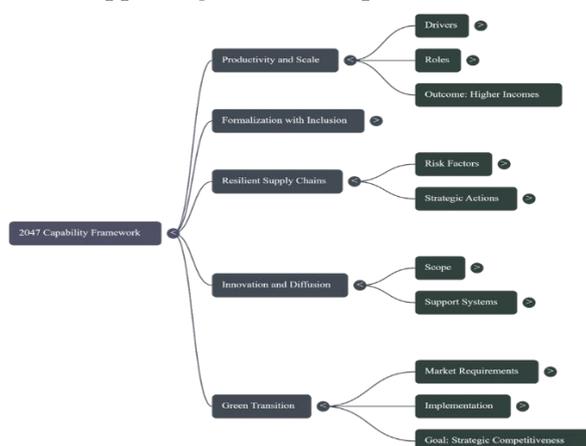


Figure no. 1: Mind map for 2047 capability framework

3. Resilient supply chains: Recent global disruptions show that resilience is not optional. India needs supply chains that can handle shocks in energy prices, shipping constraints, and geopolitical uncertainty. Commerce builds redundancy through logistics planning and risk management, while industry builds domestic capacity in critical components.

4. Innovation and technology diffusion: Innovation is not only frontier research. It includes diffusion of proven technology to

MSMEs, adoption of quality systems, and incremental process improvement. Commerce supports innovation by financing, market discovery, and customer feedback. Industry operationalizes innovation through production learning.

5. Green transition and responsible competitiveness: By 2047, global markets will increasingly enforce carbon disclosure, resource efficiency, and ethical supply chain standards. Industry must decarbonize processes and invest in energy efficiency. Commerce must support green finance, credible reporting, and circular economy marketplaces. Sustainability becomes a competitiveness tool rather than a cost burden when implemented strategically.

Research methodology:

1. Type of Data: The present paper totally relies on secondary data drawn from government press releases, official macroeconomic estimates, policy papers, and selected peer-reviewed and institutional research studies.

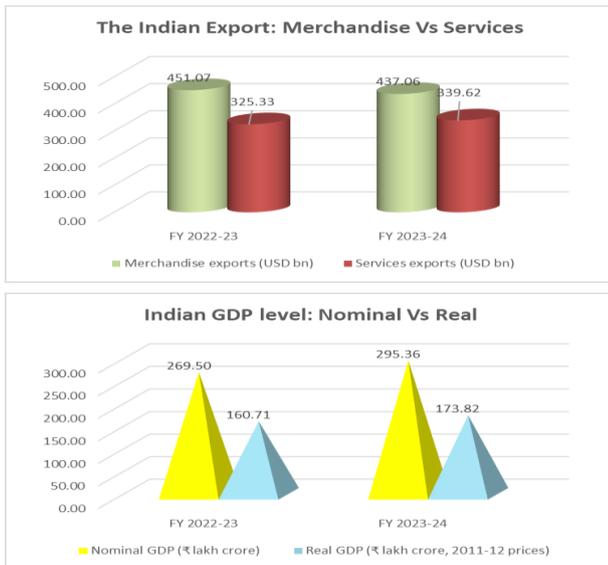
2. Type of Research: The research type for the present paper is descriptive and analytical, using a conceptual framework approach supported by recent macro indicators and literature synthesis.

3. Period of Research: The period of study is from FY 2022-23 to FY 2023-24 for key statistical indicators, with literature and policy sources reviewed within the years 2014 to 2024.

Table no. 1 Statistical table

Indicator	FY 2022-23	FY 2023-24
Merchandise exports (USD bn)	451.07	437.06
Services exports (USD bn)	325.33	339.62
Overall exports: merchandise + services (USD bn)	776.40	776.68
Real GDP (₹ lakh crore, 2011-12 prices)	160.71	173.82
Nominal GDP (₹ lakh crore)	269.50	295.36

Source: Press Information Bureau, Ministry of Commerce & Industry, press release dated 15 April 2024 (Trade during FY 2023-24).



Recommendation:

- It is recommended that India's 2047 strategy treat commerce and industry as a single capability system, with policy design focused on lowering transaction costs, improving predictability, and enabling firm scaling across states and sectors.
- It is recommended that MSME upgrading be prioritized through cluster-based support, quality testing infrastructure, shared logistics, and easier access to working capital so that small firms can reliably join domestic and global value chains.
- It is recommended that export competitiveness be strengthened by moving from volume-led exports to value-led exports through design capability, standards compliance, and service integration such as engineering services, after-sales support, and digital trade facilitation.
- It is recommended that manufacturing growth be supported by synchronized investments in skilling, apprenticeships, and shop-floor productivity programs, ensuring that technology adoption leads to better jobs and not only higher capital intensity.

- It is recommended that digital governance be expanded in a business-friendly way through simplified compliance, interoperable platforms, and time-bound approvals so formalization becomes easier rather than intimidating for micro and small enterprises.
- It is recommended that green competitiveness be mainstreamed by expanding energy efficiency support, green finance instruments, and practical carbon measurement tools for firms, especially MSMEs, so sustainability becomes export enabling.
- It is recommended that logistics and supply-chain resilience be improved through multimodal connectivity, warehousing modernization, and data-driven planning, because reliable delivery performance is now a core element of national competitiveness.
- It is recommended that academia and industry collaborate on applied research, local innovation labs, and problem-based curricula so the workforce and enterprise ecosystem jointly learn, adapt, and scale toward 2047.

Conclusion:

Millennium India @2047 requires a nation-building model where commerce and industry operate as a single integrated engine. Commerce builds the institutional infrastructure of exchange: finance, logistics, platforms, trust, and market access. Industry builds the productive backbone: scalable output, learning-by-doing, technology depth, and job creation. Recent indicators show a resilient export base with services strengthening external performance, while rising GDP scale provides a foundation for industrial upgrading. The decisive factor for 2047 will be capability: the ability of firms to scale with quality, the ability of MSMEs to upgrade and integrate, and the ability of institutions to lower friction while ensuring trust and

sustainability. Make in India and Digital India illustrate how production and commerce reforms can reinforce each other when aligned with investment, innovation, and infrastructure goals. A practical 2047 pathway therefore combines productivity growth, inclusive formalization, resilient supply chains, and green competitiveness. When commerce lowers transaction costs and industry raises value addition, the nation-building outcomes become visible in jobs, incomes, innovation, and global standing. The policy and business challenge is to sustain this alignment consistently across states, sectors, and enterprise sizes over the next two decades.

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