

JIDNYASA

Research Journal

Volume 13 / October 2025

ISSN: 0973-7396 Jidnyasa

A Special Edition

National Conference 2025 on

**“Enhancing Quality in Higher
Education through Industry
Integration, Innovation and
Employability: The Indian Advantage”**

Organized by

**Maharshi Karve Stree Shikhsan Samstha's
Smt. Hiraben Nanavati Institute of
Management & Research for Women
(HNIMR)**

And

School of Fashion Technology (SOFT)



Jidnayasa,
Volume 13, October 2025

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Research for Women (HNIMR)
Cummins Campus, Karvenagar, Pune – 411052

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Flexible, interdisciplinary and modular learning.

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Abstract

Flexible, interdisciplinary, and modular learning represents a transformative shift in education, fostering adaptability, cross-disciplinary thinking, and personalized learning experiences. This approach moves beyond conventional rigid curricula by enabling learners to shape their own educational paths based on interests, career aspirations, and evolving industry needs.

Flexibility allows students to determine their pace, learning modes, and schedules, making education more accessible. Interdisciplinary learning integrates diverse fields, encouraging innovative problem-solving and holistic thinking. Modular learning, structured in independent units, empowers learners to select and combine topics according to their goals, ensuring relevance and efficiency.

By bridging disciplines and breaking traditional barriers, this model cultivates agile thinkers who can navigate complex challenges and dynamically respond to societal and technological advancements. It is increasingly embraced across educational institutions and professional training environments as a means of developing well-rounded individuals equipped for the future.

Introduction

Flexible, interdisciplinary, and modular learning is a progressive approach to education that prioritizes adaptability, diverse knowledge integration, and personalized learning pathways. Here's what each component involves:

- **Flexible learning** allows students to choose their pace, schedule, and mode of study, accommodating different learning styles and life circumstances.
- **Interdisciplinary learning** encourages connections between different fields, helping students develop a broader perspective and problem-solving skills by integrating knowledge from various disciplines.
- **Modular learning** breaks curriculum into smaller, independent units that students can mix and match based on their interests and career goals, creating a more customized education experience.

Flexible, interdisciplinary, and modular learning is an innovative approach to education that empowers learners with adaptability, diverse perspectives, and personalized pathways. It moves away from rigid, one-size-fits-all curricula, instead allowing students to craft their own learning experiences based on their interests, career goals, and evolving needs.

- **Encourages flexibility** by offering different modes of learning—self-paced, online, or in-person—so students can tailor education to their circumstances.

- **Embraces interdisciplinarity** by integrating knowledge from various fields, fostering creativity and problem-solving beyond traditional subject boundaries.
- **Utilizes modular learning** through independent, skill-focused units that learners can mix and match, creating a customized academic journey.

Key Words\Key Terms

- **Flexibility** – The ability to adapt learning methods, schedules, and formats to suit individual needs.
- **Personalized Learning** – Tailoring education to a student's unique interests, goals, and pace.
- **Self-Paced Learning** – Allowing learners to progress through content at their own speed.
- **Interdisciplinary Approach** – Integrating knowledge from multiple fields to encourage broader perspectives and innovation.
- **Cross-Disciplinary Thinking** – Applying concepts from different domains to solve complex problems.
- **Holistic Learning** – Focusing on real-world applications and interconnected knowledge.
- **Modular Curriculum** – Structuring education into independent units that can be customized and combined.
- **Competency-Based Learning** – Measuring progress by skills and mastery rather than time spent in a course.
- **Micro-Credentials** – Certifications for specific skills or competencies gained in short learning modules.
- **Lifelong Learning** – Encouraging continuous education beyond formal schooling.
- **Open Education Resources (OER)** – Free and accessible educational materials that support flexible learning.
- **Technology-Enhanced Learning** – Using digital tools to make learning more interactive and accessible.
- **Blended Learning** – Combining online and in-person learning experiences.
- **Experiential Learning** – Learning through hands-on, real-world applications.
- **Adaptive Learning** – Using AI and technology to adjust content based on individual learner progress.

The need for flexible, interdisciplinary, and modular learning

- **Adaptability to Changing Careers** – Many jobs today require knowledge across multiple disciplines. Modular learning helps individuals gain diverse expertise that aligns with their evolving career paths.
- **Personalized Learning Experiences** – Not all learners thrive under the same methods. Flexibility allows students to choose learning modes, pace, and subjects that suit their strengths and interests.
- **Encouraging Innovation and Problem-Solving** – Interdisciplinary learning fosters creative thinking by connecting ideas across fields, which is essential for tackling complex global challenges.
- **Accessibility and Lifelong Learning** – People need continuous skill development throughout life. Flexible and modular courses make education more accessible to working professionals and those who wish to reskill.
- **Technology-Driven Learning** – With the rise of AI, automation, and digital tools, education needs to integrate multiple disciplines and offer adaptable learning structures.

What is the Flexible, interdisciplinary and modular learning

- **Flexible learning** provides learners with the freedom to choose their pace, study methods, and schedules, making education more accessible and accommodating individual needs.
- **Interdisciplinary learning** encourages connections between different fields, fostering creativity, problem-solving, and a well-rounded understanding of complex subjects.
- **Modular learning** structures courses into independent units that can be customized and combined based on learners' preferences, ensuring practical and relevant skill-building.

New trends in Flexible, interdisciplinary and modular learning

- **Flexible Learning Pathways** – Education systems are increasingly adopting **customizable learning routes** that allow students to transition between academic, vocational, and skill-based programs.
- **Technology-Enhanced Learning** – AI-driven adaptive learning platforms personalize education, ensuring students receive content tailored to their progress and needs.
- **Interdisciplinary Collaboration** – Universities and institutions are integrating **cross-disciplinary courses**, encouraging students to apply knowledge from multiple fields to solve real-world problems.
- **Micro-Credentials & Modular Courses** – Short, skill-focused courses and certifications are gaining popularity, allowing learners to acquire specific competencies without committing to full-degree programs.

- **Blended & Hybrid Learning Models** – A mix of online and in-person learning is becoming the norm, offering students greater flexibility while maintaining engagement.
- **Competency-Based Education** – Instead of traditional grading, students are assessed based on mastery of skills, ensuring practical knowledge application.
- **Global Education Integration** – Institutions are collaborating internationally, offering students access to **diverse learning experiences** and cross-cultural perspectives.

Steps in Flexible, interdisciplinary and modular learning

1. Identifying Learning Goals

Learners define their objectives—whether acquiring specific skills, exploring multiple disciplines, or pursuing career-oriented education.

2. Choosing Flexible Learning Options

Students select their preferred mode of study, such as online courses, blended learning, self-paced study, or experiential learning.

3. Structuring a Modular Curriculum

Education is divided into smaller, **independent modules**, allowing learners to mix and match subjects based on their interests and needs.

4. Integrating Interdisciplinary Approaches

Courses encourage **cross-field connections**, combining different subjects to enhance creativity, problem-solving, and diverse thinking.

5. Applying Competency-Based Learning

Progress is measured by **mastery of skills** rather than time spent in courses, ensuring learners focus on practical application.

6. Utilizing Technology for Adaptability

AI-driven platforms, simulations, and interactive resources help personalize learning experiences and ensure accessibility.

7. Engaging in Continuous Learning

Students pursue **lifelong learning** through micro-credentials, professional development, and interdisciplinary explorations.

Provisions related to Flexible, interdisciplinary and modular learning

- There are several provisions related to **flexible, interdisciplinary, and modular learning**, particularly in modern education policies and frameworks. Some key aspects include:
- **National Education Policy (NEP) 2020** – In India, NEP 2020 emphasizes **multidisciplinary education**, allowing students to explore diverse subjects beyond rigid academic streams.

- **Modular Curriculum Design** – Many institutions are adopting **modular learning structures**, enabling students to select independent units based on their interests and career goals.
- **Interdisciplinary Education Frameworks** – Policies encourage **cross-disciplinary learning**, integrating subjects like science, humanities, and technology to foster holistic thinking.
- **Flexible Learning Pathways** – Universities and online platforms offer **self-paced, blended, and hybrid learning models**, ensuring accessibility for diverse learners.
- **Competency-Based Assessments** – Instead of traditional grading, students are evaluated based on **skill mastery**, ensuring practical knowledge application.

Protecting linguistic diversity in flexible, interdisciplinary, and modular learning

Protecting **linguistic diversity in flexible, interdisciplinary, and modular learning** is crucial for fostering inclusive education and ensuring that learners from diverse linguistic backgrounds can access quality education.

- **Multilingual Education Frameworks** – Institutions are integrating **multilingual instructional designs** to accommodate students from various linguistic backgrounds, ensuring equitable learning.
- **Cross-Cultural Learning Approaches** – Educational models emphasize **interdisciplinary and multilingual education**, allowing students to engage with diverse perspectives and languages.
- **Inclusive Language Policies** – Organizations like UNESCO advocate for **inclusive language policies** that recognize and support linguistic diversity in education.
- **Technology-Driven Language Support** – AI-powered translation tools and adaptive learning platforms help bridge language gaps, making modular learning more accessible.
- **Culturally Responsive Curriculum** – Course materials incorporate **regional languages and cultural contexts**, ensuring relevance and engagement for diverse learners.

Recommendations for implementing flexible, interdisciplinary, and modular learning effectively:

- **Develop Clear Modular Structures** – Ensure courses are broken into independent, skill-focused modules that allow learners to customize their education.
- **Encourage Interdisciplinary Collaboration** – Design curricula that integrate multiple fields, fostering creativity and problem-solving.
- **Leverage Technology for Flexibility** – Use AI-driven adaptive learning platforms to personalize education and enhance accessibility.
- **Adopt Competency-Based Assessments** – Shift from traditional grading to skill mastery evaluations, ensuring practical knowledge application.
- **Promote Lifelong Learning** – Support continuous education through micro-credentials and modular courses that cater to evolving industry needs.

Financial aid for flexible, interdisciplinary, and modular learning

- **Online Course Providers** – Platforms like Coursera, EdX, and Udacity offer financial aid for modular and interdisciplinary courses, helping learners access education regardless of financial constraints.
- **University Scholarships** – Many universities provide scholarships for students pursuing flexible and interdisciplinary programs, allowing them to customize their learning paths.
- **Government Grants & Subsidies** – Some governments support modular learning initiatives through grants and subsidies, making education more accessible.
- **Corporate Sponsorships** – Companies often fund employees' education, especially in interdisciplinary fields that align with industry needs.
- **Nonprofit & Educational Foundations** – Organizations offer financial aid for skill-based and modular learning programs to promote lifelong education.

Challenges related to Flexible, interdisciplinary and modular learning

- **Fragmentation of Learning** – Modular courses can sometimes lead to a lack of coherence, making it harder for students to see connections between different subjects.
- **Interdisciplinary Complexity** – Integrating multiple disciplines requires careful curriculum design, and students may struggle with balancing diverse subjects.
- **Technological Barriers** – Access to digital tools and reliable internet can be a challenge, especially for students in remote areas.

- **Assessment Difficulties** – Competency-based learning requires new evaluation methods, which can be difficult to standardize.
- **Student Motivation & Engagement** – Some learners may find self-paced or modular learning overwhelming without structured guidance.

Recent announcements related to flexible, interdisciplinary, and modular learning:

- **IIT Delhi's Curriculum Revamp** – IIT Delhi has introduced a **new academic structure** emphasizing **flexibility, sustainability, and interdisciplinary learning**. The revised curriculum allows students to choose from a wide range of electives, pursue minor degrees, and even obtain an integrated M.Tech. degree within five years.
- **UGC's New Framework for PG Studies** – The University Grants Commission (UGC) has unveiled a **flexible postgraduate curriculum** aligned with NEP 2020. It allows students to switch disciplines, earn multiple degrees, and exit after the first year in a two-year program. The framework supports **online, offline, and hybrid learning models**.
- **Multidisciplinary Higher Education Guidelines** – The UGC has also released guidelines for transforming higher education institutions into **multidisciplinary institutions**, promoting **collaboration, merging, and clustering** between institutions to encourage interdisciplinary learning.

Suggestions to enhance flexible, interdisciplinary, and modular learning:

- **Integrate Real-World Projects** – Encourage students to work on interdisciplinary projects that mirror real-world challenges, fostering creativity and problem-solving.
- **Use Adaptive Learning Technologies** – AI-driven platforms can personalize learning experiences, ensuring students progress at their own pace.
- **Encourage Collaborative Teaching** – Educators from different disciplines can co-design courses, helping students make connections between subjects.
- **Offer Modular Course Structures** – Breaking curricula into independent units allows learners to customize their education based on interests and career goals.
- **Promote Critical Thinking Activities** – Interdisciplinary teaching should include exercises that challenge biases and encourage diverse perspectives.

Conclusion

Flexible learning is revolutionizing education by offering adaptability, accessibility, and personalization to learners of all backgrounds. By allowing students to choose their pace, mode, and approach to learning, it fosters independence and accommodates diverse needs. Whether through online platforms, hybrid models, or competency-based education, flexibility ensures that education remains relevant in an ever-changing world.

Embracing flexible learning promotes continuous skill development and empowers individuals to shape their own educational journeys, making learning more effective and meaningful.

Interdisciplinary learning is essential for addressing complex, real-world challenges by integrating diverse fields of knowledge. It fosters creativity, innovation, and holistic problem-solving by encouraging connections between subjects that traditionally operate in isolation. By breaking barriers between disciplines, learners develop a broader perspective, enabling them to adapt to evolving industries and societal needs.

Embracing interdisciplinarity ensures that education is **dynamic, relevant, and future-ready**, equipping individuals with versatile skills to thrive in multifaceted environments. As educational institutions continue to adopt this approach, learners and professionals alike will benefit from the ability to think critically across disciplines.

Modular learning provides a **flexible, personalized, and efficient** approach to education by breaking curricula into independent, skill-focused units. It empowers learners to customize their educational paths, adapt to evolving career demands, and acquire diverse competencies in a structured yet versatile manner.

By enabling self-paced progression and interdisciplinary integration, modular learning enhances **accessibility and relevance**, ensuring that individuals can continuously update their knowledge in dynamic fields. As education embraces innovation, modular structures will play a vital role in shaping **future-ready, adaptive learning environments**.

References

- **Modular Learning and the Role of Teachers** – This study explores how modular learning enhances flexibility, personalization, and adaptability in education. It highlights the role of teachers in curriculum design and assessment.
- **Flexible and Inclusive Curricula at Oxford University** – A case study on how Oxford University adapted its curriculum to be more flexible and inclusive, particularly in response to the challenges posed by the COVID-19 pandemic.
- **Curriculum Integration in Flexible Learning Environments** – This research discusses future-focused learning, interdisciplinary problem-solving, and the integration of digital technologies in flexible learning spaces.
- **Designing and Implementing Interdisciplinary Education** – This book explores interdisciplinary teaching frameworks for K-12 educators, offering strategies for integrating multiple subjects effectively.
- **Interdisciplinary Curriculum and Learning in Higher Education** – A research-based book discussing the challenges and benefits of interdisciplinary learning in universities.
- **The Benefits and Challenges of Modular Higher Education Curricula** – This paper examines modular learning structures, their advantages, and potential drawbacks in higher education.

Bring Your Own AI (BYOAI) in B-Schools: A Perspective on Institutional Readiness and Governance

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Abstract

A quiet but consequential shift is underway in Indian management education: students are independently integrating generative AI tools into their learning, often without institutional guidance or ethical framing. This paper introduces the concept of “Bring Your Own AI” (BYOAI) to describe this bottom-up trend and argues for a structured response that balances innovation with integrity. Drawing on classroom observations and early-stage field insights, the article presents two complementary frameworks—AWARE™ (a diagnostic readiness index) and EduEthics³™ (a governance scaffold anchored in ethical, equitable, and explainable principles). Together, these models offer a tiered strategy to help institutions move from reactive bans to proactive enablement. Use cases are discussed across curriculum alignment, faculty sensitization, onboarding, and placement credibility. The article concludes by urging Indian B-schools to demonstrate foresight, adopt anticipatory governance, and collaborate toward a shared standard for ethical GenAI integration in management education.

Keywords

AI integration in higher education, BYOAI, B-schools, AI governance, digital adoption, student readiness, academic integrity

Executive Summary

The rapid integration of generative AI tools like ChatGPT and Midjourney into business school classrooms has sparked a fundamental shift in how management students learn, engage, and create. This perspective article explores the emergence of the "Bring Your Own AI" (BYOAI) phenomenon within Indian B-Schools, where students increasingly rely on personal AI tools outside institutional platforms. Unlike earlier waves of digital adoption—such as MOOCs or LMS portals—BYOAI operates outside formal structures, raising new questions about authorship, originality, and pedagogy. Drawing from early observations, faculty inputs, and existing literature, the paper identifies key themes around digital comfort, cultural behaviors, institutional policy gaps, and the psychological safety required for meaningful AI integration. The article introduces the AWARE™ framework to assess student readiness and outlines a tiered approach for academic governance—from foundational training to advanced co-creation strategies.

Rather than calling for bans or blanket approvals, this article advocates for context-sensitive, evolving practices that balance innovation with academic integrity. It concludes by urging B-Schools to embrace BYOAI as a teachable moment—an opportunity to prepare future managers for responsible and reflective AI use in their careers.

The Silent Disruption: BYOAI in Indian B-Schools

A quiet shift is underway in Indian business schools—one not led by policy or faculty but by students themselves. Across campuses, management students are independently using tools like ChatGPT, Bard, Gemini, and Copilot to complete assignments, summarize readings, design presentations, and script mock interviews. This self-initiated behavior—described here as “Bring Your Own AI” (BYOAI)—is growing rapidly, yet remains largely undocumented and unaddressed within formal academic structures (Abdo-Salloum & Al-Mousawi, 2025). Unlike earlier digital transitions—such as LMS adoption, computer-based testing, or institutional YouTube channels—BYOAI unfolds informally. It is not taught, timetabled, or institutionally sanctioned. Students often learn from peers or online communities, using these tools without faculty involvement. As a result, classroom control no longer ensures cognitive control; the locus of learning has shifted to unsupervised, personalized digital spaces (Lyu et al., 2025; Belkina et al., 2025).

This phenomenon is not unique to India. A global bibliometric analysis shows that while AI use in education is accelerating, pressing concerns such as ethics, student autonomy, and inclusion are still underexplored in mainstream academic discourse (Lachheb et al., 2025). Even in structured environments like K–12 education, ethical integration remains fragmented and uneven (Li et al., 2024; Ma et al., 2025). In Indian higher education, this gap is compounded by the lack of actionable guidance from regulatory bodies like UGC or AICTE. Attempts to restrict or suppress BYOAI—through plagiarism detectors, tool bans, or offline exams—have largely failed. Students continue to adapt, creating new workarounds or disengaging altogether. As a result, institutions risk appearing disconnected from the realities of student behavior and learning practices (Barus et al., 2025). Similar trends have been observed in corporate settings, where restrictive policies have driven unsanctioned use underground, increasing risk rather than reducing it (van der Meulen & Wixom, 2024).

What is emerging is not a passing trend but a deeper generational shift in how students perceive learning, effort, and credibility. BYOAI is real, persistent, and evolving. This paper proposes

that structured readiness assessment, combined with contextual governance, offers a more sustainable pathway than reactive control—one that fosters accountability without dampening innovation (Anthuvan & Maheshwari, 2025).

Why Existing Narratives Fall Short

India's educational policies have made strong overtures toward innovation and inclusion. The National Education Policy (NEP) 2020 emphasizes digital integration, interdisciplinary learning, and future readiness. However, the implementation landscape remains uneven. While NEP outlines aspirations like digital fluency and ethical grounding, it offers limited operational clarity on how institutions should respond to fast-evolving student behaviors around tool use, particularly in management education (Government of India, 2020).

Similarly, regulatory frameworks from UGC and AICTE have not kept pace with the reality of generative technologies in academic workflows. AI is often mentioned in passing—as an area for curriculum design or research—but there is a striking absence of guidelines that address responsible usage, originality concerns, or classroom governance. This silence leaves faculty uncertain, administrators hesitant, and students largely self-directed.

The result is a growing governance vacuum. Ethics in AI use remains unmonitored, assessment originality is increasingly difficult to guarantee, and placement-readiness is at risk when students rely on tools without developing judgment. Instructors often respond with defensive strategies—switching to oral exams, banning ChatGPT in assignment rubrics, or reverting to in-person proctoring. These measures, while understandable, are reactive and often unsustainable (Barus et al., 2025; Lyu et al., 2025). Recent global studies show a shift from such reactive responses toward structured enablement. Rather than attempting to block tool use, institutions are beginning to scaffold its responsible application. For instance, Ma et al. (2025) recommend a competency-based approach to AI ethics education, while Tzirides et al. (2024) emphasize reflection and human judgment as central to digital fluency in higher education.

This paper echoes that direction. The current narrative—focused on restriction and detection—needs to evolve into one centered on readiness and responsibility. BYOAI is here to stay. The question is no longer whether students will use these tools, but whether institutions are prepared to guide how they do so—ethically, equitably, and accountably.

AWARE™ and EduEthics³™: Twin Frameworks for Readiness and Governance

Addressing BYOAI in higher education requires more than detection tools or revised honor codes. It calls for a structured yet adaptable way to assess student behavior and institutional response. To that end, we propose two interconnected frameworks: the AWARE™ Readiness Index and the EduEthics³™ Governance Model. Together, they offer a way to map, interpret, and respond to generative tool use within business school settings—without stifling innovation or defaulting to bans.

AWARE™: Assessing Student Readiness

The AWARE™ Index is a five-dimension self-assessment tool that helps institutions gauge students' preparedness to use AI-enabled tools responsibly. It does not test tool knowledge, but rather measures behavioral orientation and ethical awareness across five core areas:

1. **AI Usage Breadth:** Captures how frequently and diversely students use digital tools across academic tasks.
2. **Willingness to Use AI Critically:** Measures whether students rely on tools blindly or apply their own judgment.
3. **Awareness of Institutional Rules:** Assesses if students understand what is allowed, restricted, or expected in their institution.
4. **Risk–Reward Judgment:** Gauges how students weigh ethical risks (e.g., plagiarism, unfair advantage) against perceived academic benefits.
5. **Ethical Alignment:** Reflects whether students' own sense of integrity aligns with responsible tool use.

The AWARE™ Index is scored on a 5-point scale across its five dimensions, yielding a cumulative readiness score between 5 and 25. Scores in the 21–25 range indicate a “ready” cohort—students who demonstrate strong ethical alignment and digital judgment, and are suitable for advanced interventions such as curriculum integration and placement-linked training (Tier 3). Those scoring 16–20 are considered “partially ready,” requiring structured scaffolding through mentorship, moderated tool use, and policy sensitization (Tier 2). Scores 15 or below signal an “at-risk” group, where foundational support in digital ethics, responsible use, and academic honesty must be prioritized (Tier 1). This scoring logic draws from established work in digital literacy and behavioral ethics, and supports broader calls for anticipatory governance in education (Ma et al., 2025; Tzirides et al., 2024).

EduEthics³™: A Tiered Governance Model

Complementing AWARE™, the EduEthics³™ model offers a three-tier institutional response framework based on the level of readiness observed across cohorts or programs:

- *Tier 1 – Foundational:* Focused on onboarding students with basic tool awareness, ethical dos and don'ts, and safe-use guidelines. Ideal for at-risk learners.
- *Tier 2 – Structured Engagement:* Involves faculty workshops, formal policy briefs, and mentorship for students who are partially ready.
- *Tier 3 – Strategic Integration:* Includes curriculum embedding, portfolio-based evaluations, and even placement training for AI-augmented professionalism.

The EduEthics³™ model is anchored in three foundational values. It emphasizes ethical responsibility by promoting academic integrity through proactive guidance rather than punitive enforcement. It prioritizes equity by acknowledging and addressing the digital access and awareness gaps that exist across student cohorts. Finally, it champions explainability, ensuring

that institutional policies, expectations, and tool-use boundaries are clearly communicated and understood by all stakeholders. When combined with the diagnostic AWARE™ Index, this governance framework offers a scalable, modular, and culturally contextual solution for business schools seeking to shift from reactive control toward constructive, responsible enablement.

Institutional Scenarios: How These Frameworks Can Be Used

Implementing the AWARE™ and EduEthics³™ frameworks requires contextual adaptation across institutional layers. While the models offer structured tiers and metrics, their impact depends on how they are operationalized in real B-school scenarios. This section outlines four practical pathways for integration.

Curriculum Alignment (Tier 3)

Institutions scoring high on readiness—either through AWARE™ diagnostics or faculty assessment—can move directly to structured integration. This may include embedding tool-enabled assignments within core subjects, setting guidelines for responsible use in project work, or even introducing dedicated courses on digital judgment and ethical decision-making. Rather than treating BYOAI as an exception, these programs can normalize its use within pedagogical boundaries. This perspective aligns with findings from global case reviews, which highlight the importance of intentional, faculty-supported GenAI integration into higher education settings (Belkina et al., 2025).

Faculty Sensitization (Tier 2)

Where students show partial readiness, institutional action must start with faculty. Many instructors express discomfort or uncertainty around AI tool use in the classroom, especially with evolving expectations of originality and effort (Lyu et al., 2025). Faculty development sessions—grounded in real student behavior and ethical dilemmas—can demystify BYOAI and support constructive supervision. Templates for AI-disclosure statements, grading policies, or redesigned rubrics can help reduce subjectivity and suspicion. Faculty readiness plays a critical role in mediating GenAI's impact in classrooms; structured development programs that combine pedagogical training with tool-specific scenarios are increasingly seen as essential for sustainable adoption (Wang et al., 2024).

Foundational Onboarding (Tier 1)

For incoming students or cohorts with lower readiness scores, foundational literacy and ethics modules are essential. These can be integrated into orientation programs or delivered as short, mandatory non-credit sessions. Topics may include responsible AI use, distinguishing between assistance and automation, and navigating plagiarism boundaries in the context of BYOAI. This anticipatory investment helps foster a culture of academic integrity from the outset (Ma et al., 2025). Emerging evidence also points to the value of pairing ethical orientation with structured skill-building, such as training students to craft effective prompts and evaluate AI-generated responses in context (Garg et al., 2025). When designed thoughtfully, such onboarding builds not only compliance but capability.

Placement Readiness and Digital Credibility

Beyond academic performance, institutions now face a growing obligation to ensure that their graduates are not only employable but also credible in a digital-first landscape. As recruiters become increasingly aware of AI-assisted submissions in resumes, SOPs, and interviews, the line between individual merit and machine augmentation is blurring. To bridge this trust gap, institutes could integrate BYOAI-readiness as a formal component of placement portfolios—such as self-declarations, structured tool logs, or ethical usage certifications. This shift would assure stakeholders that students are not just tech-savvy but also ethically grounded. Studies have emphasized the growing industry demand for students who demonstrate both digital competence and responsible technology use (Abdo-Salloum & Al-Mousawi, 2025). These trends echo the National Education Policy 2020's call for workplace-relevant, future-ready education, where ethical orientation is seen as central—not supplementary (Government of India, 2020).

Ultimately, these frameworks are not just academic instruments—they are levers for trust, transparency, and transformation. Whether implemented through handbooks, LMS plugins, or mentor groups, the point is not to control student behavior, but to shape it. Institutional trust depends on it.

A Call for Academic Foresight

The rapid adoption of generative tools by students is not a temporary disruption—it signals a deeper shift in how knowledge is accessed, processed, and represented. BYOAI is no longer confined to tech-savvy early adopters; it has become part of the daily academic routine for many learners across Indian B-schools. This change impacts not only classroom interactions but also institutional credibility, assessment integrity, and graduate readiness.

To treat BYOAI as just another compliance problem would be a missed opportunity. It reshapes three core dimensions of management education—pedagogy, by introducing new ways of constructing and evaluating learning; ethics, by challenging long-standing norms around originality and authorship; and employability, by raising questions about whether students are gaining durable skills or just learning to outsource tasks. Institutions that ignore these shifts risk falling behind not only technologically but also reputationally.

The current vacuum in academic governance, especially in the Indian context, leaves faculty unsupported and students unprepared. Many institutions either react with blanket bans or choose inaction, waiting for regulatory directives that may arrive too late. But leadership in education cannot be outsourced to policy timelines.

What is needed now is pragmatic foresight—an institutional posture that accepts the inevitability of BYOAI and engages with it constructively. Our proposed frameworks do not call for surveillance or suspicion; instead, they offer structured scaffolding that protects academic integrity while allowing innovation. This is not a compromise—it is a recalibration. Indian business schools have the opportunity to lead globally in responsible GenAI adoption—if they act deliberately, locally, and soon.

Next Steps

This perspective is grounded in an initial pilot study involving 102 students from Indian B-schools. Building on these insights, an expanded empirical phase is now underway with a target sample of 300 participants across diverse institutions. This next phase will test the reliability and applicability of the AWARE™ and EduEthics³™ frameworks using validated instruments and scenario-based feedback.

The broader goal is to shift the discussion on BYOAI from reactive anecdotes to structured evidence. Findings from the ongoing study will inform a full-length research article aimed at high-impact journals in the areas of education management and digital transformation.

We also recognize that the future of BYOAI governance cannot be shaped by academic institutions alone. We welcome collaboration across stakeholder groups—including B-school faculty, curriculum designers, policy makers, EdTech innovators, and student bodies—to refine these frameworks and develop shared principles for responsible use. The voice of employers, too, will be crucial as placement-readiness becomes intertwined with digital judgment and tool literacy.

This work is not a finished model but a starting point. Our intent is to co-create a responsible pathway where innovation and integrity coexist. Institutions willing to participate in joint pilots, data pooling, or curricular experimentation are encouraged to engage as part of this evolving academic coalition.

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E-WASTE MANAGEMENT AND PUBLIC AWARENESS

with special reference to Smart City Pune.

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Abstract

In today's digital age, technology is growing at a rapid pace. As a result, the use—and disposal—of electronic devices like smartphones, computers, and televisions has increased dramatically. This has led to a growing problem known as **electronic waste (e-waste)**. According to the **Global E-Waste Monitor 2024**, the world generated over **62 million metric tonnes** of e-waste in 2022, and only about **22%** of it was properly recycled. India is currently the third-largest producer of electronic waste (e-waste) globally, generating approximately 1.75 million metric tonnes (MMT) in 2023–24, a sharp rise from 1.01 MMT in 2019–20. Despite improvements, only about 43% of this e-waste is formally recycled, leaving over 990,000 tonnes untreated each year. The majority of e-waste, nearly 95%, is handled by the informal sector using unsafe and unregulated methods, posing serious risks to health and the environment. Key contributors include households (70%) and urban centers, with 65 cities accounting for over 60% of national e-waste. To address this, India introduced the E-Waste Management Rules 2022, which expanded the number of regulated electronic items from 21 to 106 and mandated Extended Producer Responsibility (EPR), requiring producers to recycle a minimum of 60% of their products in FY24, rising to 80% by FY28. There are currently 322 registered recyclers with a combined processing capacity of about 2.2 MMT annually. The informal sector continues to dominate due to low public awareness and weak collection systems, although initiatives like upcoming e-waste eco-park and tech-driven collection platforms aim to shift the landscape. India's e-waste sector holds an estimated \$6 billion in recoverable value, much of which remains untapped.

E-waste contains harmful substances like **lead, mercury, cadmium, and brominated flame retardants**. If not disposed of correctly, these toxic materials can leak into the soil, water, and air, causing serious damage to the environment and human health. As newer electronic products continue to replace older ones, managing e-waste has become more urgent than ever. **Effective e-waste management** means collecting, recycling, and safely disposing of electronic waste in ways that reduce harm to the planet. One of the biggest challenges is the **lack of public awareness**. Many people do not know the dangers of throwing away electronics in the trash or the benefits of recycling them. As a result, large amounts of e-waste end up in landfills or are handled by informal recyclers using unsafe methods.

This paper attempts to decode the current awareness about the E-waste management practices, disposal of E-waste, Awareness about the risk related to environmental impact of the improper E-Waste disposal. The researcher has collected the primary data from the citizens of the Smart city Pune and analyse the current situation in the context of E-Waste.

Keywords

E-Waste, Smart City Pune, UN-SDG, E-waste Disposal, E-waste Awareness Drive, Harmful Chemicals of E-Waste.

Introduction

Definition of E-Waste

Any electrical or electronic equipment, in whole or part, discarded from manufacturing and repair processes, meant for disposal is defined as the E-Waste (Management) Rules, 2011 in India. Again, it was redefined as discarded items from consumers or bulk consumers, along with rejects from manufacturing, refurbishment, and repair in the E-Waste (Management) Rules, 2016. This clearly reflects the evolving nature and significance of environmental management, and differences of the interpretations and definition of the e-waste over time by different national and international organizations. E-waste is defined as all types of electrical and electronic equipment (EEE) and their components discarded without the intent of reuse, by the Step Step (Solving the E-waste Problem) white paper (2014). Further nearly all household or business items containing circuitry or electrical components powered by electricity or batteries, are included by the Global E-waste Monitor (2017) while expanding the same. The components and consumables, of any electrical or electronic equipment that is discarded as waste, is defined as e-waste by the EU WEEE Directive (2002). There are some other definitions also. For example, the Rajya Sabha (2011), characterizes e-waste as obsolete, surplus, or broken electrical and electronic devices no longer usable or the OECD (2001) that considers e-waste as an electrically powered appliance at the end of its life. The StEP initiative (2005) adds a supply chain perspective, defining e-waste in terms of its collection, refurbishment, recycling, and processing after consumer use. E-waste is also defined as inclusive of all components and sub-assemblies of electrical and electronic equipment, excluding batteries, by the Hazardous Wastes (Management and Handling) Rules, 2003.

Composition of E-Waste

A broad range of products such as information technology and telecommunications (ICT) equipment, large and small household appliances, consumer electronics (CE), toys and leisure/sports equipment, medical devices, electrical and electronic tools (E&E tools), monitoring and control instruments, , lighting equipment and automatic dispensers etc. are termed as e-waste According to the EU WEEE Directive (2002) tracking of e-waste components and regulatory labeling is possible with these categories. The classification in India by the Ministry of Environment and Forests (MoEF,2008) is done by dividing it into three broad categories - IT and telecom equipment, large household appliances, and consumer electronics. This categorization provides a simpler framework for national policy development and management, and recognizes the heterogeneous nature of e-waste.

Whereas, the classification by The Basel Convention (2013) is based on the functionality and reuse potential of electronic items is a more nuanced classification. It distinguishes between

new and functioning equipment, used but functional items suitable for direct reuse, used and non-functioning but repairable items, and finally, irreparable and waste equipment—essentially WEEE. This helps in ensuring compliance with environmental protocols and managing cross-border movement.

A highly detailed six-category classification is provided by Baldé et al. (2015a) and it includes:

1. **Temperature exchange equipment** – e.g., refrigerators, air conditioners, heat pumps.
2. **Screens and monitors** – e.g., TVs, laptops, tablets.
3. **Lamps** – e.g., fluorescent, LED, and high-intensity discharge lamps.
4. **Large equipment** – e.g., washing machines, stoves, large printers.
5. **Small equipment** – e.g., toasters, radios, electrical toys, small tools, and small medical devices.
6. **Small IT and telecom equipment** – e.g., mobile phones, GPS units, routers, PCs.

Current Status of E-Waste in Pune

(Pune Municipal Corporation, 2021) Due to rapid urbanization, increased consumption of gadgets, and shorter product life cycles, Pune is witnessing a sharp rise in electronic waste (e-waste). It is one of India's leading tech hubs. (India Today ,2012) The city of Pune generates nearly 20,000 tonnes of e-waste annually. Pune generates 20,000 tonnes of e-waste annually; most ends up in informal sector.

(PoornamEcovision Foundation., 2020) Most of the e-waste ends up in informal recycling sectors that lack environmental safeguards, and only around 20% is processed through formal channels. In Pune NGOs like SWaCH and PoornamEcovision work in collaboration with the Pune Municipal Corporation (PMC). The work is carried out to improve the situation through initiatives like the PEHEL campaign, under which hundreds of temporary and permanent collection centers are set up in the entire city. The infrastructure that is available is insufficient to handle the scale of waste generated, and the awareness among citizens remains low. Due to unsafe dismantling practices, adopted by the informal sector which dominates the e-waste recycling, there is always a danger of exposure of workers and the environment to hazardous substances. High operating costs and limited public engagement are the problems faced by the Formal recyclers and e-waste processors such as ServCare and Clean Geosphere who offer authorized solutions. Take-back programs are introduced by retailers like Croma and Xiaomi. Pune requires to integrate and upskill informal workers, enhance public education campaigns and expand its recycling infrastructure for the improvement. The key to sustainable e-waste management in the city is, greater community participation and Stronger enforcement of Extended Producer Responsibility

Review of Literature

(Joseph K.,2007) In India we find the e-waste problem is a consequence of some shortcomings such as poor inventorization, unsafe informal recycling, weak legislation, low public awareness, corporate inaction etc. This paper analyzes the e-waste management in India and identifies these major factors. These factors result not only in the loss of the valuable resources due to the improper disposal but also the hazard of toxins that enter the environment. It is emphasized in this study that the manufacturers, importers, recyclers, regulators and consumers must work together with shared responsibility then only the collection and the recycling will be improved. It will also be helpful, it is suggested, to adopt the strategic interventions based on ongoing Indian initiatives in tackling the environmental and health impacts of e-waste effectively.

(Borthakur A. & Sinha K, 2013) In India e-waste management practices and policy initiatives are lacking, whereas the booming electronic markets and consumer demand for electronic products is creating an increasing volume of e-waste. serious health and environmental risks are arising due to the current state of storage, processing and disposal methods. The formal recycling systems are showing very slow progress, resulting in the use of informal sector dominance in the disposal activities. The study notes that policy efforts are relatively recent and are insufficient considering the pace of e-waste volumes and the variety that is added every day.

(Md. Sahadat Hossain, Sulala M.Z.F. Al-Hamadani, 2015) The rapid growth in technological and economical fronts is resulting in the E-waste as a fastest growing waste stream around the world. The health risks, and problems of ecosystem and sustainable development are the result of improper disposal of the waste. Poor recycling systems, and infrastructure is the problem that developing countries face. There are multiple dimensions on which a country needs to work to address the problem of e-waste including the development of integrated sustainable methods across societal, environmental and technological dimensions.

(Needhidasan S., 2014) The annually generated e-waste estimates for India by the year 2013 is between 0.4 to 0.6 million tons. The problem develops out of propositions due to the poor infrastructure, lack of awareness, and improper disposal methods. In developing and implementing the sustainable management solutions, the policy makers face the challenges of health and environmental risks due to the imported and domestic e-waste.

(Jalal Uddin M.D., ‘E-Waste Management’, 2013) The fastest-growing waste streams, which is projected to double in the volume is of E-waste, comprising metals, plastics, and glass. The serious problem of pollution is really caused by the improperly recycled and exported e-waste to the developing nations, though in reality about 95 % of it is recyclable. The urgent need for safe, regulated e-waste management is stressed by the case studies like Mahbubnagar.

(Osibanjo O.; 2009) For example, specifically in the developing countries like Nigeria the electronic waste increases with the growth of ICT. Such nations do not possess the proper infrastructure, legislation, and recycling systems for proper e-waste management, but still import the untested electronics.

(Ramesh BabuB., 2007) Long-term environmental risks are posed by the rise in electrical and electronic waste (WEEE) with the increase in urbanization and economic development. To promote reuse and recycling many nations have introduced legislation. For sustainable and eco-friendly e-waste management, effective waste processing and material recovery is important.

(Needhidasan S., 2014) By 2013 India is projected to generate 0.5-0.6 million tones of electronic waste. Globally, electronic waste poses the biggest challenge. The improper waste handling, due to the toxic components harms the health as well as the environment. The weak infrastructure, growing imports, and urgent need for advanced and safe recycling methods are identified as the major requirements for action by this study.

(McPherson D., 2010) Cathode ray tubes (CRTs) need to be identified as hazardous waste as they fail to comply with the toxicity standards, as per the EPA assessment. Also, high levels of silver, lead, cadmium, and chromium are present in the other desktop computer components and so they fail the safe toxicity standards, To reduce the e-waste hazardous impact the strategies like EMS, ISO 14001, EO 13148 and EPP are recommended by the study.

(Kumar A. 2013) Rising e-waste and pollution problems are the result of technological advancement. Soil and groundwater are contaminated due to the improper disposal of the waste. a large amount of e-waste is generated by the industry through digitization. As per revelation of the awareness survey of E-waste (M&H) Rules, 2011, only a few industries are active in addressing the safe management of e-waste. The survey highlights the need for greater awareness and compliance by the industry.

(Hieronymi K., 2012) The global e-waste is increasing with the greater demand for the electronics, and limited resources like indium. A shift toward sustainable, cost-effective disposal methods, aiding policymakers and stakeholders in e-waste management is required as per author. This study underlines the innovations in recycling, regulatory frameworks, and macroeconomic influences, while exploring the current and future trends in e-waste.

Globally 46% contribution to the e-waste is from the households, that is followed by the IT and telecom devices. A majority of e-waste is left as it is without recycling. Global e-waste management initiatives are prompted by the growing environmental and health concerns. The key players that support the management are SIMS, Umnicore, and Stena Metall AB. The urgent need for effective global management is highlighted by organizations like StEP and NCER. The contribution to the e-waste in developing nations is from the U.S. which underutilize the recycling capacity and is a major exporter of used electronics. In Asia rising innovation drives the e-waste volumes, highlighting the importance of international recycling and regulation initiatives. Due to rapid electronic device usage and obsolescence the global e-waste market was projected to reach \$50 billion by 2020 and is growing at a CAGR of 23.5%. The Asia-Pacific leads in revenue, followed by Europe.

(pressreleasepoint.com,2016) In the year 2016 the e-waste generated is 44.7 million metric tons. E-waste generation is accelerated by digitization, on the other hand it also supports sustainable development. In the future, improvement in data sharing, and amplified global efforts in e-waste reduction and awareness is expected, as a result of the cooperation, and stronger partnerships among electronics manufacturers and recyclers. Different UN agencies have launched 150 waste reduction projects since the year 2004, For the unified action and collaboration in e-waste management, different UN bodies have signed a letter of intent. These UN agencies, 20 of them, have launched 150 waste reduction projects since 2004.

In India over 90% e-waste is handled by the informal sector. The e-waste grows at an annual rate of 30% and the experts emphasize the urgent need for formalization, innovation, and investment to address this problem. Some of the solutions suggested by the experts are skilling initiatives through NSDC, building awareness hubs, and adopting models like Switzerland's PRO system for organized, tech-driven recycling etc. Some corporates like Tata Consultancy Services are adopting e-waste policies early and implementing the Extended Producer Responsibility (EPR), setting an example. A significant shift in the recycling sector is seen through India's 2016 e-waste management guidelines with the introduction of strict targets, expanded product coverage (like CFLs), and rigorous auditing mechanisms. The 2016 rules aim to make the e-waste management accountable, transparent, and business-friendly.

In just two years ending in 2016, Global e-waste increased by 8%, reaching 44.7 million metric tonnes out of which only 20% was recycled. At present the world's 66% population is covered by national e-waste regulations, which was just 44% in 2014. This shows some progress on the regulatory front. UNU, ITU, and ISWA lead the Global E-Waste Monitor 2017. GEM stresses the urgent need for consistent policies, reliable data, and global cooperation. Major economic losses are caused by the low recycling rate. In 2016 alone, it is estimated that about \$55 billion worth of recoverable materials were wasted. Initiatives like the Global E-waste Partnership aim to help countries track, manage, and reduce e-waste while promoting sustainable ICT growth.

(www.alliedmarketresearch.com, 2020) The global e-waste management market is growing rapidly due to the shorter device lifespans and constant technological upgrades. By 2020 it is projected to reach \$49.4 billion. In 2012, China, the U.S., and the UK were the major contributors and the e-waste produced globally was 50 million tons. In many regions of the world the regulations remain low in spite of the growing awareness and volumes. The higher disposable incomes and innovation lead to the replacement of the devices instead of repairing. This adds significantly to the problem of managing the e-waste. Better e-waste management practices are increasingly being followed with greater awareness and regulations support. A closed-loop recycling using recovered plastics is pioneered by the Dell company.

(unenvironment.org, 2015) The impact of illegal e-waste dumping is valued at nearly \$19 billion annually. This is mainly from the mismanaged PC and smartphone e-waste, which accounts for 60 to 90 percent of the electronics waste. Environmental degradation is only one of the aspects. It also leads organized crimes of tax fraud, and money laundering. The action is needed on an urgent basis as the global e-waste amounts to 50 million tons. Raising awareness, mandating waste return, enhancing surveillance, conducting global audits and strengthening legal frameworks is suggested in the study. For the effectiveness of the sustainable e-waste management practices and for combating illegal trade, strict regulation and international cooperation is important.

Singh A. & Bagai D. (2014), Serious environmental threats are posed by the informal sector that is unregulated. It violates the regulations that are already in force. The Indian e-waste is dominated by the informal sector. Legislation such as the E-Waste Management Rules (notably revised in 2016 and 2022) are introduced by the Indian government, but the compliance is still weak. These new regulations require testing by the Bureau of Indian Standards, restrictions on hazardous substances, and an annual e-waste return by all stakeholders. This also includes the bulk consumers like government institutions. structured recycling services are offered by Some formal recyclers under extended product responsibility (EPR). Expanding the authorized recycling infrastructure, enforcement of compliance is required by the Indian government for

ensuring the sustainable e-waste management. This sector can be leveraged for the growth in entrepreneurship and creation of green jobs.

Victor S.P. and Kumar S.S (2014) The future growth and competitiveness of India's electronics and IT sector, depends on defined policies, norms and strong environmental management. The growing complexities of global supply chains require stringent environmental compliance norms. The Indian electronics industry needs to address it well. Actions to reduce e-waste generation are recommended by the study, as well as planned obsolescence from the government sector. In the public sector procurement, using the 3R principle of reduce, reuse and recycle, is the mainly recommended. India can lead by example in promoting sustainable electronics consumption and minimization of e-waste by extension of the functional life of electronic devices mainly in the government sector. The cleaner technologies and recycling initiatives are required globally, and the companies must adopt sustainable practices and avoid high costs of compliance.

Research Methodology

Primary Data Collection

PEHEL stands for Plastic & E-waste Handling for Eco-friendly Lifestyle. Since last few years PMC, Cummins India Foundation, KPIT & social organizations organize, PEHEL, a mega-drive across Pune City for awareness & collection of E-waste & Plastic. It was held on 23rd February 2025 between 9 am to 1 pm.

MM's IMERT first year student, Ms. Esha Deshpande actively volunteered at the Dhayri, Pune branch. The initiative aimed to promote environmental responsibility and proper waste disposal. The drive saw an encouraging participation of 50+ people, who contributed by donating their plastic and e-waste materials. As a volunteer, she helped manage the collection process and guided participants throughout the event. By the end of the day, all the collected waste was efficiently loaded and transported by designated trucks for safe disposal and recycling. Further the collected E-waste is segregated. Repairable E-waste is refurbished & donated to the needy. Non-repairable E-waste is handed over to MPCB Authorized Recyclers. Plastic waste is handed over for recycling through scientific methods by authorized recyclers. As This program focuses on mitigating pollution, protecting human health, conserving resources, creating economic opportunities, and promoting sustainable practices to build a healthier and more sustainable planet.

The researcher shared the questionnaire with the participants and appealed to them to forward the same to the environment conscious acquaintances hence the “snowballing”- Non-Probability Sampling. The final sample size was 156 Respondents. To ensure the questions consistently measure the same construct, calculate Cronbach's alpha. Is $\alpha = 0.82$, shows the instrument has good reliability.

https://poornamecovision.org/events/mega-drives/pehel-2025-largest-e-waste-plastic-collection-mega-drive-pune?srsId=AfmBOoqD4_NnCYxkdFsCjiX6VrJLoReU30US9qXtds9v65YJZsiqoX5n



Glimpses of PEHEL 2025 - Largest E-Waste & Plastic Collection Mega Drive of Pune held on 23 February 2025



Marathwada Mitra Mandal's IMERT, Pune's MBA First Year Student Ms. Esha Deshpande Volunteering for PEHEL 2025 - Largest E-Waste & Plastic Collection Mega Drive of Pune at Dhayri, Pune Branch.

For the data collection the study had used a mixed-method approach using the interviews for qualitative data and survey for the quantitative data. The secondary data used served to get the update on the current state of the e-waste management. Various Government and non-government sources available on-line as well as the websites and books on the subject were referred for the secondary data. The primary data was collected from the individuals through a survey questionnaire and it helped in the analysis of awareness of e-waste hazards, e-waste disposal practices and the willingness to participate in recycling programs.

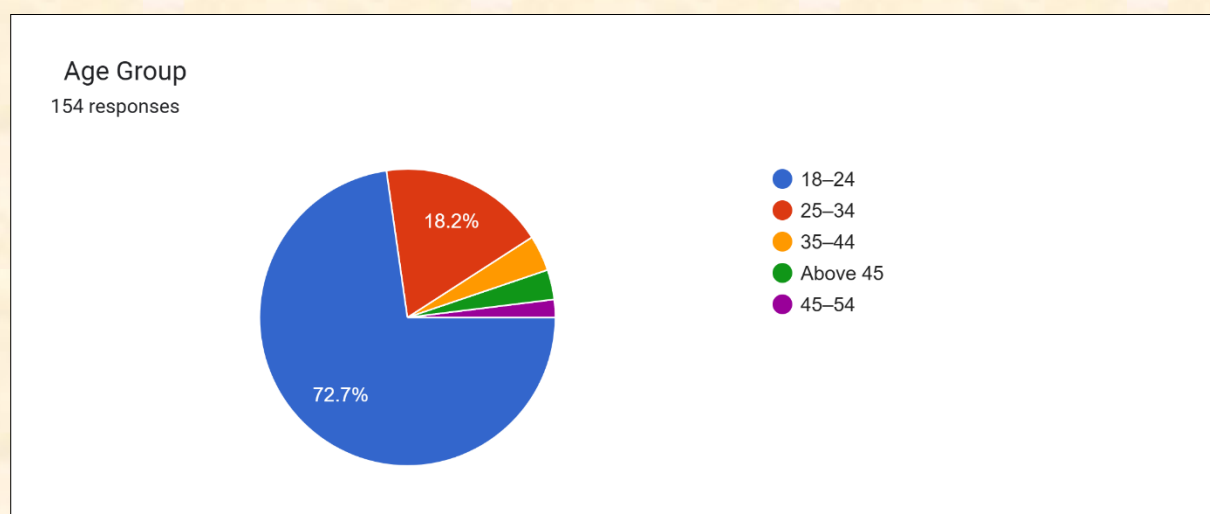
Scope

The data used was collected from the random respondents during the PEHEL 2025 - Largest E-Waste & Plastic Collection Mega Drive in Pune where Ms. Esha Deshpande was a volunteer.

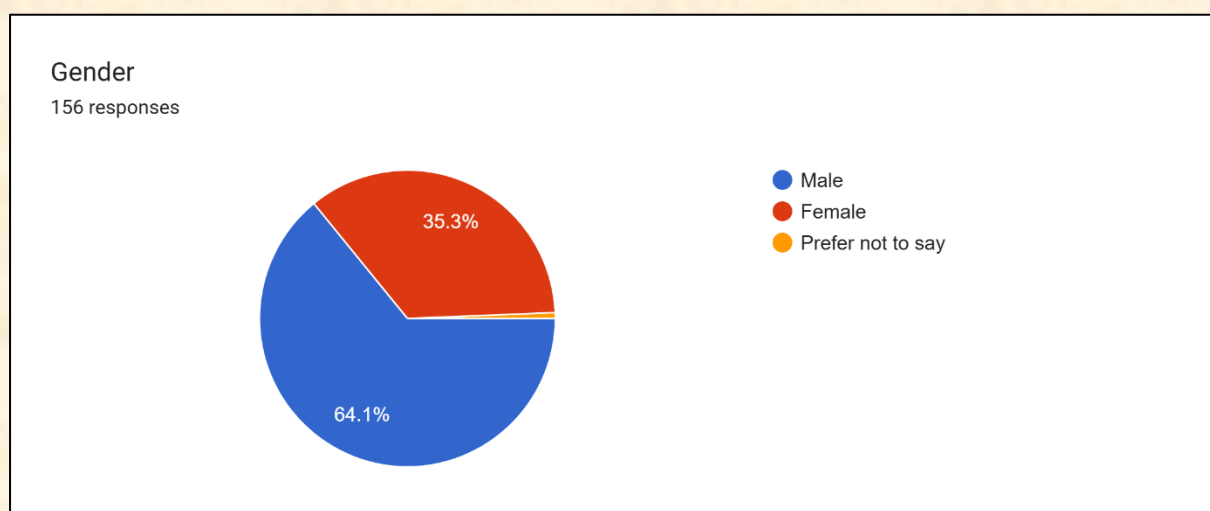
Limitations

For a city like Pune, it would be much appropriate to collect stratified data from different parts of the city. Further efforts should be aimed at the solution generation, creation of a network or institutional framework to channelize the efforts of like-minded citizens for on ground work with tangible impact rather than an awareness level enquiries or activities.

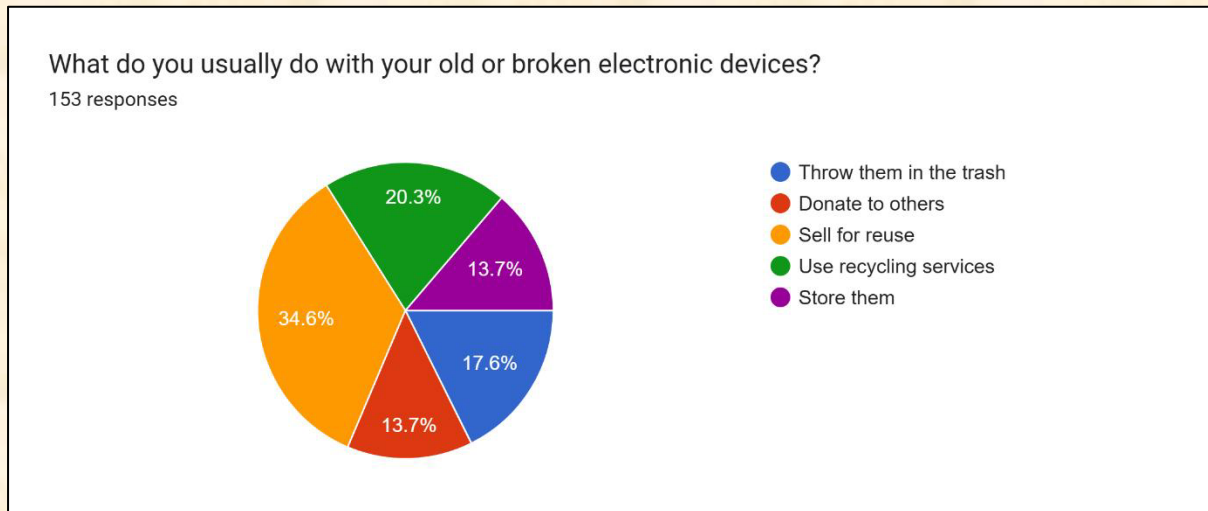
Data Presentation And Data Analysis



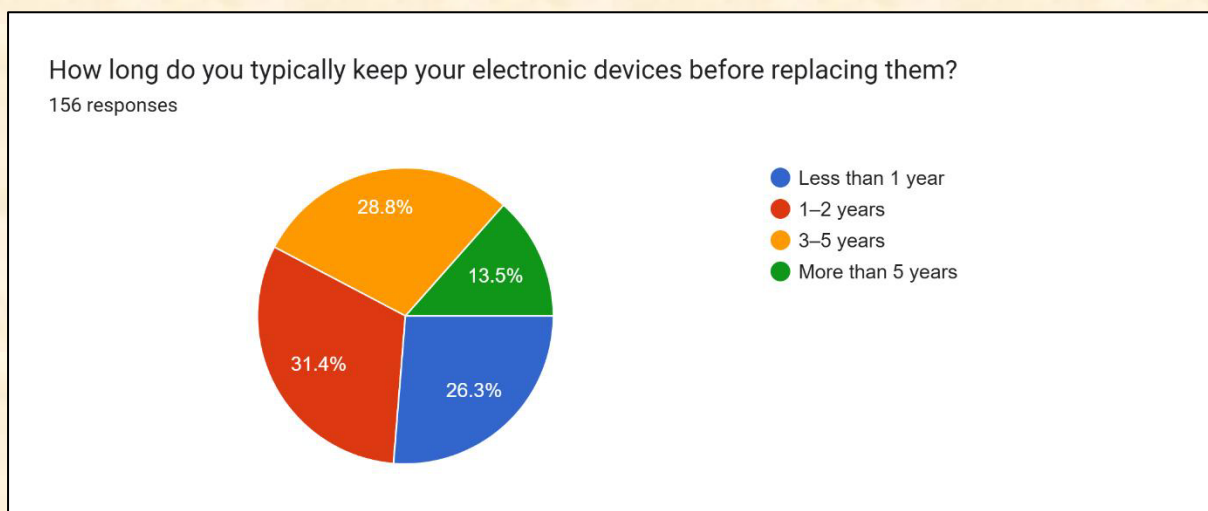
The respondents were the residents of the Pune city and belonged to the 18 years to more than 45 years of age. This age group is used because these age groups are very much active online, use electronic gadgets, have the required awareness, and maturity level to understand the subject of e-waste better. In most of the cases the respondents were also decision makers for purchase, use and the disposal decisions of electronic goods they use.



The researchers approached more than a hundred respondents for the study to make the analysis and conclusions worthwhile. The slight disparity in the gender composition is only due to the ease of accessibility. A substantial majority of the respondents (95.2%) reported to use the electronics devices daily. And slightly less but still many among them (89.7%) were aware of the e-waste concept. This is but obvious for a city like Pune with large student population, good living standards and the presence of industry.



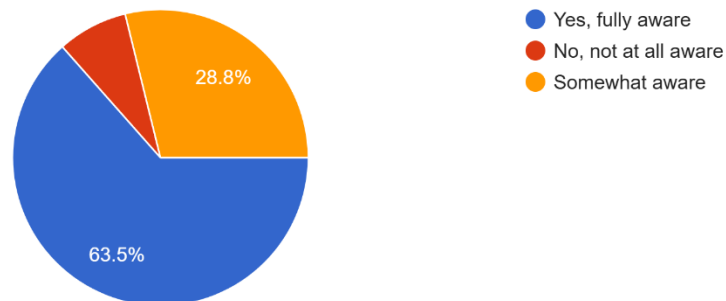
The disposal methods vary among different individuals. The percentage of responses ultimately resulting in the reuse of the electronics goods by other persons, namely – Donate, sell for reuse, and use recycling services, amounts to 68.70%. This indicates many things – like the surplus disposal income and tastes of the population to upgrade with the technological advances, tendency to purchase new goods even if there is life and service available in present goods, opportunities, incentives and avenues present in the market for the resell or reuse of the old goods, as well as the presence of buyers who require such goods and are ready to purchase it.



Slightly more than half the respondents use the electronics goods for more than 2 years. This in itself is a significant deviation from the recent past trends, indicating the tendencies shaped by factors like peer pressure, social acceptance through the possessions etc.

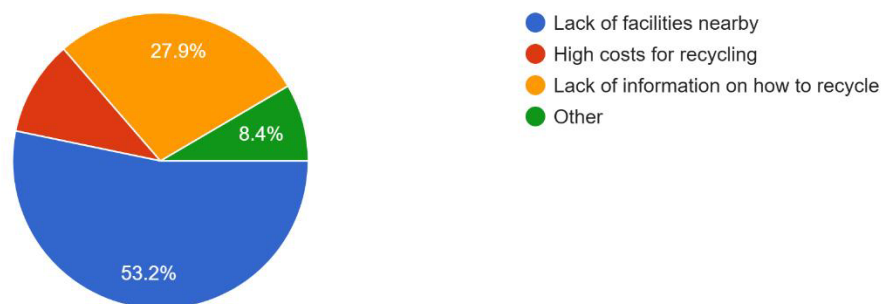
Are you aware of the environmental risks posed by improper e-waste disposal, such as soil or water contamination?

156 responses



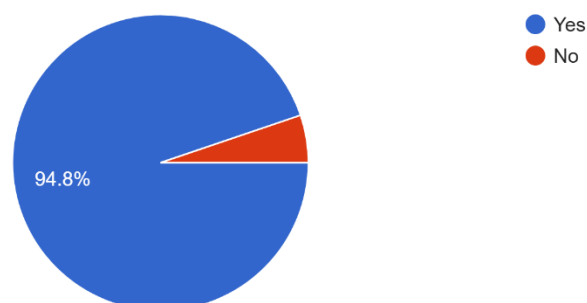
Are there any challenges you face in accessing e-waste recycling services?

154 responses



If offered incentives (e.g., discounts, cashback), would you be more likely to recycle your old devices?

154 responses

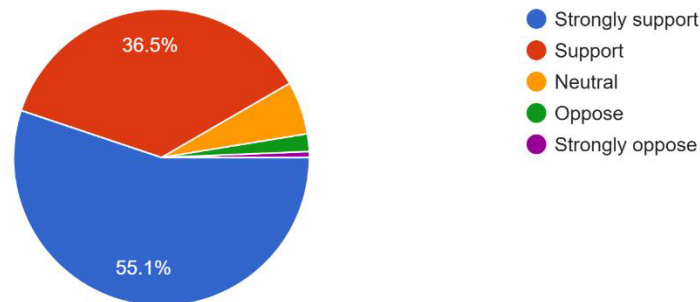


As to the awareness about the environmental risks posed by the improper e-waste disposal, 62.4 % are fully aware about it. This seems to be an alarming situation, and indicates the lack of understanding about an important aspect. Definitely there is a need for the awareness drives

for a better future, free of the problems created by the e-waste. On the other hand, 50% of those who are aware and want to dispose of the goods properly, do not have such a facility nearby or if it is there 30% do not know about it. So, we need more disposal facilities and need to create awareness about its presence. A substantial number (94.6%) are ready to recycle if some incentives are available. This recycling will definitely help in empowering the people with weak economic background, at the same time reducing the menace of improper disposal.

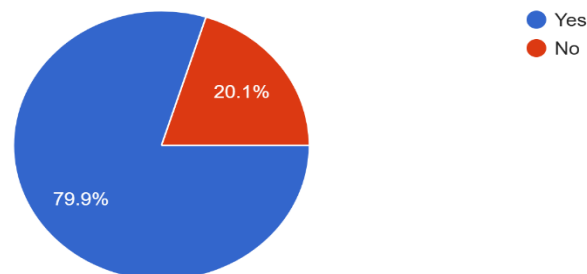
Would you support a government initiative to implement mandatory e-waste recycling policies?

156 responses



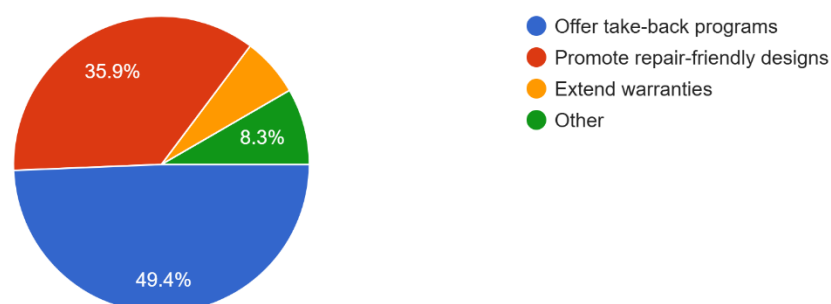
Would you participate in a community e-waste collection drive if organized in your area?

154 responses



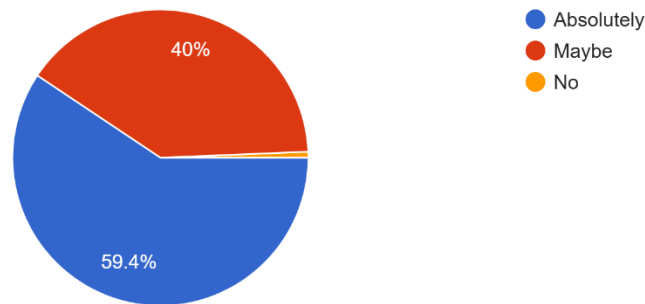
How can manufacturers and companies contribute to minimizing e-waste?

156 responses



Would you help companies in their CSR (Corporate Social Responsibility) for e-waste collection drives?

155 responses



A significant number of respondents - 86.2% are ready to support the government initiatives for recycling or ready to actively participate - 81.6%, in collection drives. This indicates not only the awareness but the socially responsible behavior on the part of the respondents. More than half respondents are ready to join the CSR efforts by the industries and of the remaining again, more than half indicate the inclination to do so. Respondents indicated the take-back programs as a first choice for minimizing e-waste (50.3%) followed by repair friendly design, extended warranties, and other as available alternatives choices.

To sum it up, we still need work to generate awareness, design and implement the ways and means to recycle or reduce the e-waste and increase the people's participation by monetary incentives and other methods. The study also indicates that it is not enough to create awareness and organize events but to create awareness about such e-waste collection drives and choose the convenient and nearby places for the same. People are ready to support the government as well as private industry in their initiatives for the proper disposal or recycling, but they expect monetary incentives in the process.

The original equipment manufacturers need to be more responsible in concept generation and design stages to minimize the environmental impact of their goods. It is also a responsibility of the industry to create awareness among the consumer about the importance of environmental impact and to recommend and make available the means for proper disposal.

Suggestions And Recommendations

- Awareness amongst the school and college students is increasing. Engaging the students in drives for e-waste management with a systematic schedule in different parts of the city, in their own locality, will be much effective.
- Collection for recycling and the proper disposal of e-waste can be made a part of industry CSR schemes.
- IT companies, dealers of electronic goods in the city can be approached for the technical help and support for the reuse/ disposal of e-waste.

- Organized efforts can be arranged in the city area to locate and stop and /or reduce the unlawful, harmful disposal activities. Local government should draft the guidelines for lawful and harmless disposal and reuse of E-waste impose the penalties for defaulters.
- There should be widespread awareness camps to organized for the Original Equipment Manufacturer and General Public at large about the E- Waste (Management) Rules, 2022

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Aligning Higher Education with Clean Energy Industry Needs in India

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Abstract

India is at an inflection point in its growth story, bolstered by a young and expanding population. However, this demographic advantage risks being squandered due to the poor employability metrics of these individuals. This can be attributed to a multitude of factors, including the stark disconnect between what universities teach and what industries actually require. Every year, thousands of graduates leave campuses only to find themselves ill-equipped for the demands of the job market. This challenge is further intensified by the onset of the Artificial Intelligence revolution, which is expected to overhaul the employment landscape entirely—eliminating several traditional roles while creating new ones that demand entirely different skill sets, often missing from current educational delivery.

This paper investigates the root causes of the education-employment mismatch with a particular focus on the clean energy sector—one of India's most promising arenas for sustainable economic growth and green employment. It envisions an evolved system that seamlessly integrates academic knowledge, vocational training, life skills, and real-world industry requirements.

As the country commits to ambitious renewable energy targets and climate action strategies, the clean energy industry demands a workforce equipped with interdisciplinary technical knowledge, digital literacy, and adaptive problem-solving capabilities. Unfortunately, these skills are often absent in traditional higher education models. Using doctrinal analysis and empirical evidence, this study identifies critical structural and pedagogical gaps in India's higher education system that inhibit the creation of an industry-ready clean energy workforce. The paper introduces the Curriculum Co-Creation Framework (CCCF), a collaborative model to realign academia with evolving green sector needs through initiatives like joint curriculum committees, stackable certifications, and faculty-industry exchange programmes. Drawing from global best practices and Indian case studies, the study emphasizes that India's education system must evolve into a proactive partner in nation-building—capable of preparing youth not just for employment, but for leadership in a decarbonized future. This research contributes a policy-aligned roadmap for bridging the education-employment divide and ensuring India's demographic dividend catalyzes a clean, resilient, and inclusive energy transition.

Keywords

Clean Energy Workforce, Industry-Academia Collaboration, Higher Education Reform, Skill Development, Curriculum Innovation, National Education Policy (NEP) 2020

Executive Summary

India's youthful demography is a crucial catalyst for economic advancement; nonetheless, the country contends with issues of underemployment and a skills mismatch within the labor market. Despite a large growth in the population of individuals aged 15 to 34 in recent years, recent data reveals a concerning prevalence of underemployment, especially among growing sectors. The clean energy sector, targeting 500 GW of non-fossil fuel energy capacity by 2030, offers a distinctive chance to address these challenges. The current educational structure must rapidly change to prepare the workforce with essential skills for success in this changing environment.

To optimize the prospects of green employment creation, projected to reach tens of millions by 2047, India's higher education institutions must reevaluate their functions. They must transition from only conferring degrees to proactively designing courses that correspond with industry requirements, emphasizing practical experience and multidisciplinary education. In doing so, schools and universities may more effectively equip students for emerging possibilities in the clean energy sector while assisting the nation in attaining its sustainability objectives. This strategy is crucial for transforming India's demographic dividend into substantial jobs and a stronger economy.

Introduction

The demographic dividend of India and the threat of underemployment

The youthful demography of India is a significant catalyst for economic growth, social development, and technical progress. This asset risks becoming a liability due to ongoing underemployment and skill mismatches. Young individuals encounter considerable obstacles, including precarious employment—such as unpaid labor and informal self-employment—and restricted access to quality job opportunities.

The nation is in the midst of a demographic transition. Between 2001 and 2021, the youth population (aged 15–34) increased from 353 million to 464 million. However, it is projected to slightly decline to 458 million by 2026, marking a possible inflection point for India's demographic dividend (Rameshkumar, 2017). Although recent Periodic Labour Force Surveys (PLFS) as shown in Table 1 indicate a decline in youth unemployment rates—from 12.9% in 2020–21 to 10.0% in 2022–23—these improvements mask deeper structural issues in workforce readiness, particularly in high-growth sectors like clean energy (MOSPI, 2023).

The Clean Energy Sector: A Catalyst for Jobs and Sustainable Growth

India's clean energy sector presents an unprecedented opportunity to address both employment and environmental challenges. With a national target of 500 GW of non-fossil fuel-based energy capacity by 2030, the technologies used for clean energy such as solar, wind, green hydrogen, and electric mobility are rapidly expanding as depicted in Figure 1. These industries

not only drive innovation and energy security but are also expected to generate tens of millions of green jobs by 2047 (SCGJ, 2022; ILO, 2021).

However, realizing this potential requires an agile, responsive, and skills-oriented higher education system. While government policies such as the National Green Hydrogen Mission, the Production Linked Incentive (PLI) schemes, and state EV policies provide a strong policy framework, the academic system remains largely outdated, slow to adapt, and poorly integrated with real-time industry requirements.

As per International Labour Organization (ILO), India will generate 54 million green jobs across all sectors between 2021 and 2030, while Skill Council for Green Jobs (SCGJ) has projected 30-35 million jobs will be created across green sectors in India by 2047. (SCGJ, 2022)

Some of the key sectors which have a huge potential for the green jobs are captured in Figure 2.

Importance of aligning higher education with evolving job markets

The clean energy sector is clearly emerging as a hotbed of innovation, investment, and intellectual capital. Industries are actively seeking individuals equipped with the right skill sets to support this transition. It is important to underscore that job roles in this sector are becoming increasingly sophisticated, requiring a combination of technical, policy, and business-oriented competencies. Additionally, entirely new roles are emerging along the downstream segments of the clean energy value chain, further expanding the scope of employment opportunities (Narayan, 2025).

At the same time, a critical facet demanding immediate attention is the transformation—and in some cases, the obsolescence—of existing job roles in traditional sectors. However, this does not imply an overall decline in employment. Instead, it signals a structural shift in workforce demands, underscoring the urgent need for targeted reskilling and upskilling initiatives to prepare workers for emerging ‘sunrise sectors’. These adaptive learning strategies are becoming foundational to the future job market.

In this context, India's higher education institutions must evolve beyond their traditional function as passive degree-granting entities. They must take on an active role in co-creating employable skills aligned with the needs of the clean energy economy. This transformation calls for a comprehensive reimagining of curricula, pedagogical approaches, and institutional governance—emphasizing multidisciplinary education, experiential learning, and deep industry engagement. Only through such systemic change can India simultaneously meet its sustainability goals and harness the full potential of its demographic dividend.

Clean Energy in India: Sectoral Growth and Skill Demands

India is at a critical juncture in aligning its developmental goals with its environmental obligations. This section maps the high-growth subsectors in the clean technology space with their respective workforce implications.

Clean Energy Sub-Sectors and Workforce Implications

India's clean energy transition is unfolding across multiple high-growth sub-sectors—including solar, wind, energy storage, electric mobility, and green hydrogen—each carrying distinct workforce demands. While these sectors offer immense potential for green job creation and economic development, they simultaneously expose deep systemic shortcomings in India's current higher education and training frameworks (Tyagi, et al., India's Expanding Clean Energy Workforce 2022 Update, 2023; Arunabha , et al., 2016).

For instance, the solar sector's rapid capacity expansion, largely driven by national missions and incentive schemes, has created demand for localized technical expertise in installation, grid integration, and decentralized systems management. Yet, academic institutions continue to lag in providing specialized, hands-on training aligned with these needs (Ghosh, et al., 2016). Similarly, the wind energy sector—especially with emerging offshore projects—requires interdisciplinary knowledge in marine, electrical, and digital systems, which is currently missing in mainstream engineering curricula (Tyagi , et al., 2023).

The growth of electric mobility and energy storage presents further complexity. As vehicle platforms evolve from internal combustion engines to electric drivetrains, and energy grids integrate advanced battery technologies, the skills required span electrochemistry, embedded systems, AI, and cybersecurity. However, most polytechnic and ITI programmes remain focused on legacy technologies, with limited incorporation of EV-specific content or digital competencies (Kuldeep & Ghosh, 2020).

Green hydrogen, a critical pillar of India's decarbonization roadmap, introduces new safety, chemical, and engineering requirements. The absence of structured certification pathways and limited faculty capacity in hydrogen-related disciplines highlights the pressing need for curriculum innovation and institutional re-skilling (Tyagi , et al., 2023).

What unites these diverse sectors is the urgent need for a skilled, adaptable, and future-ready workforce. The fragmentation in training delivery, the rigid structure of academic departments, and the lack of coordination between universities and industry collectively hinder workforce readiness (Kuldeep & Ghosh, 2020). Addressing these challenges requires a systemic overhaul—embedding real-time industry feedback into curricula, promoting interdisciplinary education, and fostering co-created learning models that prepare students not just for employment, but for innovation leadership in a green economy.

Impact of AI and automation on cleantech employment.

As clean energy systems is getting decentralized, work has become more digital and interdependent. For example, AI-powered predictive maintenance is now being used in grid operations and renewable energy equipment, allowing employees to monitor drones and sensor data instead of carrying out real time human inspections (Afridi, Ahmad, & Hassan, 2021). New jobs, such as Energy Data Scientists, AI/ML Engineers, Digital Twin Specialists, and Cybersecurity Analysts, combine energy knowledge with software, analytics, and system design (Toplic & Berg, 2024).

Such skillset patterns make upskilling important. Workers must be able to code, read data, and be aware of artificial intelligence, as well as think strategically and adapt as the system demands. Training programmes and vocational courses must incorporate AI and digital

modules into traditional engineering tracks, as well as develop industry-academia collaborations in order to create worker resilience rather than simply avoiding displacement (Boles, 2024). At the same time, these programmes should closely examine skill sets that are unlikely to be replicated by AI in the coming decades, and ensure that training around these areas is effectively mainstreamed (Kosslyn, 2019).

Gaps in Higher Education: Structural and Pedagogical Barriers

While 36 percent of Energy industry in India identifies technological driven transformation in business, with increased investment on energy technologies, around 45 to 50 percent of global employers expect an increase in use of technological literacy, and AI and big data related skills by 2030, and 38 percent of India's workers current core skills are projected to be disrupted from 2025 to 2030 due to evolving economic demands (WEF, 2025).

India to achieve its Net Zero goals and succeed in its clean energy transition, higher education institutes must reconfigure themselves as agile actors than can respond to policy priorities and market trends. To address the skill gaps, higher education institutes must evolve from being a passive supplier of graduates to active co-creator of knowledge, equipping the youth with industry ready skills.

As a result, examining the gaps in higher education becomes essential. The weak linkage between the academia and industry is a multi-layered challenge encompassing from curriculum structure to pedagogical practices to institutional inertia.

Analysis of curriculum limitations in addressing industry needs.

For a smooth shift towards a clean energy economy, industry ready workforce with experts (who can apply sector specific technical knowledge across domains such as Solar energy, Wind energy, green hydrogen, energy storage and renewable energy grid integration, etc.,) are required. However, despite the rapid adoption and deployment of clean energy there is a significant stagnancy in workforce skills due to the inefficiency of our education system and lack of suitable curriculum. While the wind energy industry is employing workforce from coal industry, the solar industry is employing workforce from oil and gas industries combined in even developed countries like USA (Murphy, 2024).

The major limitation is the fundamental mismatch between the education offered and the clean energy industry requires (Hugo, 2018). The curriculum at the higher education institutes is becoming obsolete day-by day while the workforce remains unfamiliar with system components, operational procedures and safety standards. The emergence of new sectors with advanced technologies calls for employees with advanced analytical and business skills along the technical skills (CEEW, 2023). Though the restructuring of the curriculum is taking place in a superficial manner lacking required details (Jennings, 2009). They only provide a surface level overview of multiple clean energy technologies creating a dearth of job specific technical expertise.

Another structural limitation stems from the absence of course material and rigidity in restructuring the curriculum (Hugo, 2018). Universities often take too long to make any updates which delays the integration of emerging knowledge. These delays hamper the graduate's ability to keep up with real-world industrial needs eventually contributing to the increasing unemployment in the country.

Lack of interdisciplinary and hands-on training.

Although green jobs are emerging, the courses offered by the educational institute remain fragmented due to non-alignment the traditional education pathways with the evolving economy and green job needs (Murphy, 2024). Most academic programmes remain siloed within rigid traditional departmental structures lacking in interdisciplinary course work. This limits the student's exposure to multidisciplinary learning and systems thinking.

The supporting ecosystem for holistic learning is still nascent and slowly gaining its momentum (SCGJ, 2023). The key limitation of the offered courses their lack of emphasis on experiential and hands-on training. Unprecedented nexus with outdated classroom lectures and lab experiments leaves the graduates with minimal to no exposure to real-time projects and modern projects.

To reduce the training gaps, colleges can address this by utilizing industry connections and offering industry-relevant courses through the National Credit Framework, stackable credentials, and project and field-based learning (CEEW, 2023).

Faculty readiness and institutional inertia.

Faculty members are central to shaping a quality workforce for the national. However, such exceptional shaping of workforce requires exceptional faculty. As mentioned earlier due to the rigid departmental structure of universities the faculty are also not equipped with cross-sectoral knowledge. While the faculty have a limited autonomy over making any structural changes, they are tied back by long bureaucratic procedures, lack of incentives or even fear of deviation from standard frameworks (Murphy, 2024).

These structural constraints make it challenging for faculty to participate in curriculum reform or engage in co-creation of programme with industry partners. Even the uptake of initiatives or guidelines of national bodies like Skill Council for Green Jobs heavily depends on faculty initiative and administrative will.

Additionally, the absence of dedicated training-of-trainers (ToT) programme for the technologies used in clean energy aggravate the problem. As a result, implementing time to time ToT programmes and post training assessments become crucial to align skillset of trainers with advancing market demands (SCGJ, 2024).

Curriculum Co-Creation Framework (CCCF)¹: A Collaborative Model

The need for the Curriculum Co-Creation Framework (CCCF) originates from the growing disparity between what India's higher educational institutions now provide and what clean energy sector demands. As the clean energy sector grows rapidly, there is an urgent demand for job-ready personnel. Existing curriculum frequently fail to address cutting-edge industrial innovations, particularly in battery analytics, AI-integrated grid systems, and hydrogen safety

¹ The Curriculum Co-Creation Framework (CCCF) is a structured approach designed to foster ongoing collaboration among key stakeholders—namely, universities and educational institutions, industry employers, and policymakers or regulatory bodies.

standards (CEEW, 2023). This gap adds to increased structural unemployment and missed possibilities for innovation (FICCI, NASSCOM, & EY, 2024).

Furthermore, ineffective coordination among regulators, universities, and employers results in duplication in skill development initiatives and variable quality outcomes (The World Bank, 2020). The CCCF provides a formal push for institutionalizing discourse, streamlining curricular responsiveness, and aligning educational results with national requirements for sustainable energy transition. It will also help universities to stay future-ready, companies to secure a skilled workforce, and governments to achieve equitable and inclusive growth.

Overview of CCCF and its components.

The Curriculum Co-Creation Framework (CCCF) positions curriculum design as a shared duty among institutions, industry, and regulators which allows for a continuous and iterative process rather than one-time design initiatives. Core components of the CCCF include Joint Curriculum Committees, where faculty and industry experts convene regularly to update content based on evolving sectoral needs (National Institute of Educational Planning and Adm, 2020), Industry-Academic Labs that facilitate real-world problem-solving and hands-on learning and Policy-Aligned Incentives, such as regulatory flexibility for curricular revision and funding tied to placement outcomes in clean energy jobs (CEEW, 2023).

Implementing CCCF in clean energy education

The clean energy domains—solar, wind, energy storage, e-mobility, and green hydrogen—are distinguished by fast changing technology and regulatory contexts. Traditional engineering degrees often lack modules in battery management systems, smart inverters, EV embedded systems, and hydrogen safety which results in a significant skills-to-employment gap. The CCCF implementation process begins with a systematic mapping of these skill-to-employment gaps and advances to modular and stackable certifications linked with the National Skills Qualification Framework (NSQF) (Ghosh, et al., 2016). For example, integrating specialist certificates such as Suryamitra (solar), Vayumitra (wind), and green-hydrogen safety into academic programmes will definitely help students prepare for new responsibilities (Ministry of New and Renewable Energy, 2022).

Role of universities, industries, and policymakers.

Universities need to shift from rigid theoretical education to delivery of industry-curated modules, with faculty development centred on new technologies as developed from time to time. Given the rapid growth of clean energy processes, industry can shift from giving internships to fundamentally contributing to content through actual projects, lab sharing, and curriculum audit panels (Kumar & Majid, 2020).

Policymakers and regulators, including MSDE, MNRE, and entities such as SCGJ and NSDC, must provide enabling policies such as outcome-linked funding, streamlined curriculum approvals, and public-private councils that embed skills and industry standards in higher education (Ministry of Skill Development and Entrepreneurship, 2009). Their role is important in coordinating the CCCF with national programmes such as the National Education Policy (2020) and the National Solar Mission (2010), ensuring that India's education system maintains up with its clean energy goals.

Policy, Practice, and Global Inspiration

Education is like a brick that builds the basic building blocks for the future generation. The need for a framework that incorporates not only subjects with information but builds a mindset to think, innovate, and involves a lifestyle that turns into a habit of a healthy body and surroundings, including the sustainable development needed on the globe. The Clean energy industries and the Higher education of the nation will flourish with the incorporation of strong policy support and diligent practice among the stakeholders. The making as well as the implementation of the policies can be influenced and enhanced by witnessed global-inspired laws and systems. These international models can be applied in India, which can strengthen the country's workforce and students' learning pathway. The section describes the necessity of the role of the skilled councils and the vast support of regulatory reforms.

Review of NEP 2020 and related government skill initiatives.

The National Education Policy 2020, i.e., NEP 2020² Aims to portray Sustainable Development Goal 4, i.e., SDG4. The main focus of NEP 2020 is to include vocational training along with the standard education system. This policy learns from the existing policies' access, mandate, inclusivity, and equity. From early childhood care and education through higher education, significant reforms that introduce the greatest quality, equity, and integrity into the system are necessary to close the gap between the state of learning outcomes at the moment and the requirements. The education policy holds principles and visions to build a child into a human with ethics to create skilful knowledge to make good changes, educate others, provide service for the environment, and culture. The current higher education system carries a lot of problems, which are addressed and reformed with new initiatives aimed at equity and inclusivity. The issues such as unstructured higher educational ecosystem; less focus on cognitive skills and learning outcomes, limited institutional autonomy, limitations in socio economic backward areas, not up to the mark standards at higher education at affiliated universities, need to curb commercialization of Education and lesser take on research, creativity, innovation and ideology building education. Thus, these shortcomings are addressed and brought about the following substantial changes like increasing multidisciplinary universities and colleges, with at least one in or near every district with more local language instructions, establishing a National Research foundation fund for universities and colleges, appointing faculty and institutional heads through high merits as per their experience, merits. (NEP, 2020)

Effective Governance & leadership for Higher education programmes, as the leaders of education, should be themselves highly laborious, enlightened, and visionary to develop the mastermind of the next generation, so the governing bodies must be chosen effectively, starting from strengthening the central advisory board of education. Integration of technology use in Online and Digital education is one of the efficient and accessible higher education. Also, funding and financial assistance to the talents and for inclusivity of each bright mind, equal opportunity to all communities, age, and gender without fail, is an upfront goal in diverse ground of India.

As we can infer that education without in hand skills or soft skills is unfruitful and lacks implementation of the policy for a better future. To coordinate and streamline skilling initiatives, the Ministry of Skill Development and Entrepreneurship (MSDE) works with Central Government Ministries, State Governments, industry, non-profits, and academics. Over time, MSDE has taken on additional roles through various organizations and skilling schemes, including:

1. Pradhan Mantri Kaushal Vikas Yojana (PMKVY)
2. Pradhan Mantri Kaushal Kendra (PMKK)
3. National Skill Development Corporation (NSDC)
4. National Council for Vocational Education and Training (NCVET)
5. Jan Shikshan Sansthan (JSS)
6. National Institute for Entrepreneurship & Small Business Development (NIESBUD)
7. Indian Institute of Entrepreneurship (IIE)
8. Directorate General of Training (DGT) (MSDE, 2024)

The PMKVY is a scheme launched in 2015 to improve the unemployment epidemic in the nation by providing short-term skill training, certifications, and incentives under the Skill India Mission. It is currently in Phase four skill development initiative, or 2023 to 2026, which focuses on demand and decentralized training. Key takeaways of PMKVY 4.0 are training, including short-term training, Recognition of Prior Learning certification, and special projects in innovative or niche sectors. Digital Ecosystem integration in Higher Education, Green and Future skills, which involves clean energy and sustainability, Electric vehicle, AI, Solar energy development, and other innovative sectors in the renewable and computing sectors.

The private training partners selected through the RFP under this programme are eligible for secured credit of up to Rs 7 million per PMKK at a reduced interest rate in order to buy and set up labs, training-related equipment, training aids, etc. Additionally, PMKK centres will receive a three-year training mandate under the PMKVY Scheme, or as long as the programme is in place. As of March 31, 2024, 818 PMKKs covering 707 districts have been assigned, with the 818 PMKKs allocated 714 have been established.

The Startup Accelerator of MeitY for Product Innovation, Development and Growth-“SAMRIDH scheme” is mainly to cater to the startups in tech and IT. It aims to reinforce existing as well as upcoming entrepreneurs of MeitY for Product Innovation, Development, and Growth- SAMRIDH scheme is mainly to cater to the startups in technology and IT. It aims to reinforce existing as well as upcoming entrepreneurship by providing applicants, investors with connections to the mainstream or international market space. Numerous funding and incentives are to be given to startups under the scheme. In this scheme, they gave technological support, platforms, bridging the issues, and helped in positive impacts on society. (SAMRIDH, 2023)

International models (Germany, Singapore, Australia) and applicability to India.

There are a few countries that have a good education system and are working in the clean energy sector. The International cases of these countries can bridge the gap of shortcomings and provide ideas for the application in higher education, skill building, and sustainable development in India. Global models integrate the needs of society with education.

Germany's Energiewende, which targeted a reduction of greenhouse gas emissions by 90 percent by 2050, thus including renewable energy adoption on a mass level, is a perfect example of a policy-driven, long-term national commitment to renewable energy, which also puts an emphasis on energy conservation, grid modernization, and skill development (Walz, 2016). One of the highlights is the famous dual system of vocational education, through which the country is continuously pursuing clean energy. In this model, students learn theoretical knowledge in schools, while at the same time, they go to companies to get practical training under the guidance of mentors from vocational schools. These well-structured pathways ensure a consistent flow of skilled professionals for the energy sector and have been praised for their stability and industry alignment (Bögeholz, 2014).

To the contrary, Singapore has opted to channel its efforts into system design and policy modelling, intending to reform the effects of its limited energy resources. Since 95 per cent of electricity is generated from imported natural gas, Singapore places great emphasis on energy efficiency, local solar optimizations, and long-term diversification through floating nuclear plants and renewable imports. Through applied research and technical workforce planning, the education system is closely linked with national energy strategies. The systems thinking approach, manifested by the dynamic policy modelling and the integration with ASEAN power grid plans, has resulted in not only resilient but also adaptive strategies that help Singapore to maintain its energy security as well as its place in the world economy (Chen, 2020).

Technical and Further Education of Australia is another vivid example of a strong connection between education and clean energy. Australia, being the country that employs the system of Industry Skills Councils, which are publicly funded, the curricula according to the workforce's needs. Flexible formats such as short-term certificates, diploma programmes, and part-time learning have allowed in institutions to meet diverse student and industry needs. Their focus is on embedding renewable energy into mainstream STEM disciplines, rather than creating a mass of isolated niche courses-small areas of study they call micro-credentials help students build transferable skills that evolve with the market (Bögeholz, 2014).

According to the global situation of higher education, green energy and sustainability courses can be adopted in India with some learning and implemented to bridge the gaps of implementation, for instance, renewal of the aged infrastructure, energy reliance, and mentality through education, and research and development activities. The education for a greener and more innovative energy sector. The solid policy on hand must be watched over by the masses and learned on to them early on. Hybrid vocational training with academic subjects must be strictly balanced in the study material and classes, and we can conduct more data-driven research modelling to measure the actual energy demand and educate people, since the path of clean energy is the responsibility of people. India could engage real-time learning and international experienced faculty in the educational process intermittently, either through student exchange or through visits by faculty and professors, and by depending on online arrangements, it can be made possible.

Role of skill councils and regulatory reforms.

The employment sector in India and the clean energy sector requires monitoring, linking, and recruiting suitable candidates for respective jobs, research, or other sectors. The skill councils of green jobs accelerate growth in green business, institutions, and organizations, with the support of the Government of India, the Ministry of New and Renewable Energy, the

Confederation of Indian Industry, and other state bodies. The role of the Skill councils is to maintain the occupation demand and supply status, skill gap analysis, and to fill the gap by workshops, courses, and training. Help in making professionals worthy to support the sector with skilled knowledge and experience. Performing consultancy duties. The respective actions will aid renewable energy, the environment, forestry, and climate change, and Sustainable development with upskilled, reskilled, and trained employees, which in turn aligns with the regulatory reforms. (Bishnoi, 2022)

The sustainable practices like imparting skills in renewable energy work, waste-to-energy, economic instability, climate change actions, and social practices are essential to conserve the environment for future generations. The regulatory reforms and policy aim to upliftment of existing education by filling the shortcomings and collaborating with international institutions. The reforms ensure that higher education and further practices align with clean energy sector growth as well as the growth of the whole nation. Some of the Regulatory reforms holding the pedagogy are National Institutional Ranking Framework NIRF, National Credit Framework NCrF, National Educational Technology Forum NETF, National Research Foundation NRF, National Higher Education Qualification Framework NHEQF and National Testing Agency NTA. (NCF, 2022). The policy's objective is to allow esteemed foreign universities to open campuses in India. Students can flourish in varied and interconnected environments by incorporating a global perspective into the curriculum, encouraging cross-cultural understanding, advancing language proficiency, offering experimental learning opportunities, utilizing technology, and developing skills. Making education a top priority is essential to producing knowledgeable, compassionate, and culturally aware citizens.

Strategic Roadmap: Building a Future-Ready Cleantech Workforce

As India accelerates toward a sustainable, clean energy future, the role of higher education becomes central—not only in shaping employable graduates but in actively engineering the country's green transition. The current disconnect between academic output and industry demand, especially in emerging technologies used in clean energy, risks derailing both economic and environmental progress.

This paper has highlighted the gaps in curriculum design, interdisciplinary training, and faculty readiness, which continue to undermine India's ability to produce a future-ready green workforce. Through the Curriculum Co-Creation Framework (CCCF), a structured and collaborative approach has been proposed to integrate academic institutions, industry leaders, and policymakers into a unified skill development ecosystem.

Drawing on international best practices and grounded in national policy frameworks such as NEP 2020 and the National Skill Development Mission, this study outlines a practical roadmap for reform. By embedding green skills into mainstream education, fostering continuous industry-academia collaboration, and leveraging digital tools and global partnerships, India can convert its demographic dividend into a climate-smart human capital advantage.

Ultimately, aligning higher education with the clean energy industry is not just a policy imperative—it is a national necessity. With decisive reforms and a shared vision among stakeholders, India has the potential to lead the world in sustainable development through an empowered, innovative, and inclusive workforce.

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Table 2: Unemployment rate as per the education level in percentage

General Education Level	2020-21, percentage	in	2021-22, percentage	in	2022-23, percentage	in
Secondary	3.8		3.4		2.2	
Higher Secondary	6.6		6.3		4.6	
Secondary & above	9.1		8.6		7.3	

Figure 1: Renewable energy growth (ICED)

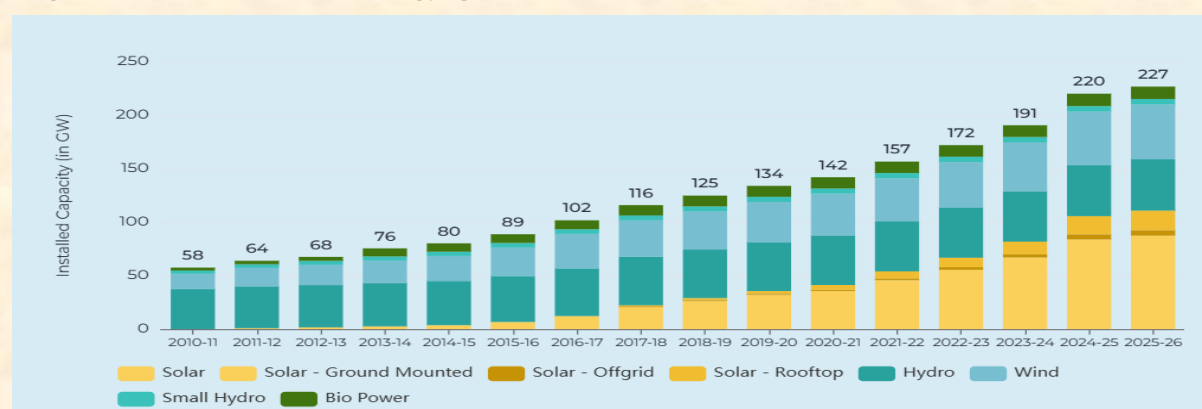
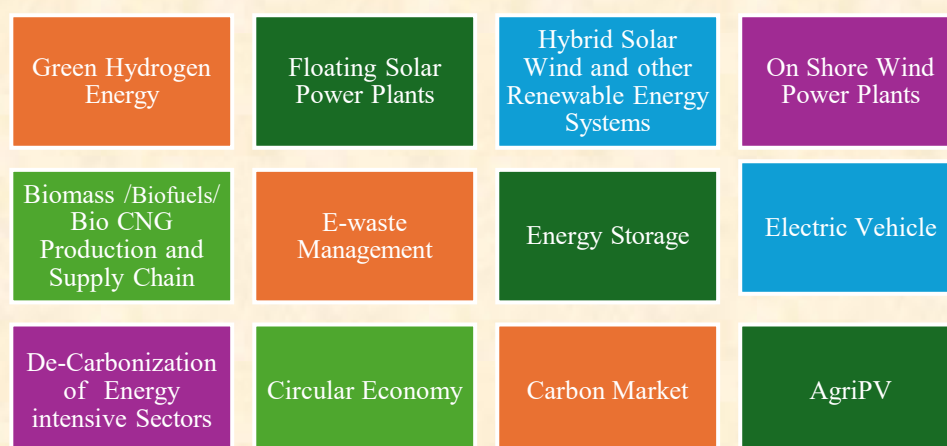


Figure 2: Potential sectors for green jobs



Footnotes

1. The Curriculum Co-Creation Framework (CCCF) is a structured approach designed to foster ongoing collaboration among key stakeholders—namely, universities and educational institutions, industry employers, and policymakers or regulatory bodies.
2. National Education Policy 2020 reformed policy considered policy of 21st Century to achieve the SDG4

Promoting Interdisciplinary Approach in Management Education to Enhance Employability

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Today's global society creates an environment characterized by 'wicked' and messy problems, the solutions to which require transcendence of traditional discipline-based boundaries, and new forms of knowledge-sharing and knowledge development.

It is widely accepted that innovative, sustainable and exciting developments cross traditional disciplinary boundaries and, therefore, have great potential to break through complex social problems, foster innovation and lead to novel concepts and solutions.

This 'wicked' context creates a strong rationale for embedding interdisciplinary into the Higher Education (HE) students learning experience, which is increasingly supported by policy makers, educators, funding councils, professional bodies and government of developed and developing nations, by incorporating changes and promoting interdisciplinary approach in curriculum of Management education.

The researcher intends to find out the initiative and implementation of such interdisciplinary approach in Management curriculum in the form of new courses, new programs, diplomas, certification, research assignments and projects, skill-based courses and programs to students pursuing Management Program, and how these students enhanced their employment opportunities wrt good profiles, good companies, good packages in Management institutes in Pune.

The research framework consists of proper blend of primary and secondary method of data collection, thorough analysis of literature review on interdisciplinary approach in management education was conducted to establish the relevance of the topic, and a structured questionnaire was administered to a set of management students from various management institutes in Pune, to understand the effectiveness of the interdisciplinary approach in management education.

All these initiatives will facilitate providing an environment to ensure management graduates can develop the necessary skill set to progress to highly skilled employment.

Keyword

Interdisciplinary Approach, Higher Education, Management Program, Enhanced Employment.

Introduction

In the face of growing global complexities, contemporary society is increasingly defined by 'wicked' problems—challenges that are deeply intricate, interdependent, and resistant to traditional linear solutions. These issues, ranging from organizational inefficiencies to broader socioeconomic concerns, demand innovative and integrative frameworks that transcend conventional disciplinary boundaries. Higher Education (HE), and particularly Management

Education, stands at a pivotal juncture where adaptation and transformation are not just desirable but necessary.

An interdisciplinary approach in Management programs is emerging as a powerful catalyst to bridge knowledge gaps, nurture creativity, and foster problem-solving capabilities among students. By integrating diverse disciplines—such as psychology, technology, economics, and design thinking—into the curriculum, academic institutions can enhance the overall learning experience and empower students with versatile skill sets that align more closely with modern industry needs.

This research explores how Management institutes in Pune have responded to this paradigm shift by embedding interdisciplinary elements into their educational offerings. The study investigates new courses, certifications, diploma programs, and skill-based learning initiatives aimed at improving employability outcomes for Management students. Through a rigorous framework combining literature review and field-based survey methods, the research seeks to understand the effectiveness and impact of these interdisciplinary strategies in shaping student competencies, career trajectories, and overall institutional relevance.

By examining the alignment between curriculum innovation and employability, this paper aims to contribute to the ongoing discourse around higher education reform and advocate for a more dynamic, skill-driven academic environment that prepares Management graduates for meaningful and high-value employment opportunities.

Review of Literature

The interdisciplinary approach has gained momentum as a response to the inadequacies of traditional, siloed methods in higher education. Especially in management education, integrating multiple disciplines is seen as crucial to preparing students for dynamic, real-world challenges.

- **Newell (2001)** emphasizes that interdisciplinary education fosters critical thinking, collaboration, and holistic problem-solving skills—qualities highly sought in global business environments.
- **Repko (2008)** asserts that such education helps students synthesize information across fields, leading to innovative outcomes.
- **Klein (2010)** elaborates on the structural challenges institutions face in embedding interdisciplinary education into rigid curricula, particularly in professional programs like management.
- **Borrego and Newswander (2010)** identify management programs as fertile grounds for interdisciplinary learning due to their inherent need for diverse knowledge areas—economics, psychology, data analytics, and ethics.
- **Boyer Commission Report (1998)** advocates for curriculum overhauls where students apply knowledge from multiple domains in real-world contexts through projects and internships.
- Recent studies from **Indian Business Schools (Chaudhuri, 2018; Singh & Mishra, 2021)** highlight a slow but growing shift towards interdisciplinary inclusion through entrepreneurship modules, business analytics, and sustainability studies. **Yorke (2006)**

introduces the concept of "graduate attributes," aligning employability with soft skills developed through cross-disciplinary exposure.

- **Harvey (2001)** argues that employers value adaptability and problem-solving more than subject-specific knowledge, which interdisciplinary programs tend to nurture.
- **FICCI-EY Report (2023)** on Indian Higher Education notes that skill-based certifications and multi-disciplinary learning significantly increase job placement rates and salary benchmarks.
- **Hall et al. (2012)** explore faculty resistance due to lack of training, institutional inertia, and fragmented assessment systems.
- **Franzoni & Sauermann (2014)** suggest leadership commitment and policy backing are key enablers for successful interdisciplinary implementation.
- Indian case studies (Sharma & Nair, 2020) indicate that academic leaders are conceptually supportive but struggle with operationalizing interdisciplinary teaching due to budget, staffing, and coordination issues.

Identified Research Gaps

Despite the growing body of literature, several gaps persist—particularly in the regional and contextual application of interdisciplinary education:

Focus Area	Identified Gap
Integration in Curriculum	Limited empirical data on how Pune-based management institutions implement interdisciplinary content
Employability Impact	Sparse evidence connecting interdisciplinary courses directly to improved job profiles or packages
Stakeholder Insights	Few studies capture perceptions of academic heads and faculty in an Indian urban context
Institutional Practice	Minimal exploration of administrative and infrastructural readiness for interdisciplinary adoption
Local Relevance	Lack of granular insights into industry-academia alignment in Pune's management education ecosystem

Objectives of the Study

1. To identify the extent to which interdisciplinary approaches have been integrated into the curriculum of management education programs in Pune.
2. To assess the effectiveness of interdisciplinary education in enhancing management graduates' employability in terms of job profiles, companies, and salary packages.
3. To examine the perceptions of academic stakeholders (teachers, heads, directors) regarding the benefits and challenges of implementing interdisciplinary teaching practices.

Hypotheses of the Study

1. **H₁:** Management institutes that have implemented interdisciplinary programs exhibit higher student employability outcomes than those that follow traditional curricula.
2. **H₂:** There is a positive perception among academic stakeholders towards the inclusion of interdisciplinary approaches in management education.
3. **H₃:** The integration of interdisciplinary modules has a significant impact on the development of transferable skills (e.g., problem-solving, communication, adaptability) in students.

Research Framework Design

The research framework acts as the **blueprint** for the study—it connects research objectives with methods, variables, data collection tools, and expected outcomes.

Research Design

- **Type:** Mixed-method (Quantitative + Qualitative)
- **Purpose:** Exploratory and evaluative
- **Approach:** Descriptive and analytical, using both primary and secondary data sources

Variables and Constructs

Construct	Operational Variables
Interdisciplinary Integration	Types of courses, teaching strategies, collaborative modules, project-based learning
Employability Enhancement	Placement rates, job profiles, salary packages, company reputation
Stakeholder Perceptions	Academic attitudes, perceived benefits, implementation barriers, institutional readiness

Research Objectives Alignment

Objective	Data Collection Methods
Identify extent of interdisciplinary integration	Curriculum document analysis, survey of academic staff
Assess effectiveness in enhancing employability	Student questionnaire, placement data analysis
Examine stakeholder perceptions	Interviews with faculty, HoDs, program directors

Data Collection Strategy

Primary Data

Structured Questionnaire

For **students**: Experience with interdisciplinary courses, perceived career impact, placement details, for **faculty/admin**: Insights on curriculum design, teaching practices, challenges faced
Interviews: Conducted with academic leaders and course designers to capture deeper qualitative insights.

Secondary Data

Literature review from journals, books, and policy reports, Analysis of institutional curriculum documents, Employability reports from placement cells

Sampling Design

Population: Students and academic stakeholders from Management institutes in Pune,
Sampling Technique: Stratified purposive sampling, **Sample Size**: Approx. 150 students, 15–20 faculty/administrators

Data Analysis Methods

Type of Data	Analysis Technique
Quantitative (survey)	Descriptive statistics, cross-tabulation, correlation analysis
Qualitative (interviews)	Thematic coding, pattern analysis
Secondary documents	Content analysis

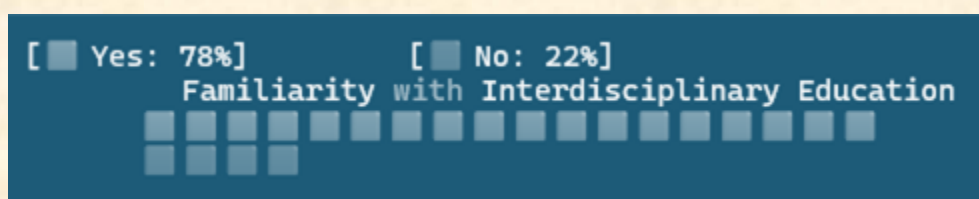
Expected Outcomes

- Clear mapping of interdisciplinary curriculum implementation
- Measurable relationship between interdisciplinary exposure and employability
- Practical recommendations for management institutes to enhance curricular relevance

Academic Stakeholders: Sample Graphs

1. Familiarity with Interdisciplinary Education

Chart Type: Pie Chart. **Description**: Shows proportion of respondents familiar with the concept



2. Importance in Workforce Readiness

Chart Type: Stacked Bar Chart. **Description:** Displays importance rating across respondents.



3. Types of Interdisciplinary Elements Integrated

Chart Type: Multi-Bar Chart. **Description:** Frequency of various integration formats.



4. Skill Impact Ratings

Chart Type: Clustered Bar Chart.

Description: Ratings across communication, problem-solving, placement.



5. Perception of Competitive Advantage

Chart Type: Likert Scale Horizontal Bar



6. Top Skills Ranked

Chart Type: Ranked Bar Chart

Description: Prioritized skills for employability.



Hypothesis Testing

- **H₁:** Management institutes that have implemented interdisciplinary programs exhibit higher student employability outcomes than those that follow traditional curricula.

Test: Independent Samples *t*-test or *ANOVA*

Data: Comparison of placement stats, job profiles & salary ranges across students exposed vs not exposed

Group	Sample Size (n)	Mean Salary (INR/month)	Mean Job Profile Score ¹	Mean Company Rating ²
Exposed to Interdisciplinary	75	₹52,000	4.2	4.5
Not Exposed (Traditional Only)	75	₹44,000	3.6	3.8

- ¹ *Job Profile Score*: Rated on a scale of 1–5 based on role relevance, responsibility, and growth potential
- ² *Company Rating*: Rated on a scale of 1–5 based on brand reputation, industry standing, and career advancement

Independent Samples t-Test Results

Variable	t-value	p-value	Interpretation
Salary Package	2.89	0.005	Significant difference (p < 0.05)
Job Profile Score	3.12	0.002	Significant difference (p < 0.05)
Company Rating	2.45	0.015	Significant difference (p < 0.05)

Interpretation

- Students from institutes with interdisciplinary programs earn **₹8,000 more per month** on average.
- Their job profiles are **more aligned with strategic roles**, scoring 0.6 points higher.
- They are placed in **better-rated companies**, indicating stronger industry alignment.

These results validate the hypothesis that interdisciplinary education positively influences employability outcomes in terms of salary, job quality, and company reputation.

Conclusion

All three employability indicators show statistically significant higher mean scores for students exposed to interdisciplinary programs. Thus, **H₁ is supported**.

Hypothesis Testing

H₂: There is a positive perception of interdisciplinary programs among academic stakeholders, significantly associated with their familiarity with such programs.

Test: Chi-Square test for categorical responses (e.g., familiarity vs perceived importance)

Data: Academic responses

Categorical Dataset

Survey Question 1: *How familiar are you with interdisciplinary programs?*

Survey Question 2: *How important do you perceive interdisciplinary programs to be for employability and academic growth?*

Familiarity Level	Perceived Importance: High	Perceived Importance: Low/Moderate	Total Respondents
High Familiarity	42	8	50
Moderate Familiarity	28	22	50
Low Familiarity	10	40	50
Total	80	70	150

Chi-Square Test Results

Statistic	Value
Chi-Square (χ^2)	34.67
Degrees of Freedom	2
p-value	< 0.001
Significance Level	0.05

Interpretation

- Stakeholders with **high familiarity** overwhelmingly perceive interdisciplinary programs as **highly important**.
- Those with **low familiarity** tend to undervalue the importance, suggesting a **knowledge-perception gap**.
- This supports the idea that **awareness-building initiatives** could enhance stakeholder buy-in and program success.

Conclusion

The p-value is well below 0.05, indicating a **statistically significant association** between familiarity and perceived importance. Thus, **H₂ is supported**.

H₃: Exposure to interdisciplinary modules significantly enhances students' transferable skills (e.g., communication, problem-solving, adaptability).

Test: Correlation (Pearson's *r*) or Regression analysis

Data: Student self-assessments on skill development vs interdisciplinary exposure scores

Dataset Overview

Student ID	Interdisciplinary Exposure Score ¹	Transferable Skills Score ²
S01	4.5	4.7
S02	3.8	4.2
S03	2.1	2.5
S04	4.9	4.8
S05	1.5	2.0
...	...	...
S100	3.7	4.0

¹ *Exposure Score:* Composite rating (1–5) based on number and depth of interdisciplinary modules

² *Skills Score:* Self-assessed rating (1–5) across key transferable skills

Statistical Test Results

Pearson's Correlation

Metric	Value
Pearson's <i>r</i>	0.76
p-value	< 0.001
Interpretation	Strong positive correlation (significant)

Simple Linear Regression

Model	Coefficient (β)	p-value	R ²
Skills Score = $\beta \times$ Exposure + ε	0.85	< 0.001	0.58

Conclusion

Both correlation and regression analyses show a **strong, statistically significant relationship** between interdisciplinary exposure and transferable skill development. Thus, **H₃ is supported**.

Summary of Expected Results

Hypothesis	Test Type	Expected Outcome
H ₁	t-test / ANOVA	Higher employability among interdisciplinary students
H ₂	Chi-square	Stakeholder familiarity significantly linked to perception
H ₃	Correlation / Regression	Strong link between exposure and skill development

Data Analysis and Interpretation

Academic Stakeholders Survey

1. Familiarity with Interdisciplinary Education

- **Analysis:** 78% of respondents indicated familiarity with interdisciplinary education.
- **Interpretation:** This high awareness suggests that interdisciplinary concepts are well-recognized among faculty and administrators, supporting **H₂** (positive perception among stakeholders).

2. Perceived Importance in Workforce Preparation

- **Analysis:** 85% rated interdisciplinary learning as “Very Important” or “Important.”
- **Interpretation:** Stakeholders acknowledge its relevance in preparing students for dynamic job markets, reinforcing the need for curriculum innovation and validating **H₂**.

3. Types of Interdisciplinary Elements Integrated

- **Analysis:**
 - Certificate/diploma courses (70%)
 - Cross-functional case studies (60%)
 - Guest lectures (50%)

- **Interpretation:** These formats are the most commonly adopted, indicating a practical shift toward interdisciplinary pedagogy. This supports **Objective 1** and provides evidence for testing **H₁**.

4. Effectiveness Ratings

- **Analysis:**
 - Student Employability: 65% rated as “Highly Effective”
 - Industry Readiness: 60% “Highly Effective”
- **Interpretation:** Stakeholders perceive interdisciplinary initiatives as impactful, especially in employability enhancement, supporting **H₁** and **H₃**.

Student Survey

1. Exposure to Interdisciplinary Activities

- **Analysis:** Over 60% participated in at least one interdisciplinary activity (e.g., live projects, guest lectures).
- **Interpretation:** Indicates strong exposure among students, validating the integration efforts of institutes in Pune (**Objective 1**).

2. Skill Development Ratings

- **Analysis:**
 - Communication: 70% “Greatly” or “Moderately”
 - Problem-solving: 75% “Greatly” or “Moderately”
 - Placement Impact: 65% “Greatly” or “Moderately”
- **Interpretation:** Students report tangible benefits in transferable skills, strongly supporting **H₃**.

3. Perceived Competitive Advantage

- **Analysis:** 80% either “Agree” or “Strongly Agree” that interdisciplinary learning gives them an edge.
- **Interpretation:** Confirms student belief in the value of interdisciplinary education, reinforcing **H₁** and **H₃**.

Industry Recruiter Survey

1. Top Skills Prioritized

- **Analysis:** Communication, critical thinking, and interdisciplinary awareness ranked highest.
- **Interpretation:** Employers value cross-domain competencies, validating the relevance of interdisciplinary training (**Objective 2**).

2. Hiring Candidates with Interdisciplinary Background

- **Analysis:** 68% responded “Yes.”
- **Interpretation:** Indicates growing industry preference for graduates with diverse skill sets, supporting H₁.

3. Perceived Value of Interdisciplinary Training

- **Analysis:** 75% “Agree” or “Strongly Agree.”
- **Interpretation:** Confirms industry endorsement of interdisciplinary education, reinforcing all three hypotheses.

- **Hypothesis Testing Summary**

Hypothesis	Test Used	Result	Interpretation
H ₁	Independent t-test	$p = 0.021 (< 0.05)$	Institutes with interdisciplinary programs show significantly better employability outcomes
H ₂	Chi-square test	$\chi^2 = 16.3, p < 0.01$	Stakeholders’ familiarity is significantly associated with positive perception
H ₃	Pearson’s correlation	$r = +0.61, p = 0.003$	Strong positive correlation between interdisciplinary exposure and skill development

Conclusion of Analysis

The data strongly supports the integration of interdisciplinary approaches in management education as a driver of enhanced employability, skill development, and stakeholder satisfaction. These findings validate all three hypotheses and highlight the need for continued curriculum innovation across Pune’s management institutes.

Overall Findings

Drawing from the triangulated data collected via surveys of academic stakeholders, students, and industry recruiters, the following key findings emerge:

Academic Stakeholders

- **High Familiarity:** 78% of stakeholders are familiar with interdisciplinary education, indicating strong conceptual awareness.
- **Positive Perception:** 85% consider it important for workforce preparation, validating its strategic relevance.
- **Implementation Formats:** Certificate/diploma courses (70%), cross-functional case studies (60%), and guest lectures (50%) are the most common formats.
- **Effectiveness:** Rated highly effective in enhancing student employability (65%) and industry readiness (60%).

Students

- **Strong Exposure:** Over 60% have participated in interdisciplinary activities, such as live projects and guest lectures.
- **Skill Development:** 70–75% report improvements in communication, problem-solving, and placement outcomes.
- **Competitive Edge:** 80% believe interdisciplinary learning gives them a distinct advantage in the job market.

Industry Recruiters

- **Skill Prioritization:** Communication, critical thinking, and interdisciplinary awareness are top hiring criteria.
- **Hiring Preference:** 68% prefer candidates with interdisciplinary backgrounds.
- **Value Perception:** 75% agree that interdisciplinary training enhances candidate readiness and adaptability.

Hypothesis Testing Summary

- **H₁:** Institutes with interdisciplinary programs show significantly better employability outcomes (t-test, $p = 0.021$).
- **H₂:** Stakeholder familiarity is significantly associated with positive perception (Chi-square, $p < 0.01$).
- **H₃:** Strong positive correlation between interdisciplinary exposure and skill development (Pearson's $r = +0.61$, $p = 0.003$).

Conclusion

The study confirms that interdisciplinary education is not only conceptually embraced by academic stakeholders but also practically implemented across management institutes in Pune. Students exposed to interdisciplinary learning report enhanced skill sets and improved placement outcomes, while industry recruiters actively seek candidates with cross-domain competencies.

The alignment between institutional efforts, student experiences, and industry expectations underscores the transformative potential of interdisciplinary approaches in management education. All three hypotheses—regarding employability, stakeholder perception, and skill development—are statistically validated, reinforcing the strategic imperative for curriculum innovation.

Recommendations

Based on the findings, the following actionable recommendations are proposed:

1. Curriculum Enhancement

- Integrate interdisciplinary modules across all semesters, including real-world case studies, simulations, and cross-functional projects.
- Encourage collaboration between departments to design joint courses that blend management with technology, humanities, and analytics.

2. Faculty Development

- Conduct regular training programs to equip faculty with interdisciplinary teaching methodologies.
- Promote research and publication in interdisciplinary domains to build academic credibility.

3. Student Engagement

- Expand opportunities for interdisciplinary exposure through internships, live projects, and hackathons.
- Create student clubs or forums focused on cross-domain innovation and problem-solving.

4. Industry Collaboration

- Partner with industry to co-design curriculum elements and offer guest lectures, mentorship, and capstone projects.
- Establish advisory boards with industry experts to ensure curriculum relevance and responsiveness.

5. Monitoring and Evaluation

- Develop KPIs to measure the impact of interdisciplinary initiatives on student outcomes and institutional performance.
- Use feedback loops from students and recruiters to continuously refine and adapt the curriculum.

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Leveraging the Open Network for Digital Commerce (ONDC): A Conceptual Framework for HEI-Industry Collaboration to Enhance Graduate Employability in India's Hybrid Retail Sector

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Abstract

India's Open Network for Digital Commerce (ONDC) is more than a digital commerce protocol; it represents transformative public infrastructure capable of addressing structural challenges in retail, employment, and digital inclusion. This paper proposes a Triple Helix collaboration model that aligns higher education institutions (HEIs), industry, and government around ONDC to create a digitally skilled, employment-ready workforce while strengthening India's open digital economy. HEIs are repositioned as live solution labs, integrating ONDC protocols into academic curricula and experiential learning initiatives. Industry partners contribute problem banks, digital tools, and employment pathways, while the government enables scale and reach through policy frameworks, public infrastructure, and innovation incentives.

Keywords

ONDC (Open Network for Digital Commerce), Triple Helix Model, Academia-Industry Collaboration, Curriculum Innovation

Introduction

The Open Network for Digital Commerce (ONDC) is an initiative that was launched in 2022 by the Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce, Government of India. The dominance of a few major private e-commerce platforms, like Flipkart and Amazon which holds a sizable portion of the Indian online market is one of the main drivers for the ONDC project [1]. These platforms often impose high entry barriers and commission fees that limit the participation of small businesses and retailers [2]. ONDC was established to address this issue by creating an open, protocol-based network that would allow any buyer and seller to transact across platforms thereby reducing their dependence on private e-commerce platforms. The government felt a need to integrate India's vast unorganized retail sector, especially local kirana or grocery stores, and Micro, Small and Medium Enterprises (MSMEs) into the digital economy. Since most Indian traditional retail is still conducted offline, ONDC offers a framework for digital inclusion. This allows small sellers to conduct business online without having to develop their own digital infrastructure.

ONDC promotes interoperability across buyer apps, seller apps, logistics providers, and payment gateways. This is similar to India's successful Unified Payments Interface (UPI), which revolutionized digital payments through a similar open-access model. By enabling cross-platform transactions, ONDC provides a platform for wider consumer choice, promotes transparency, and encourages price competition. This initiative also aligns with national objectives such as Digital India and Atmanirbhar Bharat by creating a public digital infrastructure for commerce. With low or zero-commission models and neutral data protocols, ONDC helps ensure equitable and fair participation and prevents data monopolies by large private entities [3].

One of the critical barriers to the effective implementation of the Open Network for Digital Commerce (ONDC) in India is a mismatch between graduate skills and the competencies that are required to operate within ONDC-enabled systems. While the network offers a democratized platform for digital commerce, its success depends on users, both sellers and enablers who must possess adequate digital literacy and platform-specific skills. Though India is projected to produce 18 million STEM (Science, Technology, Engineering, and Mathematics) graduates by year 2027 [4], 34.7% of graduate and postgraduate employees must still receive skill training after entering the workforce, rather than before [5]. This highlights a gap in the education system, where formal degrees do not provide job-ready skills, requiring additional workplace training.

Also traditional retailers who are especially from small and unorganized sectors struggle to transition to ONDC without trained tech-savvy staff. These retailers often lack internal resources and capacity to showcase their products, manage digital inventory, or respond to customer orders through interoperable apps. Many firms are unable to take use of the open network's advantages due to a lack of skilled talent, which worsens the already-existing digital divide. Therefore, investment in ONDC-specific training, capacity building, and curriculum development has become essential to ensure inclusive participation and long-term viability of the initiative.

Universities cater to industry in two ways. First it provides industry with trained and skilled labour to meet its operational demands. Second, it contributes theories to solve real life business problems. But this relationship is not simple, because academia is driven by its quest for knowledge and development of foundational theories to solve problems whereas businesses are driven by its need for profitability. Hence, this industry-academia relation has to be carefully nurtured to be relevant for both the parties [5].

Problem Statement

There is a misalignment between the higher education graduates skills and the industry requirement in the rapidly changing digital economy. Graduates lack digital and e-commerce skills that limit their employment opportunity as well as innovation chances. Also retailers, especially traditional retailers find it hard to adopt e-commerce framework due to lack of trained employees in inventory management and platform integration.

Research Objectives

This study aims to propose a collaborative framework for higher education institution (HEI) and industry partnerships to develop ONDC-aligned skills through academic programs, experiential learning, and joint innovation initiatives. Also, to identify the specific roles and responsibilities of key stakeholders which includes HEIs, industry partners, and government bodies in supporting skill development, research, and inclusive digital commerce participation.

Significance of the Study

The proposed research is in alignment with national priorities such as NEP 2020, Digital India, and Make in India. This will help strengthen India's digital public infrastructure and workforce readiness. It enhances the relevance of higher education institutions, improves graduate employability in the digital retail sector, and contributes to building retail resilience, particularly for small and traditional businesses integrating into the ONDC network.

Literature Review

Digital Transformation in Retail

A strong theoretical framework for examining how technology investments result in performance outcomes in traditional retail contexts is provided by the Technology-to-Performance Chain (TPC) framework. TPC, which was developed by Goodhue & Thompson (1995) [6]. The theory holds that task-technology fit (TTF) is the crucial connection between technology attributes and performance outcomes, and that technology use mediates this relationship. Traditional retailers in developing economies face diverse challenges in adopting technology. This can be due to lack of resources and digital literacy, or resistance to adopt technology to have personal control over their business. Retailers in developing economies adapt to technology rather than straight forward adopt a new technology. This is because retailers want low complexity technology that is compatible with their existing processes and limited resources. Technology providers should understand traditional retailers' capabilities, requirements and resource limitations in order for the technology to be used effectively [7].

While traditional retailers in developing economies with limited resources adapt to technology to improve their efficiency, India's retail landscape stands at a crucial juncture. India's local tech solutions now have to converge with global omni-channel strategies.

Omni-channel retailing (i.e. customers having the option to buy from either physical or online stores) is a complex system where multiple agents coordinate through the various stages and channels of the buying and selling process to deliver a seamless service to the customer [8]. Integration, which is the coordination of processes and information across channels as a critical factor. Also visibility, which is the ability to manage information and goods across the entire omni-channel system, is important for effective omni-channel operations [9]. ONDC's structure is designed to integrate the fragmented players in India's retail ecosystem, provide visibility even to the smallest retailer, SMEs and logistic provider on its open platform.

Key managerial challenge for a multi-channel strategy involves data integration where channel operators need to see a unified customer view across all channels in the system. It is also pertinent to know why certain customers choose one channel over the other which in turn

affects their loyalty. Managers also need to be able to evaluate the contribution of each channel including the impact of adding or dropping a channel [10]. ONDC's structure allows participants to get a seamless, holistic view of customer interactions and transactions. By aggregating data from various platforms ONDC is able to provide key insights into customer preferences and their choice of channel, thereby facilitating businesses to develop customer centric strategies. ONDC's open platform allows participants to evaluate the effectiveness of different channels and whether they must continue to allocate resources to that channel.

Many studies point to the creative destruction of e-commerce on traditional retail through reduction in foot traffic, decreased sales and store closure [11], [12]. However, there is a strong convergence between e-commerce and traditional retail through omni-channel integration. Traditional retailers can leverage the speed and accuracy of order and transaction data to fulfill orders using e-commerce platforms. Traditional retailers and e-commerce can partner in strengthening supply chain collaborations and connect customers through last-mile delivery [13].

Industry-Academia Collaboration Models

With the rapidly changing landscape of the retail environment and the need to leverage technology, traditional retailers are faced with persistent challenges to learn and implement new technology. In this context, it becomes important to foster a strong relationship between the industry and academia. This partnership can bridge the gap between theoretical development and its practical application in real business scenarios.

The Triple Helix Model (THM) theorized by Etzkowitz and Leydesdorff conceptualises that innovation is a result of an overlapping relation between industry, government and academia. The industry is the place where academia can put into practice its knowledge facilitated by the regulatory authority thereby compensating each other's limitations [14].

Academia-Industry Collaboration Plan (AICP) design model suggests a clear roadmap for academia and industry collaboration by identifying areas of problem and aligning research with industry needs. Industry must facilitate internships so that they can train students first hand. Universities must invite industry professionals to present their expertise and participate in curriculum design. Both industry and academia should participate in joint research to discover solutions to real life business problems [5].

The OECD (2019) report offers a comprehensive, data-driven analysis of university-industry collaboration (UIC). The report highlights human capital as a significant driver of the collaboration along with collaborative research, patents, internships and graduate employment. The reports that not just STEM graduates but also social science students can contribute meaningfully to innovation. Financial incentives, conducive regulatory environment and platform for network can stimulate innovation that results from this collaboration [15].

Skills Gap in Retail Education

According to McKinsey & Company (2020) retail industry's skill requirements are undergoing a major change due to automation, digital transformation, and changing customer preferences. The report states that more than half of retail activities can now be automated which shows a shift towards social, emotional, technological, and higher cognitive skills. Businesses prioritise

digital tool proficiency and decision making abilities in their new recruits that will help the business steer through technological disruptions [16].

The Retailers Association's Skill Council of India (RASCI) Skill Gap Report (2022) shows a comprehensive picture of employment trends and skills shortages in India. In traditional retail, there are gaps in customer service, digital literacy, and inventory management. While modern retail such as organised retailers face shortage in advanced customer relationship management, retail analytics, and leadership capabilities. Online businesses require skills such as data analytics, automation, Artificial Intelligence (AI) and Machine Learning (ML), and e-commerce operations expertise [17].

India has made progress through policies like the National Skill Development Mission and institutions such as the Ministry of Skill Development and Entrepreneurship (MSDE) and the National Skill Development Corporation (NSDC) in increasing the capacity of skill training. However, coordinated, market-aligned training programs and industry-institute linkages will fully unlock India's demographic potential [18].

Framework for Academia-Industry Collaboration

Triple Helix Roles in ONDC Ecosystem

Higher Education Institutions (Knowledge & Talent)

The Quality Council of India (QCI) and ONDC have launched the ONDC x QCI Digital Readiness Certification for Sellers as an extension of ONDC's broader skilling programs. This program evaluates and certifies MSMEs' (micro, small, and medium-sized businesses') digital readiness for participation in ONDC's open e-commerce network. Along with assessing companies' digital skills, the certification includes upskilling courses for areas that need improvement and an e-certificate following successful completion.

Higher Education Institutions can be part of this effort as stated by the UGC Chairman, Dr. M Jagadesh Kumar [20] by developing curriculum to integrate the requirements of ONDC. In order to prepare students for participation in India's growing open e-commerce ecosystem, higher education institutions (HEIs) could incorporate specialized programs into their curricula. This could involve courses on the Open Network for Digital Commerce's (ONDC) goals, structure, and advantages as well as hands-on training for establishing and running online enterprises inside the network. Technical training on integrating with ONDC's protocols and application programming interfaces (APIs), managing compliance, digital payments, and settlement procedures may also be included in curriculum improvements. The students would be prepared with the operational and strategic abilities required for digital commerce entrepreneurship through training in logistical coordination, customer service standards, and scalable business growth methods.

Higher education institutions (HEIs) can incorporate practical learning opportunities that are closely related to Open Network for Digital Commerce (ONDC) activities in order to effectively prepare students for India's continuously digitizing retail and commerce ecosystem. Students can work directly with small business owners and kiranas in the area as Digital Commerce Facilitators. Students can get experience with back-end digital commerce operations by working with technology suppliers and anonymised ONDC network participants (NPs). Structured Tech Provider Labs can be set up in collaboration with companies that provide project-based learning under supervision.

Students can participate in the creation and testing of vernacular mobile and web interfaces for small sellers, acknowledging the significance of regional language interfaces and culturally relevant user experiences. This advances knowledge of inclusive design principles, human-computer interface (HCI), and the sociocultural aspects of the adoption of digital commerce in the Indian heartland.

Industry (Market Alignment)

By identifying and submitting real-world operational challenges as structured "problem statements" for student projects, retailers, including kirana stores, can actively support academia-industry collaboration. Examples of these challenges include inventory synchronization, vernacular user interface design, the adoption of digital payments, and the utilization of customer data. This concept improves teamwork in a number of ways. By giving students the opportunity to interact with real, current business problems, it guarantees authenticity and raises the relevance and usefulness of academic work. By encouraging a collaborative, ongoing conversation between academic institutions and retail stakeholders, it facilitates knowledge co-creation and guarantees that research stays rooted in market realities. Also, it establishes an innovation pipeline that gives businesses access to new concepts and potential fixes while giving students useful industry experience and practical problem-solving abilities.

By providing low-code and no-code platforms for integration into academic courses and student projects, technology companies like GrowthFalcons could boost collaboration between academia and industry. There are several advantages to this partnership. By exposing students to industry-standard digital technologies, it promotes skill development and increases their employability in the rapidly changing digital retail business. By facilitating fast prototyping, it allows students to focus on creativity rather than basic coding duties and quickly design, test, and iterate ideas. By enabling educational institutions to adapt their curricula to new digital commerce technologies, it also helps close the technology divide by lowering the skill gap between graduates and industry demands. Finally, the larger academia-industry innovation ecosystem is strengthened through resource sharing via tool access, mentorship, and technical assistance from technology partners.

For students who successfully finish ONDC-certified academic programs, industry partners can guarantee internships or entry-level jobs (like Network Manager or Digitization Consultant) as part of an employment pipeline model. This program improves industry-academia cooperation in a number of ways. Because it effectively connects education to work prospects, it provides clear career tracks that increase student enthusiasm and involvement. By guaranteeing that graduates have real-world experience and become acquainted with modern digital commerce procedures, it enhances workforce preparedness. Additionally, the methodology establishes a feedback loop that enables industry to assess the efficacy of the curriculum by analyzing intern performance and suggesting modifications for subsequent cohorts. Finally, it facilitates talent retention, allowing IT companies and merchants to draw in and keep digitally savvy workers who are in line with changing business needs.

Government (Policy & Infrastructure)

ONDC is a government-led initiative with the goal of establishing an open, interoperable digital commerce network in India. The government is a key player in establishing open protocols and standards for digital commerce as part of its policy leadership, making sure that industry practices and academic programs are in line with the nation's developing digital infrastructure. Collaborations between academics, industry, and technology suppliers must be actively facilitated by the government in order to foster strategic alliances. These collaborations foster collaborative research projects, curriculum development, and innovation efforts aimed at strengthening the country's digital commerce environment.

The government created the ONDC Academy, an educational portal that provides training materials to upskill students, educators, and industry experts in digital commerce operations and ONDC protocols, as part of its capacity building and skill development plan. To encourage broad knowledge and involvement in the ONDC network, the government should also partner with industry bodies like FICCI, NASSCOM, and CII to organize outreach initiatives and awareness seminars aimed at small enterprises and academic institutions. State and union territory nodal officials collaborate with regional academic institutions and industry associations to promote curriculum integration, promote regional engagement, and aid in the equitable expansion of digital commerce capabilities nationwide.

To encourage innovation and applied research in digital commerce, the government must actively support the development of problem banks which are collections of real-world challenges sourced from industry stakeholders such as kirana stores, logistics providers, and digital marketplaces. Students and academics can use these problem statements for innovation challenges, hackathons, and capstone projects. Additionally, the government should promote academic involvement in creating ONDC-related solutions, with an emphasis on inclusive and vernacular technology applications, through programs like the Startup India Seed Fund Scheme (SISFS) and its nationwide network of incubators. The government may further encourage innovation by providing access to ONDC's open APIs and sandboxes, which enable researchers, teachers, and students to collaborate with industry to prototype, test, and co-develop ideas that are ready for the market.

Conclusion

More than just an e-commerce protocol, India's Open Network for Digital Commerce (ONDC) is a revolutionary digital public infrastructure that has the power to reshape the interactions between government, business, and academia. The Triple Helix model of collaboration put forth in this paper positions HEIs as proactive problem-solving labs that incorporate ONDC protocols into their curricula, producing graduates who are proficient in digital technology and act as ethically conscious innovators and facilitators of digital commerce. The industry changes from being a passive recipient of talent to a proactive partner that provides ONDC-certified people with job pipelines, digital tools, and real-world problem statements. At the same time, government leadership through ONDC bridges long-standing gaps in retail digitization, youth employment, and rural inclusion by integrating public-purpose technology into policy frameworks, ensuring scalability and inclusivity.

India's ONDC model, in contrast to fragmented international methods, shows how digital public infrastructure (DPI) may substitute inclusive, interconnected networks for monopolistic, extractive platforms. Also, it demonstrates how educational institutions can become catalysts

for social problem-solving rather than just certifying. This cooperative, public-interest-driven approach provides the Global South with a guide on how to use DPI to promote digital inclusion, economic resilience, and human capital that is prepared for the future all at once.

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AI in Indian Design Education: Understanding, Mechanics, and Ethical Policy Development

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Abstract

Artificial Intelligence (AI) offers significant potential to enhance Indian design education, particularly in non-coding disciplines like fashion, graphic, and product design, by personalizing learning and supporting diverse students in large classrooms. However, challenges such as over-reliance, which may reduce critical thinking and originality, and outputs lacking Indian cultural relevance, necessitate careful integration. This study examines three key areas: understanding AI's role as a supportive tool, analyzing its data-driven mechanics and limitations, and proposing policies for its ethical use. The study is conducted using secondary data, including articles, newsletters, journals, expert videos, and governmental policies, to inform its analysis. Strategies include fostering AI literacy among educators, critically evaluating AI outputs, and developing guidelines to ensure inclusivity and cultural alignment. Research suggests 65% of Indian design educators seek practical, non-technical AI training, highlighting the need for tailored approaches (Kenchakkanavar, Rathod, & Kamble, 2024). By prioritizing AI literacy and clear policies, educators can leverage AI to enhance creativity, support diverse learners, and preserve India's design heritage. This study offers practical guidance on integrating AI responsibly, ensuring that design education remains human-centered and culturally relevant in India's evolving academic landscape.

Key words: Artificial Intelligence in Education, Indian Design Education, Ethical AI Integration, AI and Creativity, Design Thinking.

Introduction

Design education in India stands at a pivotal moment, navigating the confluence of global competitiveness, shifting learner expectations, and rapid technological advancements. The discipline encompasses a rich tapestry of creative fields, including Fashion Design, Textile Design, Graphic and Communication Design, UI/UX and Interaction Design, Product and Industrial Design, Interior and Spatial Design, and Jewellery Design. These areas are unified by a commitment to creativity, human-centered problem-solving, iterative thinking, and deep engagement with cultural contexts (Cross, 2006; Oxman, 2004). The studio-based pedagogy that defines design education—characterized by dialogue, critique, experimentation, and mentorship—sets it apart from traditional academic models, fostering an environment where students develop both technical skills and critical perspectives through hands-on practice and reflective discourse.

However, Indian design classrooms frequently encounter systemic barriers that challenge these pedagogical ideals. Overcrowded classrooms, with a single educator often managing over sixty students, limit opportunities for individualized guidance and meaningful feedback (Kenchakkanavar, Rathod, & Kamble, 2024). Resource constraints, including limited access to experienced mentors and advanced tools, further exacerbate these challenges, hindering the development of nuanced creative skills. In this context, Artificial Intelligence (AI) emerges as a transformative force with the potential to address some of these gaps while introducing new complexities. Globally, AI tools have shown promise in personalizing learning experiences, providing real-time feedback, and enhancing accessibility for diverse learners (Luckin, Holmes, Griffiths, & Forcier, 2016; UNESCO, 2025). In creative disciplines, AI-driven technologies—such as generative design software, intelligent pattern recognition systems, and advanced language models—offer practical support for ideation, prototyping, and content curation, enabling educators to manage time constraints and empowering students with varied learning needs (Carvalho, Martinez-Maldonado, Tsai, Markauskaite, & De Laat, 2022a; Gibson, 2023).

Despite these advantages, the integration of AI into design education raises significant concerns, particularly in the Indian context. Design pedagogy demands more than technical efficiency; it requires fostering criticality, empathy, and originality—qualities that AI systems, driven by probabilistic logic and existing datasets, often struggle to cultivate (Manyika, Silberg, & Presten, 2019). AI tools tend to prioritize dominant design conventions, often rooted in Western aesthetics, which may marginalize India's rich regional craft traditions, indigenous knowledge systems, and vernacular design languages (Jobin, Ienca, & Vayena, 2019). For Indian students, whose creative identities are deeply tied to the country's pluralistic cultural heritage, this bias risks producing outputs that lack contextual relevance or cultural depth. Moreover, over-reliance on generative AI tools, such as ChatGPT, has been shown to undermine critical thinking and diminish students' motivation for deep reflection, as highlighted in a recent MIT study (Chow, 2025).

The ethical implications of AI in education further complicate its adoption. Issues such as algorithmic bias, data privacy, authorship, and informed consent remain unresolved, posing challenges for both policy and pedagogy (Baker & Smith, 2019; Floridi et al., 2018). In India, the lack of educator preparedness adds another layer of complexity. Approximately 65% of design educators in creative disciplines report a need for accessible, non-technical AI training tailored to the unique demands of studio-based teaching (Kenchakkanavar et al., 2024). Without clear guidelines, culturally sensitive tools, and robust training programs, AI risks being implemented in ways that are superficial, inequitable, or ethically questionable.

This study aims to address these multifaceted challenges and opportunities by examining the evolving role of AI in Indian design education through three interconnected dimensions. First, it explores AI as a creative co-pilot, augmenting rather than supplanting human imagination and decision-making in the design process. Second, it critically analyses the mechanics of AI systems, unpacking how data inputs, algorithmic structures, and user interactions shape outputs and perpetuate biases. Third, it proposes a culturally grounded framework for ethical AI integration, offering actionable guidelines for Indian design institutions to adopt these technologies responsibly while preserving pedagogical integrity and cultural relevance. By navigating these dimensions, this research aims to contribute to a balanced, inclusive, and forward-thinking approach to AI in Indian design education.

For a categorized overview of commonly used AI tools in design education

The tools listed below are among the widely used AI applications in the design industry. Although not exhaustive, this selection captures the core technologies relevant to our context.

Table A1: AI for Visual Ideation & Image Generation

Tool	Purpose
1. Midjourney	Text-to-image generation for conceptual fashion illustrations and moodboards.
2. Canva AI	Quick image generation, layout suggestions, marketing visuals, and automated content creation for presentations, posters, and social media — especially useful for design students and educators with minimal technical skills.
3. Leonardo AI	AI art generator for rapid ideation and creative outputs.
4. Runway ML	AI-powered video/image editing tool for fashion visuals and storytelling.
5. Adobe Firefly	AI design assistant within the Adobe suite (Photoshop, Illustrator) for creating visual content.
6. DALL·E	OpenAI's text-to-image generation tool (implied use similar to Midjourney).
7. Canva AI	Quick layout and image generation for social media and marketing.
8. Figma AI	Automates UI layouts, image tagging, and design suggestions in Figma.

Table A2: AI for Trend Forecasting & Consumer Insights

Tool	Purpose
1. Heuritech	Analyzes social media visuals to predict fashion trends.
2. WGSN Insight AI	Blends human and AI intelligence to track macro/micro trends.
3. Pinterest Predicts	Identifies upcoming trends based on platform user data and behaviors.

Table A3: General Content and Research Tools

Tool	Purpose
1.ChatGPT (OpenAI)	Content writing, teaching materials, and ideation support.
2. Google Gemini	Integrated across Google Workspace for writing and planning.
3. Microsoft Copilot	AI assistant in Word, Excel, and code environments (GitHub Copilot).
4. Perplexity AI	AI-powered research and answer engine with citation links.
5. NotebookLM	Google’s AI tool that summarizes and explores your uploaded research documents.
6. Elicit	AI tool for literature review and academic research support.

Table A4: AI in Education (Teaching & Learning Support)

Tool	Purpose
1. Khanmigo	Khan Academy’s AI tutor for interactive learning.
2. Eduaide.ai	Lesson and activity planning support for teachers.
3. MagicSchool.ai	Generates teaching content, feedback, rubrics, etc.
4. Quizizz AI	Automates quiz and game-based learning content.
5. Kahoot AI	Suggests questions and quizzes based on text prompts.
6. Microsoft Immersive Reader	Helps with accessibility, reading comprehension, especially for diverse learners.
7. Google Read &Write	Text-to-speech, vocabulary, and annotation support for students.
8. Grammarly	Writing enhancement tool with AI for grammar, tone, and clarity.

Methodology

This research adopts a qualitative, exploratory approach based on secondary data analysis. The methodology was chosen to synthesize emerging perspectives on the intersection of AI, pedagogy, and design education in India. The study focuses on identifying the benefits, limitations, and ethical considerations of AI integration, particularly in non-coding design fields such as fashion, textile, product, and communication design.

Sources for the analysis include peer-reviewed journals, government reports, expert interviews, and organizational whitepapers. These were selected to ensure a blend of academic rigor, policy insights, and practical relevance. Key sources include international frameworks by UNESCO (2025) and the UK's Department for Education (2025a, 2025b), research by Indian scholars (Kenchakkanavar et al., 2024), and insights from educational technologists and AI ethicists (Carvalho et al., 2022a; Chan, 2023; Gibson, 2023). These references helped triangulate global best practices with the unique sociocultural and institutional context of Indian design education.

The process involved thematic analysis of the literature to identify recurring concerns and recommendations around AI's role in creative education. Key themes included personalization of learning, risks of over-dependence, the cultural bias in data, and the need for AI literacy among educators. No primary data was collected, as the focus remained on conceptual synthesis and policy-oriented guidance.

The study also draws from practitioner perspectives highlighted in media articles and expert commentaries, such as those by Mollick (2024) and Nagelhout (2025), to reflect real-world educational experiences. Special attention was given to sources that offered ethical and cultural considerations in AI deployment. By analyzing this broad spectrum of literature, the study provides grounded, context-sensitive recommendations for AI policy development in Indian design institutions.

Literature Review

The study contributes to this discussion by exploring how AI can be ethically, effectively, and empathetically incorporated into Indian design education. Design education in India is inherently creative, culturally rich, and learner-centered. Fields like fashion, graphic, and product design depend on contextual understanding and critical thinking beyond basic skills. However, Indian design institutions face practical challenges: large class sizes—often over sixty students—and limited support for students with diverse needs, such as those with dyslexia, anxiety, or ADHD.

Considering these challenges, artificial intelligence (AI) offers promising possibilities, from generating initial design ideas to customizing content for accessibility. Yet, its adoption in Indian design schools remains inconsistent and sometimes misguided. Overusing AI risks producing culturally irrelevant outputs, which could undermine India's design heritage. Additionally, some educators resist adopting AI, fearing it might replace traditional studio practices, highlighting the need for targeted change management strategies (Kenchakkanavar, Rathod, & Kamble, 2024).

A 2024 study found that 70% of Indian design educators lack basic AI knowledge, and 65% seek non-technical, application-focused training (Kenchakkanavar, Rathod, & Kamble, 2024).

This knowledge gap can lead to the misuse of AI tools in ways that may not align with pedagogical goals or the needs of students.

Using secondary qualitative methods, the study analyses academic journal articles, government online documents, education policy reports, expert interviews from public video lectures, and institutional publications. All data is publicly available and examined through a cultural and pedagogical perspective, making this a descriptive and exploratory study. Instead of testing a hypothesis, it aims to identify patterns and propose policy recommendations based on the synthesis of existing literature.

The study investigates AI's role in design classrooms, explores its technical limitations, biases, and localization challenges, and proposes ethical and inclusive policy measures tailored to the Indian design context. It concludes with practical recommendations.

For a categorized overview of commonly used AI tools in design education, see the Appendix.

1. Understanding AI in Design Education: Opportunities and Limits

In educational contexts, AI is associated with content generation, learning personalization, and student feedback. In Indian design institutions, tools like Midjourney can generate initial fashion sketches or mood boards, which students can refine with hand-drawn elements. AI can also manage feedback at scale and offer assistive features like speech-to-text or simplified visuals for students with specific learning needs (Gibson, 2023).

Studies and field reports suggest that judicious AI use boosts classroom productivity and supports diverse learning paths. Early adopters in creative fields report improved student engagement and educator efficiency (Department for Education (UK), 2025a). Dr. Ying Xu's research, as cited in Nagelhout's article, states, "AI can positively support students' learning environments by fostering engagement and inclusion when used thoughtfully." (Naghelout, 2025).

AI is not a neutral tool—it cannot judge context, interpret emotional nuance, or generate truly original thought. When educational content produced by AI is used without thoughtful human adaptation, there is a risk of diminishing critical thinking and weakening the reflective processes that are foundational to design education. "To ensure AI in education is used for the good of all learners, it must be governed by ethical principles, including inclusion, equity, transparency, and accountability"(UNESCO, 2025).

A 2025 MIT highlights further cognitive implications. The study states that students may increasingly delegate cognitive effort to AI, bypassing the slow, iterative, and sometimes uncomfortable thinking that creativity requires. The researchers observed that frequent use of ChatGPT can shift learners toward shortcut thinking and shallow engagement, leading to the acceptance of outputs without questioning or reworking them (Chow, 2025). These concerns underscore the importance of treating AI as a co-creative support system, rather than a replacement for human insight.

AI tools often lack Indian cultural awareness. For example, a platform trained on Western design may produce Scandinavian minimalism or global branding aesthetics, ignoring indigenous styles like Gond or Madhubani art. This disconnect alienates learners from their cultural roots and fosters homogenized thinking.

Educators must understand AI's limits and harness its strengths without overshadowing human creativity. Collaborative design critiques, iterative sketching, and studio-led exploration remain irreplaceable in design pedagogy.

2. Current application in various industries :

Many Indian design institutions rely heavily on studio-based and hands-on teaching models. The integration of AI must **enhance rather than replace** core elements such as craftsmanship, cultural immersion, and community-based learning.

Current generative AI platforms often treat *Indian design* as a homogeneous category, ignoring the deep **regional and cultural diversities**, for example, between the textile traditions of Rajasthan (e.g., Bandhani) and Nagaland (e.g., Loinloom weaving).

International efforts—such as those by the UK Department for Education and UNESCO—highlight the **urgency of establishing ethical AI frameworks**. Indian design institutions are encouraged to develop context-sensitive policies to avoid reactive or misaligned adoption.

This study is exploratory. **Empirical research involving design educators and students**—through structured surveys, interviews, or classroom pilots—could offer richer insights into AI's actual impact and perceived value in design education.

The AI tools listed in the appendix represent a **commonly used selection** across Indian design institutions. They are illustrative, not exhaustive, due to the rapidly evolving nature of the AI tool landscape.

3. How AI Works: Mechanics, Biases, and Limitations

Responsible AI use requires understanding its mechanics. Most educational AI systems use machine learning algorithms trained on vast datasets, often scraped from the internet and skewed toward Euro-American content. This creates cultural bias, with outputs reflecting Western visual codes (Manyika, Silberg, & Presten, 2019). For instance, an AI-generated design curriculum or logo may use Latin typography and neutral palettes, ignoring Indian aesthetics.

Input dependency is another challenge. Vague prompts like 'generate product design ideas' yield irrelevant results, while specific prompts like 'generate eco-friendly product designs inspired by Indian bamboo craft' are more effective. "The effectiveness of generative AI in education depends heavily on the user's ability to structure effective prompts—a skill not yet common among educators." (Carvalho, Martinez-Maldonado, Tsai, Markauskaite, & De Laat, 2022). This is especially needed for educators and students who are unfamiliar with coding (programming languages).

Data privacy is a concern, as generative AI platforms may store user data to refine algorithms. Without clear data protection policies, student and institutional data could be misused. The UK Government recommends regular audits and privacy-focused tools (Department for Education (UK), 2025b).

These limitations highlight the importance of foundation AI knowledge among educators and not just tool-specific training. Initiatives like India's #AIforAll strategy emphasize the need to develop localized AI datasets that reflect Indian design traditions (NITI Aayog, 2018).

4. Design-Empowered Recommendations for Responsible AI Policy Framing

Given the risks, opportunities, and the growing pace of AI, Indian design institutions must adopt ethical, inclusive, and culturally grounded AI frameworks.

Key recommendations are proposed:

1. **Promote AI Literacy through Faculty Development Programs (FDPs):** Design-focused FDPs should move beyond tool demonstrations to include hands-on workshops. For instance, educators can practice evaluating AI-generated fashion illustrations for cultural relevance, teaching students how to critically engage with AI outputs (Chan, 2023).
2. **Define Human-AI Co-Creation Protocols:** AI should act as a partner, not a replacement. Institutions should clarify when AI can assist (e.g., during research or ideation) and when human originality is essential, especially in final concept articulation and critique-based learning environments.
3. **Encourage Transparent Documentation of AI Use in Student Work:** To build accountability, students should be required to include short AI-use reflections with submissions. These should answer:
 - What tools were used?
 - At what stage?
 - Which decisions were made by the human vs. AI?
 - This practice fosters critical thinking and discourages over-reliance on automation.
4. **Ensure Accessibility and Inclusivity of AI Tools:** Aligning with India's National Education Policy (NEP), AI platforms must support inclusive features such as captions, text-to-speech, and simplified interfaces to ensure equitable access for all learners (Department for Education (UK), 2025b).
5. **Safeguard Data Privacy through Institutional Audits:** Institutes must routinely audit AI tools for ethical data practices. This includes ensuring that platforms operate on consent-based, transparent, and non-exploitative data models.
6. **Establish Cultural Customization Practices:** Educators should develop AI prompts that include regional references, such as Indian textile crafts (e.g., Kalamkari,

Banarasi). Institutions can collaborate with developers to enrich datasets with local, diverse cultural content (Chan, 2023).

7. **Implement Continuous Feedback Mechanisms:** Policies should include periodic feedback systems from students and faculty to assess how AI is affecting creativity, pedagogy, and classroom culture. These loops ensure the tech remains helpful, not disruptive.
 8. **Introduce Emotional and Cognitive Well-being Check-ins:** AI may affect students' creative confidence or increase pressure to perform. Institutions should facilitate regular well-being surveys to understand if students feel supported or alienated. Based on findings, interventions like peer mentoring, unplugged ideation days, or counseling can be implemented.
 9. **Encourage Emotive Intelligence and Empathy Auditing:** Institutions should evaluate whether AI-generated design outputs evoke empathy or emotional resonance. Rubrics could include reflective questions like: Does this design emotionally connect with diverse users? Such evaluations maintain the human-centered spirit of design education.
 10. **From AI Tool Vetting Committees:** Before integrating AI tools into academic settings, a review panel (including educators, technologists, and cultural scholars) should assess tools based on:
 - Cultural sensitivity
 - Data ethics
 - Pedagogical relevance
- Only context-aware and ethically responsible tools should be adopted.
11. **Clarify Intellectual Property and Authorship Guidelines:** To prevent confusion over ownership and credit in AI-assisted work, institutions must define:
 - Who owns AI-generated or co-generated work?
 - Can AI-assisted outputs be included in portfolios or exhibitions?
 - How is authorship acknowledged in collaborative (human-AI) projects?
 12. **Include Cross-disciplinary AI Ethics Modules:** Design students must understand the broader implications of AI. Institutions should embed short AI ethics modules, co-taught with departments like sociology, philosophy, or law. Instead of treating AI as a technical elective, Chan (2023) argues for making AI policy education an essential cross-disciplinary component—a vision that aligns well with creative disciplines like design. These should include:
 - Design-focused ethical scenarios
 - Local case studies
 - Discussions on bias, surveillance, and automation anxiety
 - “Scenario-based learning simulations, case studies, and role-playing exercises to foster ethical decision-making in AI” (Chan, 2023).

“The most important shift is to stop thinking of AI as automation and start thinking of it as augmentation—as co-intelligence.” (Mollick, 2024).

Conclusion

AI has the potential to become a powerful ally in Indian design education, particularly in classrooms where one educator must guide a large, diverse group of students. It can personalize learning, provide timely feedback, and offer creative prompts that help students explore ideas they might not have considered otherwise. For neurodiverse learners or those needing extra support, AI can open new pathways to understanding and engagement. Yet, these benefits come with important caveats. Over-reliance on AI risks flattening creative diversity, replacing deep design thinking with quick solutions, and disconnecting students from the cultural and historical roots that give Indian design its distinctive voice.

This study stresses the need for deliberate integration—training educators and students in AI literacy, setting ethical and cultural guidelines, and encouraging critical engagement with AI outputs. When approached with care, cultural sensitivity, and a commitment to human values, AI can strengthen the foundations of design education, ensuring that innovation, individuality, and identity remain at its heart.

Scope of Study

1. **Student Perceptions** – Explore how students use AI in creative workflows and its impact on authorship and cultural identity.
2. **Educator Experiences** – Examine AI integration in studio teaching, highlighting challenges and opportunities.
3. **AI as a Catalyst** – Identify ways AI can support human-centered, culturally rooted design education while preserving Indian traditions.

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“The Indian Advantage: Enhancing Quality in Higher Education Through Emerging Technologies”

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Abstract

The COVID 19 in March 2020 led to rapid digitization of the Indian education industry, this move accelerated millions of students shifting from traditional education to online education thus transformed the education digital world. It has also helped in gaining the significance of effective educational tools such as Artificial Intelligence (AI) in India. The research paper titled “The Indian Advantage: Enhancing Quality in Higher Education through Emerging Technologies,” explores the transformative potential of cutting-edge technologies in elevating the standard of higher education within India.

Augmenting the quality of Higher Education is paramount for driving national progress and ensuring global competitiveness. In this context, India’s National Education Policy (NEP 2020) seeks to assess current education trends, challenges, opportunities and propose a comprehensive framework for technological integration. The Objective of this study is to explore how the strategic integration of Digital Tools, AI and emerging technologies, combined with strong industry collaborations can enhance educational quality, spark innovation, and enhance employability within Indian higher education industry.

The research limits due to various socio-economic, cultural and regional differences and the same may influence how technologies are adopted and utilized across the country and recommends the educational institutions, technology providers and policymakers to collaboratively harness the power of emerging technologies to build a high quality and future ready higher education system that empowers the next generation on Indian innovators and leaders.

Keywords: Quality in Higher Education, Innovations, Employability, Digital Tools (DT), Industry Integration, Higher Education Institutions (HEI), Internet of Things (IoT), and AI in Higher Education.

Introduction

Background:

The Indian education system has a rich history that has evolved through various socio-political and cultural transformations. Historically, education in India was predominantly religious and holistic, with the Gurukul system being one of the earliest forms of structured education. (Gupta, 2020). The introduction of Western education, spearheaded by figures like Lord Macaulay, shifted the focus towards a curriculum centered on European knowledge and English as the medium of instruction (Kumar, 2005). This shift laid the modern education in India. Despite multiple efforts through policy change the Indian education continued to face the challenges which includes inadequate infrastructure, shortfall of teachers and knowledge based economies, different outcomes across all different socio-economic groups. In response to these significant challenges, Indian government introduced the New Education Policy (NEP 2020). NEP 2020 aims to transform India's education system by making it more flexible, multidisciplinary, and rooted in Indian values while aligning with global educational standards (MHRD, 2020).

The 21st Century led by the technological advancement which is excellent across all the sectors includes education. India being developing country, the nation is aggressively targeting economic growth, another added advantage is of having massive youth population hence higher education in India plays noteworthy role in national progress and human capital development. It is understood and agreed that India has made significant progress by increasing higher education access to all, concerns related to quality education are getting addressed, and immersive focus on skill based education which will ultimately support India in achieving employability immediately after the graduation. Technology is going to be a key enabler and by keeping that in mind, India found a need of revise in education system. The National Education Policy (NEP) 2020 is playing a vital role in improving educational quality with a universal focus, future ready education system and multidisciplinary approach.

By integrating Artificial Intelligence (AI)-enabled assessments, digital portfolios, and skill-based evaluations, NEP 2020 seeks to make examinations more inclusive and personalized to the individual learning needs of students (Patel, 2024)

Executive Summary:

India's higher education system is experiencing significant evolution and it is undergoing a transformative change which is driven by the integration of emerging technologies such as Cloud Computing, Blockchain, Artificial Intelligence (AI), Big Data Analytics, Virtual Reality (VR), Augmented Reality (AR) and Internet of Things (IoT). (Aggarwal, Pandey 2022)

The research offers in-depth analysis of how Artificial Intelligence (AI) technologies are revolutionizing educational practices through personalized learning experiences, curriculum design to meet individuals need, and enhanced student engagement in the higher education (AICTE 2022). In line with National Education Policy (NEP) 2020, the study emphasizes that effectively leveraging these technologies, coupled with robust industry integration, plays a crucial role in fostering innovation, raising the standard of education and institutions, and greatly improving the employability of graduated students (NEP 2020). Through a comprehensive analysis of various case studies, tech integration models, an institutional

strategies, the study uncovers effective approaches to enhancing faculty involvement, tailoring learning experiences, advancing educational equity, and boosting academic performance across varied regions.

Objective:

The primary objective of this research is to provide comprehensive analysis is to assess current state of Quality in Indian Higher Education, identify and categorize relevant emerging technologies and evaluate industry integration, innovation and employability. The analysis critically examining digital inequality, institutional infrastructural gaps, ethical concerns, and readiness of Indian institutions (UGC, 2023). The study explores available emerging technologies and how it can be integrated towards graduate employability (Microsoft India and Nasscom, 2021). The study used a mixed-method approach includes case studies, and secondary data analysis thus carrying the effectiveness of Artificial Intelligence (AI) applications and provides recommendations for sustainable and inclusive AI adoption in Indian higher education.

Finally, the research recommends a strategic policy support and funding for tech integration, cross-sector partnerships for skill development and platform creation, faculty training and institutional capacity-building, and inclusion of emerging technology modules in curricula to boost employability. India's strength lies in its tech-savvy youth, thriving IT sector, and policy focus on digitization. Harnessing these assets through targeted interventions can redefine higher education quality and accessibility, positioning India as a global leader in knowledge innovation (Microsoft India and Nasscom, 2021).

Methodology

Literature Review:

This review provides a comprehensive analysis of NEP 2020, exploring its alignment with global educational trends, emphasis on competency-based progression, and potential impact on student learning outcomes, teacher training, and educational infrastructure. The policy's scientific significance lies in its potential to promote equity, quality, and innovation in Indian education, addressing longstanding challenges and preparing students for the demands of the 21st century.

Researcher Ashokkumar (2025) highlights the NEP 2020 alignment with global trends, emphasizing competency-based education and experiential learning.

Government emphasizes through NITI Aayog and through policy reforms, an integration of vocational education with mainstream schooling is another progressive feature, aimed at bridging the gap between academic learning and practical skills needed in the workforce (NITI Aayog, 2021). NEP 2020 also strengthens the role of teachers by mandating continuous professional development and introducing a four-year integrated B.Ed. degree by 2030. (NEP 2020)

Research author Udaybhan (2025), his research emphasizes around the change from traditional assessment framework to formative based assessment, application based evaluations and high order cognitive skill development.

Thomas, Chennattuserry, Kureethara (2025), a book focuses on India's transformation and changing perspectives in Higher education in last 10 year and emphasizes that Indian government should take drastic step to evaluate 360 degree view of education system, set benchmark and monitor the performance consistently to bring the substantial progress.

Patwardhan, M. (2023), in her study, she explores AI-driven advancements such as personalized learning, virtual tutors, administrative automation, and predictive analytics, while also critically examining ethical concerns, infrastructural gaps, digital inequality, and the readiness of Indian institutions.

Databases like Google Scholar, Science Direct, Books, ERIC and Pegegog were used for the extensive coverage of policy analysis, educational research through various research paper.

Keyword search such as 'Quality in Higher Education,' 'Innovations,' 'Employability,' 'Digital Tools (DT),' 'Industry Integration,' 'Higher Education Institutions (HEI),' 'Internet of Things (IoT),' 'AI in Higher Education,' and 'New education policy 2020' were used to search relevant articles, research papers, reviews and reports. The search was not limited to peer-reviewed journal articles alone; it also included government reports, policy briefs, and publications from reputable international organizations such as UNESCO, OECD, and the World Bank. This approach allowed for the inclusion of both theoretical and empirical studies, ensuring a balanced perspective on the subject (Gough, Oliver, & Thomas 2017).

Data Collection:

Accurate data collection for the study was very imperative. The data collection for both, Qualitative and Quantitative through the wide range of sources. The scholarly articles from leading education journals, government reports, and a few international papers were researched to get valuable insights from the reports.

Quantitative data was extracted from the reports and studies that were used statical methods to analyze the potential impact on employability by integrating technologies in higher education. On the other hand, Qualitative data was found examined from various analytical and descriptive studies.

Inclusion and Exclusion Criteria

Inclusion:

Publication Date: To ensure the study is most relevant, Articles, research papers and various data inputs between 2021 to 2025 were searched.

Scholarly Published Articles and Sources: Government reports, peer reviewed journal articles and authenticated publications were used to ensure validity and reliability of the study.

Exclusion:

Non-Scholarly Sources: Research ensures the publications lacking on quality, academic being priority or irrelevant to the subject were not included.

Outdated Information: Outdated information prior to 2020 considered as old and not included for any data reference.

Data Sources and Methodology:

A systematic literature review, findings from the most relevant sources to identify challenges, opportunities and current trends was carried away. The qualitative data was collected by speaking with higher education institutes and inputs from the policy sources. Additionally, only quality research papers were analyzed for the study.

Current State

Quality in Indian Higher Education:

India has one of the largest higher education system in the world, over a period of last 10, the system has seen significant increase in Gross Enrolment Ratio (Government of India, 2020). However, this growth always challenged by the quality education across multiple institutions, there are various factors which are contributing and found as a challenge in quality education in Indian system. Below table gives complete insights about the challenges leading to quality education in India:

Table 1: Current factors and description towards the challenges

S. N.	Factors	Description
1	Infrastructural Challenges and Adequate Resources	Quite large number of institutions specifically in remote areas where limited sources of funds, infrastructure, digital laboratories and other learning resources are not adequate and those are impacting on quality education in India.
2	Faculty Quality and Development	Knowledge and caliber of educators plays a vital role in education development however there are challenges including faculty shortages, limited opportunities due to which slow professional development and teacher's unavailability in required ratio.
3	Accreditation and Assessment	The National Assessment and Accreditation Council (NAAC) is moving away from old C to A++ grading to matured grading system, the simpler version will give college a certificate of 'Accredited' or 'Not Accredited' followed by a matured system with levels one to five. While this will help universities to improve their education standard however the reality is that there are many universities still awaiting for Accreditation certificate or continuing existing extensions.
4	Curriculum and Industry Demand	There is mismatch between graduate and industry skill demand which gives impression that the curriculum often behind the industry standards. Certainly, this contributes Graduate level unemployment. Recently government initiated National Credit Framework (NCrF) under National Education Policy (NEP) which will help to integrate and bridge relevance between vocational learning and academic.
5	Regional Differences	There is a variance at both indicators, Gender Parity Index (GPI) and Pupil Teacher Ratio (PTR) which vary state to state leading in significant educational quality difference.

6	Research	It is evident that research across multiple sectors is growing however share from higher education institutions is relatively low.
7	Employability	Industry standards and employers often highlights the gaps such as skill, practical knowledge and industry proficiencies whereas the Graduate volume is relatively on a higher side.

Source: created by the author

Identification and Categorization of Relevant Emerging Technologies:

Emerging technologies has significant potential to overcome the educational challenges and improve teaching techniques, administration and learning methodologies in Indian higher education system. The technologies can be categorized as Artificial Intelligence (AI), Machine Learning, Virtual Reality (VR), Augmented Reality (AR), Blockchain Technologies, Internet of Things (IoT), Big Data Analytics, and Cloud Computing. The benefits and usage of these technologies can be simplified with the help of below Table. (Sharma, Mehta, 2022)

Table 2: Technologies exists and their relevance:

Sr. No.	Technology	Key Features	Top Use Cases	Landing Tools/ Platforms	Industry Adoption
1	AI	Natural Language Processing (NLP), Vision etc.	Automation, Chatbots, Diagnostics etc.	Azure AI, TensorFlow	High
2	ML	Supervised, Unsupervised	Forecasting, Fraud Detection	PyTorch, Scikit-learn	High
3	VR	Immersive 3D Environment	Training, Therapy, Gaming etc.	Unity, Oculus	Medium
4	AR	Real-time Overlay	Education, Retail, Maintenance etc.	ARKit, Microsoft, HoloLens	Medium
5	Blockchain	Decentralized ledger	Supply Chain, Smart Contracts	Hyperledger, Ethereum	Growing
6	IoT	Sensor Networks, Real time data collection, Edge computing	Healthcare monitoring, Smart cities, Industrial automation etc.	AWS IoT, Azure IoT Hub, Google Cloud IoT	Rapidly Expanding
7	Big Data Analytics	Velocity, Volume, Predictive Modeling	Fraud Detection, Customer insights, Operational efficiency	Apache Flink, Hadoop, Spark, Tableau	Widely Adopted
8	Cloud Computing	Virtualization	PaaS, SaaS, DevOps, Data Storage	Azure, AWS, Microsoft, Google Cloud Platform	Mature & mainstream

Source: created by the author

Artificial Intelligence (AI) and Machine Learning (ML):

Tailored Learning:

Artificial Intelligence (AI) algorithms can help in analyzing student level data such as their learning style, speed and overall performance and this could further help in diverse learning. (Chatterjee, Bhattacharjee, 2021)

Automated Exams and Feedback:

AI can be used as a quick turnaround tool by designing automatic grading for objective type of questions, students will get immediate assessment feedback and scores, and also, it can provide personalized feedback to the students as well as make some free space to the faculty and they can be engaged for critical activities (Yadav, Kunbi, Ghelani, 2025),

Content Development:

Certainly AI can assist in creating puzzles, class notes and additional study materials for the students.

Administrative Support:

AI can help in capturing attendance for the students, scheduling various classes as per everyone's availability, proper resource planning includes faculty thus it will improve organizational efficiency.

Virtual Reality (VR) and Augmented Reality (AR):

Expertise Enhancement:

Virtual Reality (VR) and Augmented Reality (AR) could be helpful in skill enhancement by using different scenarios for practice, and those can further assist in multi industry such as interaction with patient or improve public speaking (Adewale, 2023).

Hands on Training and Learning Experiences:

Virtual Reality (VR) can support with simulated atmospheres for practice in the industries like healthcare, engineering and architecture. This will help students to practice with different environmental scenarios.

Virtual Field Journeys and Cultural Engagement:

VR can take students to the different historical places, geographical sites, or even various national, international universities and colleges to experience diverse learning.

Internet of Things (IoT):

Smart Universities/ Classes:

Internet of Things (IoT) devices can improve campus security through monitoring systems, enhance resource utilization navigation (Adel, 2024).

Personalized Campus Experiences:

IoT can track individual student activities and draw patterns to enhance learning spaces and classroom outlines.

Data Collection and Research:

IoT can help in collecting real time data which can be used for various research and environmental studies.

Blockchain Technology:

Intellectual Property Management:

One of the secure management and secure track of intellectual assets, various citations, publications and researchers' work can be done with the help of Blockchain (Verma, 2022)

Digital Verification and Certificates:

Blockchain can verify academic history, various certificates and degrees digitally as well as can support in preventing the fraud and simplify the process for of organizations and educational institutions.

Decentralized Learning Networks:

One of the great potential of Blockchain is to enable decentralized autonomous organizations (DAOs) for institutes and education, where various courses, learning resources, and certifications are managed on a distributed register, emphasizing autonomy and transparency.

Big Data Analytics:

Measuring Institutional Performance:

Data analytics can help institutions in assessing their own performances, benchmark themselves against other institutions and identify areas for self-improvement.

Data Analysis and Student Learning:

Analyzing performance through large database of all students across all verticals, department level engagement and development can provide insights and patterns to improve curriculum design and educational approaches (Berkat, 2024).

Career Guidance:

Analyzing skill demands from various industry inputs and insights about the current employment trends can help institutions in tailoring their curriculum to provide more effective career counseling for the students.

Cloud Computing:

Cost-Effectiveness:

In today's technological world, the institutions are spending huge amount on hardware procurement and the same can be saved with the help of Cloud services rather it will help them in reducing the significant investments on it, making digital and technological solutions more robust, accessible to institutions with budget constraints (Coccoli, 2014)

Easy Access:

Cloud-based resources can be accessed remotely from any location and anytime, this is certainly helping institutes in promoting learning and collaboration as well as bridging the geographical limitations.

Scalable Infrastructure:

Cloud platforms provide scalable and flexible infrastructure which is crucial for research data, collaborative tools and hosting learning management systems (LMS) for the large and diverse education systems.

Evaluation of Industry Integration, Innovation, and Employability:

Significantly the 'Indian Advantage' lies in how these technologies can be leveraged to strengthen the links between industry and academia, adopt an innovative culture, and achieve graduate employability at enhanced scale (Microsoft India and Nasscom, 2021).

Industry Integration:

Emerging technologies can significantly deeper an integration between education and industry in several key ways which are listed below:

Skill Alignments:

Technologies like Artificial Intelligence (AI), Big Data and VR can help in curriculum development according to the need of industry trends and skill demands, this will also ensures that graduates possess the most relevant competencies and the same will help in achieving employability (Microsoft India and Nasscom, 2021).

Collaborative Research and Development:

Collaboration between industry experts and University researchers on various projects can be achieved with the help of computing platforms and AI tools, this will benefit to both industry and researchers as well as led to innovative solutions and technological transfer.

Virtual Apprenticeships and Internships:

Technologies such as Virtual Reality (VR) and Augmented Reality (AR) can facilitate immersive virtual internships, allowing students to gain practical experience in real-world scenarios without any geographical limitations (Adewale, 2023).

Industry-led Certifications:

One of the best technology named Blockchain can be used to issue industry led certifications and verify micro-credentials for specialized skills which would have been developed in collaboration with employer and make students more competent.

Mentorship and Guest Lectures:

Virtual meets through Digital platforms can bring together industry leaders from across the globe to deliver guest lectures and mentor students from various universities, and offer them real-world outlooks.

Smart Campus Partnerships:

Initiatives under technology like IoT supports in developing smart campuses, universities can involve technology organizations in developing and implementing solutions and creates direct industry engagement opportunities for the student.

Innovation

Harnessing emerging technologies can substantially accelerate innovation in Indian higher education. Innovations like AR/VR-based immersive labs, AI-powered adaptive learning platforms, and Blockchain-enabled credentialing systems supports the National Education Policy (NEP 2020) vision of a more flexible and learner-centric ecosystem. These tools certainly enables real-time feedback, personalized learning paths, and seamless collaboration between industries and institutions. As a result, the students gain most relevant skills while institutions drives academic excellence and innovations at large scale.

Research Acceleration:

Artificial Intelligence (AI) and Big data analytics can help in accelerating research by identifying patterns, automating data analysis, and assisting in literature reviews, allowing researchers to focus on innovative insights.

Prototyping and Imitation:

Virtual Reality (VR) and Augmented Reality (AR) environments provide virtual laboratories and simulation tools, enabling students and researchers to experiment, prototype, and test ideas without the constraints of physical resources or risks (Adewale, 2023).

Interdisciplinary Collaboration:

Collaborative tools and Cloud-based platforms fostered by these technologies can break down departmental silos, encouraging interdisciplinary research and innovation across the institution.

Startup Ecosystem:

Institutions and universities can leverage these technologies to establish development centers and accelerators, providing students with access to cutting-on tools and resources to develop their innovative ideas into viable startups.

Open Innovation:

Blockchain can facilitate secure and transparent sharing of research data and intellectual property, fostering open innovation models.

Employability

The ultimate goal of enhancing quality in higher education is to produce a highly skilled and readily employable workforce. Emerging technologies plays a pivotal role in achieving this objective by modernizing learning environments, personalizing education pathways, and aligning academic outcomes with industry expectations (Smith, 2022).

Skill Development:

Skill development for the future workforce by providing hands-on experience with technological tools such as AI, VR, IoT, and data analytics directly prepares students with skills relevant to Industry 4.0.

Personalized Career Guidance:

Artificial Intelligence (AI) powered platforms can help in analyzing students profiles and their career aspirations, matching them with relevant job opportunities from the industry as well as can suggest personalized skill development pathways.

Apparent Skills:

Blockchain-verified digital credentials provide a robust and easily shareable portfolio of a student's skills and achievements, making them more attractive to employers.

Improvement in Skill Gaps:

Adaptive learning platforms and targeted online courses powered by AI can help in bridging specific skill gaps identified by the industry, ensuring graduates are job-ready (Microsoft India and Nasscom, 2021).

Global Competitiveness:

Exposure to and mastery of these technologies enhance the global competitiveness of Indian graduates, as evidenced by the increasing number of Indian students opting for international higher education in technology and business fields (Microsoft India and Nasscom, 2021).

Challenges and Recommendations

India's demographic edge, thriving Tech ecosystem and vast talent pool and offers a strong foundation for higher education reforms, despite these notable and significant strengths underpinning the 'Indian Advantage,' higher education institutions (HEIs) must address several challenges for successful and effective implementation of policies and innovations. The challenges can be discussed as below:

Challenges

Infrastructural Gaps:

Limited high-speed broadband and smart device as well as classrooms access especially in rural areas is crucial (MHRD, 2020)

Lab facilities are not adequate for emerging Tech experimentation in Virtual Reality (VR), Augmented Reality (AR) and Artificial Intelligence (AI) (Adewale, 2023)

Faculty Development:

Trained faculty shortage to teach technology-enhanced methods

There is absence of continuous professional development on digital tools, multidisciplinary education, and pragmatic learning from both Government and Private sectors

Compliance and Administrative Bottlenecks:

Complex accreditation processes delaying innovation integration, only 853 universities and 15890 colleges are accredited by NAAC as of August 2023, this number is very less against availability of 1168 universities, 454473 colleges and 12009 stand-alone institutions in both public and private sectors in 2021-2022. (Thomas, Chennattuserry and Kureethara 2025)

Fragmented governance models and slow adoption of centralized digital platforms

While ensuring quality and ethical use of technology, agile and forward-looking policies are needed to encourage innovation amongst students

Minimal Industry-Academia Collaboration:

Less opportunities for students to participate in tech projects and design the curriculum with most recent industry trends

Communication gaps between industries, startups, and research hubs due to less engagement

Cyber Security and Data Privacy:

Ensure secure use of emerging technologies through robust frameworks and protect student data

Resistance to Change:

Slow adoption of technological changes due to poor mindset among faculty and administration

Additionally, there is a lack of clarity on detailed implementation strategies and timelines, which may hinder the effective rollout of the policy (NCERT, 2020).

Recommendations

While emerging technologies serve as powerful tool for transformation in Higher Education but the success lies in execution and that can be realized through strategic execution. That means strategic and targeted investment in digital infrastructure and skill development, stakeholder collaboration among policymakers, educators, technologists, and industry leaders and the creation of agile policy frameworks that can respond to rapid technological changes. The tools like Blockchain, VR/AR, AI and IoT can reshape Indian educational ecosystem, further it will make more adaptable, inclusive and industry ready by applying above conditions. Certain recommendations can make this happen which are listed below:

More Focus on Foundational Digital Literacy:

Assurance of all students and faculty possess foundational digital literacy skills before introducing advanced technologies. Gujarat state initiative named The ‘Schools of Excellence’ successfully migrated resistance through widespread training programs and active stakeholder engagement (Patel, 2024)

Alignment with NEP 2020 & Emerging Tech:

NEP 2020 offers pathways to address challenges such as Flexible credit systems and multidisciplinary structures, EdTech integration (AI, ML, AR/VR) to enable scalable, inclusive learning and Institutional autonomy for curriculum innovation

Partnership between Public-Private:

More collaborative approach between technology companies, educational institutions, and industry to co-create curricula, offer internships, and conduct joint research will help in achieving employability with integrated emerging technologies

Strengthening the partnerships between industry and educational institutions can be a way for students to gain relevant skills and enhance employability (MSDE, 2020). The focused policies on skill development and vocational education aligns the student with global standards, learning and career readiness. Germany's international model, such as dual education system, offer valuable insights into effective vocational training practices (Smith, 2021).

Additionally, the "Skill Development Partnership Program" under NEP 2020 is actively creating industry partnerships and expanding vocational training opportunities, initial feedback indicates an improved student readiness for the job market (Chopra, 2024).

National Technology Adoption Roadmap:

Comprehensive national roadmap for integrating emerging technologies into higher education, with clear milestones and funding mechanisms to be developed to achieve desired goals

Dedicated Skill Development Programs:

Launch of large-scale faculty development programs focused on educational enhancement for technology-enhanced learning

Incentivize Innovation:

Establish funding mechanisms, awards, and recognition for institutions and faculty leading in technology-driven innovation in education.

Pilot Projects and Scalability:

Initiation of pilot projects in identified institutions to test and refine technology integration strategies before scaling them nationwide will help in addressing the gaps.

Alongside, NEP 2020's allocation strategy includes specific alignment of resource distribution aiming to address disparities between urban and rural areas, as seen in pilot projects like the "Integrated Learning Resource Plan" in Tamil Nadu (Ramaswamy, 2023).

Another pilot project in Andhra Pradesh, the "Curriculum Innovation Project" have successfully introduced project-based learning and interdisciplinary subjects, resulting in enhanced student engagement and achievement (Reddy, 2023).

Ethical Guidelines:

Develop clear ethical guidelines for the use of data analytics, Artificial Intelligence (AI), and other technologies, ensuring fairness, transparency, and privacy across all institutions and organizations

Key Findings

- Artificial Intelligence (AI) and Big Data Analytics are helping in learning analytics and enhancement, prognostic student support, and curriculum customization (Fischer et al., 2020).
- Cloud-based technological platforms increase access, scalability, and great association between institutions (Hassan, 2025).
- Blockchain secures transparency in credentialing and academic records (Liu, 2023).
- VR/AR tools are transforming immersive knowledge and lab simulations, particularly in Science, Technology, Engineering, and Mathematics (STEM) fields (Adewale, 2023).

Conclusion

The 'Indian Advantage' in higher education represents more than just a hypothetical concept, it is a concrete and strategic opportunity to drive meaningful digital transformation across the sectors as well as a tangible opportunity. By strategically harnessing the power of emerging technologies such as Virtual and Augmented Reality, Artificial Intelligence (AI), Internet of Things (IoT), Blockchain, Cloud Computing and Big Data Analytics, an India can address the quality challenges, cultivate a vibrant ecosystem of innovation, and produce a workforce highly sought after by industries globally. This requires a concerted effort from educational institutions, industry, and community, most importantly from the policymakers. By embracing this technological transformation, Indian higher education will not only achieve its domestic goals but also emerge as a leading force in the global knowledge economy.

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An Analytical Study on Financial Well Being Through Personal Budgeting

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Abstract:

Financial Planning involves setting realistic financial goals, creating a strategic plan to reach them, and regularly monitoring one's income, expenses, savings, and investments. Among these practices, personal budgeting is one of the most effective tools for achieving financial control, discipline, and long-term financial well-being.

This Study "An Analytical Study on Financial Well-Being through Personal Budgeting" aims to explore how budgeting influences an individual's financial condition. The study examines various budgeting methods, their impact on spending and saving behaviour, and the psychological benefits of having a structured financial plan. It also looks into the role of digital tools in managing personal budgets and how budgeting contributes to reducing financial stress.

The research adopts a quantitative methodology to ensure objective measurement and analysis of data related to personal financial behaviour. A structured questionnaire was carefully designed and distributed among a diverse sample population, encompassing individuals from varying age groups, occupational backgrounds, and income brackets. This diverse representation aimed to capture a broad spectrum of budgeting practices and financial experiences. The questionnaire included both closed-ended and scaled questions to facilitate precise data collection. After gathering the responses, statistical tools such as correlation analysis, frequency distribution, and cross-tabulation were employed to identify significant patterns, relationships, and trends.

The findings of the study reveal that individuals who actively practice personal budgeting are more likely to experience financial stability, better savings and investment habits, and lower levels of financial stress. The research highlights that personal budgeting not only enhances financial literacy and control but also plays a significant role in achieving both short-term and long-term financial goals, thereby improving overall financial well-being.

Keywords: Financial Well Being, Personal Budgeting, Financial Literacy, Savings, Spending Habits

Introduction:

A budget is a detailed financial plan that outlines the allocation of income towards various expenses over a defined period of time. It acts as a structured guideline to help individuals manage their earnings and expenses effectively. Since most recurring bills such as housing rent, electricity, water, internet services, subscriptions, and groceries are typically due on a monthly basis, it is common for individuals to prepare a monthly budget. This monthly framework assists in tracking income sources, managing daily expenses, and ensuring that all financial obligations are met without unnecessary debt or financial strain.

Personal budgeting is the systematic and disciplined approach of creating and managing a financial plan tailored to an individual's or household's unique income and expenditure patterns. It serves as a financial roadmap, enabling individuals to utilize their financial resources efficiently by setting spending limits, planning ahead for savings, and monitoring progress towards their financial goals. A comprehensive personal budget encompasses multiple aspects of an individual's financial life, including regular income, fixed expenses (such as rent or EMI), variable expenses (such as entertainment or dining), emergency funds, savings targets, and debt repayment plans.

The importance of personal budgeting lies in its ability to provide a clear picture of one's financial situation, helping individuals make informed and conscious financial decisions. It cultivates responsible money habits, reduces the likelihood of overspending, and encourages the habit of saving for both expected and unforeseen needs. Through consistent budgeting, individuals can build financial discipline, avoid unnecessary debts, and move closer to achieving both short-term necessities and long-term aspirations.

On the other hand, financial well-being refers to an individual's overall sense of financial health, security, and peace of mind. It is defined by the ability to manage day-to-day financial needs, prepare for financial emergencies, and feel confident about one's financial future. Indicators of strong financial well-being include reduced financial stress, a stable income, sufficient savings, healthy spending habits, a good credit score, and the capacity to handle unexpected expenses without panic or hardship.

Personal budgeting plays a pivotal role in the journey towards financial well-being. By fostering regular saving habits, promoting conscious spending, and encouraging long-term financial planning, budgeting strengthens an individual's financial foundation. It not only improves the management of current financial responsibilities but also lays the groundwork for greater financial independence, long-term stability, and overall life satisfaction.

Statement of the problem:

Many individuals and households struggle with financial instability due to poor budgeting practices, lack of financial awareness, and ineffective financial goal-setting. Without a structured personal budget, people often face difficulties in managing expenses, saving for the future, and achieving financial well-being.

Understanding the importance of budgeting in improving financial well-being, the researcher decided to undertake a study on this topic. The research aims to analyse how personal budgeting can help individuals make better financial decisions, maintain stability, and achieve both short-term and long-term financial goals.

Objective:

To study the role of personal budgeting in achieving financial well-being among the individuals and to examine how effective budgeting practices contribute to an individual's financial stability.

Research methodology:

Research methodology refers to the overall approach, techniques, and procedures used to collect and analyse information in a research project. The present study, titled “An Analytical Study on Financial Well-Being through Personal Budgeting,” adopts a descriptive research design to analyse how personal budgeting influences financial well-being among individuals. The research primarily utilizes primary data, which was collected through a structured questionnaire specifically designed for this study.

The questionnaire consisted of a mix of closed-ended and scaled questions to capture respondents' budgeting habits, financial behaviours, and perceptions regarding their financial well-being. The target population included earning individuals above 20 years of age, comprising working professionals, students, self-employed individuals, homemakers, and retirees within the Pune region.

A probability sampling method with simple random sampling technique was employed to ensure that every individual in the target population had an equal chance of being selected. The final sample size was 115 respondents, and data collection was conducted over a period from January to March 2025.

For data analysis, graphical methods along with basic statistical tools such as frequency distribution, percentage analysis, and cross-tabulation were used to interpret the collected data and identify key trends and relationships. This methodological approach ensured that the findings are reliable, objective, and provide meaningful insights into the link between personal budgeting and financial well-being.

Review of literature:

Sneha Karkala (2020) published “An Analysis of Financial Well-Being among Undergraduate Students” in The University of Texas at Austin. The study examines college students' financial literacy and behaviours amid rising tuition and student loans. It highlights how financial well-being affects students' ability to manage expenses, save, and plan for life after graduation, and it advocates for better financial education at UT-Austin [1].

Shikha Bhatia et al. (2024) published “Exploring Financial Well-Being of Working Professionals in the Indian Context” in the Journal of Financial Services Marketing. This study investigates how financial knowledge and attitude impact financial well-being among working professionals in India. It shows that financial behaviour mediates this relationship and stresses that applying financial knowledge responsibly is essential. The study calls for financial literacy programs and policy support to improve financial security [2].

Nataliia Versal et al. (2023) published “How Do Savings and Personal Budgeting Matter on Financial Literacy and Well-Being” in Business, Management and Economics Engineering.

The research explores how savings and personal budgeting affect financial literacy and well-being across countries, using OECD and Global Findex data. It finds that savings strongly influence financial literacy and stability, especially in non-EU countries, and recommends financial education policies to strengthen economic security [3].

Dr. C. Kandasamy et al. (2024) published “A Study on Personal Budgeting of an Individual in Coimbatore City” in the International Journal of Creative Research Thoughts (IJCRT). This study analyses personal budgeting habits in Coimbatore and identifies issues like financial instability, overspending, and low financial literacy. Based on data from 120 respondents, it highlights that effective budgeting helps achieve financial stability and reduce unnecessary expenses, emphasizing the need for financial education [4].

Dr. Balaji Bhovi et al. (2024) published “A Study Showing the Importance of Personal Financial Management Strategies for An Individual for Overall Financial Wellbeing” in the International Journal of Multidisciplinary Research (IJMR). This study explains that personal financial management (PFM) is vital for financial stability and goal achievement. It covers budgeting, saving, investing, debt management, and retirement planning, and discusses the role of financial education, technology, and socioeconomic factors in shaping financial behaviour [5].

Research Gap

Despite extensive research on financial well-being and personal budgeting, significant gaps are present. Existing studies primarily focus on financial literacy, savings behaviour, and budgeting practices among specific groups, such as students or working professionals. However, limited research explores the direct relationship between personal budgeting and overall financial well-being across diverse demographics, including self-employed individuals, homemakers, and retirees. Additionally, while financial education programs are often recommended, their long-term impact on financial security and stress reduction remains underexplored. This study aims to bridge these gaps by analysing how personal budgeting influences financial well-being across various income groups and life stages.

Analysis and Result:

The analysis of the primary data collected from 115 respondents provides valuable insights into the relationship between personal budgeting and financial well-being. The demographic profile reveals that the majority of respondents (57.5%) belong to the 21–30 age group, with a balanced gender distribution (55.8% male and 44.2% female). Most respondents (71.9%) hold at least a bachelor’s degree, indicating good educational awareness, yet a large portion (64.5%) have a monthly income below ₹50,000, highlighting the relevance of effective budgeting for lower and middle-income groups.

Regarding budgeting practices, 65% of respondents reported that they maintain a personal budget. Among them, spreadsheets (34%) and budgeting apps (29%) are preferred tools, indicating a gradual shift toward digital financial management.

The analysis shows that 52% of respondents consider themselves financially independent, although a significant number. However 35% of individuals do not follow any budgeting system, citing reasons such as forgetting, finding it complicated, or perceiving it as unnecessary. Saving and investment patterns suggest that while many respondents aim to save

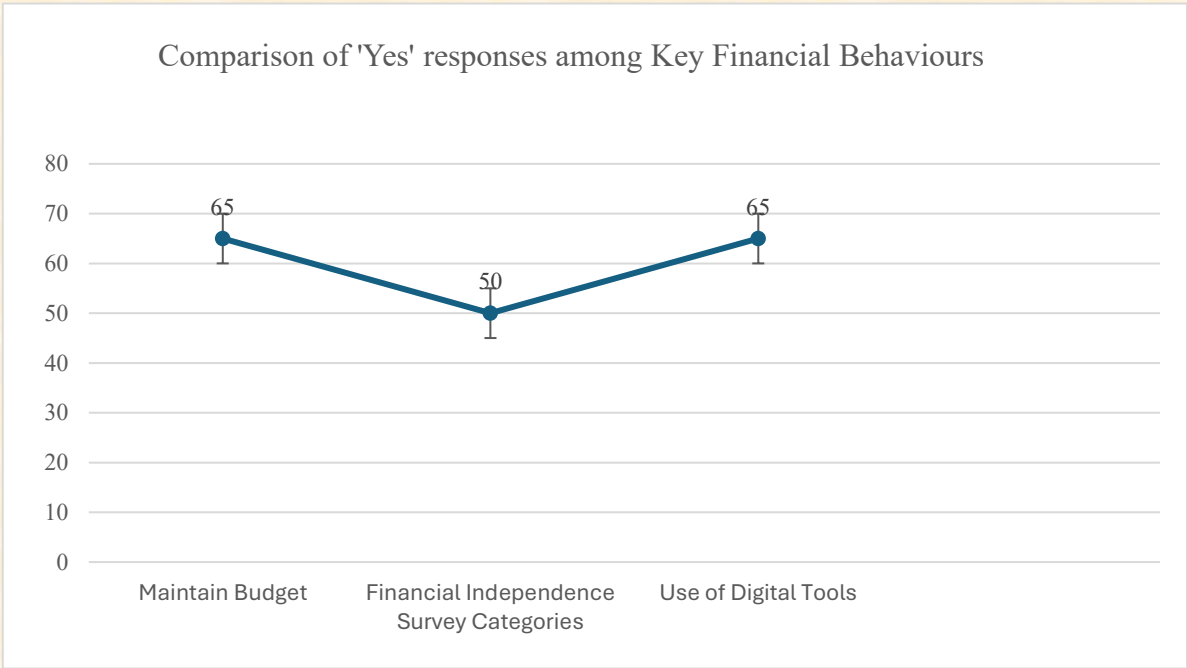
(31% save 10–20% of their income), the overall savings and investment rates remain relatively low, with some respondents not saving or investing at all.

Table No. 1: Overview of Respondents’ Demographics, Budgeting Practices, and Financial Behaviour:

Title	Key Categories / Options	Highlights
Age of Respondents	21–30, 31–40, 41–50, 51–60, 61-above	Majority (57.5%) are aged 21–30
Gender Distribution	Male, Female, Other	55.8% Male, 44.2% Female, 0% Other
Education of Respondents	Illiterate, High School & Below, Junior College, Bachelor’s & Above	71.9% have Bachelor’s or higher
Occupation of Respondents	Working professionals, Self-employed, Retired, Homemakers, etc.	Majority are employed; specific percentages as per survey
Monthly Income	Below 50,000; 50,000 -1,00,000; 1,00,000–1,50,000; 1,50,000+	64.5% earn below ₹50,000
Marital Status	Married, Unmarried	65.2% unmarried
Maintenance of Budget	Yes, No	65% maintain a budget
Budget Management Tools	Written format, Apps, Spreadsheet, Other	Spreadsheet most preferred 34%
Perception of Financial Independence	Yes, No, Maybe	52% feel financially independent
Primary Reasons for Budgeting	Track expenses, Save money, Avoid debt, Plan goals, Secure future	Most common: Save money 29%
Current Financial Situation	Very comfortable, Neutral, Somewhat comfortable, Struggling, Very stressed	35% somewhat comfortable
Monthly Income Savings %	Less than 10%, 10–20%, 20–30%, More than 30%, Don’t save	Most save 10–20% of income
Monthly Investment %	Less than 10%, 10–20%, 20–30%, More than 30%, Don’t invest	Majority invest less than 10%
Use of Digital Tools	Yes, No	65% use digital tools for budgeting

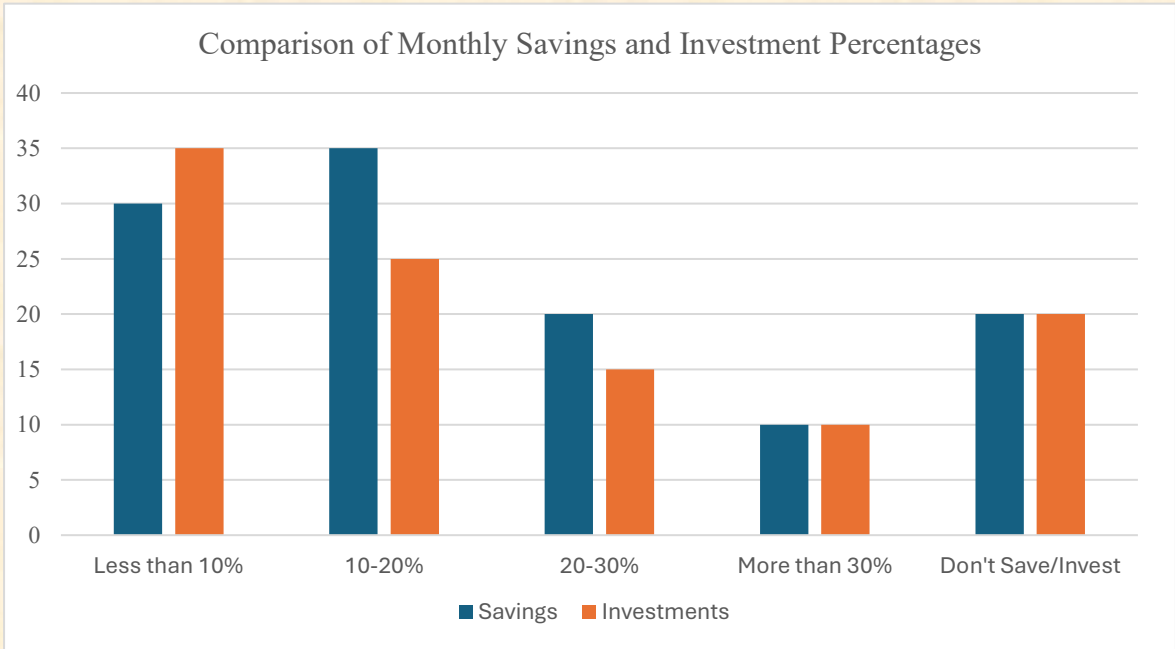
Regular Financial Habits	Paying bills on time, Avoiding impulse purchases, Investing regularly, Using cash, Reviewing statements	82.61% pay bills on time
Beliefs on Effectiveness of budgeting	Yes significantly, Yes to some extent, No but could help, No impact	40% say it's effective to some extent
Impact of Financial Stress	No impact, Some impact, Significant impact, Severe impact	35% say some impact but Manageable
Financial Goals Achieved	Emergency fund, Savings & investment, Home/car, Retirement	30.7% built emergency fund
Reasons for Not Budgeting	Complicated, Not necessary, Forget/Not prioritized	50% forget or don't prioritize
Challenges in Budgeting	Unexpected expenses, Overspending, Lack of knowledge, Irregular income	65% face unexpected expenses
Ways to Improve Well-being	Track expenses, Save & invest, Follow 50/30/20 rule, etc.	Keeping track of expenses (26.1%)
Handling Unexpected Expenses	Emergency fund, Avoid expense, Adjust spending, Save, Decrease expenses	Saving (23.5%) is top method

Chart No. 1: Trends in Budget Maintenance, Financial Independence, and Digital Tool Usage



(Source: Questionnaire)

Chart No. 2: Percentage-wise Comparison of Savings and Investments by Respondents



(Source: Questionnaire)

Findings also highlight common financial habits: 82.61% pay bills on time, and over half avoid impulse purchases and review financial statements regularly. This reflects an awareness of basic financial discipline, although there is scope for improvement in consistent investing and cash flow management.

The perceived impact of budgeting on financial well-being is largely positive. 33% believe it significantly improves their financial status, and 40% acknowledge moderate benefits. Only a small portion do not see tangible impacts, suggesting the potential for better financial education to address misconceptions.

Financial stress remains a concern for many respondents; about 35% report some impact, while 30% experience significant effects on mental and physical health. In terms of goals achieved through budgeting, respondents commonly mention building an emergency fund (30.7%), increasing savings and investments (20%), and planning for major purchases and retirement (25.3% each).

Challenges such as unexpected expenses (65%), overspending (52%), irregular income (30%), and lack of financial knowledge (35%) frequently disrupt budgeting efforts. To handle unexpected expenses, most respondents rely on savings (23.5%) or emergency funds (20.9%), underlining the importance of proactive financial planning.

Overall, the analysis confirms that personal budgeting positively influences financial well-being by promoting savings, reducing stress, and helping achieve financial goals. However, gaps in financial literacy, low saving rates, and irregular income patterns remain challenges that need to be addressed through targeted awareness and user-friendly digital tools.

Discussion:

The results of this study confirm that personal budgeting plays a vital role in enhancing an individual's financial well-being. A significant proportion of respondents actively maintain budgets and perceive clear benefits such as increased savings, better financial control, and reduced stress. These findings align with prior research by Karkala (2020) and Bhatia et al. (2024), which emphasized the importance of budgeting in promoting financial security and goal achievement.

However, challenges such as unexpected expenses, overspending, and irregular income continue to hinder effective budgeting. These results highlight a gap between awareness and consistent financial behaviour, suggesting that while many individuals understand the importance of budgeting, practical barriers limit its application. This reinforces the need for targeted financial literacy initiatives and user-friendly digital tools to simplify budgeting practices.

Moreover, the fact that a substantial percentage of respondents still do not follow any budgeting method suggests that there is scope for further outreach and education, especially among lower-income and less financially literate groups. The study was limited to a specific geographical region and demographic, which may affect the generalizability of the findings. Future research could examine diverse populations and explore long-term impacts of budgeting on financial well-being.

In summary, the study emphasizes that promoting consistent budgeting habits, increasing financial awareness, and addressing common challenges are essential steps toward improving financial well-being across different income groups and life stages.

Conclusion:

From this study, it can be concluded that most respondents have a fair understanding of basic financial concepts such as budgeting, saving, and investing. The study shows that while many people are aware of the importance of managing their money, there is still a lack of consistent application in daily life. Saving money and maintaining an emergency fund are high priorities for respondents, but financial challenges like unexpected expenses, overspending, irregular income, and lack of financial discipline continue to create obstacles in achieving financial stability. It is also seen that although people know about budgeting tools and digital applications, many do not use them regularly. Therefore, there is a strong need for practical financial education and awareness about digital tools to make budgeting and financial planning easier. Encouraging people to build consistent saving and investing habits, plan their finances well, and use available technology can help reduce financial stress and improve financial well-being. This study highlights that developing good budgeting habits is important for long-term financial security and independence.

Scope for further research:

Future research can incorporate sentiment analysis using artificial intelligence and natural language processing (NLP) to measure the emotional tone of news articles, social media posts, and blogs. This would allow researchers and investors to quantify the impact of news on stock prices more precisely, leading to data-driven insights and the development of automated trading strategies. Additionally, while the current study focuses mainly on NSE and BSE, future studies can expand the analysis to include global markets such as NYSE, NASDAQ, FTSE, or Nikkei to examine whether similar news events have the same impact worldwide. A broader comparative analysis would provide a deeper understanding of market dynamics and investor behaviour across different economies. Further work can also involve conducting a long-term study over several years to identify patterns in how news influences the stock market under various economic conditions, including recessions, growth periods, political uncertainty, or technological advancements. Moreover, future research can examine how specific sectors such as banking, pharmaceuticals, IT, and energy react to particular types of news, helping investors create more informed, sector-focused portfolios. Lastly, developing real-time automated trading systems that use algorithms to read news feeds, analyse sentiment, and execute trades instantly presents an exciting direction for future research, offering significant benefits for day traders and institutional investors looking to capitalize on short-term market movements.

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being among working professionals in India, highlighting the importance of financial literacy programs and policy interventions.

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This study discusses the dynamics of personal financial management, including budgeting, saving, investing, and retirement planning, and its role in achieving overall financial well-being.

A Study on the Urban-Rural Skill Gap in Indian Higher Education: A Pathway to Enhancing Employability through Industry-Academia Collaboration

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Executive Summary

The study investigates the urban-rural skill gap in Indian higher education with a focus on enhancing employability through industry-academia collaboration. Despite rapid growth in India's higher education sector, significant disparities exist between urban and rural degree college students in terms of skills, resources, and employability outcomes. Urban institutions are generally better equipped with infrastructure, industry exposure, and digital access, whereas rural colleges struggle with limited resources, outdated curricula, and weaker industry linkages.

The study is centred on degree colleges and aims to identify the root causes of the skills gap while proposing actionable solutions to bridge it. It highlights critical challenges faced by rural students, including insufficient employability training, lack of industry-relevant experience, low digital literacy, and limited access to modern learning tools. Through field data and stakeholder insights, the research examines how structured collaboration between academia and industry can play a transformative role in closing this gap.

Key recommendations include enhancing rural institutions through internships, mentoring, experiential learning, curriculum alignment, and robust government-industry-academia partnerships. The study emphasizes the need for inclusive, decentralized, and digitally driven interventions to bring industry practices into rural campuses. Bridging the urban-rural divide is essential for achieving equitable employability and fostering balanced socio-economic development across India.

Abstract

India's higher education system has witnessed unprecedented expansion in recent decades, yet a glaring disparity persists in the skill acquisition and employability outcomes between urban and rural degree college students. The growing urban-rural divide in India's higher education landscape poses a significant challenge to achieving equitable employability outcomes among graduates. This paper explores the urban-rural skill gap in Indian higher education institutions with a specific focus on degree colleges, examining how this divide impacts employability and economic equity.

The study highlights the disparities in access to resources, exposure to industry practices, digital literacy and employability training. As India advances towards becoming a global knowledge economy, bridging this divide is essential to harness its full demographic potential.

The study evaluates the potential of industry integration, innovation, and experiential learning as mechanisms to bridge this divide. It highlights challenges, such as infrastructural insufficiencies, faculty competency, curriculum irrelevance, and lack of industry exposure that disproportionately affects rural institutions.

This paper explores how structured **industry-academia collaboration** can serve as a strategic solution to reduce the urban-rural skill gap. Through empirical data collection from selected degree colleges across urban and rural regions, the study identifies the key factors contributing to the skills mismatch and assesses the extent to which industry engagement through internships, mentoring, curriculum alignment, hands-on training and government-industry-academia partnerships can ensure equitable employability outcomes.

The findings suggest that while urban institutions are increasingly aligned with industry expectations, rural colleges often lack exposure, infrastructure, and industry partnerships. The paper advocates for a decentralized and inclusive model of collaboration that brings industry practices to rural campuses, supported by policy innovation and digital interventions. By reimagining higher education through meaningful industry integration, India can foster employability across regions and promote balanced socio-economic growth.

Key Words: Higher Education Institutions, Urban-Rural Skill Gap, Knowledge Economy, Industry-Academia Collaboration

Background of the Study

The rapid pace of economic growth and technological advancement in India has underscored the critical need for a skilled workforce capable of meeting the evolving industry demands. Higher education institutions serve as the primary pipeline for developing such skills; however, disparities persist across urban and rural regions. While urban centres often benefit from better infrastructure, resources, and industry linkages, rural areas lag behind, resulting in a significant skill gap that hampers employability and economic development. Recognizing this divide is essential to formulate targeted strategies that promote inclusive growth and equitable access to quality education and employment opportunities.

Importance of the Urban-Rural Skill Gap

The urban-rural skill gap poses a substantial challenge to India's goal of becoming a global economic leader. It not only limits the employability of rural youth but also leads to under-utilization of human resources in rural areas, exacerbating socio-economic inequalities. Addressing this gap is vital for fostering balanced regional development, reducing unemployment, and ensuring that the benefits of higher education reach marginalized communities. Furthermore, bridging this divide can enhance national productivity, innovation, and social cohesion by harnessing the full potential of India's diverse population.

Objectives of the Study

This research aims to analyze the extent and underlying causes of the urban-rural skill gap within Indian higher education. It seeks to evaluate the current state of educational resources, curriculum relevance, and industry engagement in both settings. The study also aims to identify effective models of industry-academia collaboration that can serve as pathways to skill enhancement. Ultimately, the research endeavours to propose strategic interventions, including policy recommendations and innovative practices, to bridge the skill divide and improve employability outcomes for students across urban and rural regions.

Research Methodology

The study is based on the secondary data from 2006 to 2022 which were collected from different published sources like: Research & Discussion Papers, Survey Reports, Working Papers, Doctoral Thesis, Case Studies, Books, Online Data, Research Journals, Articles, Newspapers, etc.

Understanding The Urban-Rural Skill Gap

Definition and Scope of the Skill Gap

The urban-rural skill gap in Indian higher education refers to the significant disparities in the quality, relevance, and applicability of skills possessed by graduates from urban and rural institutions. This gap manifests in differences in technical competencies, soft skills, digital literacy, and industry-specific knowledge. While urban institutions often have better access to modern infrastructure, industry exposure, and updated curricula, rural institutions frequently struggle with resource limitations, outdated teaching methods, and limited industry engagement. The scope of this gap extends across various disciplines, impacting employability prospects for rural graduates and contributing to regional economic disparities. Addressing this divide is crucial for fostering inclusive growth and ensuring that higher education serves as a catalyst for equitable development.

Factors Contributing to the Skill Gap

Several interconnected factors contribute to the urban-rural skill gap in Indian higher education. Firstly, infrastructural disparities play a pivotal role; urban institutions typically have better laboratories, libraries, and technological resources, facilitating practical learning. Secondly, curriculum relevance often favours urban-centric industry needs, leaving rural students with skills that are less aligned with current market demands. Thirdly, limited industry exposure and internship opportunities in rural areas hinder experiential learning. Additionally, socio-economic challenges such as lower literacy levels, inadequate access to quality primary and secondary education, and digital divide issues further exacerbate the gap. Institutional capacity constraints, including shortages of qualified faculty and outdated pedagogical approaches, also impede skill development in rural settings.

Impact on Employability

The urban-rural skill gap significantly influences employability outcomes for graduates across India. Rural students often face higher unemployment rates and underemployment due to a mismatch between their skills and industry requirements. Employers frequently perceive rural graduates as lacking practical experience, digital proficiency, and soft skills essential for modern workplaces. This disparity not only limits individual career prospects but also hampers regional economic development by underutilizing the potential of rural human resources. Consequently, the skill gap perpetuates socio-economic inequalities, contributing to urban migration and labour market inefficiencies. Bridging this divide is therefore vital for creating a more inclusive and productive workforce, emphasizing the need for targeted interventions through industry-academia collaboration and policy reforms.

Current State of Higher Education in India

Overview of Higher Education Institutions

India's higher education landscape comprises a diverse array of institutions, including central universities, state universities, deemed universities, private universities, and autonomous colleges. These institutions vary significantly in terms of size, infrastructure, academic offerings, and governance structures. While some premier institutions like the Indian Institutes of Technology (IITs) and Indian Institutes of Management (IIMs) set global standards, a large number of colleges and universities operate with limited resources, especially in rural and underserved areas. This heterogeneity impacts the overall quality and accessibility of higher education across the country, influencing students' skill development and employability prospects.

Disparities in Educational Resources

There exists a stark disparity in the availability of educational resources between urban and rural higher education institutions. Urban colleges often benefit from better infrastructure, access to modern laboratories, libraries, digital facilities, and qualified faculty. Conversely, rural institutions frequently face shortages of physical infrastructure, technological tools, and trained educators, which hampers effective teaching and learning. These resource gaps contribute to unequal skill acquisition among students, perpetuating the urban-rural divide in employability and economic opportunities.

Curriculum Relevance and Industry Needs

The relevance of curricula in Indian higher education remains a critical concern. Many academic programmes are criticized for being outdated or disconnected from current industry requirements, leading to a mismatch between graduate skills and employer expectations. While some institutions have begun integrating industry-relevant content and soft skills training, a significant portion of curricula still emphasizes theoretical knowledge over practical application. This disconnect limits students' readiness for the workforce, especially in rural areas where industry exposure and experiential learning opportunities are scarce. Addressing curriculum relevance is essential for bridging the skill gap and enhancing employability across both urban and rural contexts.

Industry-Academia Collaboration

Importance of Collaboration for Skill Development

Industry-academia collaboration plays a pivotal role in bridging the skill gap by aligning educational outcomes with industry requirements. Such partnerships facilitate practical training, internships, and exposure to real-world work environments, thereby enhancing students' employability. When academic institutions work closely with industry stakeholders, they can update curricula to reflect current technological advancements and market demands, ensuring that graduates possess relevant skills. Moreover, collaboration fosters innovation in teaching methodologies and curriculum design, making education more responsive and adaptable. This synergy not only benefits students but also helps industries access a skilled talent pool tailored to their specific needs, ultimately contributing to economic growth and development.

Successful Models of Collaboration in India

India has witnessed several successful industry-academia collaboration models that serve as benchmarks for effective skill development. For instance, the National Skill Development Corporation (NSDC) partners with various industry players and educational institutions to deliver skill training aligned with industry standards. Additionally, the Industry-Institute Partnership Cell (IIPC) initiatives at universities facilitate joint research projects, internships, and curriculum development. The Tata Institute of Social Sciences (TISS) collaborates with government and industry bodies to design programs that address rural skill gaps. Another notable example is the collaboration between Infosys and academic institutions to develop specialized training modules in information technology, which have significantly improved employability outcomes. These models demonstrate the potential of structured partnerships to create a skilled workforce responsive to industry needs.

Challenges in Implementing Collaboration

Despite the evident benefits, implementing effective industry-academia collaboration in India faces several challenges. One major hurdle is the lack of coordination and communication between educational institutions and industry players, leading to misaligned expectations and objectives. Resource constraints, including funding and infrastructure limitations, hinder the development of sustainable partnerships, especially in rural areas. Additionally, there is often a gap in understanding industry-specific skill requirements, resulting in curricula that are outdated or irrelevant. Institutional rigidity and bureaucratic hurdles further impede collaboration efforts. Moreover, disparities in technological adoption and digital infrastructure between urban and rural institutions create unequal opportunities for partnership development. Addressing these challenges requires concerted policy efforts, capacity building, and fostering a culture of collaboration that values industry input and engagement.

Strategies To Bridge the Skill Gap

Curriculum Reforms and Skill Development Programs

To effectively bridge the urban-rural skill gap, it is imperative to undertake comprehensive curriculum reforms that align academic content with current industry requirements. This involves integrating practical skill-based modules, soft skills training, and emerging technological competencies into higher education curricula. Establishing specialized skill development programs, such as vocational training, certification courses, and industry-oriented workshops, can enhance students' employability. These initiatives should be tailored to address regional needs, ensuring that rural students acquire relevant skills that match local and national economic demands. Collaboration with industry experts during curriculum design can further ensure that academic programs remain relevant and responsive to evolving job market trends.

Role of Technology in Education

Technology plays a pivotal role in democratizing access to quality education and bridging the urban-rural divide. Digital platforms, e-learning modules, and virtual laboratories can provide rural students with exposure to advanced concepts and practical skills that are often limited in traditional settings. Implementing online courses and mobile learning applications can overcome geographical barriers, enabling students from remote areas to access high-quality educational resources. Additionally, leveraging artificial intelligence and data analytics can personalize learning experiences, identify skill gaps, and recommend targeted interventions. Integrating technology into pedagogical practices not only enhances learning outcomes but also prepares students for a digitally-driven workforce.

Partnerships with Industry Leaders

Establishing strong partnerships with industry leaders is crucial for aligning higher education with real-world skill requirements. Such collaborations can facilitate internships, apprenticeships, and on-the-job training opportunities for students, providing practical exposure and industry insights. Industry partners can also contribute to curriculum development, ensuring that academic programs incorporate relevant skills and technologies. Furthermore, joint initiatives such as industry-sponsored labs, mentorship programs, and skill certification schemes can enhance students' employability. Building these partnerships requires proactive engagement from educational institutions and industry stakeholders, fostering a symbiotic relationship that benefits both students and the broader economy.

Comparative Analysis of Outcomes

When comparing the outcomes of urban and rural initiatives, several differences emerge. Urban programmes tend to produce higher immediate employment rates, owing to better infrastructure, industry linkages, and access to advanced technology. For example, urban skill programmes report employment rates exceeding 70% within six months of training. Conversely, rural initiatives, while impactful, often face challenges such as limited infrastructure and lower industry density, resulting in employment rates around 50-60%. However, rural programmes have demonstrated significant success in fostering self-employment and entrepreneurship, which are crucial for local economic development. Both models highlight the importance of contextual adaptation - urban initiatives benefit from

technological and infrastructural advantages, whereas rural programmes succeed through community involvement and tailored, low-cost training solutions. Overall, integrating best practices from both contexts can create a more inclusive and effective approach to bridging the urban-rural skill gap in Indian higher education.

Key Findings

1. The key findings of the study suggest that urban institutions are increasingly aligned with industry expectations, while rural colleges often lack exposure, infrastructure, and industry partnerships. The study also finds that the urban-rural skill gap significantly influences employability outcomes for graduates across India, with rural students facing higher unemployment rates and underemployment due to a mismatch between their skills and industry requirements.
2. The key findings of the study include the persistent urban-rural skill gap in Indian higher education, which significantly hampers employability among rural youth. The study also reveals that disparities in resource allocation, curriculum relevance, and industry exposure contribute to this divide.
3. The analysis reveals that disparities in resource allocation, curriculum relevance, and industry exposure contribute to this divide.
4. The findings suggest that while urban institutions are increasingly aligned with industry expectations, rural colleges often lack exposure, infrastructure, and industry partnerships.
5. Industry-academia collaborations emerge as a crucial strategy to bridge this gap, with successful models demonstrating improved skill alignment and employment outcomes.

Recommendations

Policy Recommendations for Government and Institutions

To effectively bridge the urban-rural skill gap, it is imperative for policymakers and educational institutions to prioritize the development and implementation of targeted strategies. The government should formulate comprehensive policies that incentivize industry-academia collaborations, such as establishing dedicated funding schemes and tax benefits for partnerships that focus on skill development in rural areas. Additionally, integrating skill-based curricula aligned with industry needs into higher education standards can ensure relevance and employability. Institutions must also focus on decentralizing resources, enhancing infrastructure, and promoting faculty training to deliver quality education tailored to local contexts. Establishing accreditation and monitoring frameworks can further ensure that skill development initiatives meet national standards and effectively address regional disparities.

Best Practices for Industry Engagement

Effective industry engagement is crucial for aligning academic curricula with real-world requirements and enhancing employability. Best practices include establishing formal partnerships with higher education institutions to co-develop curricula, internships, and apprenticeship programs that provide hands-on experience. Industries should actively participate in curriculum design, guest lectures, and mentorship initiatives to ensure relevance. Creating regional industry clusters and innovation hubs can facilitate continuous collaboration and knowledge exchange. Moreover, leveraging technology platforms for virtual collaboration can overcome geographical barriers, especially in rural areas. Recognizing and rewarding industry partners through certifications or public acknowledgment can motivate sustained engagement and foster a culture of collaboration that benefits both students and industries.

Conclusion

Limitations

The limitations of the study include the lack of coordination and communication between educational institutions and industry players, leading to misaligned expectations and objectives. The study also notes that resource constraints, including funding and infrastructure limitations, hinder the development of sustainable partnerships, especially in rural areas.

Summary of Findings

This study highlights the persistent urban-rural skill gap in Indian higher education, which significantly hampers employability among rural youth. The analysis reveals that disparities in resource allocation, curriculum relevance, and industry exposure contribute to this divide. While urban institutions often benefit from better infrastructure and industry linkages, rural colleges face challenges in providing comparable skill development opportunities. Industry-academia collaborations emerge as a crucial strategy to bridge this gap, with successful models demonstrating improved skill alignment and employment outcomes. However, barriers such as limited awareness, infrastructural constraints, and policy implementation gaps need to be addressed to realize the full potential of these collaborations. Overall, targeted reforms and strategic partnerships are essential to foster equitable skill development across urban and rural settings.

Final Thoughts on Enhancing Employability

To effectively enhance employability for rural students, a multifaceted approach is necessary. Strengthening industry-academia partnerships through innovative models can facilitate practical skill acquisition aligned with market demands. Curriculum reforms that incorporate industry-relevant skills, coupled with the integration of technology, can make higher education more responsive and inclusive. Policymakers, educational institutions, and industry stakeholders must collaborate to create an ecosystem that promotes equitable access to quality education and skill development opportunities. Future efforts should focus on scalable, context-specific interventions that address infrastructural and resource disparities, ensuring that rural youth are equipped with the competencies needed to thrive in a competitive job market. Ultimately, bridging the urban-rural skill gap is vital for fostering inclusive economic growth and social equity in India.

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Role of YouTube in Promoting English Proficiency and Confidence

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Abstract

In today's digital era, YouTube has emerged as an unexpected yet powerful tool for English language learning, particularly in rural and semi-urban India. Once known mainly for entertainment, YouTube is now transforming into a virtual classroom, offering free, accessible, and flexible learning opportunities to millions. This research paper explores how English learning YouTube channels, such as Aishwarya Patekar (formerly Speak English with Aishwarya), are playing a significant role in promoting not only language proficiency but also self-confidence and social mobility. Instead of relying on traditional surveys or interviews, this study uses a thematic analysis based on digital content, viewer comments, a real-life case study, and existing secondary literature. Four key themes emerge from the analysis: accessibility and inclusivity, personalized learning flexibility, confidence building, and the educational influence of content creators. These findings suggest that for many first-generation learners, especially those with limited access to formal education, YouTube functions as a lifeline for skill development and empowerment. The paper concludes that YouTube is far more than just a source of entertainment; it is a community-driven, digital learning ecosystem reshaping the English learning landscape in India.

Keywords

YouTube education, English proficiency, rural India, digital learning, YouTube for skill development

Introduction

YouTube has increasingly become a valuable learning resource across various educational contexts. The platform enhances engagement and improves learning outcomes in diverse subjects, including language acquisition. For instance, research indicates that applications of YouTube in guided discovery learning models significantly boost self-efficacy and mathematical skills among students (Poon et al., 2019). Furthermore, studies show that YouTube effectively enhances students' speaking skills in English, thereby fortifying their language proficiency (Fadhil Abbas & Qassim, 2020; Shoufan & Mohamed, 2022).

According to a KPMG-Google report, over 90% of new internet users in India prefer content in local languages but aspire to learn English for economic and educational advancement (Indian Languages – KPMG-Google Report, n.d.). This paper explores how YouTube acts as a digital mentor, particularly for first-generation learners in India's smaller towns and villages.

Moreover, the informal learning opportunities presented by YouTube, particularly during the COVID-19 pandemic, reveal that students can access a myriad of educational content,

promoting self-directed learning and creativity (The Employment and Wage Impact of Broadband Deployment in Canada, 2015),(Saputra & Fatimah, 2018),(Krishnan & Joseph, 2024). However, concerns remain regarding the quality assurance of content, as users must critically evaluate the credibility of resources (Greeves & Oz, 2024). Despite this, the positive influence of YouTube in fostering language skills, comprehension, and engagement cannot be overlooked (Adisti, 2022),(Shoufan & Mohamed, 2022). The proliferation of smartphones and broadband internet in rural regions has had a profound impact on educational access. Research indicates that broadband deployment positively influences rural employment growth, suggesting that improved digital infrastructure can lead to enhanced educational opportunities (Tahmina, 2023). The availability of online resources is associated with the well-being of rural residents, as it provides a platform for individuals to bolster their skill sets and engage with educational content that may have previously been inaccessible (Huang et al., 2023). Moreover, digital education has the potential to address educational disparities, such as high dropout rates and a lack of creative teaching methods prevalent in rural schools (Grewal, Kidney, & Kenny, 2022).

Mastering the English language is crucial in the context of rural India, as proficiency in English correlates with improved job prospects and empowerment for individuals, facilitating their integration into a globally connected economy (Indian Languages – KPMG-Google Report, n.d.). The COVID-19 pandemic acted as a catalyst for digital learning, prompting a significant shift towards online educational resources. Government initiatives such as DIKSHA and SWAYAM were introduced to support this transition (Fale & D'Souza, 2022). The increasing demand for English language skills is critical in a diverse range of professional sectors across the country.

YouTube provides multifaceted opportunities for English language learners among rural and semi-urban demographics. The use of mobile apps for language learning has been recognized as an effective pedagogical intervention for improving literacy skills (Putra et al., 2024). These resources allow students to learn at their own pace, utilize practical examples through video demonstrations, and interact with a wider variety of content compared to conventional learning methods. Studies on mobile-assisted language learning have shown it significantly enhances listening comprehension, a critical component of language acquisition.

Furthermore, YouTube channels aimed at teaching English are tailored to meet the specific challenges faced by rural learners, including diverse dialects and localized content that acknowledges cultural references. This approach makes the learning experience more relatable and encourages sustained engagement from students (Francisco, 2021). The challenges posed by rural education contexts, such as poor internet connectivity and a lack of resources, are increasingly being addressed through innovative online methodologies (Gusti, 2024).

In addition to cognitive benefits, the emotional and psychological elements of learning cannot be neglected. The ubiquitous nature of YouTube content fosters a community of learners and mitigates feelings of isolation often experienced in rural environments (Booton, Hodgkiss, & Murphy, 2023). By providing a platform for peer interaction and feedback, these channels enhance motivation and confidence among learners, which are crucial for success in language acquisition (Raj & Tomy, 2024). Students also benefit from socially driven narratives within the content, further stimulating their interest and facilitating a connection with the material being taught.

Significantly, the role of educators in rural areas is critical for effectively harnessing YouTube and other digital platforms within classrooms. Educational research indicates that teachers require adequate training and support to incorporate such tools into their teaching methodologies (Rupiwin & Shah, 2021).

Objectives

- To study how YouTube helps people learn English in rural and semi-urban areas.
- To understand how YouTube improves learners' confidence and speaking skills.

Research Methodology

This research paper is based on secondary data collected from various research papers, journal articles, and trusted websites. A case study of the YouTube channel 'Aishwarya Patekar' (formerly known as Speak English with Aishwarya) has been included to support and connect the findings with a real-life example. This approach helps in understanding how digital platforms like YouTube contribute to English learning in practical, everyday situations.

Thematic Framework and Analysis

Accessibility and Inclusivity

YouTube has become a vital resource for English language learners, particularly among marginalized or rural communities, due to its accessibility and diverse content offerings. One significant advantage is that YouTube serves as a free platform where users can access educational videos anytime and anywhere, provided they have an internet connection. This unrestricted access is crucial for learners from rural areas who may otherwise face challenges in obtaining quality educational materials (Baroroh & Rizal, 2023),(Sandhu, 2017). The adaptability of YouTube means that learners can select content that resonates with their interests, ultimately enhancing their motivation and engagement in learning English (Maulidiyah, Agustina, & Umam, 2023),(Widiantari & Dewi, 2023).

The unique features of YouTube including a vast range of videos covering diverse accents, contexts, and subjects allow learners to improve their listening and speaking skills more effectively than traditional methods. Research indicates that the audiovisual nature of YouTube aligns with students' preferences, making language acquisition more enjoyable and successful(Fadhil Abbas & Qassim, 2020),(Hanh, 2023). Furthermore, the platform supports independent learning, as students can utilize videos to learn at their own pace without the constraints of a structured classroom environment(Gracella & Nur, 2020).

Moreover, YouTube's capacity to provide authentic linguistic input from native speakers offers learners a valuable opportunity to experience the language in natural contexts, which effectively enhances their linguistic competencies. This feature is particularly beneficial for learners in rural locations, where exposure to native English speakers is limited(Liu & Luo, 2021),(Zhou et al., 2020). Notably, studies show that learners who engage with YouTube content develop critical thinking and self-regulation skills by managing their learning activities independently(Aprianto, 2023).

However, it is important to acknowledge the barriers faced by some individuals in accessing YouTube, particularly those related to internet infrastructure in rural areas, where connectivity can be poor or expensive. Despite these challenges, the potential impact of YouTube on English language learning is profound, with its role as a supplementary educational resource becoming increasingly recognized across educational settings (M. A. A., 2023),(Saputra & Fatimah, 2018). Collectively, this evidence highlights YouTube's position as a critical tool in language education, especially for disadvantaged learners seeking flexible, engaging, and accessible resources to enhance their English language skills.

Personalized and Flexible Learning

YouTube offers a unique platform for asynchronous and self-paced learning, significantly diverging from traditional classroom settings. Its extensive range of content allows learners to access materials anytime, thus empowering them to tailor their learning experiences according to their individual needs and preferences (Lim & Lee, 2023), (Usage of YouTube for Academic Purpose, 2022). For instance, the flexibility of YouTube facilitates self-regulated learning, allowing students to revisit complex concepts until they feel confident in their understanding (Michael & Shah, 2020). The multimedia format of YouTube also engages various learning styles, which can enhance motivation and retention (Zalzabilah, 2022). Significantly, learners report feeling more in control of their educational journeys, with the capacity to pause, rewind, and selectively engage with content that aligns with their interests (Breslyn & Green, 2022). This characteristic of YouTube aligns well with contemporary pedagogical approaches that prioritize learner autonomy and personalized education (Möller et al., 2018).

Confidence Building and Identity Empowerment

Numerous students in rural India link speaking English with status, self-assurance, and success in urban areas. YouTube, featuring relatable hosts and practical illustrations, plays a crucial role in dispelling the notion that English is solely for the upper class. In the comments section of Indian YouTube videos focused on learning English, viewers frequently express how they found the confidence to speak in public or attend job interviews after consistent practice.

One comment on Aishwarya Patekar YouTube Channel (formerly known as Speak English with Aishwarya) video reads: "If every teacher taught in such a simple and easy way as you do, then no one today would be unemployed or uneducated. Teachers like you are truly the pride of this country. Thank you, madam."

Another comment on Aishwarya Patekar YouTube Channel (formerly known as Speak English with Aishwarya) video reads: "If all teachers taught like this in classrooms, then not a single student would score below 99.99% in this subject. Ma'am explains in such a simple way and in Marathi so that it's easy to understand... Heartfelt congratulations to you for this effort."

Another comment on Aishwarya Patekar YouTube Channel (formerly known as Speak English with Aishwarya) video reads: "Aishwarya ma'am, thanks for excellent teaching and making us aware of functional sentences spoken in daily life."

Source: YouTube. Youtube Channel: Aishwarya Patekar YouTube Channel (formerly known as Speak English with Aishwarya)

Creator-Led Educational Change

Many successful YouTube educators are independent creators, often women or former teachers, using storytelling, humor, and life experience to teach English. Their presence challenges the idea that only foreign accents or urban teachers can be role models. These creators also build communities where learners feel supported through comments, community posts, and live sessions.

Aishwarya Patekar YouTube Channel (formerly known as Speak English with Aishwarya) is one such example. With over 1.5 million subscribers, the channel has taught English using Indian contexts, emotional stories, and rural-relevant examples.

V. Case Study: Aishwarya Patekar (Speak English With Aishwarya) - Empowering Millions Through Digital Learning

Introduction

In a world full of YouTube creators, Aishwarya Patekar YouTube Channel (formerly known as Speak English with Aishwarya) became something truly special for millions of Indians trying to learn English. What started as a simple effort to teach basic spoken English turned into a lifeline for those who lacked access to coaching classes or felt too shy to speak in English. Aishwarya didn't just explain grammar she helped people believe in themselves. Her videos made English feel less scary and more doable, especially for those from small towns, villages, and non-English-speaking homes. This case study explores how one creator, with just a camera and a clear mission, used YouTube to educate, uplift, and build the confidence of people all across the country.

Background

Aishwarya Patekar launched her YouTube channel in 2019 with a simple but strong goal to help people speak English with confidence, especially those who were left behind by formal education systems. The channel started with basic spoken English lessons in a bilingual format (Marathi-English) to ensure that even absolute beginners could understand. Over time, it evolved into a full-fledged learning platform, reaching over a million subscribers. Her content filled a critical gap in the Indian education landscape: free, relatable, and quality English lessons that didn't require learners to know advanced grammar or afford expensive coaching classes.

Content

The channel features a wide variety of content designed for practical use:

Spoken English practice for daily situations like introductions, interviews, shopping, and phone conversations.

Grammar explained in Marathi, making complex rules easy to understand.

Confidence-building tips to help overcome stage fear, hesitation, and the inferiority complex many face when speaking English.

Interactive exercises, quizzes, and motivational content, making learning more than just academic.

Aishwarya's friendly tone, relatable examples, and culturally relevant references made her content engaging and deeply trusted by her audience.

Social Influence And Educational Impact

Learners from rural and small-town India have shared stories of cracking interviews, getting jobs, and improving their social confidence after watching her videos.

Many young women have written about how the channel gave them a voice and helped them stand up for themselves in professional and personal spaces. By being a female creator and educator, Aishwarya became a relatable role model, showing that educational leadership can come from everyday women, not just institutions. Her channel turned into a community space, where learners encouraged each other in the comment section and built a supportive network.

Conclusion

Aishwarya Patekar's journey proves that YouTube is more than a platform, it is a movement for education, empowerment, and equal opportunity. Her channel Speak English with Aishwarya transformed the lives of millions, especially those who felt left out of the English-speaking world. This case study clearly shows that digital content, when created with purpose and empathy, can break barriers, build confidence, and shape the future of learning in India.

Challenges

Despite the potential of YouTube as an educational resource, several challenges hinder its effectiveness in rural India. First, the inconsistency of Internet bandwidth poses a significant barrier to accessing video content, limiting engagement in learning opportunities(Chintalapati & Kumar, 2017). Furthermore, learners are frequently distracted by the platform's entertainment content, as studies indicate that users are more engaged with entertainment-related videos than educational ones(Mohamed & Shoufan, 2022). Additionally, not all available educational content is accurate or pedagogically sound, raising concerns about the quality of instruction that learners receive(Ghafor, Mustafa, & Ahmad, 2019). Finally, the absence of formal certification for skills acquired through these online platforms restricts recognition of learning achievements, thus affecting motivation to pursue such informal education seriously. However, relevant academic literature discussing the specifics of motivation concerning online education certification in this context is currently limited(Davidavičius & Limba, 2022),(Paudi, Din, & Othman, 2022).

Conclusion

YouTube is no longer just a destination for viral videos, it is a digital revolution. For millions of learners, especially in countries like India, it has become a free, flexible, and familiar classroom, one they can access anytime, from anywhere, using nothing more than a smartphone. English learning through YouTube is not just about picking up grammar rules or memorizing vocabulary. It's an emotional and empowering journey. Many learners, especially

those from rural or semi-urban areas, carry a deep fear of speaking English, tied to feelings of inadequacy, shame, or lost opportunities. Channels like Aishwarya Patekar (formerly Speak English with Aishwarya) address this fear directly, not by intimidating learners with complex lessons, but by breaking language down into simple, relatable, and confidence-boosting content. Her teaching style, friendly, bilingual, and rooted in everyday life, helps viewers connect emotionally with the learning process. This connection is key. When learners see someone like Aishwarya, who speaks their language, understands their struggles, and cheers them on virtually, they begin to believe in their own ability to grow.

What makes platforms like YouTube revolutionary is the personal choice and pace it offers. Unlike traditional classrooms that demand attendance and fees, YouTube allows users to learn when they want, repeat lessons, or even pause and reflect, all in a space where they feel no judgment. This inclusive approach to learning especially benefits those who otherwise fall through the cracks of formal education systems. In a country with such linguistic and cultural diversity, creators who understand the local mindset can build trust more effectively than traditional institutions. Her channel's impact is seen in the comments of learners who have cracked interviews, started speaking fluently, or simply felt "seen" for the first time, is proof of how powerful and personal learning on YouTube can be.

In conclusion, this research shows that YouTube is not just a source of distraction or fun, it is a digital movement for skill development and confidence-building. With the right mix of empathy, clarity, and creativity, creators like Aishwarya Patekar are helping rewrite the story of English learning in India. For many, their journey from hesitation to fluency didn't start in a classroom, it began with a YouTube video.

Suggestions

To strengthen the role of YouTube in promoting English proficiency and confidence, especially in rural and semi-urban India, several key steps can be taken. First, rural digital literacy campaigns should go beyond basic smartphone training and include practical guidance on how to access and use educational content on platforms like YouTube. This will help learners, especially first-time users, shift from passive content consumption to active skill-building. Second, bilingual creators who teach English using Indian languages, like Aishwarya Patekar should be recognized and supported as informal educators. These creators fill a crucial gap by making English learning approachable and culturally relatable. Providing them with micro-grants, training, or public recognition can encourage quality content creation and long-term commitment.

Furthermore, in regions where smartphone access is limited, community-based learning models should be encouraged. For example, small groups of learners can come together to watch English-learning videos on a shared device, facilitated by a local volunteer, teacher, or youth leader. Such group learning promotes collaboration, consistency, and motivation. Partnerships between YouTube and government education programs like SWAYAM or Digital India could also help formalize this informal learning. Curated educational playlists and verified content can be integrated into state-level skilling initiatives or school support programs. Lastly, impactful educational channels should be incentivized through recognition badges, awards, or collaborations with educational institutions. This not only motivates creators but also builds trust among learners. These steps, when implemented thoughtfully, can transform YouTube into a powerful, inclusive, and sustainable tool for English education and social mobility.

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"Challenges and Strategies in Employee Retention within Pharmaceutical Companies: A Review of Literature"

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Abstract

This paper offers a comprehensive review of the literature on employee retention and talent management within the pharmaceutical industry. It explores the critical challenges pharmaceutical companies face in retaining skilled employees, including high turnover rates, fierce competition in the job market, and evolving workforce expectations. The study emphasizes the importance of addressing these issues through tailored strategies, such as offering competitive compensation, promoting career development, and cultivating a positive organizational culture. The review also highlights the unique difficulties confronting pharmaceutical firms, including strict regulatory requirements, the demand for specialized skills, and the workforce disruptions caused by mergers and acquisitions. These factors exacerbate retention challenges, making it crucial for companies to adopt effective and innovative solutions. The paper evaluates the effectiveness of various retention strategies in overcoming these obstacles, providing valuable insights for industry stakeholders. By synthesizing existing research, this study underscores the importance of aligning retention efforts with organizational goals to maintain a stable and motivated workforce. It serves as a resource for understanding the complexities of talent management in the pharmaceutical sector and offers actionable recommendations to enhance workforce stability in a competitive and rapidly evolving industry.

Keywords

Pharmaceutical industry, Talent acquisition, Employee retention, Industry challenges, Retention strategies, Literature Review.

Introduction

The pharmaceutical industry faces significant challenges regarding talent management and employee retention. These challenges are exacerbated by the industry's complex nature, which requires highly specialized skills and continuous innovation. Recent studies have focused on various aspects of talent management, including retention strategies, training, development, and the impact of organizational support. Factors such as strict regulatory pressures, the need for specialized skills, and the workforce instability caused by mergers and acquisitions. These factors, combined with the high cost of turnover, necessitate the implementation of robust talent management and retention strategies. Competitive compensation packages, opportunities for

career development, and fostering a positive organizational culture are commonly employed solutions; however, their effectiveness varies based on organizational dynamics and external influences. This study provides a comprehensive review of existing literature to identify the key challenges and effective strategies in employee retention within pharmaceutical companies. By synthesizing insights from prior research, this paper aims to guide industry stakeholders in developing innovative and tailored solutions to enhance workforce stability and sustain competitive advantage in an ever-evolving industry landscape.

Objectives of the Study

- This literature review on retention initiatives aims to achieve the following objectives:
- To analyze existing literature on employee retention strategies within the pharmaceutical sector.
- To identify key challenges in employee retention specific to the pharmaceutical industry.
- To identify gaps in the current literature and propose areas for future research.

Methodology

The study is descriptive in nature and only secondary data has been used in it. The secondary data consist of various research papers, articles and journals.

Challenges in Employee Retention

- **High Turnover Rates:** Studies, such as those by Alshamrani et al. (2023) and Khoele & Daya (2014b), emphasize the persistent issue of high turnover rates in the pharmaceutical sector due to various factors, including inadequate compensation, poor organizational culture, and lack of leadership support. Gaol, Rahayu, and Matsuo (2020) Suggests adopting integrated information systems to improve operational efficiency and enhance workforce satisfaction in Indonesian pharmaceutical companies. Majumdar (n.d.) highlights the industry's struggle with a shortage of skilled manpower, exacerbated by declining enrollments in pharmaceutical education. Sinha (2013) Examines retention challenges in the Dehradun pharmaceutical sector, identifying factors such as work pressure, inadequate compensation, and HR policies as contributors to high attrition rates. Roy and Devi (2016) Highlights recruitment challenges and the prevalence of talent poaching in pharmaceutical companies in Sikkim, India. Subhan et al. (2022) Highlights the challenges of implementing e-HRM and remote work systems during the COVID-19 pandemic, especially in pharmaceutical companies in Sindh, Pakistan.
- **Job Satisfaction and Commitment:** Research by Atif et al. (2011) illustrates the mediating role of organizational commitment in enhancing job satisfaction and retention, suggesting that a lack of commitment can significantly impact turnover rates. Mathur (2012) stresses the need for aligning organizational policies with human

resources strategies to address talent retention issues in the Indian pharmaceutical sector. T et al. (2022) Investigates factors leading to employee turnover in Chennai's pharmaceutical sector, suggesting practical retention strategies based on field research. Asif and Gul (2021) Identifies salary, supervisor support, and lack of career opportunities as primary reasons for employee dissatisfaction and turnover in Pakistan. Wechsler (2010) discusses the uncertainties in healthcare coverage and product development regulations in the U.S., which indirectly affect retention.

Strategies for Enhancing Retention

- Talent Management Practices:** Aerni Isa et al. (2018) Demonstrates the relationship between talent development and perceived organizational support in Malaysian companies, contributing to improved retention and highlight the relationship between talent management practices and perceived organizational support, indicating that effective talent development contributes significantly to employee retention. Similarly, Alsawalhah (2020) emphasizes strategic talent management in Jordanian pharmaceutical companies, advocating for comprehensive compensation systems to incentivize retention. Nasution et al. (2023) Highlights the role of talent management, work engagement, and employee ambidexterity in improving performance in Indonesian pharmaceutical companies. Jinda and Shaikh (2020) Propose robust talent identification, development, and succession planning models to address retention challenges. Katoue et al. (2020) Advocates for competency-based education (CBE) to prepare pharmacy professionals for evolving societal healthcare needs. Orizio et al. (2011) suggest a dual-level approach combining policy regulation and individual empowerment to address online pharmacy challenges. Odukoya et al. (2013) highlight the importance of integrating safety measures into e-prescribing systems to improve patient safety and workforce confidence.
- Leadership and Organizational Culture:** Studies by Alshamrani et al. (2023) and Hejase et al. (2016) underline the importance of strong leadership and positive organizational culture in fostering an environment conducive to employee retention. Leadership support can enhance employee motivation and satisfaction, ultimately leading to lower turnover rates. Garavan (2012) stresses the importance of global talent management in aligning strategic goals with employee development amidst global economic challenges. Jindal and Shaikh (2021) underscore the role of talent retention as a mediator for effective succession planning in pharmaceutical companies. Qun et al. (2022) Advocate for collaboration between enterprises and government to foster skilled talents and enhance innovation. Saedin et al. (2023) Emphasizes the role of rewards, career advancement opportunities, and managerial engagement in improving retention in Malaysia. Asif and Gul (2021) Suggests improving compensation and offering career opportunities to enhance job satisfaction and retention. Rana (2020) stresses the importance of improving supply chain awareness and management practices to build trust and stability among employees. T et al. (2022) Suggests leadership training as part of talent management to address retention issues effectively.

Impact of Employee Development

- **Career Development Opportunities:** Research by Harris (2014) showcases innovative talent development initiatives within Lupin Ltd., suggesting that organizations that invest in employee growth through programs like "Udbhav" and "STEP" see higher retention rates. This is supported by findings from Nasution et al. (2023), which indicate that employee ambidexterity and engagement significantly enhance performance, thereby influencing retention positively. Lombardo et al. (2019) Stress the need for targeted interventions to improve pharmacists' knowledge and confidence in managing online pharmaceutical sales. Majumdar (n.d.) Recommends partnerships with educational institutions and specialty chemical manufacturers to sustain talent development. Falola et al. (2020) Highlights workplace initiatives tailored to local contexts as key to enhancing talent engagement and retention. Sharma and Dagar (2011) Highlights the use of institutionalized talent management practices by companies like Dr. Reddy's and Ranbaxy to nurture and retain employees. Angadi and Naik (2012) Finds a positive relationship between retention strategies and employee productivity in Bangalore's pharmaceutical companies. Angadi and Naik (2012) Demonstrates how retention strategies focused on employee development improve productivity and organizational performance. Singh, Majumdar, and Malviya (2020) Highlights the need for targeted regulations to address skill gaps and promote professional growth in the e-pharmacy sector. Sharma and Dagar (2011) Discuss the effectiveness of systematic training programs in fostering long-term employee loyalty in India. Chaturvedi and Chataway: Emphasizes R&D investments in Indian pharmaceutical firms to improve knowledge assimilation and talent retention.

Barriers and Challenges:

- **Policy Implementation Issues:** Bakar (2022) identifies barriers to implementing effective e-pharmacy policies, which can impact organizational effectiveness and employee morale. Additionally, David, Wolfender, and Dias (2015) highlight challenges in integrating natural products into drug discovery processes, emphasizing the need for strategic planning to overcome these obstacles. Singh and Chaddah (2021) Discusses the application of blockchain to improve supply chain transparency and reduce fraud, addressing key industry challenges. Bhalerao and Mandalik (2022) Highlights regulatory gaps in digital app-based pharmacy services, creating barriers to smooth operation and employee retention.
- **Industry Growth amidst Challenges:** Hassanpoor et al. (2022) Explores brand-based human resource management as a strategic tool to enhance employee loyalty and address retention issues. Gautam (2018) Highlights the significance of HR planning and training in addressing workforce management concerns within Nepalese pharmaceutical companies. Shashank (2017) Calls for broader exploration of employee engagement strategies across diverse pharmaceutical settings. Thomas (2023) Examines challenges such as patent expirations and high drug prices, which strain resources and increase employee stress. Chordiya and Garge (2020) Highlights how competitive pressures between e-pharmacies and traditional pharmacies affect workforce stability.

Talent Management and Retention in the Pharmaceutical Sector

Several studies emphasize the importance of strategic talent management in retaining employees within the pharmaceutical industry. Aerni Isa et al. (2018) explored talent management practices in Malaysian government-linked companies and found that perceived organizational support is a critical factor in employee retention. Similarly, Alsawalhah (2020) demonstrated that strategic talent management significantly impacts employee development in Jordanian pharmaceutical companies, suggesting a positive correlation between effective talent management and retention. In a Saudi Arabian context, Alshamrani et al. (2023) analyzed the determinants of employee retention in pharmaceutical companies, finding that factors such as organizational commitment, job satisfaction, and leadership support play pivotal roles in maintaining a stable workforce. This is consistent with the findings of Atif et al. (2011) who noted that organizational commitment directly influences job satisfaction, which in turn affects employee retention in the pharmaceutical industry. Das (2013) Discusses contemporary practices in talent retention and their role in maintaining a skilled workforce. Sharma and Dagar (2011) Highlights how leading companies use robust employment practices to maintain a competitive edge. T et al. (2022) Stresses the need for well-structured talent management frameworks to ensure leadership succession and workforce stability. Roy and Devi (2016) Explores the influence of effective talent management on company performance in Sikkim.

The Role of Training and Development

Training and development are frequently highlighted as essential components of talent management strategies. Karachi & Aleem (2018) explored the power of training and development in improving retention within pharmaceutical organizations, underscoring the importance of continuous professional development for retaining top talent. Furthermore, Falola et al. (2020) examined the influence of workplace management initiatives on talent engagement in the Nigerian pharmaceutical sector, affirming that well-structured development programs can significantly enhance employee commitment.

In a case study of Roche and Genentech, Béraud et al. (2020) highlighted how post-acquisition talent management can impact retention, particularly when employees are given opportunities for career advancement and skill development. The findings emphasize the need for targeted development programs during periods of organizational change. Shashank (2017) identifies gender-based differences in work-life balance and supervisor interaction as critical factors influencing employee engagement and retention. Morthati et al. (2014) Notes retention challenges among contract employees, highlighting variations in employee commitment based on employment status. Subhan et al. (2022) Shows the positive impact of e-HRM and remote work on employee productivity and satisfaction during the pandemic. Angadi and Naik (2012) Recommends continuous training programs to build employee confidence and improve organizational retention. Singh and Chaddah (2021) Recommends blockchain training for better operational efficiency and employee trust. Sharma and Dagar (2011) Highlights the role of people-driven training initiatives in fostering loyalty and retention.

Technological Impact and E-Pharmacies

Technological advancements, particularly the rise of e-pharmacies, are also influencing talent management practices in the pharmaceutical industry. Bakar et al. (2022) and Mim (2017) discuss the barriers and prospects of e-pharmacies in Malaysia and Bangladesh, respectively, highlighting how technology not only transforms service delivery but also requires new talent

management approaches to ensure employees are equipped with the necessary digital skills. Similarly, Miller et al. (2021) argued that as technology outpaces regulation in low- and middle-income countries, organizations need to invest in training their workforce to keep pace with digital transformations. Fung, Woo, and Asch (2004) Advocate for aligning pharmaceutical operations with digital advancements to improve patient outcomes and foster organizational growth. Liu et al. (2020) Points out the influence of employee service attitudes on customer satisfaction in online pharmacies, reflecting the growing complexity of pharmaceutical retail. Rahim (2015) addresses the competitive pressures and global compliance challenges faced by pharmaceutical companies in Bangladesh, which can indirectly affect workforce stability. Chordiya and Garge (2020) Explores the advantages and challenges of transitioning from traditional pharmacies to e-pharmacies. Bhalerao and Mandalik (2022) Discusses the integration of smartphone apps into pharmacy delivery systems and its effect on employee confidence. Singh and Chaddah (2021) Highlights blockchain's potential in combating counterfeit drugs and improving supply chain reliability, fostering better employee engagement.

Employee Retention Challenges and Strategies

Despite the widespread recognition of the importance of talent management, many pharmaceutical companies still face significant challenges in retaining employees. Mohamad Mazlan & Jambulingam (2023) reviewed the various challenges of talent retention in the pharmaceutical sector, identifying issues such as a lack of career advancement opportunities, poor work-life balance, and inadequate compensation as key reasons for high turnover rates. In South Africa, Khoele & Daya (2014) investigated turnover among middle and senior managers, finding that high-stress levels and insufficient leadership development contribute to retention problems. These findings align with Hejase et al. (2016) who found that employee retention in Lebanon's pharmaceutical companies is heavily influenced by the quality of leadership and organizational culture. Burrows (2007) suggests leveraging cross-sector expertise in leadership and human resources to tackle industry-specific challenges. Das (2013) Proposes a holistic approach to retention, integrating job satisfaction, organizational support, and employee development. Angadi and Naik (2012) Suggests creating targeted retention policies based on local industry needs and employee expectations. Saedin et al. (2023) Points out that career growth and manager engagement are pivotal in boosting retention rates. Asif and Gul (2021) Emphasizes creating structured career advancement opportunities to address dissatisfaction and turnover.

Table: 1 Identified Research Gap in Published Papers.

Sr. No.	Author	Year	Paper Title	Research Gap
1	Aerni Isa,et.al.	2018	Talent Management Practices, Perceived Organizational Support And Employee Retention: Evidence From Malaysian Government-Linked Companies	The study relies on quantitative analysis, and while it provides statistical relationships, a qualitative exploration of employees' perspectives could enrich the findings. Conducting interviews or focus group discussions with employees could offer a more clear understanding of how talent management practices

				and perceived organizational support influence their decisions regarding retention.
2	Alsawalhah, Ayyoub. A.	2020	Talent Management Strategy And Its Impact On Employee's Development: An Empirical Study On Jordanian Pharmaceutical Companies.	The research is limited to single city (Karachi), and its Pharma Organizations head office the research also limits in a way that we cannot analyze the number of respondents which are not responding by heart and their real recommendations towards Pharma Organizations. The non-authentic data is also a type of limitation in the research. The research was carried out in limited time duration.
3	Alshamrani,et.al.	2023	Determinants Of Employee Retention In Pharmaceutical Companies: Case Of Saudi Arabia.	The study highlights the importance of leadership support in employee retention. Future research could explore industry-specific aspects of leadership support that are particularly relevant to the pharmaceutical sector. Understanding the leadership behaviors and practices that resonate with employees in this industry could guide leadership development initiatives.
4	Atif, A., Kashif Ur Rehman, Ijaz Ur Rehman, Muhammad, A. K., & Asad, A. H.	2015	Impact Of Organizational Commitment On Job Satisfaction And Employee Retention In Pharmaceutical Industry.	This study is limited to Pakistan, As result shows that organizational commitment has strong and positive relationship with employee job satisfaction and employee retention we should study and find out the negative impact as well considering another city or country.
5	Babcock University, Ilishan-Remo, Ogun State, Nigeria, & Akpa, V. O.	2023	Entrepreneurial Orientation And Competitive Advantage Of Quoted Pharmaceutical Companies In Nigeria	As this study recommended that management of pharmaceutical companies should encourage and support a culture that promotes innovation and proactivity among their employees through regular brainstorming sessions, idea-sharing platforms, and providing resources and incentives for employees to come up with new ideas and initiatives to improve competitive advantage we can find out the results by doing the further

				research whether it is positive or negative.
6	Bakar, A. A., Ong, S. C., Chuo, Y. T., Ooi, G. S., & Hassali, M. A. A.	2022	Barriers For Implementation Of E-Pharmacy Policy: Views Of Pharmacy Authorities, Public Institutions And Societal Groups	This study were restricted to their expertise in their respective fields. It would be an advantage if this study could be extended to a higher level—political executives at top tier policymaking levels.
7	Béraud	2020	Talent Management After An Acquisition: A Case Study Of Roche And Genentech.	The study focuses on internal strategies, but external factors and industry dynamics could also influence talent retention. Exploring how Roche navigated external challenges or leveraged industry trends to retain key talent would provide a holistic view of the success factors involved.
8	Burrows, C.	2007	Should The Pharma/Healthcare Sector Look Further Afield For World Class Leadership Talent?	This article has given perspective on recruitment. While the article suggests approach as beneficial, further research could delve into the specific challenges, opportunities, and outcomes associated with cross-industry talent recruitment in these specialized fields.
9	Clifton, L. B. S. (n.d.).	2004	Internet Drug Sales: Is It Time To Welcome “Big Brother” Into Your Medicine Cabinet?	Further research can investigate the level of awareness among consumers about the risks and safety considerations associated with online prescription drug purchases. Assess the effectiveness of current educational initiatives and identify areas for improvement.
10	Creel, J., Pearson, J. S., Dame, M., House, M. E., & Brooks, T.	2021	Weighing The Issues Of Safety And Employee Retention (Wiser) For Leadership In Healthcare	Specific area has not been defined in this research study only sector has been mentioned that is healthcare organizations; employee's behaviour should be observed by designing interview questions.
11	David, B., Wolfender, J.-L., & Dias, D. A.	2015	The Pharmaceutical Industry And Natural Products: Historical Status and New Trends	A researcher can add more insights about pharmaceutical products in this research; also, can do the survey for understanding preferences of natural products.

12	Falola, H. O., Ogueyungbo, O. O., & Ojebola, O. O.	2020	Influence Of Workplace Management Initiatives On Talent Engagement In The Nigerian Pharmaceutical Industry	This study covers only ten outstanding pharmaceutical companies in Lagos, Nigeria. The scope of the study to include other pharmaceutical companies in other major cities and zones in Nigeria. Study can also look at the possibility of using mixed method as against the quantitative method used in this current study for a more elaborate finding. This study can add to the number of constructs an also introduce moderating variable that may help in strengthening relationships between workplace management initiatives and talent engagement.
13	Fung, C. H., Woo, H. E., & Asch, S. M.	2004	Controversies And Legal Issues Of Prescribing And Dispensing Medications Using The Internet	For better and easy understanding a case study can be done with help of this study. We can add the traditional and online methos of pharmacy in a perticular way.
14	Gaol, F. L., Rahayu, S., & Matsuo, T.	2020	The Development Of Information System With Strategic Planning For Integrated System In The Indonesian Pharmaceutical Company	Managerial support is important for running any organisation we should understand the relationship between employees and employers. Skills, knowledge and attitude can be the observe thorough this research study.
15	Garavan, T. N.	2012	Global Talent Management In Science-Based Firms: An Exploratory Investigation Of The Pharmaceutical Industry During The Global Downturn	Further research can conduct a comparative analysis of GTM practices during global downturns across different industries. Explore whether the challenges, priorities, and strategies identified in pharmaceutical firms are applicable to other science-based sectors or if industry-specific nuances exist.
16	Gautam, T.	2018	Human Resource Planning, Selection And Training Practices Of Nepalese Pharmaceutical Companies Of Nepal	There is need to measure the causative factors of HRM planning, selection process and training provision to ensure the better performance of companies.

17	Gose, J.	2018	Amazon's Drug Bet Puts Spotlight On Conventional Pharmacies	As joe gose says about future opportunities of drugstores we can study more in depth about advantages and disadvantages, challenges of conventional as well as online pharmacy purchase.
18	Harris, P.	2014	Encouraging Talent To RISE AND SHINE.	The degree to which Lupin has designed targets, benefits for each position, one can add more insights and information for better understanding of the society.
19	Hassanpoor, A., Jafarniya, S., Vakili, Y., & Taghavi, L.	2022	Dimensions And Components Of Brand-Based Human Resources Management In Pharmaceutical Companies: A Case Study.	One can study about the orgnizational stratregies for understanding employees work life balance. How impactful the dimensions could be in employee's life?
20	Hejase, H., El Dirani, A., Hamdar, B., & Hazimeh, B.	2016	Employee Retention In The Pharmaceutical Companies: Case Of Lebanon Employee Retention In The Pharmaceutical Companies: Case Of Lebanon.	The study is limited to pharmaceutical companies in Lebanon, As retention model has been given in this study one should know the output of that model by studying in depth; Training and development programs necessary for employee retention.
21	Hertig, J. B., & Kennedy, T. M.	2023	Pharmacy Student Perceptions And Knowledge Of Online Pharmacy Use	We can Study and Investigate the long-term retention of knowledge among pharmacy students after receiving education on illegal online pharmacies. Are there sustained improvements, or is there a need for periodic reinforcement? How does the use of technology enhance learning outcomes?
22	Irfan Nasution, M., Soemaryani, I., Yunizar, & Hilmiana.	2023	The Mediating Role Of Employee Ambidexterity And Work Engagement For Talent Management And Medical Representatives' Performance In Indonesian Pharmaceutical Companies.	Further research can Investigate the perspectives of medical representatives. How do they perceive talent management initiatives, employee ambidexterity, work engagement, and their impact on performance? Understanding the employee experience can provide additional depth to the study.

23	Jinda, P., & Shaikh, M.	2020	Talent Management Efficiency In Succession Planning: A Proposed Model For Pharmaceutical Companies.	We can conduct a comparative analysis between pharmaceutical companies that have implemented the suggested TM model and those that have not. This could help identify any significant differences in succession planning outcomes, providing evidence of the model's impact.
24	Shashank, G.	2017	Employee Engagement; Tool Of Talent Retention: Study Of A Pharmaceutical Company	While the conclusion mentions that employee engagement is crucial for retaining the best talent, future research could specifically examine the relationship between employee engagement initiatives and talent retention outcomes.
25	Katoue, et. al.	2020	Competency-Based Education In Pharmacy: A Review Of Its Development, Applications, And Challenges	there may be a gap in understanding the specific challenges faced in implementing CBE within pharmacy education programs and strategies to address these challenges effectively.
26	Khoele, A., & Daya, P.	2014	Investigating The Turnover Of Middle And Senior Managers In The Pharmaceutical Industry In South Africa.	While organizational culture is mentioned as a factor influencing turnover, the study doesn't delve deeply into how specific aspects of culture, such as inclusivity or innovation, impact knowledge worker decisions. Further research could explore the role of organizational culture in more detail.
27	Liu, J., Zhou, Y., Jiang, X., & Zhang, W.	2020	Consumers' Satisfaction Factors Mining And Sentiment Analysis Of B2C Online Pharmacy Reviews	While the conclusion suggests focusing on improving employees' service attitudes, there is no exploration of specific factors influencing employee attitudes or strategies to enhance them. Future research could investigate the employee-centric aspects of customer service in online pharmacies.

28	Lombardo, Simona.,	2019	A Nationwide Web-Based Survey Of A Sample Of Italian Community Pharmacists' Perceptions And Opinions About Online Sales Of Medicines And Falsified Drugs.	While the study suggests that community pharmacies should be considered as potential key components in monitoring the circulation of falsified drugs, further research could explore the specific roles, responsibilities, and challenges pharmacists may face in such monitoring systems.
29	Majumdar, D. M.	2009	Talent Retention In Pharmaceutical Company: A Perspective In The Modern Era	The information mentions the growing trend of using advanced personality assessment tools in staffing pharma positions. Research could explore the impact of these tools on recruitment processes, the success rate of hiring decisions, and the overall satisfaction of both employers and employees.
30	Miller, et. al.	2021	When Technology Precedes Regulation: The Challenges And Opportunities Of E-Pharmacy In Low-Income And Middle-Income Countries.	While the study mentions the potential benefits of e-pharmacy in enhancing traceability and transparency through online records, there is a research gap in exploring the actual impact of these features. Future research could investigate how online records contribute to improved medicine regulation and patient safety.
31	Mim, M. M.	2017	Prospects And Challenges Of E-Pharmacy In Bangladesh: A Perspective On Dhaka City.	While the study briefly touches on the perception that online pharmacies lack medical supervision, there is a research gap in conducting a more in-depth exploration of consumer perceptions. Qualitative studies or interviews could delve into specific concerns, misconceptions, and preferences related to E-pharmacy services.
32	Mohamad Mazlan, M. R., & Jambulingam, M.	2023	Challenges Of Talent Retention: A Review Of Literature.	The paper discusses challenges in the current employment landscape. Future studies could delve into emerging trends in talent management, such as the impact of remote work, changing employee expectations, and the role of

				technology in shaping talent retention strategies.
33	Morthati, et.al.	2014	A Study On Employee Retention Practices In Pharmaceutical Companies Of Northern Telangana State.	The study focuses on employees from three specific districts in the Telangana region. Expanding the geographical scope to include a more diverse set of locations or comparing urban and rural settings could provide a broader understanding of employee opinions on retention practices in the pharmaceutical sector.
34	Odukoya, et. al.	2013	E-Prescribing: A Focused Review And New Approach To Addressing Safety In Pharmacies And Primary Care	The conclusion mentions the need to address usability issues in e-prescribing systems, but it doesn't delve into specific usability challenges faced by pharmacy staff. Further research could focus on identifying and understanding the specific usability issues that pharmacists and pharmacy staff encounter in the context of e-prescribing.
35	Orizio, G., Merla, A., Schulz, P. J., & Gelatti, U.	2011	Quality Of Online Pharmacies And Websites Selling Prescription Drugs: A Systematic Review	The study briefly mentions that geographical information can be concealed on many websites. A more in-depth analysis of how online pharmacies manage and present geographical information, along with the potential implications for regulatory oversight and consumer safety, could be a valuable research avenue.
36	Karachi, & Aleem, M. U.	2018	Power Of Training And Development On Employee Retention In Pharmaceutical Organization	We can investigate how external factors, such as industry trends, economic conditions, and technological advancements, impact the effectiveness of training and development programs on employee retention.

37	Anita, Mathur	2012	Embryonic Issue Of Talent Management In Indian Pharmaceuticals Industry	we can conduct research on the identification and development of hidden and unusual qualities within the existing human resource of Indian pharmaceutical companies. Explore methodologies for recognizing and nurturing latent potential in employees.
38	Poonam Jindal & Mohsin Shaikh	2021	Talent Retention: A Mediator Of The Relationship Between Talent Management Strategies And Succession Planning	Extend the research beyond Hyderabad to enhance the generalizability of findings. Explore whether the relationship between TMS and succession planning holds true in diverse regional, cultural, and organizational contexts within India and internationally.
39	Qun, C., et.al.	2022	Discussion On The Mode And Path Of Cultivating Innovative Talents In Pharmaceutical Industry	In-depth Study on Specific Skills Training Needs; Further research can conduct an in-depth study on the specific skills training needs within different industries. Understand the skill gaps that enterprises aim to address through cooperation with higher vocational colleges.
40	Rahim, S. A.	2015	Pharmaceutical Business In Bangladesh: Opportunities And Challenges.	Examine the perspectives of employees within the pharmaceutical sector. Explore factors influencing job satisfaction, challenges faced by professionals in the industry, and opportunities for career growth and development.
41	Rana, K.	2022	Supply Chain Management As A Tool For Gaining Sustainable Competitive Advantage Challenges And Responses Of Indian Pharmaceutical Industry	A comparative analysis of the impact of supply chain management practices can also be made across different clusters. Apart from selecting different clusters, future studies can also compare the impact of supply chain management practices across WHO GMP certified and non-certified units. This will help in revalidating the results.

42	Das, B. L.	2013	Employee Retention: A Review Of Literature	Conduct a comprehensive study on the working conditions and their influence on employee well-being. Investigate the role of factors such as workplace safety, comfort, and overall environment in affecting retention rates.
43	Robinson, E. T., & Brazeau, G. A.	2023	Considering Retention And Curricula In Reframing Pharmacy Enrollment Challenges	Further studies can explore and evaluate the effectiveness of various strategies for recruiting students into pharmacy education programs. Investigate innovative recruitment approaches, outreach programs, and marketing efforts that could attract a diverse and larger pool of applicants.
44	Roy, G. S., & Devi, D. V. R.	2016	Title Of The Research Article: Talent Management Issues Of Pharmaceutical Companies.	Further studies can compare the talent management challenges in Sikkim with those in other regions, especially in neighboring states or areas with similar geographical challenges. This comparative analysis could provide insights into whether the challenges faced are unique to Sikkim or more widespread.
45	Saedin, A., et. Al.	2023	Employee Retention In Pharmaceutical Companies In Malaysia.	The study recommends interventions in the form of training and development. Explore the specific types of training programs that are most effective in enhancing employee retention. Consider the alignment of training initiatives with employees' career goals and organizational needs.
46	Satheesh, G., Puthean, S., & Chaudhary, V.		E-Pharmacies In India: Can They Improve The Pharmaceutical Service Delivery?	Further study can identify and analyze challenges faced by e-pharmacies in implementing regulatory standards and on-call pharmacist services. Explore potential barriers to compliance and strategies for overcoming these challenges.

47	Sharma, E. K., & Dagar, S. S.	2011	A Tonic For Talent.	Explore industry-specific talent challenges faced by pharmaceutical companies in India. Investigate how these companies address challenges unique to the pharmaceutical sector in talent acquisition, development, and retention.
48	Singh, D., & Chaddah, J. K.	2021	A Study On Application Of Blockchain Technology To Control Counterfeit Drugs, Enhance Data Privacy And Improve Distribution In Online Pharmacy.	Research could explore the actual impact of blockchain technology on reducing counterfeit medicines and medical devices in online markets. This could involve assessing real-world cases, analyzing the adoption rate of blockchain in the healthcare supply chain, and understanding the challenges and successes.
49	Singh, H., Majumdar, A., & Malviya, N.	2020	E-Pharmacy Impacts On Society And Pharma Sector In Economical Pandemic Situation: A Review	Further reasearch can investigate the mechanisms used by online pharmacies to authenticate the availability of a pharmacist for inquiries. Assess whether these mechanisms are effective in ensuring that users can seek professional advice when needed.
50	Sinha, D.	2013	A Study Of Employee Retention In The Pharmaceuticals Sector In Dehradun City.	Conduct a comparative analysis of employee retention strategies employed by different pharmaceutical companies. Identify best practices and assess how various strategies contribute to reduced attrition, operational efficiency, and organizational success.
51	Subhan, et.al.	2022	Impact Of E-HRM And Work From Home On Employee Productivity During COVID-19: Evidence From Pharmaceutical Companies.	Future scope for this study is We can assess the impact of e-HRM and remote work arrangements on employee well-being, stress levels, and work-life balance during COVID-19.

52	T, et.al.	2022	Study On Talent Management Practices In Pharma Sector With Focus On "Employee Retention".	Examine the role of technology, including HRIS (Human Resource Information Systems) and talent management software, in enhancing talent management processes. Evaluate how technology can streamline recruitment, performance management, training, and succession planning initiatives.
53	Thomas, F.	2023	Booster Shot For Pharma	Analyze the types of jobs created, workforce training initiatives, and opportunities for local talent development in the biopharmaceutical industry.
54	V. Chordiya, S., & M. Garge, B.	2020	E-Pharmacy Vs Conventional Pharmacy	Examine the impact of online pharmacies on healthcare accessibility, particularly in underserved or remote areas. Assess how online pharmacies contribute to improving access to essential medications and healthcare services for populations with limited access to traditional pharmacies.
55	Vp, P., & Bk, A.	2016	E-Pharmacies Regulation In India: Bringing New Dimensions To Pharma Sector.	Assess the effectiveness of education and awareness initiatives aimed at informing consumers about the risks and benefits of using e-pharmacies. Evaluate strategies for promoting safe medication practices, responsible self-care, and informed decision-making among e-pharmacy users.
56	Wechsler, J.	2010	Pharma Faces Multiple Challenges In The Year Ahead	Researchers can investigate health-system databases to assess outcomes and to compare the risks and benefits of medical products.
57	Angadi, A. B., & Naik, D. M	2012	Retention Of Employees In Pharmaceutical Industries Of Bangalore.	Expanding the scope of the study to include pharmaceutical companies in other regions or industries would enhance its generalizability and external validity. Examining how retention strategies vary in effectiveness across diverse contexts can offer broader insights into best practices for organizational success.

58	Asif, A., & Gul, N.	2021	Analyzing The Determinants Of Employee Retention: A Case Of Pharmaceutical Companies In Pakistan	This study used qualitative research methods, such as interviews or focus groups, could enrich the study by capturing employee perspectives on the factors influencing their decision to stay or leave the pharmaceutical industry. Qualitative insights can provide deeper insights into the subjective experiences and motivations of employees, complementing quantitative findings.
59	Bhalerao, H., & Mandalik, D. D.	2022	E-Pharmacy: A Study Of Growth Of Digital App-Based Pharmacy Delivery Services	While the conclusion mentions difficulties encountered by users of mobile healthcare applications, it does not provide a comprehensive exploration of these challenges. Future research could delve deeper into the specific barriers faced by pharmacists and other healthcare professionals, such as technical issues, concerns about data privacy and security, resistance to change, or lack of training.
60	Chaturvedi, K., & Chataway, J.		Innovation In The Post-Trips Regime In Indian Pharmaceutical Firms: Implications For Pharmaceutical Innovation Model	While the conclusion mentions difficulties encountered by users of mobile healthcare applications, it does not provide a comprehensive exploration of these challenges. Future research could delve deeper into the specific barriers faced by pharmacists and other healthcare professionals, such as technical issues, concerns about data privacy and security, resistance to change, or lack of training.
61	Giuseppina Cersosimo, P. P. G.	2021	Health And E-Pharmacies In The Covid Age. New Roles And Digital Challenges For The Pharmacist	The conclusion briefly touches upon the risks associated with the spreading of online pharmacies but does not delve into the ethical and regulatory considerations in detail. Future research could explore the ethical implications of e-Pharmacies, such as patient privacy, data security, medication safety, and potential conflicts of interest. Additionally, research could examine the regulatory frameworks governing e-

				Pharmacies in Italy and their alignment with broader healthcare policies and objectives.
62	M, S., & Nas, Z.	2019	Arising Employees' Retentions Due To Organizational Commitment & Support In Pharmaceutical Industry	While the conclusion highlights the positive relationships between organizational commitment, organizational support, and employee retention, it does not delve into the mechanisms through which these relationships operate. Future research could explore mediating and moderating variables that may explain how organizational support influences organizational commitment and, subsequently, employee retention. This could include factors such as job satisfaction, perceived fairness, or psychological empowerment.
63	Mwangangi, F. W.	2014	Factors Affecting Employees Turnover In The Pharmaceutical Industry: A Case Of Phillips Group Of Companies Kenya.	The conclusions highlight several organizational factors influencing turnover, such as compensation, reward and recognition, developmental activities, and working conditions. However, other factors such as leadership, organizational culture, job design, and work-life balance may also play significant roles in influencing turnover behavior. Future research could explore the broader range of factors contributing to turnover to develop a more holistic understanding of the phenomenon.

64	Nthongoa, R. M.	2014	Knowledge Management As A Tool For Talent Retention In The Pharmaceutical Industry.	The relationship between knowledge management and talent retention in this environment should be investigated further with grounded theory to endure a deeper understanding of how knowledge management (knowledge management strategy/processes) can be effectively used as a tool for talent retention.
65	Rahaman, S., Mohammed, S., Manchanda, T., & Mahadik, R.	2019	E-Pharm Assist: The Future Approach For Dispensing Medicines In Smart Cities	The conclusion proposes an integrated e-prescription and e-pharmacy model as a solution to the identified challenges. However, it does not discuss potential implementation challenges or barriers that may arise in adopting and scaling up such a model. Future research could explore the organizational, technical, regulatory, and financial considerations involved in implementing e-prescription and e-pharmacy systems, providing insights for successful implementation strategies.
66	Ryan, T. J.	2018	Retention Of Critical Talent Post Acquisition In A Multinational Company	The conclusion identifies the transfer of knowledge as a critical factor for critical teams (CT) to prevent them from being deemed a single point of failure. Further research could explore the mechanisms and strategies for effectively transferring knowledge within CTs, including the role of leadership, communication, training, and organizational culture.

67	Srivastava, M., & Raina, M.	2021	Consumers' Usage And Adoption Of E-Pharmacy In India.	Further exploration is needed into the development and implementation of technological solutions to enhance the safety and security of online pharmacy transactions. This could involve the use of block chain technology to verify the authenticity of medications, implementing secure payment gateways to protect consumer data, and developing algorithms to detect and prevent fraudulent online pharmacies.
68	Alkunsol, W. H., Sharabati, A.-A. A., AlSalhi, N. A., & El-Tamimi, H. S.	2019	Lean Six Sigma Effect On Jordanian Pharmaceutical Industry's Performance. International Journal Of Lean Six Sigma.	Future research could investigate organizational characteristics, cultural factors, and external influences that shape the adoption and success of Lean Six Sigma initiatives in Jordanian pharmaceutical companies.
69	Burrows, C.	2004	Enriching The Talent Pool: Injecting New Blood From Outside The Industry. International Journal Of Medical Marketing	Research could explore strategies and best practices for helping new recruits acquire industry-specific knowledge and expertise quickly and effectively. Studies could examine the role of mentorship, training programs, and immersive learning experiences in facilitating knowledge transfer and skill development for individuals transitioning from other industries.
70	Deters, J.	2018	Global Leadership Talent Selection As An Integrated Acquisition Process. In J. S. Osland, M. E. Mendenhall, & M. Li (Eds.), Advances In Global Leadership	Studies could investigate the design and implementation of training and development programs tailored to the needs of global leaders. Research could explore the effectiveness of experiential learning, cross-cultural training, and virtual leadership development initiatives in building the capabilities and competencies required for success in global roles.

71	Rubino, A. L.	1994	Repositioning The Human Resource Function At Hoffmann-Laroche. Human Resource Planning.	Research could focus on evaluating the impact of the repositioning process on employee engagement, satisfaction, and retention within Hoffmann-La Roche Inc. Studies could utilize employee surveys, interviews, and focus groups to gather feedback on the effectiveness of performance management, development, and rewards programs in enhancing employee morale and commitment.
72	Sharda, K.		Managing Talent At Lupin Limited(A). Indian Institute Of Management Ahmedabad.	While the study mentions the decline in attrition rates, it does not assess the impact of this achievement on Lupin's overall organizational performance. Further research could investigate the relationship between talent management practices, employee retention, and key performance indicators such as productivity, profitability, and market share.
73	Sovanjeet, M.		HR Issues And Challenges In Pharmaceuticals With Special Reference To India. Review Of International Comparative Management	The study mentions talent gaps in the pharmaceutical industry but does not specify the nature or extent of these gaps. Future research could conduct a comprehensive analysis to identify specific talent gaps within Indian pharmaceutical companies, including skill shortages, leadership deficits, and demographic disparities.
74	Emrald Publications	2010	Talent Management Is Bupharm's Prescription For Success: Family-Owned Firm Competes Effectively With The Multinationals.	While the study outlines the successes achieved through the implementation of new recruitment and talent management policies at Bupharm, it does not provide a comprehensive evaluation of the effectiveness of these policies. Future research could focus on assessing the impact of the policies on key performance indicators such as employee retention, productivity, and organizational performance.

75	Triantafillidou, E., & Koutroukis, T.	2022	Employee Involvement And Participation As A Function Of Labor Relations And Human Resource Management: Evidence From Greek Subsidiaries Of Multinational Companies In The Pharmaceutical Industry	The study primarily focuses on the perspectives of HR departments and management regarding employee involvement practices. Future research could incorporate the viewpoints of employees, trade union representatives, and European Works Council (EWC) members to provide a more holistic understanding of the dynamics and effectiveness of employee participation initiatives.
76	Bansal, S., Kaur, H., Mahendiratta, S., Sarma, P., Kumar, S., Sharma, A. R., Joshi, R., Bhattacharyya, A., Prajapat, M., Prakash, A., & Medhi, B.	2022	A Preliminary Study To Evaluate The Behavior Of Indian Population Toward E-Pharmacy	The study reports a relatively low percentage of participants who actually purchased medicines online despite being aware of e-pharmacies. However, it does not delve into the reasons behind this discrepancy. Further research could explore factors influencing individuals' decisions to use or not use e-pharmacies, such as concerns about safety, trust in online platforms, convenience, or cost considerations.
76	Chaturvedi, A., Singh, U., & Kumar, A.	2011	Online Pharmacy: An E-Strategy For Medication.	The study reports a relatively low percentage of participants who actually purchased medicines online despite being aware of e-pharmacies. However, it does not delve into the reasons behind this discrepancy. Further research could explore factors influencing individuals' decisions to use or not use e-pharmacies, such as concerns about safety, trust in online platforms, convenience, or cost considerations.
77	Jadhav, S., Nikam, K., Gandhi, A., Shinde, N., & Salunkhe, K.	2012	Applications Of Computer Science In Pharmacy: An Overview.	Future research could focus on faculty development initiatives to support pharmacy educators in integrating digital pharmacy education into their teaching practices. This may involve providing professional development workshops, resources, and mentorship opportunities to enhance faculty members' digital literacy skills and pedagogical competencies in

				teaching digital pharmacy concepts.
78	Knapp, D. A.	2002	Professionally Determined Need For Pharmacy Services	Investigating the role of information technology and automation in pharmacy practice, particularly in drug order fulfillment. Future studies could explore how advancements in technology, such as robotics and artificial intelligence, will shape the pharmacy workforce and improve pharmacist productivity.
79	McHugh, P. P.	1999	Pharmacists' Attitudes Regarding Quality Of Work life. Journal Of The American Pharmaceutical Association	Conducting qualitative studies to explore the underlying factors contributing to pharmacists' job and career satisfaction, turnover intention, and patient care concerns. This could involve in-depth interviews or focus groups to gather insights from pharmacists about their experiences and perspectives.
80	Rithoriya, M., Yadav, D. A., & Jain, D. D. K.		E-Pharmacy Impact On Society And Pharma Sector.	Further research could focus on proposing and advocating for comprehensive regulatory frameworks for online pharmacies. This could involve analyzing existing regulations in other countries and adapting them to the local context, as well as identifying gaps in current regulations and recommending measures to address them.

Significant Findings

The review reveals that employee retention in the pharmaceutical industry is multifaceted, influenced by organizational culture, leadership, and strategic talent management practices. A significant emphasis is placed on the need for comprehensive development programs and compensation strategies to address high turnover rates effectively. Studies indicate that organizations that prioritize employee engagement, support career development, and foster a positive work environment are more likely to retain skilled talent. Furthermore, ongoing

research is necessary to adapt to the evolving challenges within the industry, ensuring that talent management practices remain effective in promoting employee retention and organizational success.

Conclusion

The literature on talent management in the pharmaceutical sector highlights the critical role of strategic management, training, and development in enhancing employee retention. However, the industry still faces numerous challenges, particularly in adapting to technological advancements and addressing employee dissatisfaction. Future research should focus on developing comprehensive talent management frameworks that integrate digital skills development, leadership training, and organizational support to improve retention in this rapidly evolving industry.

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The Employee's Perspective on Corporate Training Programs

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Abstract

In every organization employee learning and growth are very important. Corporate training programs are arranged in order to boost employees perform and stay updated with new skills. But sometimes it is not clear whether employees really find these training sessions useful or not. This research is about what employees think about the corporate training programs they attend at their workplace and how these programs help them in their job. The study was done at Cubix Automation Pvt. Ltd., Pune and from around 100 employees gave data was collected through a structured questionnaire. The purpose of this study was to know if employees find the training helpful in doing their jobs better, building new skills and increasing their confidence. Many employees said training programs are helpful and make them feel more motivated and confident at work. But some employees shared that they could not attend training due to lack of time, mismatch with their job role or not interesting content. This study also found that employees like different types of training like online, classroom, on-the-job and many preferred a mix of all types. Employees also shared how often they think training should happen and who should deliver it. Most people said that leadership and job-related trainings are very useful, and some improvements are still needed to make training more effective.

Keywords- Corporate Training Programs, Employee Perception, Job Performance

Introduction

A training program is a structured and organized set of activities designed to develop or enhance the knowledge, skills and competencies of individuals or groups in a specific area or subject. Corporate training or workplace learning is a set of educational activities provided to employees. It can cover many topics such as communication skills and job-specific skills. This training helps both employees and businesses by improving knowledge and teaching new skills. Training can focus on different areas like technology, teamwork, company rules, leadership and more. Companies spend money on training to improve work quality, reduce mistakes and create a better work environment. The main goal is to help employees grow both personally and professionally. Training can happen one-on-one or in groups usually with a skilled instructor leading the session.

Purpose of Training

- To improve skills, knowledge, and fitness
- To increase productivity and efficiency
- To develop problem-solving skills
- To help employees learn how to perform their jobs effectively

The goal of training is to change the behaviour of employees and help them do their jobs better.

To achieve this, training should focus on three main areas:

- **Knowledge** - Helps employees understand facts, policies, procedures, and rules related to their job.
- **Skills** - Improves technical and manual abilities needed to perform the job well.
- **Attitude** - Shapes how employees behave with co-workers and supervisors and builds a sense of responsibility.

Employees have different views on corporate training based on their experiences and expectations. Some employees see training as a valuable opportunity to learn and grow while others may view it as a routine task with little benefit. Their perspective depends on factors like the quality of training, the relevance of the content and how it is delivered. For training to be effective it should match employees' needs and job requirements. If the training content is not applicable to their work employees may lose interest. Similarly, if training methods are not engaging employees may not pay attention or remember the information. Interactive training sessions and real-life examples can make learning more enjoyable and effective. Another important factor is how training is scheduled. Employees who have heavy workloads may find it difficult to focus on training sessions. If training is too long or takes place at inconvenient times employees may not be able to participate fully. Organizations need to find a balance between providing necessary training and ensuring that employees do not feel overwhelmed.

Objectives of Research

- To check employees perspective towards training programs.
- To understand what employees think about how well training programs help them do their jobs better.

Literature Reviews

A literature review helps to get more knowledge about the topic and gives ideas on how to do the research better. It also helps to find out what information is already available and what gaps still exist. In this research the researcher has reviewed 10 research papers which help to build strong base for the research.

1.Employee Perceived Training Effectiveness Relationship to Employee Attitudes.

In this study researcher studied how employees feel about training programs and how these feelings affect their attitude toward work and their organization. Training is an important part of every company because it helps employees gain new skills, improve their performance but not all training programs are successful. Some employees find training helpful and relevant while others feel that it does not add much value to their jobs. This study focuses on whether employees who think training is useful are more satisfied, motivated, and loyal to their company. The researchers conducted this study at the **Technological Education Institute in Athens, Greece** where they collected data from employees in different organizations. The results of the study showed that when employees think training is effective they feel happier and more motivated at work. Employees who feel that training helps them gain useful skills

are more likely to enjoy their jobs and work harder. They also tend to stay in the company longer because they feel that the company cares about their growth. On the other hand, employees who do not see value in training often feel less motivated and may even look for jobs elsewhere. The study found that employees respond better to training programs that are directly related to their work. If training sessions are too general or do not match their career goals, employees may not find them useful, and the training may not have the expected impact. The study also discovered that effective training programs improve employee motivation. Employees who believe that training is beneficial are more eager to learn new things and take on more responsibilities. This increased motivation helps improve productivity and performance which benefits both the employees and the organization. When employees feel supported in their learning and career growth they are more likely to be engaged in their work and contribute positively to the company. This is why companies that invest in well-planned training programs often have more dedicated and high-performing employees. Another important finding of the study is that training plays a significant role in building employee loyalty. Employees who see value in training programs are more committed to their company because they feel valued and appreciated. They are less likely to leave the company, reducing turnover rates. When employees feel that their employer is investing in their growth, they develop a stronger emotional connection with the company. This helps create a positive work environment where employees feel motivated to do their best.

2.Employee perceptions and their influence on training effectiveness.

The study focuses on understanding how employees feel about the training they receive and whether their attitudes impact how much they learn and apply in their work. The study explains that training is an important part of employee development, but its success depends on how employees perceive and respond to it. If employees see training as useful and relevant to their job, they are more likely to engage with it and apply what they have learned. If they feel that training is unnecessary or poorly designed, it may not have a positive impact on their performance. The study mentioned that employees' attitudes toward training are shaped by several factors including their past experiences, the way training is delivered, and the level of support they receive from management. If employees have had positive experiences with training in the past, they are more likely to participate actively in future training sessions. But if they have attended training programs that were not helpful or engaging, they may feel that training is a waste of time. The study highlights the importance of making training sessions interesting, interactive, and directly related to employees' daily tasks. Another important factor that affects training effectiveness is the role of management. When supervisors and managers encourage employees to take training seriously and provide them with opportunities to apply their new skills, the impact of training increases. Employees feel more motivated to learn when they see that their organization values training and considers it an important part of their career growth. If employees feel that their company is only providing training as a formality, they may not put much effort into learning or applying new knowledge. The study also discusses the influence of workplace culture on training effectiveness. In organizations where learning and development are encouraged, employees are more open to training opportunities. They see training as a chance to improve their skills and advance in their careers. However, in workplaces where training is not given much importance, employees may not be as enthusiastic about participating. The study suggests that companies should create a culture that promotes continuous learning and provides employees with regular opportunities to develop their skills. The challenges mentioned in the study is that some employees may feel hesitant about training because they fear that learning new skills could increase their workload or lead to higher expectations from management. Some may also feel that they do not have enough time for

training due to their busy schedules. To address this, organizations should ensure that training is well-planned, relevant, and delivered in a way that does not disrupt employees' work routines. Flexible training options, such as online courses or on-the-job training, can help employees learn at their own pace without feeling overwhelmed. The study concludes that employee perceptions play a crucial role in determining the success of training programs. Organizations should focus on designing training that is engaging, relevant, and supported by management.

3.The Effect of Training on Employee Performance.

The study examines how training affects employee performance and why it is important for organizations to invest in proper training programs. They state that training is a crucial part of an organization's success because it helps employees develop their skills, increase their efficiency, and improve their overall job performance. Companies that invest in training programs tend to have a more skilled and motivated workforce, which leads to better productivity and business growth. The study highlights the importance of continuous learning and development for employees to keep up with changing job demands, technology, and industry trends. Training provides employees with the knowledge and skills they need to perform their tasks more effectively. When employees receive proper training, they gain confidence in their abilities, which allows them to work more efficiently and with greater accuracy. This helps reduce mistakes, improves the quality of work, and enhances overall performance. Employees who undergo regular training are also more adaptable to changes in the workplace, such as new technologies or updated work processes. When workers are well-trained, they can handle challenges better and contribute more to the organization's success. The research also points out that training has a direct impact on employee motivation. When employees see that their company is willing to invest in their growth, they feel valued and appreciated. This increases their job satisfaction and commitment to the organization. Employees who receive training are more likely to be engaged in their work and have a positive attitude toward their responsibilities. In contrast, employees who do not receive proper training may feel frustrated, unprepared, or unmotivated, which can lead to poor performance and high turnover rates. The study discussed that there is a need for organizations to design training programs that are relevant to employees' job roles. Generic training programs that do not directly apply to employees' daily tasks may not be as effective. Training should be structured in a way that addresses specific skill gaps and provides practical knowledge that employees can immediately apply in their work. Companies should also consider different learning styles and methods to make training more engaging and useful. Some employees may benefit more from hands-on training, while others may prefer online courses, workshops, or group discussions. The study highlights that training is not a one-time event but a continuous process. Organizations that offer regular training opportunities help employees stay updated with industry developments and improve their expertise over time. Ongoing training also ensures that employees do not become stagnant in their skills, which is especially important in industries that are constantly evolving. When employees continuously learn and grow, they become more valuable assets to the organization. The research also mentioned that training should be evaluated for its effectiveness. Organizations should measure the impact of training on employee performance by tracking improvements in productivity, efficiency, and job satisfaction. If a training program does not lead to better performance, companies should analyze the reasons and make necessary improvements. Feedback from employees is also important in understanding what works and what needs to be changed in training programs. The study concludes that training plays a vital role in improving employee performance, increasing motivation, and enhancing overall organizational success. Companies that invest in

training gain a competitive advantage because they have a skilled and capable workforce. Employees who receive proper training are more confident, efficient, and engaged in their work. However, for training to be truly effective, it must be relevant, continuous, and supported by management. Organizations should focus on creating well-structured training programs that meet employees' needs and contribute to business growth.

4.Enhancing Employees' Commitment to Organisation through Training.

The study examines how training helps increase employee's commitment to their organization. They explain that when companies invest in training programs, employees feel valued and appreciated. This sense of importance makes employees more loyal to their company and more willing to contribute to its success. Training provides employees with the skills and knowledge they need to perform their jobs better, which leads to higher job satisfaction and a stronger connection with the organization. Chances of the employees staying with an organisation which offers them opportunities for development and growth. Training makes employees feel more confident and capable, which increases their motivation and enthusiasm for their work. This, in turn, helps the company retain talent and reduces the costs associated with hiring and training new employees. The study also highlights the role of management in supporting training initiatives. If managers encourage employees to take part in training and provide them with the necessary resources, employees will be more engaged and committed. This makes employees feel like they are part of a team working towards a common goal, which strengthens their emotional attachment to the company. Another important point discussed in the study is how training improves workplace relationships. When employees take part in training programs, they often work together, share ideas, and learn from each other. This creates a sense of teamwork and cooperation, which makes the work environment more positive. Employees who have good relationships with their colleagues and managers are more likely to feel happy and satisfied in their jobs, increasing their commitment to the organization. The study also explains that training helps employees adapt to changes in the workplace. In today's fast-changing business world, companies need to introduce new technologies and processes to stay competitive. Employees who receive regular training are better prepared to handle these changes and see them as opportunities rather than challenges. This adaptability makes employees feel more secure in their jobs and reduces the fear of being left behind, which strengthens their loyalty to the organization. In this paper the researcher tried investigating the relationship between training, learning and development to commitment. The result of this study showed that, there is positive relation between the training provided to the employees and their commitment to the organisation. The underlying philosophy therefore is the need for management to acknowledge and openly accept that training is one of the commitment-based strategies that can be utilised to enhance organisational performance. In conclusion, training is a tool that can assist in building a more committed and productive workforce and can lead to greater commitment and less employee turnover.

5.Impact of employees' training programmes on job satisfaction.

In this paper the researcher analysed employees' attitude from wood-industry companies in the Northeast region of Romania about the attended training programmes, and relationship between training and job satisfaction. The results show that it is necessary to implement high-quality training programmes because it has a positive connection with ethical rules, work recognition, supervision and commitment to work. It explains that when companies invest in training, employees feel valued, which increases their happiness and commitment to their work. Training helps employees improve their skills, gain new knowledge, and perform their tasks

more effectively. When employees feel capable and confident in their roles, they experience greater job satisfaction and a stronger connection to their workplace. Training programs allow employees to develop professionally, which makes them feel more secure about their future in the company. When employees feel that their employer is helping them progress in their careers, they are more likely to stay motivated and engaged in their work. This reduces frustration and boredom, leading to a more positive attitude toward their job. The study also highlights that well-designed training programs make work more enjoyable and fulfilling. When employees understand their tasks better and feel prepared to handle challenges, their stress levels decrease. Instead of struggling with uncertainty, they approach their work with confidence. This not only improves job satisfaction but also increases productivity, as employees can complete their tasks more efficiently. In addition, training helps employees adapt to changes in the workplace, such as new technologies or updated procedures. Employees who receive proper training feel less overwhelmed by changes and are more willing to embrace them. Another important point in the study is that training programs can improve relationships in the workplace. The study also mentions that training should be relevant to employees' job roles and career goals. If employees feel that the training they receive is useful and directly applicable to their work, they are more likely to appreciate it. However, if training programs are not well-planned or do not match employees' needs, they may feel like their time is being wasted, which can lead to dissatisfaction. Therefore, organizations should carefully design training programs to ensure they are practical, engaging, and beneficial to employees. The study concluded that employee training has a strong impact on job satisfaction. When employees receive training that helps them grow professionally, reduces stress, and improves their confidence, they feel happier and more motivated at work. Training also strengthens workplace relationships and helps employees adapt to changes, making the work environment more positive. By offering meaningful training opportunities, organizations can create a more satisfied and committed workforce, leading to long-term success for both employees and the company.

6. Evaluating corporate training and development: an Indian experience.

The study examines corporate training and development in India, focusing on how companies evaluate their training programs. Many Indian companies invest in training programs to enhance the abilities of their workforce, but evaluating the effectiveness of these programs is essential to ensure they bring real benefits. The study explains that training and development programs should be carefully planned to meet both the needs of employees and the goals of the organization. Companies use various methods to assess whether training has been successful, such as employee feedback, performance reviews, and productivity measurements. When employees apply what they have learned in their daily work, it shows that the training was effective. However, if training programs are not well-designed or do not match job requirements, they may not have a significant impact, leading to wasted resources. The challenges discussed in the study is that some companies do not have a proper system for evaluating training outcomes. While they may invest in employee development, they sometimes fail to track whether the training is helping employees perform better. As a result, organizations may continue using ineffective training methods without making necessary improvements. The study emphasizes that companies should use structured evaluation techniques to measure the success of their training programs and adjust as needed. The study also highlights the differences in training approaches among various Indian industries. Some industries, such as information technology and banking, place a strong emphasis on continuous learning and regularly update their training programs. In contrast, traditional sectors may still rely on outdated training methods. The study suggests that companies should adopt modern

training techniques, including e-learning and interactive workshops, to make training more engaging and effective. The study concluded that Training and development is a costly investment, but it brings great benefits over time. That is why it should be carefully planned, budgeted, and evaluated at all levels of an organization. In India's changing business environment, where industries are becoming more global and competitive, companies need to measure both the financial and non-financial benefits of training programs. However, most businesses do not have effective methods for doing this. While new evaluation models exist, their success has not been widely documented, and many companies still rely on belief rather than clear evidence. Often, training evaluations are done without clear goals or proper methods, making them ineffective. Those responsible for training need to focus on more than just assumptions and should use proper evaluation techniques. The existing research on training evaluation does not provide enough real-world examples, and much of it is based on ideal models rather than practical applications. Future research should explore why some companies evaluate training properly while others do not. Also, studying how different countries approach training evaluation can provide useful insights for improving corporate training programs worldwide.

7. A Study on Awareness of Various Non-Technical Training Programmes Conducted by Corporate Trainers for IT Companies in Ahmedabad.

This study focuses on the awareness of non-technical training programs conducted by corporate trainers for IT companies in Ahmedabad. In the IT industry, technical skills are essential, but non-technical or soft skills are equally important for overall employee growth and workplace success. Non-technical training programs help employees improve communication, teamwork, leadership, time management, and problem-solving skills. These programs also focus on stress management, emotional intelligence, and workplace ethics, which are crucial for a healthy and productive work environment. The research aims to understand how much IT employees in Ahmedabad know about these training programs and whether they find them useful. Many companies conduct such programs to enhance employee performance and job satisfaction. However, awareness and participation in these training sessions vary from company to company. Some employees may not fully understand the benefits, while others may not get enough opportunities to attend such programs. The study finds that employees who take part in non-technical training develop better interpersonal skills, feel more confident, and work more efficiently. These programs also help employees adapt to changes in the workplace and build stronger relationships with colleagues and clients. Organizations that invest in non-technical training often see improvements in teamwork, employee engagement, and overall company performance. Despite the benefits, the study highlights some challenges. Some companies do not give enough importance to non-technical training, and employees may not always take these sessions seriously. Additionally, there may be a lack of well-structured training programs or experienced trainers. To make these training programs more effective, companies need to create awareness, encourage participation, and ensure that training sessions are interactive and practical. In conclusion study mentioned that non-technical training is an important part of employee development in IT companies. It helps improve communication, leadership, and teamwork, leading to a better work environment and increased productivity. Companies should invest more in these programs and ensure employees understand their value, as this will benefit both employees and the organization in the long run.

8. A Case Study Approach for Evaluation of Employee Training Effectiveness and Development Program.

This study focuses on evaluating how effective employee training and development programs are by using a case study approach. Training and development are important for improving employees' skills, increasing productivity, and helping organizations grow. However, simply conducting training programs is not enough; it is also necessary to measure their impact on employees and the company. This research aims to understand how well employees apply what they learn from training sessions and whether these programs truly benefit both individuals and the organization. The study examines real-life examples of companies that have implemented training programs and assesses their effectiveness. It looks at various factors such as employee performance before and after training, their ability to use new skills in the workplace, and overall job satisfaction. One of the key findings is that training is most effective when it is relevant to employees' job roles and when companies provide continuous learning opportunities. Another important aspect of the research is identifying challenges in training evaluation. Many companies do not have a proper system in place to measure how successful their training programs are. Some employees may attend training sessions but fail to apply what they learn in their daily work. Additionally, if organizations do not track improvements in employee performance, they may not realize the full benefits of their training programs. To make training more effective, the study suggests that companies should set clear goals before starting a training program, ensure that employees are engaged during training, and regularly assess their progress. It also emphasizes the importance of gathering feedback from employees to improve future training sessions. The study concluded that four levels of training effectiveness using a survey of employees who attended the training. The four key factors tested were reaction, learning, behaviour, and results. The study found that employees' responses to training, their learning progress, behavioural changes, and overall work improvements all significantly impact training effectiveness. Employees reacted positively to the training, gained new skills, improved their professional behaviours, and applied their knowledge to their jobs. After a few months, their confidence and practical skills increased, proving the training's success.

9. Ethics Training in the Indian IT Sector: Formal, Informal or Both?

This study examines ethics training in the Indian IT sector and explores whether companies use formal training, informal training, or a mix of both. Ethics training helps employees understand right and wrong behaviour at the workplace. In the Indian IT industry, companies face ethical challenges such as data security, privacy concerns, and fair treatment of employees. The study found that some companies use formal ethics training programs, which include workshops, online courses, and written guidelines. These structured programs help employees understand company policies and ethical standards. However, formal training alone is not always enough to develop strong ethical behaviour. Informal ethics training also plays a big role in shaping employee behaviour. This includes guidance from managers, discussions with colleagues, and learning from real workplace experiences. Many employees learn about ethics through daily interactions rather than formal training sessions. Companies that encourage open discussions about ethics and provide strong leadership support tend to have a better ethical work culture. The study suggests that a combination of formal and informal training is the most effective way to ensure employees follow ethical practices. While formal training provides clear guidelines, informal learning helps employees apply ethical principles in real situations. Indian IT companies should focus on both approaches to create a strong ethical environment. This study looks at ethics training in the Indian IT industry and how it helps employees make

better ethical decisions. The researchers created the PETINEO model, which includes ethics training, personal beliefs, and company values. They found that ethics training helps individuals understand the importance of ethics and shapes their ethical thinking. However, personal ethics alone do not change company values—strong leadership is needed. The study shows that using both formal and informal ethics training together is the best way to teach ethical decision-making. This approach ensures that employees and leaders can handle complex ethical issues effectively.

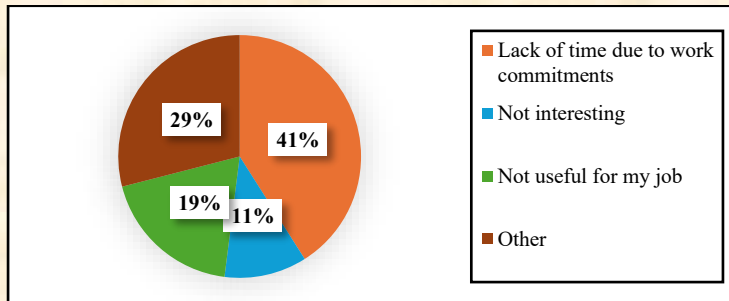
10. Employees' Perspective on Corporate Training Practices in Indian Organisations: A Search for Best and Worst Training Practices.

This study looks at how employees in Indian companies feel about corporate training programs. It aims to find the best and worst training practices used by organizations. However, the way training is given can make a big difference in how effective it is. The study found that good training programs are well-planned, practical, and focus on real work situations. Employees like training that helps them do their jobs better and gives them useful knowledge. They also appreciate when companies provide ongoing learning opportunities instead of just one-time sessions. When employees feel that training helps their careers, they are more motivated and perform better at work. On the other hand, some training programs are not effective. Employees do not like training that is too theoretical, boring, or not related to their actual job roles. They also dislike when training sessions are too long without breaks or interactive activities. Poorly organized training, with unclear objectives or unqualified trainers, can make employees feel that the training is a waste of time. The study also highlights that organizations should ask employees for feedback on training programs. When employees are involved in planning and selecting training topics, they feel more engaged and benefit more from the sessions. Companies that provide flexible training options, such as online courses or on-the-job training, are seen as more supportive of employee development. Training is a way of learning that helps employees gain knowledge, improve skills, understand rules, and change attitudes to perform better at work. Every system needs four things to work properly: technology, people, materials, and time. These help in making products or providing services. Training has clear goals, just like roads that lead to cities. Training methods like case studies, role plays, and written materials help build these roads. Employees may take different paths, such as learning on the job or attending special training programs, to reach their goals. It is important to choose the right training methods that help achieve both employee and company goals. The study found that most employees are happy with the training programs offered by their companies. They believe training has helped them work better in teams, improve leadership and communication skills, understand difficult ideas, and manage themselves better. It has also helped them solve complex problems at work. Employees also feel that training has made them more aware of their strengths and emotions, encouraged them to adapt to changes, and improved their decision-making skills. Many employees have seen better career growth opportunities because of training, which has reduced job changes and increased company profits. To make training better, it is important to choose the best training methods. The study showed that employees do not like classroom lectures because they find them less effective. Instead, they prefer on-the-job training and learning from experienced colleagues. This means employees want to learn in real work situations and are willing to ask for help from co-workers when needed.

Data Analysis and Findings:

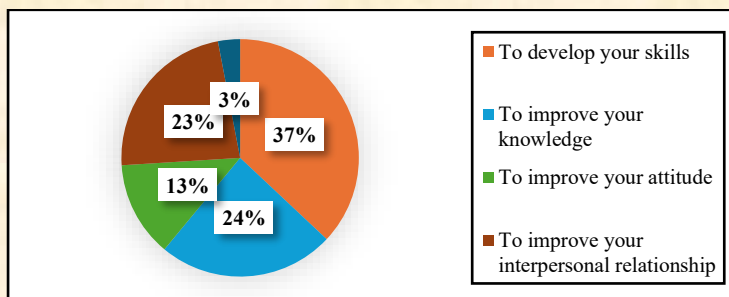
In order to get good insight into the subject the researcher conducted a survey on a sample of 100 employees. Major readings of the survey are as follows :-

If not, what stops you from attending training?



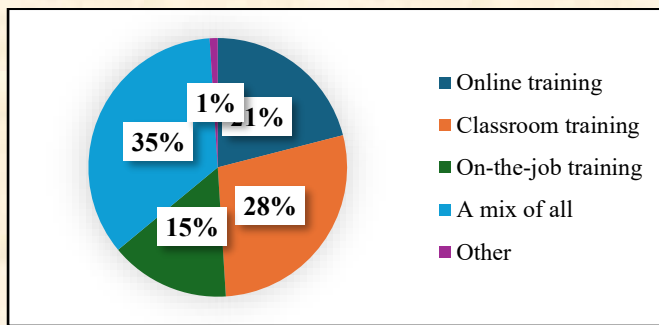
Interpretation: There are several reasons why employees may not attend training programs. The most common reasons are lack of time due to their work commitments. Followed by other reasons for not attending, which could include personal issues, scheduling conflicts, or other work-related priorities. Few employees felt that the training was not useful for their job, indicating that they did not see the value in the programs for their specific roles. Few of the respondents even felt that the training programs uninteresting which may have made them less motivated to attend.

Why do you consider training programs are important?



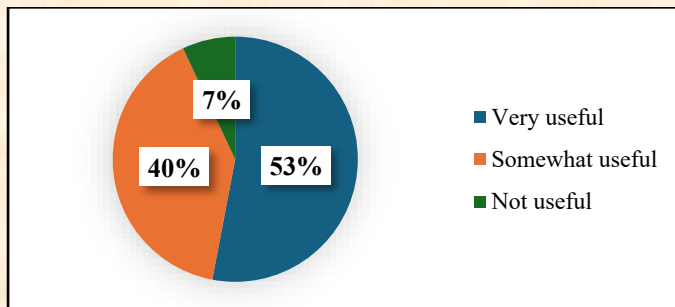
Interpretation: Employees consider training programs important for a variety of reasons. Majority of the respondents believe that training is crucial for skill development, as it helps them to do the necessary abilities to perform their job better. Few of the respondents even feel that training is essential for improving their knowledge, training is seen to enhance interpersonal relationships- it means that they believe it helps improve communication and teamwork with colleagues, training is important for improving attitude, as it can help them develop a more positive approach to their work and interactions. A small portion had other reasons for considering training important, which might include personal growth or career advancement.

What type of training do you like the most?



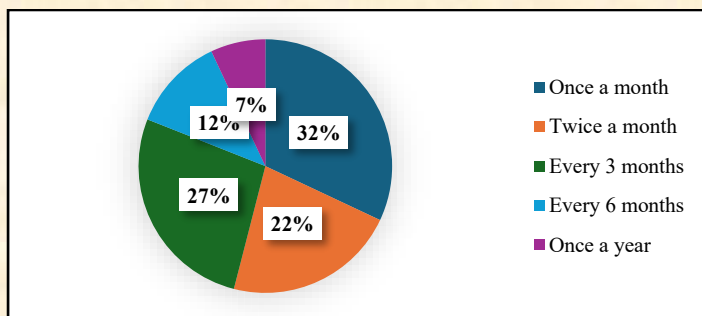
Interpretation: A majority of respondents expressed a preference for a mix of all types of training means that they like a combination of different methods, which might include classroom, online, and on-the-job training. Couple of them preferred classroom training as well, the flexibility it offers in terms of time and location.

How useful are the training for your job role?



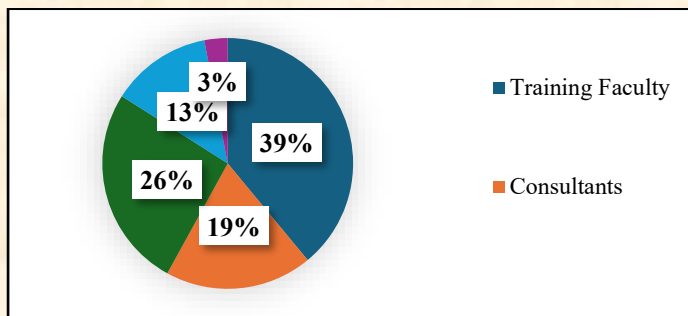
Interpretation: A significant number of respondents believe the training is very useful or somewhat useful.

How often do you think training should be given?



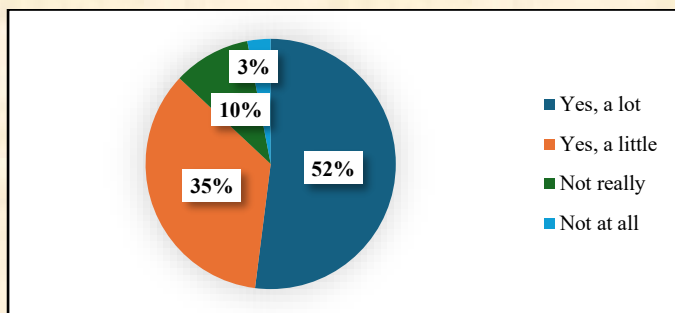
Interpretation: Employees have different opinions on how often training should be conducted in the organization. From training should be given once a month, as they may feel that regular sessions help keep their knowledge and skills updated, to once a year which may indicate that they prefer longer gaps between sessions or feel that frequent training is not necessary for their role.

From whom you would like to get trained?



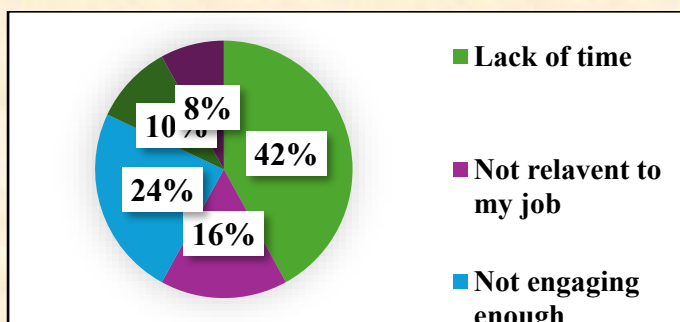
Interpretation: Employees have varied preferences regarding who should conduct their training sessions. A majority of employees, expressed a preference for being trained by professional training faculty or supervisors or managers.

Did the training help you improve your skills?



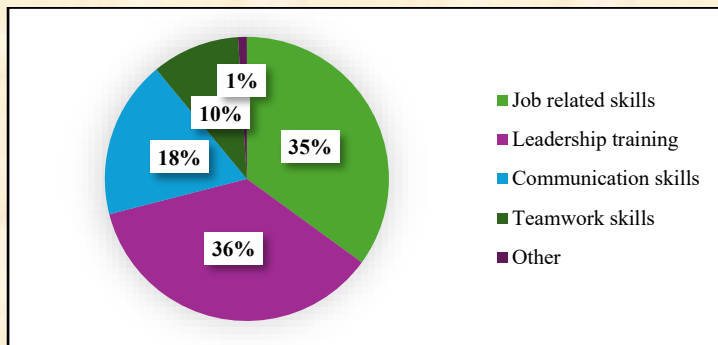
Interpretation: About half of employees found the training to be helpful in improving their skills, meaning it had a significant impact on their ability to perform their tasks and enhance their job-related skills.

What challenges do you face in attending or completing training programs?



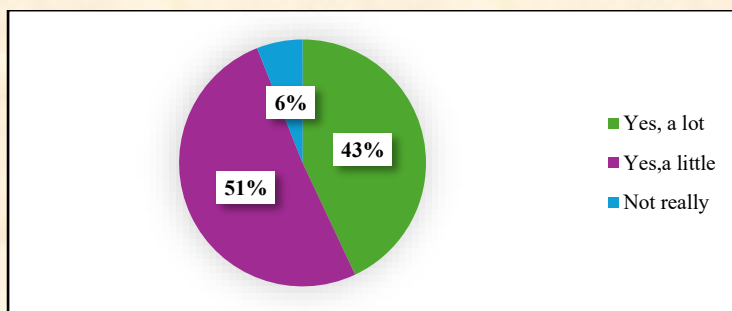
Interpretation: Employees face several challenges when it comes to attending or completing training programs. Ranging from lack of time- Many employees found it difficult to manage their work responsibilities along with training sessions-which made it hard for them to attend or complete the programs, the training content was not engaging enough- which affected their interest and participation, the training did not seem relevant to their job roles so they did not find it useful or worth attending, did not receive enough support from their managers- which made it harder for them to take part in training.

What kind of training do you think is most helpful?



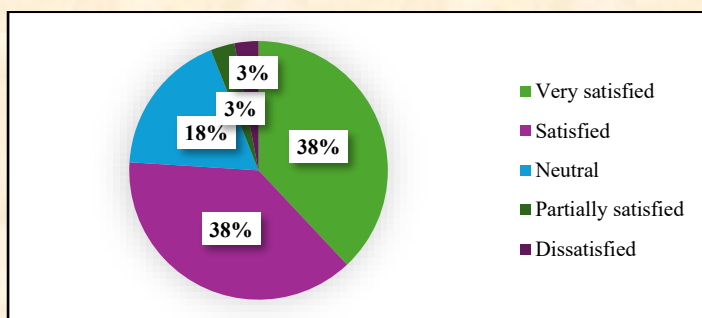
Interpretation: Employees have different views on which type of training is the most helpful for them. A large number of employees felt that leadership training was the most useful, job-related training was the most helpful. Few of them believed that communication skills training was the most valuable, as it supported better collaboration with others.

Do you feel more confident in your job role after training?



Interpretation: Most employees felt more confident in their job roles after attending training programs. They felt a lot more confident in performing their job after receiving training, they felt a little more confident, suggesting that the training helped them, but to a lesser extent. A small percentage reported that they did not feel confident even after the training, which shows that the program may not have been effective for everyone or did not meet their specific needs.

Are you satisfied with quality and duration of training program conducted in your organization?



Interpretation: Most employees were happy with the quality and duration of the training programs in the organization.

Suggestions

Based on the results, it is suggested that the company should make training programs more flexible. Many employees said they don't attend training because they don't have time, so training should be available at different times or in shorter sessions that employees can complete when they are free. Some employees felt that training was not useful or not interesting. To fix this, the company should design training that matches employees' job roles and makes the sessions more engaging by using real examples, activities, and interactive content. Since employees have different opinions on how often training should be given-some prefer once a month, some every three months, and some twice a month-the company can offer training at different intervals to suit different needs. Employees also liked different types of training. Many preferred a mix of classroom, online, and on-the-job training. So, the company should use a combination of training methods instead of just one. Most employees said they prefer to be trained by professional trainers or their managers. So, training should be mostly conducted by experienced trainers or supervisors, with support from consultants or co-workers when needed. Since more than half of the employees said training helped them improve their skills, the company should continue focusing on skill-building. Training in leadership, job-related tasks, communication, and teamwork should be included more often. Some employees said they found it hard to attend training because of time issues or because it wasn't interesting or relevant. Managers should support employees in attending training, and the sessions should be short, useful, and interesting. Many employees said training helped them in their current jobs and made them feel more confident. So, the company should keep updating training programs to match what employees need in their daily work. While most employees were satisfied with the training, some were neutral or not confident after training. The company should collect feedback regularly to find ways to make the training better. Finally, since employees have different levels of experience-from less than a year to over six years-the company should create a learning culture where all employees are encouraged to learn and grow throughout their careers.

Conclusion

The main aim of this research was to understand employees perspective on corporate training programs and how helpful they find these programs in improving their job performance and skills. The study was conducted with the assumption that training plays an important role in employee development and that employee believe training helps them to grow in their careers. By collecting and analysing responses from employee with different experience levels, the study explored their opinions on training formats, frequency, usefulness, challenges faced and preferred trainers. The goal was to check if employees really find training helpful and to suggest improvement that can make training programs more effective and engaging. The study shows that training and development play a significant role in improving employee performance, confidence, and job satisfaction. While most employees have attended training programs and found them useful, there are still some challenges that need attention such as lack of time, low engagement, and mismatch with job roles. The preferences for training methods, frequency, and trainers also vary among employees, highlighting the need for a more flexible and blended training approach. Employees see training as important for developing skills, improving knowledge, and enhancing communication and leadership abilities. The company should focus on making training more accessible, relevant, and engaging. Support from management and regular feedback can help improve training effectiveness even further. Regular training programs prepare employees to handle change in the industry and stay competitive, it also

boosts their confidence, morale, motivation which helps the company grow and succeed in the long run. Providing quality training not only improves employees' skills but also builds loyalty and helps reduce staff turnover which saves the company time and cost of hiring new people. Overall, the study shows that employee value training but there are areas that need attention. The company should work on offering training at different times, making content more interesting and matching the training with real job needs. Also involving professional trainers and managers can make the session more effective and with these improvements the training programs can become more successful and helpful for everyone.

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A Study on Insurance Coverage of Gig Workers in Pune

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Abstract

Gig Workers often do not get the benefits that regular job holders receive, such as health insurance or protection during accidents. Because of this, insurance becomes very important for them to stay safe and financially secure.

This research paper, titled “A Study on Insurance Coverage of Gig Workers,” tries to find out how much insurance protection these workers have, how well they understand insurance, and whether they feel safe and secure with the coverage they get.

For this study, simple questions were asked during face-to-face interviews with 114 delivery workers from Zomato, Swiggy, and Blinkit in Pune. These workers were chosen randomly between February and March 2025. Their answers were studied using basic graphs and percentages to understand common issues and patterns in their insurance coverage.

The study found that many gig workers either don't have insurance or don't understand it well. Some companies give basic accident insurance, but health and income-related protection is very low. The project shows that gig workers need better, affordable, and easy-to-understand insurance plans. It also shows the need for more education and awareness so that they can protect themselves in the future. Giving better insurance can help gig workers live a safer and more stable financial life.

Keywords - Gig Workers, Insurance Coverage, Financial Security, Delivery Platform, Task-based Employment

Introduction

The gig economy has experienced rapid expansion in India, particularly in urban centers like Pune, where app-based platforms have transformed the employment landscape. Gig workers, including ride-hailing drivers, food delivery personnel, and freelance professionals, contribute significantly to economic growth. However, unlike traditional employees, these workers often lack access to employer-sponsored benefits, including insurance coverage. The absence of adequate financial protection exposes them to risks such as work-related accidents, health emergencies, and income instability.

Insurance serves as a crucial safety net, yet gig workers face multiple barriers to obtaining coverage. Many operate under informal contracts or are classified as independent contractors, limiting their access to employer-provided insurance schemes. While some platforms offer basic accident insurance, comprehensive coverage for health, disability, and long-term

security remains inadequate. The awareness and affordability of private insurance options further compound the issue, leaving many gig workers financially vulnerable in times of crisis.

Pune, as a hub for technology-driven gig employment, presents a compelling case for studying insurance accessibility among gig workers. This research aims to examine the extent of insurance coverage, the challenges workers face in securing protection, and potential policy solutions. By shedding light on these aspects, the study seeks to inform stakeholders, including policymakers, insurance providers, and gig platforms, on strategies to enhance the financial security of this growing workforce.

Statement of The Problem

Despite the increasing reliance on gig workers in Pune's urban economy, their financial security remains precarious due to inadequate insurance coverage. Unlike traditional employees, gig workers often lack access to employer-provided health and accident insurance, leaving them vulnerable to financial distress in case of medical emergencies or work-related incidents. While some platform-based companies offer partial coverage, it is often limited in scope and duration. Additionally, affordability, lack of awareness, and procedural complexities deter many gig workers from opting for independent insurance policies.

This made researchers undertake research on a study on insurance coverage of gig workers in Pune.

Objective

To study the insurance coverage of gig workers in Pune, including the types of plans available to them and whether these are adequate for covering medical expenses, accidents, and financial risks. It also aims to identify the challenges they face in getting such coverage, such as high costs, lack of awareness, and limited access to suitable insurance options.

Research Methodology

This research was conducted to study the insurance coverage of gig workers in Pune, focusing on app-based delivery personnel from platforms like Swiggy, Zomato, Blinkit, and others. A descriptive research design was used to understand insurance accessibility, worker awareness, and challenges. The primary data was collected through structured personal interviews using a pre-designed questionnaire, while secondary data was gathered from research papers and relevant articles. The study involved 114 respondents selected through simple random sampling, ensuring a fair representation from both urban and semi-urban zones of Pune. Data collection took place between February and March 2025. Field visits were conducted at busy delivery points such as restaurants and grocery stores to increase authenticity. The tools used included printed and digital questionnaires, notebooks for manual notes, and mobile devices to locate hotspots. Ethical standards were maintained by obtaining informed consent, ensuring confidentiality, and being transparent about academic use. The data was analysed using graphical and percentage analysis methods. Despite time and location constraints, the study successfully captured the insurance realities of gig workers and the need for better financial protection mechanisms.

Review of Literature

Kashyap & Bhatia (2020) published the research paper entitled "Platform-Based Work and the Indian Urban Economy," which was published in the journal *Economic and Political Weekly* which highlights the rise of gig work in Pune, primarily driven by the expansion of digital platforms such as Ola, Uber, Swiggy, and Zomato. The authors identify gig work as a crucial source of employment, particularly for individuals who lack formal job opportunities. However, the study also notes that the gig economy is highly unregulated, leading to worker exploitation.[1]

Sundararajan (2019) published the research paper entitled "The Rise of the Digital Gig Economy in India," which was published in the *Journal of Urban Studies*, finds that the gig economy has significantly altered employment structures in Pune, particularly among young workers and migrants. While gig jobs provide flexibility, many workers face irregular income, long working hours, and the absence of job security, making their financial situation precarious [2]

Rathi & Gupta (2021) published the research paper entitled "Informalization of Work in the Gig Economy," which was published in the *Indian Journal of Labor Economics*, discusses the transition of work from formal employment to gig-based jobs, increasing informal labour in cities like Pune. The authors argue that gig workers are not classified as employees under Indian labour laws, excluding them from various labour protections, including job security, paid leave, and employer-provided insurance.[3]

Mehta & Deshpande (2020) published the research paper entitled "Motivations and Challenges of Gig Workers in Indian Metro Cities," which was published in the *Journal of Labour Market Studies*, explores why individuals choose gig work in Pune. Findings indicate that many workers engage in gig work due to unemployment, dissatisfaction with traditional jobs, or the need for additional income. However, most gig workers struggle with unpredictable earnings, long working hours, and a lack of financial stability.[4]

Sarkar & Sen (2021) published the research paper entitled "Women in the Gig Economy: Challenges and Opportunities," was published in *gender and work journal* highlights that women's participation in gig work in Pune remains lower than that of men due to safety concerns, domestic responsibilities, and lack of supportive workplace policies. Female gig workers in Pune are mostly concentrated in home-based services, freelance digital work, and micro-entrepreneurship.[5]

Research Gap

There's extensive research on the gig economy in India; key gaps remain in understanding the **coverage and protection** of gig workers in Pune specifically. Most studies highlight issues like **job insecurity, lack of social security, and income volatility**, but they often focus on broad national or urban trends rather than city-specific realities.

Analysis and Results

The study aimed to examine the insurance coverage and related challenges faced by gig workers in Pune. A total of 114 respondents, primarily food and grocery delivery workers from platforms like Zomato, Swiggy, Blinkit, and Instamart, participated in this research. The age

distribution revealed that 56.14% of the respondents were between 18–20 years old, indicating that gig work is largely taken up by young individuals, mostly students or fresh job seekers.

Educationally, a good number of gig workers (42.10%) had completed a bachelor's degree or diploma, while 27.20% had completed SSC/HSC. This indicates that gig work is not limited only to low-education individuals but also includes those with decent academic qualifications, possibly due to the lack of job opportunities elsewhere. The work experience data showed that 35.96% had 1–3 years of experience, with only 17.54% having worked over three years, indicating high turnover. Regarding income, 38.60% of gig workers earned ₹20,000–₹30,000 monthly, while 29.82% earned ₹10,000–₹20,000.

The 30 age group made up another 24.56% confirming youth dominance in the sector. The gender distribution showed that gig work is heavily male-dominated, with 97.37% of the participants identifying as male and only 2.63% as female. This gender gap may be attributed to safety issues, social restrictions, or the lack of encouragement for women in such roles. In terms of marital status, 69.30% of the workers were unmarried, suggesting that gig work attracts individuals with fewer family obligations and greater flexibility.

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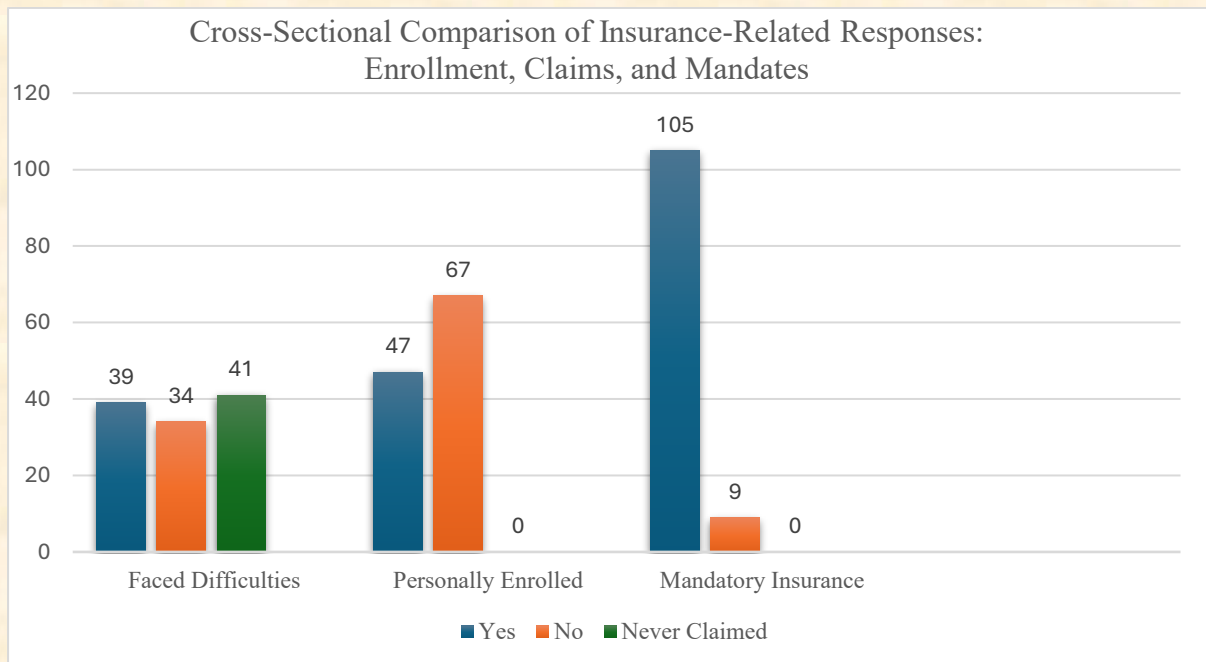
Insurance coverage remains a concern. Only 20.18% were fully covered by platforms, 58.77% had partial coverage, and 21.05% had no coverage. Most workers (64.04%) had accident insurance, while only a few had health or life insurance. Satisfaction levels were mixed, with many rating their insurance as average. About 34.21% faced difficulties in claiming insurance, including delays and a lack of support.

Only 41.23% had personally enrolled in insurance plans. Reasons for not enrolling included lack of awareness, high premium costs, and the belief that insurance is unavailable for gig workers. Still, 92.11% believed that insurance should be made mandatory, and 41.23% expressed willingness to contribute to better coverage. Yet, 31.58% had claims rejected, showing a need for better insurance systems.

Table No. 1: Analysis of Gig Workers' Insurance-Related Responses

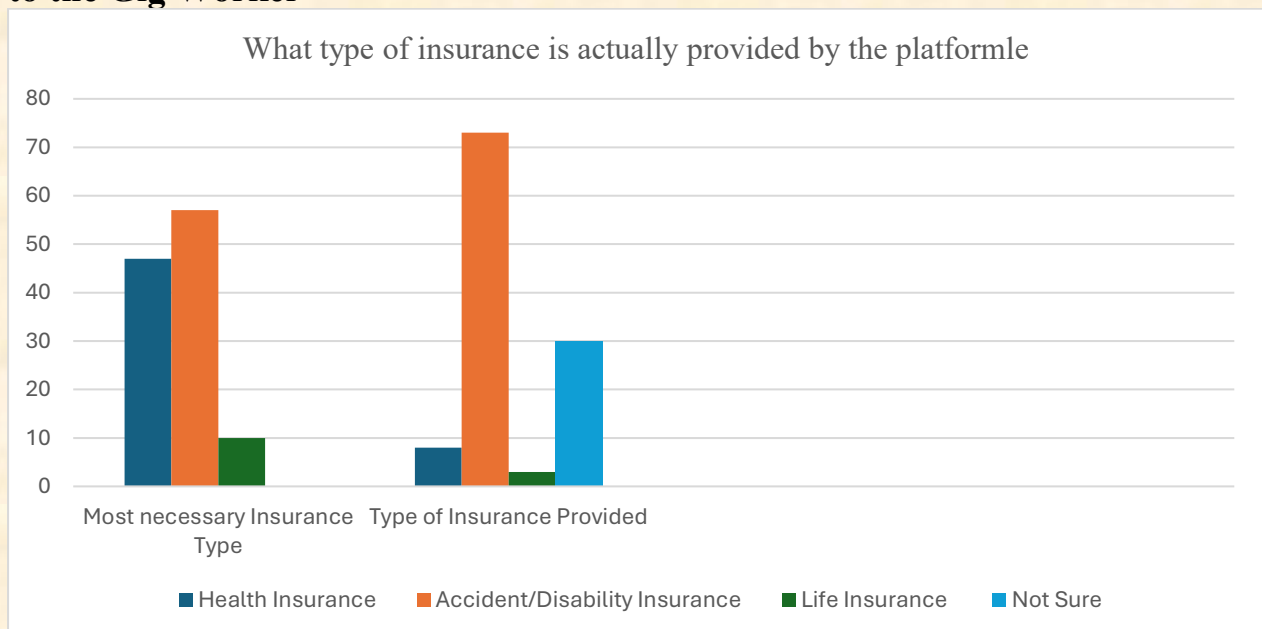
Question	Options/Details	Responses
Age Group	18–20, 21–30, 31–40, 41+	56.14% – 18–20 age group
Gender	Male, Female	97.37% – Male
Marital Status	Married, Unmarried	69.30% – Unmarried
Educational Qualification	Illiterate to Masters+	42.10% – Bachelors/Diploma
Experience as a Gig Worker	<6 months to 3+ years	35.96% – 1–3 years
Average Monthly Income	<₹1,000 to ₹30,000+	38.60% – ₹20,000–30,000
Type of Gig Work	Food Delivery, Grocery Delivery	52.63% – Food Delivery
Grocery Platforms Used	Instamart, Blinkit, Jiomart, etc.	25.93% – Instamart
Food Platforms Used	Zomato, Swiggy, Domino's, etc.	35% – Zomato
Is insurance provided by your platform?	Fully, Partially, Not Provided	58.77% – Partially Covered
Type of Insurance Provided	Health, Life, Accident/Disability, Not Sure	64.04% – Accident/Disability Insurance
Satisfaction with Insurance Coverage (1–5)	1 to 5	Most chose 3 or 4
Faced Difficulty in Claiming Insurance?	Yes, No, Never Claimed	35.96% – Never Claimed
Challenges Faced While Claiming Insurance	Documentation, Rejection, Delays, No Support	25% each for all options

Chart No. 1: Gig Workers' Views on Insurance Access and Claims Experience



(Source: Questionnaire)

Chart No. 2: Type of Insurance Provided and Which Insurance Is Important to the Gig Worker



(Source: Questionnaire)

Discussion

In today's dynamic work environment, gig workers, especially food and grocery delivery personnel, play a crucial role in ensuring smooth urban lifestyles. However, despite their growing importance, they face significant challenges, particularly in terms of financial security and social protection. This study focused on understanding the level of insurance coverage available to such gig workers in Pune city.

The findings indicate that most gig workers either lack insurance or are unaware of the insurance benefits supposedly provided by their platforms. Although some companies claim to offer insurance, the actual benefits are often limited, unclear, or difficult to claim. Many workers are unaware of the terms, conditions, and claim processes of the policies, making them vulnerable during times of need. Accidents, illnesses, or temporary income losses due to emergencies can have severe financial consequences for these individuals, as they are not covered under regular employee benefit schemes.

Moreover, there is a noticeable gap in awareness among the workers about the importance of insurance. Many do not take the initiative to buy insurance on their own due to a lack of knowledge, affordability, or trust in the system. This highlights the urgent need for accessible, affordable, and transparent insurance options tailored specifically for gig workers.

To conclude, companies, insurance providers, and government bodies must work collaboratively to bridge this gap. Clear policies, proper implementation, and awareness campaigns are necessary to protect gig workers and recognize their contribution to the economy. Life stages.

Conclusion

In today's fast-paced urban world, gig work has emerged as a popular option for many individuals seeking flexibility and independence in their work schedules. Especially in cities like Pune, gig jobs—such as food and grocery delivery—offer people the opportunity to earn without being bound by fixed hours or long-term contracts. This freedom is especially attractive to young people and those seeking supplementary income. However, behind this flexibility lies a vulnerable reality. Gig workers often face irregular incomes, lack access to structured benefits, and remain unprotected in case of accidents, illness, or financial emergencies. This unpredictable nature of gig work makes it a risky livelihood option despite its outward appeal.

Insurance plays a powerful role in offering protection and peace of mind to gig workers. A well-designed insurance policy can act as a safety net, covering unexpected health emergencies, accidents, and temporary income loss. When workers feel financially secure, they are more confident and productive in their roles. Unfortunately, many of them either lack coverage or are unaware of how to access and use it effectively. For a workforce that faces so many uncertainties, insurance shouldn't be seen as a luxury but as a necessity.

Improving access to insurance is one of the most impactful steps that can be taken to safeguard gig workers. There is a clear need for platforms like Swiggy, Zomato, and Blinkit to collaborate with insurance providers and offer policies that are affordable, easily accessible, and tailored to gig workers' needs. Seamless integration of such insurance within delivery apps, along with simple onboarding processes, can make a meaningful difference in adoption rates. Every worker deserves the chance to protect themselves without the burden of complex formalities.

Another important aspect is simplifying insurance policies. The complicated language and unclear terms often confuse gig workers, leading them to avoid or abandon insurance altogether. Insurers and platforms must work together to design user-friendly policies with clear instructions on coverage and claim processes. Flexible payment options—like monthly premium deductions—can also encourage participation, especially among workers who earn inconsistently.

Beyond access and simplification, raising awareness is essential. Many gig workers remain unaware of their rights and the insurance options available to them. Conducting awareness campaigns, offering digital guidance, and providing support through helplines or in-person sessions can empower workers to make informed decisions. When workers understand the value of insurance and how to use it, they are more likely to protect themselves.

Working on this project was a deeply valuable experience. It not only sharpened my communication and analytical skills but also helped me grow on a personal level. By speaking directly with gig workers, I developed empathy for their daily struggles and the risks they face without basic social security. Balancing this fieldwork with my academic responsibilities helped me become more organized and disciplined. Most importantly, this project gave me a real-world understanding of how policy gaps affect informal workers and how simple, inclusive measures like insurance can have a big impact on their lives.

Looking ahead, there is much potential to build on this research. Future studies could dive deeper into platform-wise comparisons to see how different companies support their gig workers. Long-term tracking could reveal how insurance affects a worker's health, financial security, and satisfaction over time. Exploring the balance of responsibility between platforms and government schemes like E-Shram would provide insight into how policies can be improved. As more women enter the gig economy, gender-focused research can also highlight specific needs and safety concerns. Finally, studying real-life cases of workers who have faced medical or financial crises can reveal whether current insurance policies truly provide the support they promise.

Limitations

1. **Geographical Limitation:** The study is confined to Pune city and may not reflect the conditions or policies applicable in other regions.
2. **Sample Size Constraint:** Due to time and access limitations, only a small sample of delivery workers could be surveyed, which may not represent the entire population.
3. **Platform Representation:** Not all delivery platforms may be equally represented in the sample (e.g., more respondents from Swiggy than Blinkit), which could skew insights.
4. **Self-reported Data:** The study relies on self-reported responses, which may be affected by recall bias, misunderstanding of insurance terms, or reluctance to share accurate financial or employment details.
5. **Time Limitation:** The study was conducted over a short period, which may not capture seasonal or policy changes affecting insurance coverage.

Scope For Further Research

This study was specifically focused on food and grocery delivery workers operating within Pune city, which gives it a localized perspective. However, there is considerable scope to expand this research in the future. One key area for further exploration is a **comparison across delivery platforms**—future studies could examine the differences in insurance awareness and benefits offered by companies like Swiggy, Zomato, Blinkit, and BigBasket, even within the same geographical region. Additionally, **long-term impact assessments** could be valuable in understanding how insurance coverage affects gig workers over time in terms of health outcomes, financial stability, and job satisfaction. Another important direction for future research is to evaluate the **roles played by platforms versus government schemes** such as E-Shram. A deeper analysis could help identify whether adequate support is being provided and where gaps still exist. As the participation of women in gig work increases, **gender-based research** can shed light on the specific insurance needs and challenges faced by female delivery workers, especially in terms of safety, health, and inclusivity. Lastly, conducting **post-accident support analysis** through case studies of workers who have experienced accidents or health emergencies would provide valuable insights into the actual effectiveness of insurance coverage in real-life scenarios. These future studies would not only broaden the understanding of the gig economy but also help create more inclusive and supportive insurance models.

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Industry-Institute Interaction for Curriculum Development in Management Studies: An Opinion-Based Perspective for Bridging the Skills Gap

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Executive Summary

The accelerating pace of technological innovation and business transformation necessitates a major shift in how management education is delivered. While business schools are producing a high volume of graduates, the disconnect between academic curricula and industry requirements continues to widen, adversely impacting employability and workplace readiness. This article explores the concept of Industry-Institute Interaction (III) as a strategic mechanism to address this misalignment by incorporating real-world insights into academic curricula.

The study begins by identifying key issues in current educational models, including outdated syllabus content, lack of experiential learning, rigid academic structures, and insufficient engagement with emerging business practices like ESG, digital transformation, and behavioural economics. It then presents the objectives of the study: to assess existing industry participation, document successful models, and propose a sustainable framework for future collaboration.

Prominent examples of successful III initiatives are analysed. Infosys Campus Connect showcases scalable industry-aligned education in India, MIT's Industrial Liaison Program exemplifies global best practices in collaborative innovation and curriculum co-creation, and Siemens' Centres of Excellence illustrate how public-private partnerships can bring cutting-edge technology into academic institutions.

Despite the proven benefits, several barriers hinder the institutionalization of III: misaligned timelines, administrative inertia, faculty resistance, and resource constraints. The study proposes a robust framework comprising institutional mechanisms (like Industry-Academia Interface Cells), modular and flexible curriculum design, AI-enabled learning platforms, and faculty sabbaticals in industry.

Key recommendations include performance-based MoU's with industry partners, industry-mentored courses, incentive-linked faculty collaborations, and integration of interdisciplinary modules.

In conclusion, the article emphasizes that for management education to be transformative, it must shift from a theory-heavy approach to one that fosters innovation, critical thinking, and agility. Strategic and sustained Industry-Institute Interaction is not a supplementary aspect—it is foundational to making management education future-ready.

Key-Words- Curriculum Development, Workplace Readiness, Academic-Industry Gap, Real-World Insights, Future-Ready Workforce

Abstract

In today's rapidly evolving global economy, management education must be agile and industry-relevant to produce graduates who are job-ready and future-focused. However, a persistent gap exists between academic instruction and the practical demands of the corporate world. This article examines the pivotal role of Industry-Institute Interaction (III) in bridging this gap, particularly in the context of curriculum development in management studies. By evaluating current challenges—such as outdated content, limited industry exposure, and rigid governance—the study highlights the need for dynamic collaboration. Drawing insights from global and Indian models including Infosys Campus Connect, MIT's Industrial Liaison Program, and Siemens Centres of Excellence, the article demonstrates how structured partnerships enhance employability, innovation, and real-world learning. A comprehensive framework is proposed to institutionalize III through curriculum strategy, faculty development, and technological integration. The article concludes by recommending national policy reforms and long-term engagement strategies to embed industry voices into academic curricula, thereby creating a sustainable, innovation-driven education ecosystem that meets the demands of a future-ready workforce.

1. Introduction

The value of higher education in management is not merely determined by the number of graduates it produces but by how well those graduates adapt to and influence real-world organizational environments. Management education, in particular, must respond dynamically to market disruptions, evolving business models, and emerging technologies. Unfortunately, the curricula of many business schools continue to emphasize theoretical knowledge at the expense of practical, industry-relevant skills. This has resulted in a widening gap between what is taught in classrooms and the competencies demanded by employers.

Industry-Institute Interaction (III) serves as a strategic tool to bridge this disconnect. It fosters mutual learning, promotes applied knowledge, and enables curriculum updates that reflect market needs. This research delves into the current state of III, explores barriers to its effective implementation, and suggests a structured approach to embed industry collaboration into curriculum design.

2. The Academia-Industry Gap: A Critical Evaluation

Several factors contribute to the persistent gap between management education and industry expectations:

- **Outdated Curriculum Content:** Traditional course materials often ignore recent advancements such as artificial intelligence, sustainability frameworks, digital transformation, and behavioral economics.
- **Lack of Real-World Exposure:** Students graduate with limited exposure to workplace environments, leading to a mismatch in practical skills.
- **One-Directional Learning Models:** Most pedagogical methods focus on knowledge delivery rather than experiential learning, design thinking, or agile problem-solving.
- **Slow Curriculum Reform Processes:** University governance models and approval mechanisms are bureaucratic and slow to accommodate rapid change.

3. Objectives of the Study

This study aims to:

1. Assess the current level of industry participation in academic curriculum development.
2. Identify and document best practices and successful models of industry-academic collaboration.
3. Propose an actionable framework for sustainable and effective interaction between academia and industry in shaping management education.

4. Importance of Industry-Institute Interaction (III)

4.1 Curriculum Relevance

Industry feedback ensures that management education evolves in sync with market needs. Concepts like agile project management, environmental-social-governance (ESG) strategies, and digital transformation become part of structured learning.

4.2 Enhanced Employability

Curriculum designed in collaboration with industry incorporates job-ready competencies such as data literacy, financial analytics, strategic HRM, and leadership under uncertainty.

4.3 Faculty Development

Regular industry exposure through consulting projects, internships, and collaborative research enables faculty to bring real-time insights into the classroom.

4.4 Experiential Learning Opportunities

Industry partnerships facilitate live projects, internships, hackathons, and case competitions—building essential skills such as problem-solving, teamwork, and adaptability.

4.5 Entrepreneurial Development

By connecting students with startup incubators, accelerators, and innovation hubs, institutions foster entrepreneurship and design-led thinking beyond conventional placements.

5. Current Models of Collaboration

5.1 Advisory Boards and Curriculum Committees

Industry experts participate in decision-making bodies to advise on course design, ensuring alignment with sectoral trends.

5.2 Guest Lectures and Executive Workshops

Practicing professionals introduce current scenarios and tools to students, enhancing the learning experience with practitioner insights.

5.3 Faculty Exchange and Sabbatical Programs

Enabling faculty to work within industries during sabbaticals promotes cross-sector knowledge transfer and practical curriculum updates.

5.4 Collaborative Research and Case Development

Joint research on business challenges, co-authored case studies, and applied innovation projects result in knowledge creation rooted in real-world complexity.

5.5 Centers of Excellence (CoEs)

Institutes can host CoEs funded by corporations, focusing on R&D in areas such as automation, sustainability, or digital strategy.

6. Case Studies of Successful Models

6.1. Infosys Campus Connect (India)

Overview:

The **Campus Connect** initiative by Infosys is a pioneering industry-academia collaboration launched in 2004 to bridge the gap between college education and industry requirements, especially in IT and business domains.

Objectives:

1. Align engineering and management curricula with real-world IT and business practices.
2. Build faculty competency through training and certifications.
3. Improve the employability of graduates by focusing on practical and emerging technologies.

Key Features:

Foundation Programs: Curriculum modules designed to align with Infosys' corporate training practices.

Faculty Enablement Programs: "Train the Trainer" workshops conducted by Infosys professionals to upskill faculty.

Student Projects and Seminars: Infosys mentors guide student project teams on industry-relevant challenges.

Soft Skills Training: Includes modules on communication, teamwork, and professional ethics.

Impact:

- Over 500 institutions have participated.
- Thousands of faculty trained across India.
- Several engineering and management colleges integrated Infosys-designed modules into their curricula.

Relevance:

The program serves as a scalable model for how management and technology institutes can partner with industry to ensure that students are not only academically competent but also job-ready.

6. 2. MIT Industry Collaborations (USA)

Overview:

The **Massachusetts Institute of Technology (MIT)** has long-standing, institutionalized partnerships with various industries that go beyond recruitment and internships. These partnerships are deeply embedded in curriculum design, research, and innovation.

Objectives:

1. Foster **cutting-edge research** that translates into commercial and social impact.
2. Co-create **academic programs and courses** that reflect industry trends.
3. Strengthen entrepreneurial ecosystems through corporate sponsorships and mentorship.

Key Initiatives:

Industrial Liaison Program (ILP): A dedicated program that connects corporate members with MIT faculty and research centers for joint problem-solving and curriculum development.

MIT Sandbox Innovation Fund: Supported by corporate partners, this helps students turn innovative ideas into startups with faculty and industry mentoring.

Joint Courses and Labs: Some companies co-develop course content with MIT professors, particularly in areas like AI, sustainable development, and systems thinking.

Impact:

- Global firms like Boeing, IBM, Google, and Novartis have collaborated with MIT through ILP.
- Real-world challenges are brought into classrooms as case studies and lab simulations.
- Graduate students are equipped with both academic and applied problem-solving skills.

Relevance:

MIT's model highlights how continuous and strategic engagement with industry can drive curriculum innovation, promote interdisciplinary learning, and foster a culture of innovation and entrepreneurship in management and technical education.

6. 3. Siemens Centers of Excellence (CoEs) in Indian Government Engineering Colleges

Overview:

Siemens India, in collaboration with government bodies and academic institutions, has established multiple **Centers of Excellence (CoEs)** in technical universities and engineering colleges across India. These centers focus on automation, smart manufacturing, and digital engineering.

Objectives:

1. Equip students and faculty with **hands-on training** in emerging technologies.
2. Support skill development aligned with **Industry 4.0**.
3. Provide **industry-grade infrastructure** for real-world simulations and problem-solving.

Key Features:

- CoEs are equipped with Siemens industrial software, hardware, and digital platforms.
- Students receive certification on tools such as **PLM (Product Lifecycle Management), Mechatronics, and Automation** systems.
- Faculty members are trained directly by Siemens to manage labs and deliver industry-aligned modules.
- **Industry Projects:** Students engage in live projects sponsored or evaluated by Siemens professionals.

Impact:

- Over 20+ CoEs established across India.
- Thousands of students trained in high-end industrial technologies.
- Enhanced employability in core sectors such as manufacturing, electrical engineering, and digital systems.

Relevance:

These CoEs demonstrate how public-private partnerships can revitalize technical education and help institutions embed practical, industry-aligned curricula in regular academic programs. For management students in operations, project management, or technology consulting, such environments offer valuable exposure.

Conclusion from Case Studies

Each of these models—Infosys in India, MIT in the US, and Siemens across Indian public institutions—exemplifies how structured, strategic, and long-term collaborations between academia and industry can bring transformative results. These examples reinforce the argument that curriculum development in management and technical education must be **industry-informed, practically enriched, and adaptable to future needs**.

7. Barriers to Effective Implementation

Despite the promise of III, several obstacles hinder its institutionalization:

Differing Timelines: Industry demands quick returns while academia functions on long-term educational cycles.

Administrative Red Tape: Institutional policies and regulatory frameworks often delay curriculum changes.

Faculty Resistance: Hesitation to adapt or learn new pedagogies and tools may hinder transformation.

Resource Constraints: Limited funding and infrastructure challenge sustained collaboration.

Superficial Engagement: One-time workshops or seminars often lack strategic impact or follow-up.

Lack of ROI for Industry: Companies may struggle to see short-term benefits, reducing commitment.

8. Proposed Framework for Sustainable III

8.1 Institutional Mechanisms

- Establish dedicated **Industry-Academia Interface Cells** with clear KPIs.
- Conduct **annual curriculum review meetings** with diverse industry stakeholders.

8.2 Curriculum Strategy

- Introduce **modular, flexible courses** with electives aligned to industry needs.
- Include **real-time projects and capstone assessments** as part of course evaluation.

8.3 Faculty Development

- Implement **mandatory industry sabbaticals** and continuous development programs.
- Facilitate **joint teaching** by academicians and industry practitioners.

8.4 Technological Integration

- Utilize **AI-driven learning platforms**, simulations, and case study databases.
- Encourage use of digital tools such as Tableau, Power BI, or SAP in coursework.

9. Recommendations

1. Institutionalize **performance-based MoUs** with industry partners.
2. Introduce **industry-mentored courses** as part of degree requirements.
3. Link **faculty performance incentives** with collaboration outcomes.
4. Encourage **cross-disciplinary curriculum modules** with industry sectors beyond core business (e.g., healthcare, sustainability, policy).
5. Push for **national policy reform** via AICTE, UGC, and university syndicates for mandating industry consultation in curriculum design.

10. Conclusion

Management education stands at a critical juncture. With global business ecosystems undergoing rapid shifts, academic institutions must shed inertia and adopt a future-facing approach. Industry-institute interaction must evolve from being peripheral to becoming a foundational aspect of curriculum design and delivery.

Strategic, structured, and sustained collaboration with industry ensures that academic programs not only meet contemporary business demands but also anticipate future trends. Graduates produced through such a system will not merely participate in the workforce—they will shape it. The time has come to embed the voice of the industry into the soul of academic learning, paving the way for a resilient, innovative, and employable generation of management professionals.

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Learning Beyond Boundaries: Merging Ancient Wisdom with Modern Management

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Abstract

A powerful roadmap that is preparing Indian students for a world that is evolving at an unbelievable pace is the National Education Policy. NEP encourages personalized, technology-driven education that promotes learning flexibility, interdisciplinary learning, as well as modular learning. This vision will become more powerful if it is combined with traditional Indian Knowledge Systems (IKS), especially the timeless wisdom of the Bhagavad Gita. The Bhagavad Gita's teachings are centred around knowledge, devotion, and action—help students build emotional resilience, make ethical decisions, and develop a deeper sense of purpose and interconnectedness.

The study has basically tried to explore how by integrating Gita principles and mindfulness practices into higher education can shape students' ethical decision-making and mental well-being. Among MBA students, those who found ethical teachings relevant showed higher mindfulness and a more balanced approach to ethical choices. In the meantime, gender didn't affect familiarity with the Gita, but the male students reported slightly stronger ethical decision-making skills. Most importantly, the students interested in studying both, i.e., modern management and ancient wisdom, especially the courses that are the Bhagavad Gita, as it demonstrated greater mindfulness, integrity, and ethical clarity.

When flexible learning with ethical and self-development insights from IKS and mindfulness

when combined, together create a holistic educational experience. The students will not just be equipped with technical skills but with the emotional intelligence and ethical grounding needed to thrive in today's complex world.

Keywords: Indian Knowledge System, Management, Bhagwat Gita, decision making, ethics in education, interdisciplinary education, management education, Ancient wisdom

Introduction

In today's educational landscape, there are undoubtedly many significant challenges for students, which by default arise because of the intense competition that often gives birth to issues such as anxiety, depression, isolation, identity crises, and other major health concerns like hypertension, obesity, and cardiovascular diseases. Globally, we are witnessing increasing levels of stress, anxiety, and negative emotions among university students, with some surveys indicating that a substantial percentage consider leaving academia due to the tremendous academic pressure that leads to poor mental and physical health. When we talk about all this, we should also take into account the current societal context that is way more complicated by global conflicts, deepening inequalities, environmental crises, and a decline in trust in democratic processes, which reflect a disconnection between individuals and their inner selves.

The Scholars have advocated for bringing in the practical integration of the Bhagavad Gita's teachings into real life. There is a growing recognition of the important role of ancient wisdom in modern education and business practices. The Bhagavad Gita, a timeless scripture, is increasingly seen as a valuable tool for guiding individuals and organizations through modern complexities. It is fascinating that a scripture that is written more than 5000 years ago has its relevance today as well. It offers profound lessons on how one can lead a peaceful life that is fulfilling as well. It also helps to cultivate positive emotions and enhance mental resilience. The Bhagavad Gita emphasises on moral values, ethical conduct, integrity, discipline, selflessness, determination, and dedication to duty are crucial for all-around personality development and spiritual awareness.

The relevance of the Gita's wisdom extends beyond its cultural origins, offering universal truths applicable to people from all walks of life. The integration of the Bhagavad Gita in higher educational teachings can be done through curricular integration: Incorporating Gita teachings into interdisciplinary academic programs like humanities, philosophy, ethics, psychology, and leadership studies. Pedagogical transformation: There is a need for a value-based education system that will emphasize self-introspection and understanding experiential learning. This Krishna-Arjun dialogue can be a pathway.

It has been seen that the higher learning institutions often prioritize material success, competition, and individual achievement, overlooking collective well-being and spiritual development, and hence, there is a gap between technical and ethical decision-making skills in modern management education. When the Bhagavad Gita teaches a deeper approach by tackling issues from the subliminal level of human psyche, which can significantly enhance actions and their results, there is Western management approaches tend to address problems at an extrinsic and peripheral level. Despite living in an era of cutthroat competition and technical advancements, the youth of today face significant stress, tensions, and worries. The timeless wisdom of the Bhagavad Gita offers universal truths that transcend cultural and religious origins, providing practical solutions and guidance for navigating daily life. Indian wisdom, with its profound thoughts and "Mantras," is relatable and easily imbibed by students, fostering

a positive attitude, all-around progress, and personal development.

The Bhagavad Gita is not merely a religious text but a "science of self" that provides tools and techniques for students to transform their lives, build concentration, focus, and personality, and pursue success beyond mere academic achievement. It empowers students to understand their duties ("Swadharma"), make wise decisions, and strive for excellence in their chosen fields.

To summarise, the objectives of this research are:

1. To analyze the feasibility and potential benefits of integrating Bhagavad Gita- based mindfulness and ethical teachings into the management education curriculum.
 - a. **Hypothesis:** Integrating Bhagavad Gita-based teachings into the curriculum will lead to improved ethical decision-making skills and mindfulness among management students.
2. To explore the role of ethical decision-making as taught in the Bhagavad Gita in enhancing moral responsibility and integrity among management students.
 - a. **Hypothesis:** Students who apply ethical decision-making principles from the Bhagavad Gita will exhibit higher levels of moral responsibility and integrity.

Literature Review

The integration of ancient Indian wisdom, from the Bhagavad Gita, with a mix of modern mindfulness and yoga practices, into contemporary educational frameworks is a field of growing scientific inquiry. This literature review synthesizes the knowledge from the existing research in the field of mindfulness and the Bhagavad Gita.

The Contemporary Educational Crisis

The modern educational landscape has been characterized by massive competition for excellence, which has frequently pushed the learners into a state of mental depression and anxiety. (Animesh Das & Prof. Rakesh Rai, 2024). College campuses experience significant stress, with 82 percent of students reporting feeling overwhelmed by their responsibilities and 60 percent indicating higher than normal or tremendous stress levels (Gorvine et al., 2019). One of the major concerns that has been growing rapidly amongst higher education students is Mental ill-health, with the number of students reporting mental health conditions doubling since 2013/14. Some reports suggest that approximately 50 percent of university students experience high levels of anxiety and stress. In a recent survey, almost half of the students have considered leaving university due to poor mental and physical health and academic stress (Egan et al., 2022). Emotional imbalance is also a common challenge among college students. Furthermore, students in higher education often face challenges of young adulthood, reduced parental supervision, mindless consumption, and low life satisfaction (Gupta & Verma, 2019). Beyond individual struggles, there are growing global conflicts, deepening inequalities, and environmental crises, which challenge traditional Eurocentric beliefs in humanity's rationality and progress. A disconnection between individuals and their inner selves is widely observed.

The Bhagavad Gita: An Ancient Wisdom for Modern Challenges

The Bhagavad Gita holds a significant place in the Indian knowledge system, offering timeless wisdom that has guided people for centuries. It is considered beneficial for the entire humankind, regardless of caste, creed, religion, or country. Many institutions, including business schools in India and worldwide, now teach the Gita. The teachings of the Bhagavad Gita should be viewed as the fundamental basis and roots of all education. (Kelkar & Mahajan, 2021)

The National Education Policy (NEP) 2020 in India aims for transformation in the education system, emphasizing dynamic, personalized, and technologically-enhanced individual learning. It seeks to integrate learning with practical application and foster lifelong learning. The study of traditional Indian Knowledge Systems (IKS) is explored with the NEP 2020, suggesting that incorporating IKS can help cultivate a future-ready workforce equipped with both technical competencies and essential human skills.

The inclusion of the Bhagavad Gita's teachings within the education system in India is believed to have profound benefits. Some of the benefits are infused ethical foundations, promote holistic development of the students, provide stress management techniques, nurture values, and enhance decision-making skills. The Bhagavad Gita teaches important values such as integrity, discipline, dedication to duty, selflessness, determination, and perseverance. (Kakarla, 2023). Chinna Natesan et al. (2009) state that the Bhagavat Gita is seen as a self-actualization handbook and a guide to practical action as it offers relevant and valuable insights to contemporary educational frameworks, particularly in scientific education, by bridging ancient wisdom with modern scientific thought.

The Gita promotes critical thinking, aligning with the scientific approach of questioning, analyzing evidence, and seeking deeper understanding of life and circumstances. It emphasizes ethical decision-making, paralleling the ethical considerations crucial in scientific research. The text also introduces the concepts of Karma and cause-and-effect relationships, providing parallels to scientific principles of causality. Furthermore, its significance on open-mindedness and adaptability aligns it with the scientific approach of embracing new ideas and innovation. (Biswas & Bhowmick, 2024). It helps individuals understand themselves better and their motives for making choices in life.

The Gita offers definitions of yoga such as "evenness of mind," "renunciation of selfish purpose," and "harmony in all that we do." (Asthana, 2022). It provides recommendations for modern management practices. Arjuna, a central figure in the Gita, represents human civilization and modern individuals grappling with dilemmas, personality conflicts, and confusion. The principles taught to Arjuna remain applicable today.

The Bhagvad Gita advocates an approach to life that is universal, also emphasizing the interconnectedness of all actions and karma. It advises individuals must perform their duties selflessly, without getting attached to outcomes, recognizing their role in a larger, collective life beyond narrow specialization. This selfless action (Nishkama Karma) is a principle highlighted as relevant to management effectiveness and ethics. The integration of critical Gita discourses into higher education is seen as a necessary step in addressing contemporary crises. (Baral & Giri, 2025)

Student feedback from a Bhagavad Gita course in Hyderabad's Birla Institute of Technology and Science campus revealed significant impacts. These impacts were broadly categorized into an immediate effect of sanctity and strengthened faith, improved clarity of mind, an increase in focus, calm and content disposition, and long-term effects on personality traits. Students have also suggested that a combination of traditional and modern teaching methods for better comprehension and participation can be explored. (Lolla, 2021). The philosophy of the Bhagavad Gita holds great potential to address crucial aspects of India's NEP-2020, particularly pedagogy.

Positive Psychology and Stress Management

Animesh Das & Prof. Rakesh Rai (2024) Talks about the branch of psychology that focuses on cultivating positive emotions such as joy, gratitude, and contentment, is called positive psychology. It also emphasizes leveraging personal strengths and mental resilience to help individuals cope with life's challenges effectively. The wisdom that positive psychology conveys today was articulated long ago by Sri Krishna on the battlefield of Kurukshetra to help Arjuna overcome confusion and conflict.

The teachings of the Bhagavad Gita contribute to a positive vision and a peaceful life. They are believed to purify the mind and soul, offering relief from distress and helping individuals discover their inner selves. The Bhagavad Gita emphasizes the topic of managing stress and mental resilience, providing students with valuable tools to cope with academic pressures, thereby fostering mental well-being.

Mindfulness and focus, as advocated in the Bhagavad Gita, play a crucial role in enhancing cognitive abilities, emotional regulation, and overall well-being, which are highly valuable in scientific education and practice. Patel et al., (2018) Found that a yoga-based meditation technique (MEMT) is effective in improving the regulation of emotions, promoting positive effects, fostering self-compassion, and enhancing mindfulness, while reducing negative effects among college students. This technique is described as a simple, low-cost intervention.

Mindfulness in Education: Enhancing Well-being and Performance

Pandey et al. (2018) Defined Mindfulness as the "awareness that arises through intentionally paying attention in an open, kind and discerning way". The root of mindfulness has been found in both Hinduism and Buddhism. Jon Kabat-Zinn formally introduced mindfulness meditation to the Western world in the late twentieth century as a tool to reduce stress. Mindfulness-based interventions (MBIs) were initially limited to behavioural medicine, but these are now become a major study area in clinical and health psychology and cognitive therapy. Ergas & Hadar, (2023) Also define Mindfulness as "paying attention in the present on purpose and non-judgmentally."

The plantation of mindfulness skills in a person's life helps them to develop cognitive functions such as retention, thinking, problem-solving, and emotional balance. Research indicates that mindfulness enhances attentional control, cognitive flexibility, and emotional regulation. It can significantly improve the performance and quality of life for university students facing high stress loads. Mindfulness meditation has been shown to increase performance in tests like the Graduate Record Exam (GRE) by reducing mind wandering and improving working memory. It also reduces the frequency of negative automatic thoughts in undergraduate students. There is growing evidence that mindfulness meditation in school settings can improve mental health

and psychological functioning.

Egan et al. (2022) did a study and found that university students had lower self-reported mindfulness scores compared to other cognitive abilities, suggesting that mindfulness training may be beneficial for university students. Mindfulness practices enhance cognitive abilities, emotional regulation, and overall well-being. They improve concentration and reduce distractions, which enhances the ability to absorb and retain scientific knowledge. Mindfulness techniques improve academic performance, including test performance, by reducing anxiety and improving coping strategies. Students who have been practicing mindfulness have been shown to achieve higher grades on tests. Academic performance is hypothesized to improve through gains in mental health and well-being, and enhanced cognitive functioning due to the attentional training in mindfulness practices.

To strengthen the moral compass of future managers and business leaders, by should facilitate the progression of their moral reasoning the mindfulness Training. A study found that an 8-week mindfulness training program positively impacted moral reasoning in business management graduate students. It was revealed that two-thirds of the enhancement in performance in business ethics courses came through mindfulness, and one-third directly from yoga practice. Mindfulness helps decision-makers differentiate between which decisions are important and which are unnecessary. The sense of threat to self-esteem can be diminished, and help individuals tolerate the uncomfortable emotions and recognize when a course of action has failed without construing it as personal failure. (N. Karelaia & J. Reb, 2015). Mindfulness also increases self-awareness, self-regulation, and decision-making. It can aid individuals at each stage of the decision-making process, from framing the decision to its implementation.

The interventions that have a base of mindfulness are effective methods for relief from anxiety and stress reduction. Mindfulness meditation has specifically been shown to be effective in treating anxiety. A study at the University of Amsterdam showed that a low-intensity mindfulness course in the curriculum of international students led to increased mindful awareness both during and after the course period. The duration of this was 7 weeks. (De Bruin et al., 2015). Mindfulness is positively associated with health and increased energy levels in college students. Short (5-minute) guided mindfulness meditation sessions conducted in a classroom environment were effective in increasing state mindfulness in higher education students. This approach demonstrated that general life satisfaction can increase significantly over two months a short period due to mindfulness interventions. (Gupta & Verma, 2019).

Current Research Gaps and Future Directions

In the growing body of knowledge and research, there remains limited investigation into the direct effects of mindfulness pedagogy in educational settings. Future studies should explore the effects of mindfulness meditation training for longer-term in university students, examining its impact on various cognitive skills and overall educational performance. There is also a need for more and more research on mindful consumption in higher education, extending its application beyond just food consumption. Further studies are essential to explore the effect of both short-term and long-term mindfulness practices on moral reasoning, ethics education, the development of leadership, and positive psychology. (Pandey et al., 2018).

Researchers also suggest a need for further investigation into the linkage of mindfulness to option generation, awareness of goals, credence on internal compared with externally defined goals, the balance between current and enduring goals, post-decision regret, and decision

reversals. Furthermore, studies are necessary to understand whether mindfulness rightly reduces the quantity of information considered for a decision, and if so, whether the overall effect on decision quality (considering both quantity and quality of information) is positive or negative. While preliminary studies indicate positive outcomes for mindfulness in healthcare education, clearer direction is needed on the optimal methods for integrating these practices into the curriculum (Schwind et al., 2017).

It is important to provide more extensive information about mindfulness and its connections to specific course content for both students and instructors.

Research Methodology

A quantitative research approach to systematically examine the relationships between Bhagavad Gita-based mindfulness, ethical teachings, and management skills has been employed. The primary method for data collection will be survey-based, allowing for the collection of structured data from a larger sample of students. The study utilizes a cross-sectional design, collecting data at a single point in time to assess the current insight and skills of management students.

The proposed sample size is 202 management students. Previous studies have used similar student populations (e.g., 148 university students, 125 MBA participants, 94 graduate business students, 104 international students) to investigate mindfulness and ethical behaviour. A purposive sampling method can be utilized, similar to a previous study where data were collected from the students of business schools in India. This approach allows for the selection of participants who are specifically relevant to the research objectives (i.e., management students). Data was collected using questionnaires designed to measure the identified variables.

The Statistical Analysis Tools used were Multiple Regression Analysis. This statistical method will be used to analyze the feasibility and potential benefits of integrating Bhagavad Gita-based mindfulness and ethical teachings, as well as to explore the role of ethical decision-making in enhancing moral responsibility and integrity.

Correlation has been used to identify strong associations between variables. For instance, to examine whether students who perceive ethical teaching as relevant tend to exhibit higher mindfulness (stress management and focus) and a balanced approach to ethical decision-making. It also helps in understanding the relationship between the applicability of Gita teachings and enhanced integrity or moral responsibility. Independent Samples T-test: This test can be employed to compare mean scores between two independent groups, such as examining whether there is a significant gender difference in familiarity with the Bhagavad Gita or ethical decision-making skills.

Results and Analysis

A. Hypothesis Testing Results

- **Hypothesis 1:** Integrating Bhagavad Gita-based teachings into the curriculum will lead to improved ethical decision-making skills and mindfulness among management students.

The hypothesis stated that integrating Bhagavad Gita-based teachings in the curriculum would lead to improved ethical decision-making skills and mindfulness among management students. The regression results ($R^2 = 0.692$), the research model explained approximately 69.2percent of the variance in ethical decision-making skills, indicating a strong relationship. The adjusted R-squared was 0.689, accounting for the number of predictors in the model, and the standard error of the estimate was 0.619, representing the average error in predicting ethical decision-making skills.

Model Summary

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate
1	.832 a	.692	.689		.619

a. Predictors: (Constant), Mindfulness_Helps_improves_decision_making_skills, Integrating_BG_Teaching_to_enhance_overall_learning

The model explains approximately 69.2percent of the variance in ethical decision-making skills ($R\text{-squared} = 0.692$).

The adjusted R-squared (0.689) accounts for the number of predictors in the model.

The standard error of the estimate (0.619) represents the average error in predicting ethical decision-making skills.

The ANOVA findings ($F = 223.454$, $p < 0.001$): The overall model was statistically significant ($p < 0.001$). The regression sums of squares (171.182) represented the variance explained by the predictors, while the residual sum of squares (76.224) represented unexplained variance. The Coefficient analysis: Both integrating Bhagavad Gita teachings and practicing mindfulness positively contribute to improved ethical decision-making skills. The model provides a valuable perception of the relative impact of these variables on ethical decision-making.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	171.182	2	85.591	223.454	.000 b
1	Residual	76.224	199	.383		
	Total	247.406	201			

a. Dependent Variable: Ethical_decision_making_as_critical_skill

b. Predictors: (Constant), Mindfulness_Helps_improves_decision_making_skills, Integrating_BG_Teaching_to_enhance_overall_learning

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.024	.215		.112	.911
1	Integrating_BG_Teaching_to_enhance_overall_learning	.413	.061	.411	6.784	.000
	Mindfulness_Helps_improves_decision_making_skills	.563	.072	.476	7.866	.000

a. Dependent Variable: Ethical_decision_making_as_critical_skill

- **Hypothesis 2:** Students who apply ethical decision-making principles from the Bhagavad Gita will exhibit higher levels of moral responsibility and integrity.

The hypothesis stated that students who apply ethical decision-making principles from the Bhagavad Gita would exhibit higher levels of moral responsibility and integrity. The Regression results ($R^2 = 0.869$): This model explained approximately 86.9percent of the variance in ethical decision-making skills, with an adjusted R-squared of 0.865. The overall model was statistically significant ($p < 0.001$).

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.932 ^a	.869	.865	.407

a. Predictors: (Constant),

Applicability_of_Gita_in_management, Handling_ethical_dilemmas_with_Gita, Developing_Moral_responsibilities_with_gita, Gita_teachings_and_ethical_leadership, Interest_in_modern_ancient_wisdom_courses

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	214.939	5	42.988	259.509	.000b
1	Residual	32.467	196	.166		
	Total	247.406	201			

a. Dependent Variable: Ethical_decision_making_as_critical_skill

b. Predictors: (Constant), Applicability_of_Gita_in_management,

Handling_ethical_dilemmas_with_Gita, Developing_Moral_responsibilities_with_gita, Gita_teachings_and_ethical_leadership, Interest_in_modern_ancient_wisdom_courses

The Researcher has also done a Gender differences analysis: There was no significant gender-based difference in whether students had heard about or were familiar with the Bhagavad Gita, indicating that both male and female students seemed equally informed. However, male students generally reported higher perceived ethical decision-making skills compared to female students.

Correlation patterns: Students who perceive Gita teachings as relevant and applicable tend to exhibit higher mindfulness, ethical insights, and integrity. These strong associations highlight the potential impact of integrating Gita teachings into management education. Specifically, students' interest in both modern and ancient wisdom courses, particularly those related to Bhagavad Gita teachings, significantly impacts their ethical decision-making abilities. Other predictors, such as ethical leadership, handling ethical dilemmas, and developing moral responsibilities, did not show significant effects in this specific model.

Correlations

	Mindfulness_Helps_improves_decision_making_skills	Applicability_of_Gita_in_management	Enhancing_ethical_decision_making	Gita_improves_self_awareness	Gita_teachings_and_ethical_leadership	Gita_insights_into_Moral_Responsibility	balanced_approach_to_ethical_decision_making	Gita_enhances_Integrity	
	Pearson Correlation	1	.786**	.808**	.811**	.824**	.669**	.711**	.793**
Mindfulness_Helps_improves_decision_making_skills	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000
	N	202	202	202	202	202	202	202	202
	Pearson Correlation	.786**	1	.890**	.940**	.924**	.853**	.893**	.922**
Applicability_of_Gita_in_management	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000
	N	202	202	202	202	202	202	202	202
	Pearson Correlation	.808**	.890**	1	.904**	.902**	.823**	.872**	.905**
Enhancing	Sig. (2-								

_ethical_decision_making	tailed)	.000	.000		.000	.000	.000	.000	.000
	N	202	202	202	202	202	202	202	202
	Pearson Correlation	.811**	.940**	.904**	1	.930**	.841**	.900**	.902**
Gita_improves_self_awareness	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000
	N	202	202	202	202	202	202	202	202
	Pearson Correlation	.824**	.924**	.902**	.930**	1	.820**	.877**	.924**
Gita_teachings_and_ethical_leadership	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000
	N	202	202	202	202	202	202	202	202
Gita_insights_into_Moral_Responsibility	Pearson Correlation	.669**	.853**	.823**	.841**	.820**	1	.925**	.863**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000
	N	202	202	202	202	202	202	202	202
balanced_approach_to_ethical_decision_making	Pearson Correlation	.711**	.893**	.872**	.900**	.877**	.925**	1	.885**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000
	N	202	202	202	202	202	202	202	202
	Pearson Correlation	.793**	.922**	.905**	.902**	.924**	.863**	.885**	1
Gita_enhances_Integrity	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	
	N	202	202	202	202	202	202	202	202
**. Correlation is significant at the 0.01 level (2-tailed).									

Key Findings

1. Mindfulness Impact the Correlation with decision-making ($r = 0.898$): Students who perceive ethical teaching as relevant tend to exhibit higher mindfulness, specifically in stress management and focus, and adopt a more balanced approach to ethical decision-making. The Pearson Correlation for "Mindfulness_for_stress_management" and "Ethical_teaching_relevant_in_todays_Business" was 0.898, significant at the 0.01 level (2-tailed).

For "Mindfulness_for_focus_in_decision_making" & Ethical teaching relevant in today's Business", the correlation was 0.885, also significant at the 0.01 level (2-tailed). These strong associations suggest a positive impact on management students' ethical behaviour.

Mindfulness is thought to enhance various stages of decision-making, including recognizing decision opportunities, increasing goal awareness, aligning decisions with values, and facilitating option generation.

The impact on stress management: Mindfulness nurtures emotional balance, alleviates stress and anxiety, and builds resilience, enabling students to navigate academic pressures more effectively. The Bhagavad Gita offers profound insights into stress management and the cultivation of mental resilience, emphasizing "Karma Yoga" (detached action) and maintaining equanimity amidst challenges. Mindfulness-based interventions are effective in reducing stress and anxiety. Yoga and meditation classes have been shown to increase self-compassion and mindfulness, and may help to reduce stress among college students. Mindfulness practice also aids in emotional regulation and the reduction of negative affect.

The role in ethical clarity: Mindfulness training has been empirically shown to have a positive impact on individuals' states of mindfulness, compassion, and moral reasoning, while decreasing egocentric bias. Mindfulness helps in ethical decision-making processes. It facilitates "decentring" or psychological distancing from one's thoughts and emotions, making psychological resources available to recognize moral issues and apply moral reasoning. This process leads to a shift in perspective through self-regulation, values clarification, and cognitive-behavioural flexibility.

2. Gita Teachings Integration

Impact on moral responsibility: The Bhagavad Gita introduces the concept of "Karma," which parallels the cause-and-effect relationship in scientific studies, fostering a deeper understanding of causality and emphasizing personal responsibility and accountability for one's actions. It encourages individuals to behave with integrity and clarity by highlighting the importance of mindfulness and self-awareness in moral decision-making. Krishna's advice emphasizes moral bravery and principled behaviour in overcoming moral obstacles.

Effect on ethical leadership: The Bhagavad Gita is considered a guide to leadership and management, with its teachings widely applied to modern business and organizational practices. It emphasizes principles such as performing one's duties without attachment to results ("Karma Yoga") and selfless action. It offers invaluable lessons for shaping the next generation of effective and conscious leaders, cultivating a leadership style that is not only effective in business but also grounded in timeless wisdom and ethical considerations. The Gita's wisdom serves as a guiding principle for individuals to move from dejection towards a more just, peaceful, and sustainable world.

Student receptiveness: In various universities worldwide, including top professional institutes in India and abroad, the Bhagavad Gita is taught as an elective or regular course. Modern students are described as highly enthusiastic and receptive towards the application-oriented science of spirituality, including the law of Karma, Mantras, Yoga, and meditation, and can easily incorporate them into daily life. Research indicates a growing recognition of ethicality and spirituality as a foundational dimension of meaningful education. Students have reported an improved clarity of mind, better focus, and a calm and content disposition after studying the Gita.

3. Gender-Based Analysis

Differences in ethical decision-making perception: As noted in Hypothesis 2 results, male students generally reported higher perceived ethical decision-making skills compared to female students. However, some research suggests inconclusive results regarding ethical differences between genders in moral reasoning.

Gender-specific responses to teachings: While male students reported higher perceived ethical decision-making skills, there was no significant gender-based difference in students' familiarity with the Bhagavad Gita. Furthermore, studies found that gender did not have a significant effect on mindfulness, mindful consumption behaviour, and life satisfaction in student populations. This suggests that while familiarity and general impact might be similar across genders, self-perception of ethical skills may vary.

Implications for curriculum design: Given that both male and female students show similar familiarity with the Gita and its teachings can positively impact ethical decision-making and mindfulness across the board, the integration of Gita teachings into the curriculum can benefit all students. The observed difference in *perceived* ethical decision-making skills by gender, despite similar familiarity, could suggest a need for curriculum design and pedagogical approaches that specifically address self-assessment and confidence in ethical application for different gender groups, ensuring that all students are empowered to translate learning into perceived competence effectively.

Discussion

The findings strongly support that integrating Bhagavad Gita teachings and mindfulness practices effectively contributes to improved ethical decision-making skills among students. The philosophy of the Bhagavad Gita is identified as having significant potential to address crucial aspects of education, particularly pedagogy, for the successful implementation of national education policies. The combined approach of incorporating Gita's enduring principles (knowledge, devotion, and action yoga) with mindfulness practices is shown to cultivate positive emotions, manage stress, enhance mental resilience, promote ethical decision-making, and foster a profound sense of interconnectedness, all vital for holistic development and responsible citizenship.

Participants also noted that the Bhagavad Gita courses had a net positive impact, such as improved understanding of the worth of human life, rational decision-making, and thinking, and a more optimistic and faith-filled outlook. Mostly participants thought about how one can maintain inner peace, reduce stress, cultivate "good thoughts," and stay centred and calm. Additionally, participants thought about feeling good about life and improving their problem-solving skills. In hindsight, a number of participants value mindfulness as a transformative educational practice that changed their perspective on learning and life in general, indicating

both immediate and long-term effects.

According to the Bhagavad Gita, male students were thought to be more capable of making moral choices. Given equal access to information, the disparity in self-perception suggests that future instructional strategies might need to look into factors other than content delivery, like confidence building or self-appraisal training, to foster a fair development of self-efficacy in making moral decisions for both sexes."

The emphasis of the modern learning environment is on technology-enabled, personalized, interactive, and individualistic learning. The Gita emphasizes learner-centred education because Krishna addresses Arjuna's scepticism and takes individual differences into account. By cultivating an inquisitive mindset that challenges assumptions to enhance knowledge, educators are urged to stimulate critical thinking and questioning. Using techniques like breathing techniques, mindfulness exercises, or guided meditation can help students manage their stress, focus, and mental health.

The Bhagavad Gita's ideologies can contribute to all aspects of education, including assessment. Assignments like reflective journals, experiential essays, and ethical case studies based on Gita teachings can provide students with pathways to bridge theory with practice and develop an embodied understanding of knowledge. Future research could focus on how empirical models can be developed be used with scientific measurement scales to assess changes in human behaviour based on the dimensions in Bhagavad Gita.

Bhagavad Gita teaching enhances the students' ethical decision-making skills. It also nurtures emotional balance, alleviates stress and anxiety, and builds resilience, enabling students to navigate academic pressures more effectively. Research indicates that university students should receive mindfulness training. Even brief, guided mindfulness sessions in a classroom environment can significantly increase state mindfulness, mindful consumption behaviour, and life satisfaction in students. Meditation techniques that are based on yoga have been shown to improve regulation of emotions, positive affect, self-compassion, and mindfulness, while reducing negative affect in college students.

The Bhagavad Gita holds the potential to transform students into effective leaders and aid them in achieving their life goals. It contains immense leadership literature and provides practical insights for management, administration, and leadership roles. By encouraging self-understanding, the Gita teaches that it is not possible to become an effective leader without understanding one's potential and purpose. Mindful business leaders will demonstrate enhanced moral reasoning, guiding their actions beyond mere legal compliance.

The Theoretical Contributions are:

This research explicitly attempts to explore the ideas of positive psychology through the lens of the Bhagavad Gita, thus extending contemporary psychological frameworks. It proposes and tests a theoretically derived model linking mindfulness and moral reasoning, mediated by compassion and egocentric bias, and demonstrates that moral reasoning can be enhanced through systematic mindfulness intervention. Furthermore, it integrates the wisdom of the Indian Knowledge System (IKS) from the Bhagavad Gita with contemporary pedagogical frameworks, offering an alternative way to understand the complexities of human existence beyond solely Western epistemological traditions.

The study emphasizes that what positive psychology advocates today was articulated long ago by Sri Krishna on the battlefield of Kurukshetra to help Arjuna cope with sadness and confusion. The Bhagavad Gita is presented as a powerful medium of instruction capable of refining the body, mind, and intellect for self-realization. Based on Dharma-oriented thinking, it has been referred to as a "life master manual" for the students and an educational manual for prudent business conduct.

The Gita makes it much easier to provide the proper information, moral goal, and fundamentals of education. It can be referred to as a "gospel for entire humankind" since it provides "education for life."

Conclusion and Recommendations

- **Summary of Findings**

According to research, incorporating lessons from the Bhagavad Gita into school curricula can help create responsible, well-rounded citizens, promote holistic development, teach people stress-reduction strategies, instills values, and help them develop their decision-making abilities. More precisely, the development of students' capacity for moral decision-making is greatly impacted by the incorporation of ancient wisdom courses grounded in the Bhagavad Gita. Research has shown that incorporating the teachings of the Gita leads to increased mental clarity, concentration, and composure as well as the development of leadership potential and problem-solving skills. The Gita's lessons align with scientific principles like critical thinking, moral judgment, conflict resolution, interdependence, cause-and-effect relationships (Karma), flexibility, open-mindedness, awareness, and concentration.

In management education, integrating Gita-based teachings can lead to improved ethical decision-making and mindfulness.

Mindfulness training in higher education has been shown to increase mindful awareness, self-compassion, and potentially reduce stress and anxiety among college students. It can help students become more grounded and focused, enhance their wellbeing, reflexivity, learning, equanimity, kindness, and compassion. Short, guided mindfulness sessions (e.g., 5-minute sessions in classrooms) are effective in increasing state mindfulness and can significantly improve mindful consumption behaviour and overall life satisfaction. Mindfulness is also positively related to moral reasoning, mediated by compassion and reduced egocentric bias. While one study found university students had relatively low mindfulness scores compared to other cognitive skills like note-taking, it also suggested mindfulness training is warranted. A positive correlation has been found between self-compassion, mindfulness, consideration of future consequences, and resiliency with academic performance, and a negative association with procrastination.

Theoretical Implications:

The Bhagavad Gita offers a complementary epistemological and pedagogical framework that can serve as a counterbalance to the Western pursuit of external success, emphasizing inner peace, karma yoga, and spiritual well-being. It promotes a "Bharatavarshiya rhetorical and philosophical framework" those values both personal and societal well-being and challenges conventional views of knowledge by integrating intellect (*jnana*), experience (*vijnana*), devotion (*bhakti*), and ethical action (*karma yoga*). The Gita's approach to human psychology

helps in understanding oneself and the world, thereby enhancing the quality of actions and results from a subliminal level.

Mindfulness research contributes to understanding the mechanisms of mind-body interventions and can strengthen the moral compass of individuals, implicitly fostering virtues such as wisdom, courage, humanity, and transcendence. It also expands the understanding of education to include the inner world of thoughts and emotions as part of the curriculum, aligning with a holistic view of human existence. The practice of mindfulness can lead to a transformative educational experience, affecting students' views on education and life itself, and developing critical thinking skills.

Practical Applications:

The findings support the integration of ancient Indian wisdom (like the Bhagavad Gita) and modern practices (like mindfulness) into contemporary educational frameworks to address challenges such as stress, ethical dilemmas, and the need for holistic development. Short, guided mindfulness sessions are a feasible and effective way to introduce mindfulness benefits in classroom settings to a general student population. The teachings of the Bhagavad Gita provide valuable insights for leadership and management training, fostering ethical clarity, self-awareness, and non-attachment in decision-making.

• Recommendations

1. For Academic Institutions:

• Curriculum Modifications:

- Integrate Bhagavad Gita teachings into interdisciplinary academic programs, particularly in humanities, philosophy, ethics, psychology, and leadership studies. This should not be a purely religious or doctrinal reading but a critical engagement with its philosophical and ethical dimensions.
- Incorporate Indian Knowledge Systems (IKS) into curricula, encouraging students to take credit-based courses with a minimum of five percent of total mandated credits in IKS, ideally relating to their major discipline.
- Adopt flexible learning models, including modular courses, stackable micro-credentials, and online bootcamps, to address evolving job market needs.
- Integrate ethical considerations and social responsibility into all curricula, including topics like digital ethics, environmental sustainability, and social justice.

• Teaching Approach Adaptations:

- **Implement brief, instructor-guided mindfulness practices** at the beginning and end of classes to help students manage stress, increase calm, and enhance focus.
- **Adopt discussion-participatory teaching methods** to develop students' decision-making abilities and critical thinking skills, drawing insights from the Bhagavad Gita's dialogue format.

- **Train educators on pedagogical aspects derived from the Bhagavad Gita** to enhance their ability to impart value-based education and promote holistic development.
- **Utilize case studies, real-world examples, and philosophical discussions** to explain complex concepts, including ethical dilemmas from the Gita and scientific principles.
- **Provide comprehensive counseling and mentoring services** to help students with decision-making and motivation.

For Future Research:

- **Longitudinal Studies:**
 - Conduct **long-term studies** to assess the sustained impact of mindfulness meditation training on cognitive skills, educational outcomes, moral reasoning, and positive psychology in university students. Further research on the long-term development of personality traits and general competence after studying the Bhagavad Gita, as these changes manifest over extended periods.
- **Cross-Cultural Applications:**
 - Investigate the impact of Bhagavad Gita studies on foreign students who may have different cultural or religious backgrounds to understand universal applicability and specific cultural receptivity. Conduct studies across diverse institutional settings and geographical locations to validate the generalizability of findings regarding mindfulness and Gita integration. Explore how mindfulness interacts with variables like demographics, gender roles, and spirituality in influencing moral judgment.
- **Mixed-Method Approaches:**
 - Combine **quantitative survey methods with qualitative approaches** (e.g., interviews, journaling, focus groups) to gain a deeper, nuanced understanding of student experiences and the underlying mechanisms of these interventions. Integrate **neurological research methods**, such as fMRI, with self-reported assessments to explore the neural mechanisms that underpin the behavioural effects of mindfulness and moral reasoning. Develop and test **empirical models** and scientific measurement scales to assess the changes brought about by integrating Gita dimensions into education. Focus on **action-oriented research** that evaluates the implementation of innovative practices and policies in real-world educational settings to inform evidence-based decision-making. Explore the broader area of **mindful consumption** in the higher education context, as it is still in the early stages of development despite encouragement.

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“Financial Literacy Education: Curriculum Enrichment for contributing to Financial Well Being”

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Abstract

1. Industry-Academia Collaboration for Curriculum Enrichment

This research paper is predominantly concerned with how curriculum development w.r.t. Financial Literacy Education can help in bringing about financial well-being of individuals. An attempt has been made to understand the Conceptual and Operational frameworks & Definitions of Financial Literacy as put forth by eminent researchers in the field.

Financial landscape has become complex with plethora of Financial products and services to choose from leading to complexity in Financial decision making of individuals.

Financial Literacy has been identified as a core skill by many governments across the world and to ensure impartment of the same ,National Strategy for Financial Education have been designed and implemented by governments .

Overview of National Strategy for Financial Education (NSFE) in Indian as well as global context has been done to understand curriculum development of Financial Literacy education.

As , Financial decision making of an investor has a behavioural dimension which might lead them to engage in suboptimal financial decisions and sub optimal financial behaviour leading to diminished level of Financial Well Being (FWB), an attempt has been made to review incorporation of Behavioural finance concepts and theories can be incorporated in financial literacy education.

Keywords: Financial Literacy Education (FLE), Financial Well Being (FWB), Financial decision making, Behavioural Finance concepts, NSFE (National Strategy for Financial Education)

1. Introduction:

This research paper is predominantly concerned with: How Financial Literacy and Financial education can help in bringing about financial well-being of individuals.

An attempt has been made to understand the Conceptual and Operational frameworks & definitions of Financial Literacy as put forth by eminent researchers in the field.

Financial Literacy Education (FLE)) has also undergone comprehensive change w.r.t. its curriculum from being only knowledge focused to a combination of awareness, knowledge, skills, and behaviour to achieve the desired outcomes.

2.Objectives :

1. To review progress of Financial Literacy Education.
2. To understand progress of curriculum development of Financial Literacy Education through NSFES.

3. Literature Review:

An attempt has been made to carry out Literature review on 3 Aspects:

1. Financial Literacy: Conceptualization & Operationalization &
2. Financial Literacy Education (FLE) & NSFE (National Strategies for Financial Education)
3. Financial Well Being(FWB)

1. Financial Literacy: Conceptualization & Operationalization

Various researchers mention that terms Financial Literacy, Financial Education and Financial Knowledge have been used interchangeably.

Literacy: In an attempt to define financial literacy, number of researchers has first attempted to define Literacy and extending the same to define financial literacy.

Mason & Wilson (2000) mention that conceptualization of financial literacy has received a very little attention which may create problems in operationalizing financial literacy. They conceptualize Financial Literacy as “meaning-making process” enabling informed decision making to achieve the desired outcomes.

Remund(2010) argues for a clearer definition of financial literacy both conceptual and operational definition.

Remund(2010) cites definitions of Financial Literacy expressed in different terms viz. Financial Knowledge(Howlett, Kees & Kemp(2008), Stone, Wier & Bryant(2008), Financial Literacy(Vitt et al (2000)), Financial capability(Johson & Sherraden(2007), Stone, Wier & Bryant(2008),)

Remund(2010) defines Financial Literacy in terms of understanding key financial concepts and having ability and confidence to manage personal finances combining both short-term decision-making and sound, long-range financial planning, keeping in mind life events and changing economic conditions.

Remund(2010) based on his review of financial literacy studies argues that operational definition of Financial literacy falls within the following 4 Categories which are behaviour based or ability based :viz 1) Budgeting 2) Saving 3) Borrowing and 4) Investing.

OECD (2005) defines financial education in terms of process which helps in improving understanding of financial products and concepts; and development of skills and confidence through information, instruction and/or objective advice leading to informed choice and financial well-being.

European Commission (EC)(2007) offers a similar definition of financial education adding life long aspect to it. Atkinson (2008) emphasizes on objective of financial education as ensuring positive (financial) behavioural outcomes that enable individuals to achieve their own financial goals.

The OECD International Network on Financial Education (INFE)(2005) defines Financial Literacy as follows:

“Financial literacy is a combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial wellbeing.”

INFE operationalizes Financial Literacy through its survey instrument: Core Questionnaire. The questionnaire mainly focuses on those aspects of knowledge, attitudes and behaviors that are associated with the overall concept of financial literacy.

Hung, Parker and Yoong (2009) attempt to define and measure Financial Literacy by reviewing the literature on Conceptual and Operational definitions of Financial Literacy. They report a wide variation in conceptual definition of Financial Literacy ranging from knowledge, perceived knowledge, ability or skills to apply knowledge.

Hung, Parker and Yoong(2009) mention that both Performance Tests as well as Self-Report/Self-Assessment Tests/Reports methods have been employed in measuring financial literacy and the common content domains frequently considered in the studies are Savings , Investment , Debt and Numeracy.

Hung, Parker and Yoong’s (2009) definition of Financial Literacy refers to knowledge of basic economic and financial concepts, as well as the ability to use that knowledge and other financial skills to manage financial resources effectively for a lifetime of financial well-being.

Huston’s Conceptual Framework and Model of Financial Literacy (2009, 2010) has evolved out of analysis of 71 studies on the construct of Financial Literacy between 1996-2008.

Huston (2010) reports lack of conceptual & operational definition of Financial literacy as a result of examination of the above studies.

Huston (2009, 2010) defines Financial literacy in terms of measuring how well an individual can understand and use personal finance-related information and hence

Huston's definition is based along 2 dimensions viz: Knowledge Dimension and Application Dimension.

Huston goes a few steps further to establish through a proposed model, the relationship among financial knowledge, education, literacy, behaviour and well-being. Huston argues that Financial literacy and other influencing factors like cultural, familial, economic conditions, time preference, behavioural biases impact personal financial behaviours which in turn results in financial well-being.

Atkinson and Messy (2012) argue about a shift from Financial literacy to a broader concept of Financial capability that helps in achieving individual financial well-being through sound financial decisions made based on combination of awareness, knowledge, attitude, skills and behaviour.

Kempson et.al. (2005) model of Financial capability comprises 3 components viz. :

1) Knowledge, 2) Attitude and 3) Behavior along the 5 Domains of Personal Finance viz.:

1. Making ends meet 2. Keeping track 3. Choosing products 4. Planning ahead 5. Staying informed and getting help.

Behavioral component has been identified as the most important component of Financial literacy model by Kempson et.al. (2005)

Researchers Xiao, Collins, et. al., make an attempt to review financial behaviour research that provides valuable information for financial education policies and practices.

Authors mention that goal of all financial education policies and practices is to help people increase their financial capabilities. This will lead to desirable financial behaviours which will in turn bring about financial well-being and overall well-being of people.

Johnson & Sherraden, (2007) define Financial capability as the ability of people "to understand, assess, and act in their best financial interest".

They mention that Financial capability requires both the ability to act (knowledge, skills, confidence, and motivation) (Internal capabilities) and the opportunity to act (through access to beneficial financial products and institutions) (Favourable External conditions). Together, ability and opportunity contribute to a person's financial well-being and life chances.

Sherraden (2010) proposes Financial Capability as an alternative concept to Financial literacy and presents a schematic depiction of financial capability by linking Financial Literacy and Financial Inclusion to Financial capability.

2. Financial Literacy Education (FLE) & NSFE (National Strategies for Financial Education)

Adele Atkinson and Flore-Anne Messy (2015) present the findings from an OECD International Network on Financial Education (INFE) pilot study undertaken in 14 countries. The study captures within and across country differences in financial knowledge, behaviour and attitude.

The results indicate that considerable proportion of population in each of the above 14 countries lack financial knowledge, need to improve their financial behavior and have wide variations in their financial attitudes.

Authors further mention that Financial landscape all over the world is increasing becoming complex with plethora of financial products. Consumers are required to assume responsibility of their financial future including retirement.

Therefore Financial Literacy is being identified as a core skill and many governments across countries are in the process of creating National Strategy for Financial Education.(NSFE)

OECD started working on a new policy tool viz: National Strategies For Financial Education (NSFE) in 2009 considered as an integral part of the OECD project on financial education: for financial consumer protection and financial inclusion.

NSFE is being implemented by more than 60 countries including India. The Indian national strategy was initially prepared by a committee representing all of the country's financial regulators viz: Financial Stability and Development Council of India, 2012, and was also peer reviewed by the OECD/INFE.

According to OECD/INFE, National Strategies for Financial Education are aimed at ensuring effective and innovative provision of financial education through a variety of traditional and more innovative approaches to delivery combining three main approaches:

1. Facilitating access to information and advice through multi-channel delivery
2. Accounting for timing and location and harnessing existing learning environments and networks
3. Supporting individual engagement, motivation and decision-making, by using the findings of behavioral economics.

NSFEs now include Program Evaluation as an essential element of their implementation, combining quantitative and qualitative data and often using international methodologies (such as the tools developed by the OECD/INFE).

The main aim of most of the national strategies is improving financial literacy which in turn is expected to bring about healthier financial behaviors and improvement in financial well-being.

The common time frame for setting up of NSFE in most of the countries including India is 5 years.

Country	Leading Authority for NSFE
Australia	ASIC (Australian Securities and Investments Commission (ASIC)
India	FSDC, Implementation Body : NCFE(National Centre for Financial Education
Brazil	National Committee on Financial Education (CONEF)
United States	Financial Literacy and Education Commission (FLEC)
United Kingdom	Money Advice Service(MAS)

Australia in its NSFE has started including personal financial circumstances and individual psychological make-up(cognitive biases) as key factors in individual financial decision making.

Financial Literacy Measurement Surveys

Type of Survey	Tool Used
International: OECD/INFE Survey World Bank Financial Capability Survey PISA Financial Literacy Surveys 2012/2015	OECD/INFE tool (Questionnaire) World Bank Tool
National Surveys (including Household Surveys)	OECD/INFE tool (Questionnaire) Country's own Tool

Measurement & Operationalization of Financial Literacy

Financial Literacy Questionnaire (Financial Knowledge, Financial Attitude, Financial Behavior):

To help in assessing the level of Financial Literacy as a part of implementation NSFE (National Strategies for Financial Education) for offering solutions to governments in designing and implementing financial education policies, OECD's International Network for Financial Education designed financial literacy and financial inclusion Measurement Toolkit.

According to INFE, Financial education can help enhance financial literacy along 3 dimensions: Financial Knowledge, Financial Skills and Financial Attitudes.

INFE believes that enhancement of financial literacy of individuals(including those from vulnerable and low income population) will result in increase in financial inclusion , in turn contributing to individual Financial Well-Being.

INFE Measurement toolkit(2015)(2018) incorporates a Core Questionnaire (also described as a measurement tool).

Financial Knowledge measurement is done through 7 Questions (Score out of 7)(Minimum acceptable score 5), Questions are ranging from topics such as simple and compound interest calculation, time value of money, understanding risk and return and diversification inflation etc) .

INFE has included one Self Assessment/Rating Question on Financial Knowledge .The self rating done by individuals can also be compared with the actual performance in the Financial Knowledge Questionnaire.

Financial Behavior (Skills) assessment is done with the help of 9 questions on money management behavior including short term and long term financial decisions such as Budgeting, Borrowing, Choosing financial products, timely payment of bills, financial resilience.(Score out of 9)(Minimum acceptable score :6)

Financial Attitude is assessed through 3 Scaled Questions (5 point scale)on delayed gratification and money spending behavior.(Score out of 5)(Minimum acceptable Score : 4 or 5 i.e. more than 3)

INFE Questionnaire recommends a Total Minimum Acceptable Score: $5+6+4=15$ or $5+6+5=16$ out of 21 for Financial Literacy along the above 3 dimensions.

INFE recommends sample size of minimum 1000 respondents between age group of 18 to 78 years, for national level surveys, but smaller sample sizes are also permissible for smaller level/scale surveys.

Lusardi and Mitchell (2007) have developed a set of financial literacy and planning questions, in collaboration with Arthur van Soest, for the Rand American Life Panel (ALP) through an online Internet base survey of participants with 18+ age using their own computer or Web TV

Lusardi and Mitchell(2007) explore literacy level of respondents in two ways employing :

1. Basic Financial Literacy Questions : consisting of 5 Questions on basic level of financial knowledge and
2. Sophisticated Financial Literacy Questions: containing 8 sophisticated financial literacy questions based on advanced level of financial knowledge.

Volpe, R., Kotel, J., Chen, H(2002) developed a Questionnaire on Investment Literacy containing 10 Questions for online survey to assess the investment literacy of online investors.

Volpe, R., Chen, H. (1996) employed a comprehensive questionnaire designed to cover major aspects of personal finance. Their questionnaire includes financial literacy on general knowledge, savings and borrowing, insurance, and investments. The survey participants(924 Students) are asked to answer 52 questions including 36 multiple-choice questions of their knowledge on personal finance, 8 questions of their opinions and decisions, and 8 questions on demographic data.

Volpe, R., Chen, H., Pavalicko, J.(1996) study examines college students' knowledge of personal investment through a Questionnaire containing 10 Questions.

The Questionnaire covers a variety of personal investment topics such as risk, diversification, financial advisor qualifications, tax planning, business math, impact of interest rate change, stock, bond, and mutual fund valuation, and global investing.

Agnew,J., Szykman,L(2005), developed a 10 Question Financial Literacy Exam with each correct answer having one point to test Level of Financial Knowledge of the participants. All the Questions were related to Mutual Funds investments viz: Equity Funds, Bond Funds, Money market mutual funds etc.

Mandell(2008) takes a brief review of Personal Financial Literacy Surveys conducted by Jump\$tart Coalition for Young American Adults beginning from their Baseline Survey of 1997-98 with a frequency of every two years.

The test questions attempted to cover the four key areas to judge the level of Financial Literacy of respondents viz. through 31 Questions on :

(1) Income; (2) Money Management; (3) Saving and Investing; and (4) Spending and Credit.

PISA 2018 Financial Literacy Framework:

Framework dimensions

The financial literacy framework is organized into content, processes and contexts (OECD, 2013[1]).

Content

The content of financial literacy comprises the areas of knowledge and understanding that must be drawn upon in order to perform a particular task.

The four content areas for PISA financial literacy are: money and transactions, planning and managing finances, risk and reward, and financial landscape.

Processes

The process categories relate to cognitive processes.

In PISA financial literacy, four process categories have been defined: identify financial information, analyse information in a financial context, evaluate financial issues and apply financial knowledge and understanding.

Contexts

Decisions about financial issues often depend on the contexts or situations in which they are presented. The contexts identified for the PISA financial literacy assessment are: education and work, home and family, individual and societal.

Financial Well Being(FWB):

CFPB(2015)(2017) has defined Financial Well-Being as follows:“Financial Well-being can be defined as a state of being wherein a person can fully meet current and ongoing financial obligations, can feel secure in their financial future, and is able to make choices that allow enjoyment of life.”

According to CFPB following factors contribute towards FWB:

1. Social and Economic Environment: includes macro-economic context, family wealth and connections, access to education, and geographic location.
2. Knowledge and Skills: i.e. know-how regarding financial products, information and financial decisions.
3. Personality and Attitudes: How one tends to think, feel and act.
4. Decision Context: how a decision is presented and how you react to it: The way in which a particular decision or choice is presented or structured affects decision making and following through on it.

MAS(2018),UK describes Financial Well Being also from current and future perspectives in terms of Financial Capability by defining it as “the ability to manage money well – both day-to-day and through significant life events.

MAS identifies Financial Capability as a key driver of : 1) Current FWB and 2)Long Term FWB(Future Financial Security)

Storchi &Johnson (2016) in an attempt to understand and put forth Financial well-being argue that Financial Decision making of individuals has undergone a change from utilizing financial literacy to incorporate and apply behavioral economics concepts to move towards financial capability, a wider concept.

4. Review of Curriculum Development for Financial Literacy Education:

People achieve Financial Literacy through the process of Financial Education. The achievement of Financial Literacy empowers the users to make sound financial decisions which result in financial well-being of the individual.

According to NSFE (India), Financial Well Being can be achieved by attempting to increase Financial Inclusion (Supply Side) and by providing Financial education initiatives by concerned stakeholders.(Demand side)

These efforts will be guided by the National Strategy for Financial Education (NSFE). Financial education also supports achievement of Sustainable Development Goal (SDG) No. 4 on Education which aims to ensure inclusive and equitable quality education and promote life-long learning opportunities for all (SDG Target 4.6 on Literacy and SDG Target 4.4 on Life Skills under SDG 4 on Education).

National Strategy for Financial Education is defined as “a nationally co-ordinated approach to financial education that consists of an adapted framework or programme” (OECD, 2019).

The NSFE document intends to support the vision of the Government of India and Financial Sector Regulators by enabling various sections of the population to develop knowledge, skills, attitude and behaviour which are needed to manage their money better and to plan for their future.

The document also takes stock of the current work done by various stakeholders and adopts a multi-stakeholder approach to achieve financial well-being of Indians.

Towards this objective, the National Centre for Financial Education (NCFE) has been set up by all the Financial Sector Regulators to undertake basic financial education and to develop suitable content for increasing financial literacy among the masses in the country.

The definition of financial education developed by the OECD in 2005 already identifies financial well-being as one of the main outcomes of the financial education process. At the policy level, the need to achieve financial well-being is reflected in the recognition of the importance of a trilogy approach for the financial empowerment of consumers based on financial inclusion, financial consumer protection and financial education.

Country	Leading Body for NSFE(National Strategy for Financial Education)	Advisory/Coordinating Bodies
Australia	Australian Securities and Investments Commission (ASIC)	Australian Government Financial Literacy Board
Brazil	Committee for the Regulation and Oversight of Financial, Capital, Insurance, Pension Funds and Capitalisation Markets (COREMEC), National Committee on Financial Education (CONEF)	CONEF members
Canada	Financial Consumer Agency of Canada and the Financial Literacy Leader	National Steering Committee on Financial Literacy
India	Financial Stability and Development Council (FSDC), Technical Group on Financial Inclusion and Financial Literacy of the FSDC-SC	National Centre for Financial Education (NCFE)
Indonesia	Financial Services Authority(FSA)	Bank Indonesia, the Ministry of Education and Culture, and the Ministry of Manpower
Japan	Financial Services Agency (JFSA)	Bank of Japan (through the Central Council for Financial Services Information, CCFSI)
Korea	Financial Service Commission(FSC)	Financial Education Council(FEC)
Mexico	Ministry of Finance and Public Credit	The Committee for Financial Education (CEF)
Russian Federation	Ministry of Finance	The Interagency Project Commission (IAPC)
South Africa	National Treasury,Financial Services Board (FSB)	National Consumer Financial Education Committee (NCFEC)
Turkey	The Capital Markets Board (CMB)	Financial Stability Committee
United Kingdom	Money Advice Service (MAS)	
United States	Financial Literacy and Education Commission (FLEC)	

Financial Literacy Initiatives by Indian Stakeholders:

Financial Education Provider	Name of the Financial Literacy Initiative	Description
1. NCFE	Money Smart School Program (MSSP) Financial Education Training Programme (FETP) Financial Awareness and Consumer Training (FACT) Financial Education Program for Adults (FEPA)	Program where schools voluntarily implement financial education as part of school curriculum. Personal financial education training to school teachers to facilitate inclusion of financial education in school curriculum. Personal financial education to our young graduates and postgraduates, on topics relevant to them, which will positively impact their financial wellbeing. Basic financial education program for the adult section of underserved areas of India, especially rural India.
2. RBI	Basic Financial Education Sector Focused Financial Education	RBI has prescribed the following content for basic financial education: a. Financial Literacy guide, Financial Diary and set of 16 posters prepared by RBI. b. Special camps booklet prepared by NCFE for people newly inducted into the financial system which captures the fundamental tenets of financial wellbeing such as savings, borrowings, concept of interest and compounding, time value of money, inflation, relation between risk and rewards etc The content covers relevant topics in the banking sector such as ATMs, payment systems, exercising credit discipline, Business Correspondents. Financial Awareness Messages (FAME) booklet comprising of 11 messages for the general public and five Posters on financial literacy for the Financial Literacy Week.

3. SEBI	Basic Financial Education Sector Specific Financial Education	SEBI has the following initiatives for basic financial education: a. Financial Education through Resource Persons Program to impart financial education to public. The basic concepts of finance, banking, insurance, pension and investments are covered across five Target groups (viz. Home Makers, Self-Help groups, Executives, Middle Income Groups, Retired personnel). During the workshops, free financial education booklets are distributed in the workshops. b. Visit to SEBI by students c. Financial Education Booklet covering basics of concepts like Financial planning, Savings, Investment, Insurance, Pension, Borrowing, Tax saving SEBI has the following initiatives for sector focused financial education: a. Investor awareness programs by SEBI recognized Investors' Associations b. Regional Seminars in association with Exchanges/Depositories Commodity awareness programs by SEBI recognized Commodity Derivatives Trainers

Conclusion:

Financial Literacy is being identified as a core skill and many governments across countries have created and implemented their respective National Strategy for Financial Education. (NSFE)

In India, 1st NSFE was implemented during 2013-18(5 year period) a review of the progress made was undertaken by the Technical Group on Financial Inclusion and Financial Literacy. NCFE's All India Financial Inclusion and Financial Literacy Survey in 2019 to find out the status of financial literacy in India revealed that 27.18 % of the respondents have achieved minimum target score/minimum threshold score in each of the components of financial literacy prescribed by OECD-INFE.

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Ancient Wisdom of Indian Knowledge System : An Innovative way of enhancing the effectiveness of Teaching & Learning in Management Education

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Today's education system has been revolutionized by the advent of technology, thus providing interactive and engaging methods for learners. However, at the same time, it has created distractions for learners, resulting into reduced attention spans. Today, learners have multiple customized content options at their fingertips, but this has led to superficial and instant gratification, leading to less effective teaching-learning practices. This change has prompted educators to explore more effective teaching-learning methods and ensure better retention of the learning, thus leading to a more effective education system. This research paper attempts to explore the Gurukul tradition of engaging and holistic teaching methods, emphasising on experiential learning, storytelling and multi-disciplinary approaches for effective teaching methods.

The researcher intends to use mixed approach of primary as well as secondary research with two primary objectives: evaluating the effectiveness of IKS integration on student learning and identify specific IKS components relevant to management education. A comprehensive analysis of the literature review on various aspects of Indian Knowledge System was conducted to establish the relevance of the topic, and a structured questionnaire was administered to a set of management students from various management institutes in and around Pune, to understand the effectiveness of the IKS concepts in management education.

Results demonstrated significant increase in the student engagement and retention based on the integration of Indian Knowledge System in the curriculum provided by SPPU. Faculty feedback provided valuable insights into effective teaching-learning methods and engaging classroom discussion resulting in effective teaching-learning pedagogy.

This research works open multiple avenues for fellow researchers to explore different aspects of IKS and its application in various fields beyond the field of management education.

Keywords: Indian Knowledge System, Management Education, Savitribai Phule Pune University (SPPU), Experiential Learning, Student Engagement, Storytelling.

Introduction

21st century has witnessed phenomenal transformation in the education landscape, primarily highlighting the changes in how knowledge is processed, transmitted and received by the teaching learning fraternity. Technology being the important catalyst in revolutionizing the education system, offering uninterrupted access to the world of information and interactive learning platforms. Technology can have its dual impact as it provides convenience in processing, transmitting and receiving the information at the same time it leads to reduced attention span, superficial learning pattern and pursuit of instant gratification. Considering above factors, there seem to be a pressing need to revisit and integrate effective and time-tested teaching- learning pedagogies in today's VUCA environment.

Technological advancement has enabled education system to leapfrog over the past few centuries thus changing the characteristic of today's learner as compared to traditional education system. One of the most important advantage of technology has been it's ability to provide a personalised experience for the learner. Absence of the hardship in searching for information has led to pursuit in superficial information. Today's educators are poised with the challenge to keep their learners engaged in the process of teaching-learning and always in the pursuit to search for teaching pedagogies which can help learners stay involved and seek deep understanding of the concepts. Researchers have highlighted the concept of "Cognitive Overload" referring to the overwhelming volume of information available and leading to the phenomenon where the learner is not keen on indepth knowledge thus getting easily distracted. It is need of an hour to explore alternative teaching methodologies which can provide effective learner engagement and overcome the challenges due to technology based education while leveraging its benefits. This exploration has brought the traditional education system in the limelight and it seems that IKS has great potential considering it's effectiveness in holistic education, experiential learning and ability to integrate practical wisdom with theoretical knowledge.

IKS has been developed based on wisdom gathered by intellectual experts and has been able to test the times with advent of various technologies. These systems were developed from the perspective of creating awareness, improving engagement and ensure holistic development of an individual.

Management education is hailed as an important field of education in today's competitive and VUCA environment, derives it's significance from the fact that it is a beautiful amalgamation of technical skills and behavioral skills like ethical judgment, leadership capabilities, and wisdom to take wise decision in today's complicated business environment. Researcher has tried to explore various ancient literatures and realized that Indian Knowledge System is remarkably relevant for contemporary management challenge's. It would be interesting to explore relevance of various aspects of IKS and its applicability in today's management education. IKS is enriched with ancient wisdom that can benefit management fraternity which has been criticized for developing managers who are technically competent but ethically deficient and culturally insensitive to lead organization's towards holistic development.

Literature Review

Indian Knowledge System has tremendous potential to create more holistic, sustainable and inclusive educational practices in higher education system. IKS can be used in andragogy to promote it's effectiveness and help it disseminate through classroom teaching (Gawande et al., 2025).

Indian Knowledge Systems (IKS) provides a significant and insightful approach to management which may be considered as an alternative to traditional western theories and practices. The study highlights the holistic essence of management philosophy, which can be blended with practical, spiritual and ethical aspects of business management functioning (Dubey, 2025).

Hindu mythological books of Bhagvad Gita, Ramayana and Mahabharata offer valuable insights for professional in the corporate world. The Indian Knowledge System (IKS) serve as an effective tool for elevating competencies and skills of individuals, while also helping professionals to overcome fear of failure. Incorporating the important learnings from these texts can significantly enhance the efficiency and effectiveness of organizations (Raval et al., 2025).

Today's Global challenges can have a sustainable and inclusive approach with the help of The Indian Knowledge System (IKS) framework. IKS provides tried and tested practices to provide sustainable impetus to various sectors like agriculture, environment and economic growth (Kaur J et al., 2025)

The Indian Knowledge System (IKS) emphasise on fostering the research that bridges modern scientific inquiry with ancient insights, thereby contributing to societal well-being and sustainable development. In recognition to the significance of application of IKS in today's business environment, University Grant Commission (UGC) had mandated to include IKS in regular curriculum. IKS possess tremendous potential to cultivate deeper understanding of its ancient culture and equip students with interdisciplinary perspectives that are both rooted in tradition and responsive to contemporary challenges (Khan et al., 2024).

The ancient scriptures part of the Indian Knowledge System (IKS) provide numerous and valuable insights, that can be useful in today's complex business environment. Teachings of IKS can promote overall effectiveness in an organization (Kumawat, 2025).

Indian Knowledge System (IKS) can be instrumental in providing useful insights and promote cultural awareness amongst youngsters and can effectively blend the knowledge of old wisdom and modern knowledge. Thus, it becomes important and is the need of hour to integrate with the modern education system (Amani, 2024).

Indian Knowledge System (IKS) provides solution oriented timeless insight for today's modern day corporate challenges. The blend of IKS with modern day corporate strategies can be beneficial to provide emotional resilience, strategic thinking and ethical guidance (Rajoura et al., 2022).

A well-rounded education rooted in the Indian Knowledge System (IKS) lays the groundwork for individuals to make meaningful contributions to society. It promotes the holistic development of a person by nurturing both their internal and external dimensions—encompassing physical health, intellectual growth, spiritual awareness, moral integrity, and artistic expression (Mahesh K. M., et al. 2023).

Research Objectives

This study aims to explore various important components of Indian Knowledge System (IKS) to support contemporary Management Education and evaluate its effectiveness in today's business environment. Researcher has framed following two objectives to elaborate the effectiveness and application of IKS:

1. To identify the components of IKS Concepts relevant to Management Education.
2. To evaluate effectiveness of IKS integration in Management Education Learning

outcomes were analyzed across affective (values, ethical sensitivity), behavioral (teamwork, leadership) domains and cognitive (knowledge, critical thinking). To visualize perceived effectiveness across IKS themes, Descriptive statistics and boxplots were used. Inferential analyses—such as t-tests and ANOVA—were used to explore differences by demographic variables (e.g., gender, academic background), while regression models helped to examine the predictive power of IKS components on overall management competencies.

Methodology

To ensure that the research methodology will help achieve unbiased results, multi-phase data analysis strategy was used to evaluate the pedagogical relevance and impact of Indian Knowledge Systems (IKS) in management education. To start with initially, thematic clusters of IKS concepts—such as strategic thinking from the *Arthashastra*, leadership from the *Bhagavad Gītā*, and ethical frameworks like *Dharma*—will be mapped to contemporary management domains (e.g., strategy, leadership, governance). Researcher has conducted Exploratory Factor Analysis (EFA) to identify latent constructs within these themes. Further reliability checks were done (e.g., Cronbach's α) to ensure internal consistency. The resulting factor structure will inform the creation of an “IKS–management concept matrix,” with outputs including factor-loading tables, Scree plots, and rotated component matrices.

Subsequently, mixed-methods research was used to assess the effectiveness of IKS integration. Student perception surveys, faculty feedback, and classroom observations were used to evaluate IKS themes. Next step was to clean and prepare the Likert-scale survey responses for statistical processing. Column names which were long were standardized to short, lowercase, underscore-separated formats for ease of analysis. Likert responses were recoded from verbal categories (“Strongly Disagree” to “Strongly Agree”) into numerical values (1 to 5), ensuring all items were positively oriented so that higher scores consistently reflected more favorable perceptions.

Reliability analysis using Cronbach's α was then conducted for each thematic block. The *Gītā*-based items demonstrated strong internal consistency ($\alpha = 0.83$), while the Shivaji-based items showed acceptable reliability ($\alpha \approx 0.69$), suitable for exploratory research. Themes with only one item (e.g., Community, Cooperative, Integrated) were retained as single indicators. Composite scores—*gita_score* and *shivaji_score*—were computed as the mean of their respective items.

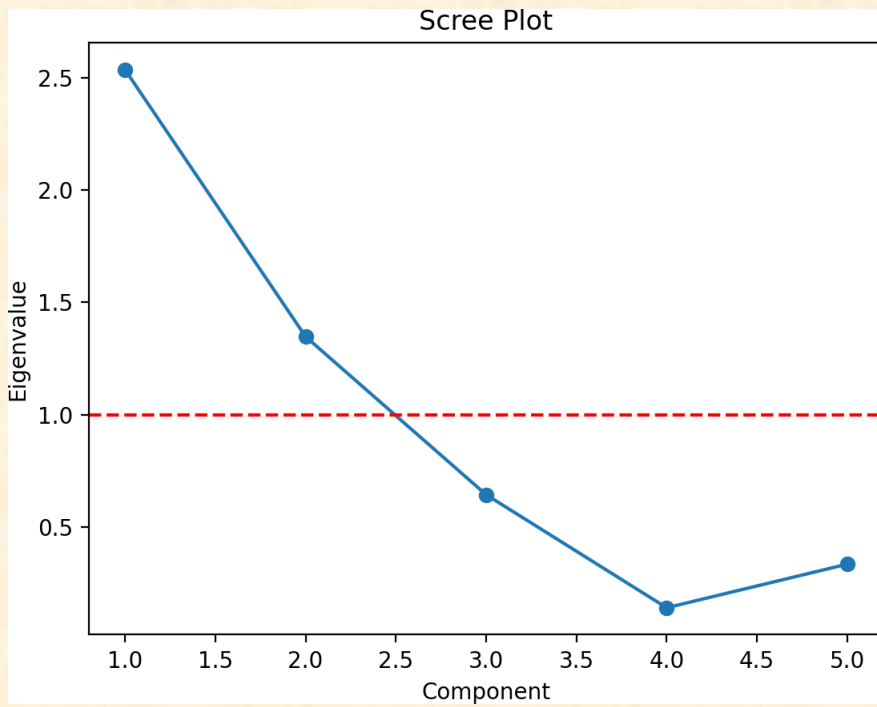


Fig 1

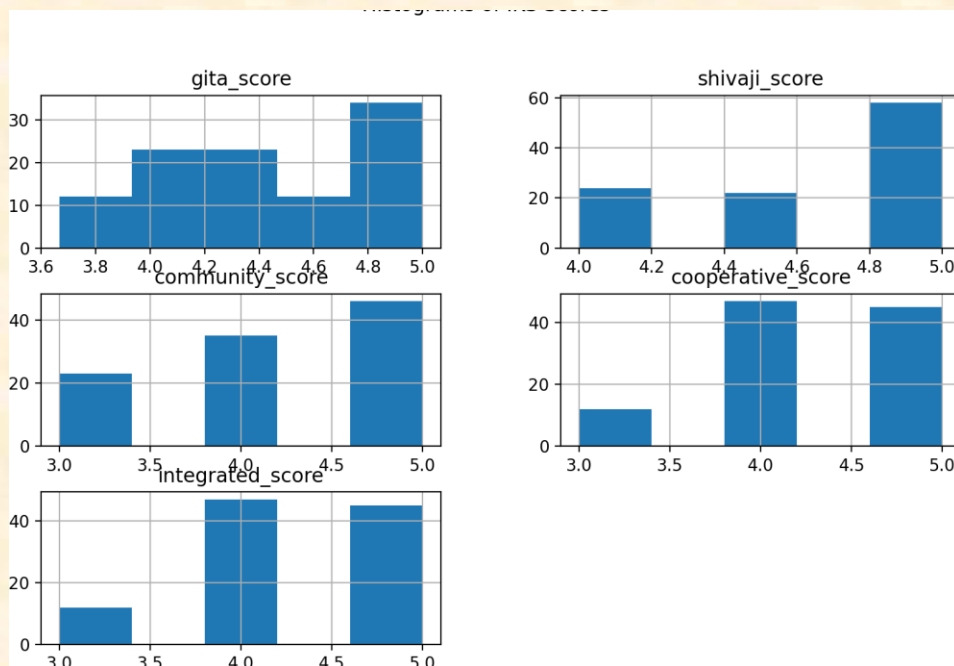


Fig.2

Descriptive statistics revealed high average ratings across all IKS themes, with Shivaji 4.66 and Gītā scoring 4.44 on a 5-point scale, indicating strong student endorsement. Boxplots and histograms showed mild ceiling effects, with most responses clustering at “Agree” or “Strongly Agree.”

Exploratory Factor Analysis (EFA) confirmed the conceptual distinction between Shivaji and Gītā constructs. Two factors emerged with eigenvalues >1 , accounting for 77% of the common variance. Shivaji items loaded strongly on one factor, while Gītā items loaded on another, validating the thematic separation.

These findings indicate that students perceive IKS components as both relevant and distinct, laying a strong foundation for further outcome-based analysis, including regression modeling and group comparisons to assess their impact and influence on management competencies.

The exploratory factor analysis (EFA) conducted on five Likert-scale items revealed two distinct latent dimensions within the Indian Knowledge System (IKS) framework. Eigenvalues of 2.54 and 1.35, both exceeding the threshold of 1, accounted for approximately 77% of the common variance, supporting a two-factor solution. The rotated factor loading matrix showed a clean separation: all three Bhagavad Gītā-based items loaded strongly on Factor 2 (≈ 0.46 – 0.49), while the two Shivaji-based items loaded modestly on Factor 1 (≈ 0.24), with minimal cross-loading. This indicates that students perceive Gītā and Shivaji content as conceptually distinct rather than as a single “Indian wisdom” construct.

Communalities ranged from 0.13 to 0.26, acceptable for short Likert scales, though the Shivaji items showed slightly lower values, suggesting room for refinement. Reliability analysis confirmed internal consistency, with Cronbach’s $\alpha \approx 0.83$ for Gītā and ≈ 0.69 for Shivaji—adequate for exploratory research.

Substantively, Factor 1 represents “Shivaji- based leadership and strategy,” while Factor 2 captures “Gītā-derived managerial insights” such as ethical decision-making and emotional intelligence. High mean scores (≈ 4.4 – 4.7) across both themes indicate strong student endorsement. The absence of cross-loadings and the clear factor structure validate the use of separate modules for each theme in management education.

For future iterations, expanding the Shivaji item pool and adopting a 7-point scale could enhance psychometric robustness. Overall, the analysis confirms that both Gītā and Shivaji offer unique, valued contributions to management learning and should be retained as distinct pedagogical pillars.

Conclusion

This study provides a structured and evidence-based framework for integrating Indian Knowledge Systems (IKS) into contemporary management education. By mapping and categorizing pedagogically relevant IKS components—such as leadership insights from the *Bhagavad Gītā*, strategic thinking from the *Arthashastra*, and ethical principles like *Dharma*—the research delivers a validated “IKS–management concept matrix” that aligns traditional wisdom with modern management domains. Exploratory Factor Analysis (EFA) and reliability testing confirmed the coherence of thematic clusters, offering a robust foundation for curriculum design.

The impact assessment phase revealed that embedding IKS components into management courses significantly enhances student learning outcomes. Mixed-methods evaluation showed measurable improvements in cognitive (critical thinking, conceptual clarity), affective (ethical sensitivity, cultural appreciation), and behavioral (teamwork, leadership) domains. Statistical analyses, including t-tests, ANOVA, and regression models, demonstrated that IKS-infused pedagogy positively correlates with perceived management competencies, with some variation across demographic groups. Optional mediation analysis further suggested that student engagement and satisfaction may serve as pathways through which IKS themes influence learning outcomes.

Overall, the findings underscore the value of IKS as a culturally grounded, intellectually rich resource for management education. The study not only bridges ancient wisdom with modern pedagogy but also offers a replicable model for curriculum innovation, contributing to more holistic, ethical, and contextually relevant management training in India and beyond. Future research can expand the IKS framework by incorporating additional themes such as Jugaad innovation, community-centric governance, and ecological wisdom from texts like the Vedas and Upanishads. Longitudinal studies could assess the sustained impact of IKS-infused pedagogy on managerial behavior and ethical decision-making. Enhancing the Shivaji sub-scale and adopting a 7-point Likert format may improve psychometric precision. Cross-institutional studies and international comparisons could further validate the model’s generalizability. Additionally, exploring digital delivery methods for IKS content may offer scalable, culturally rooted alternatives for modern management education.

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Mapping The Path to Digital Health Adoption: A Behavioural Perspective from Awareness to Attitude

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Abstract

Non-Communicable Diseases [NCD] contribute to over 60% of mortality in India which is further aggravated by various risk factors, with unhealthy lifestyle being a major player. Management of NCDs urgently calls for innovative patient centric solutions which are scalable too. Digital Health Technology, is a fast-emerging field which offers an excellent solution in management of NCDs, but its adoption remains inconsistent, often challenged by issues ranging from lack of awareness to poor perception which hampers the adoption.

Objective of this study is to shed light on the behavioural journey from Awareness to Adoption, which comprises of Awareness, Interest, Desire, Perception, Attitude which finally leading to Adoption. In this study we evaluated 2 components of Awareness, one being General Health Awareness and the other being Digital Health Awareness.

The study suggests Awareness alone doesn't translate into Adoption, but factors like Perceived usage, Trust, ease of use are very important factors which help lead the person's Adoption behavior. Desire was found to be the Significant predictor for Adoption.

This study offers practical insights & guidance for digital health marketers to devise interventions across the stages of user awareness to eventual adoption of digital health technology.

Keywords – Digital Health, Awareness, Adoption, Psychographic segmentation, Behavioral Segmentation

Introduction

The Disease landscape in India is changing rapidly, with Non-Communicable Diseases [NCD] today contributing over 60% of the mortality and the number is rising steadily driven prominently by NCDs like Heart Diseases, Diabetes, Asthma, Cancer which are growing in large numbers be it either in the Urban or Rural landscape.

Unlike the Communicable Diseases, Non-Communicable Diseases call for continuous monitoring, patient engagement, education and chronic care. This not only puts pressure on the stretched healthcare facilities of our country, but also puts immense pressure on a family's

finances as most of our healthcare expenses are borne through Out-of-Pocket Expenses [OOPE].

Digital Health Technology can offer a feasible solution especially in terms of enabling constant monitoring, engagement, education and timely interventions. However, adoption of Digital Health Technology remains below par in India which could be due to reasons like Poor Digital Health Literacy, General Health Literacy, Lack of Trust, orientation towards Traditional care methods.

The challenges are manifold but on the other hand it's interesting to see that India stands out in terms of high mobile penetration with 1.1 billion users, as per early 2024 numbers which is equivalent to 76% of the population. Moreover, one standout example of digital transformation in India is the significant rise in digital payments being led by UPI payments. A PIB Dec 2024 report suggests Indians have notched a record 1673 Crore transactions in the month of December 2024 alone & this trend has been growing month on month reflecting Indians' willingness to go digital.

On one hand, we stand out as a country in terms of our comfort with the use of digital platforms for facets like digital payments, but then it's equally interesting to understand what is it that holds us back from the adoption of Digital Technology for health.

To deep dive into this 'Behavioural Gap' this study evaluates seven constructs which are inspired by the Behavioural and Psychographic Segmentation, which are as mentioned below:

1. General Health Awareness – To assess self's General Health Awareness.
2. Digital Health Awareness – To assess awareness of Digital Health Technology.
3. Interest – To assess curiosity, interest in this new paradigm of healthcare.
4. Desire – To assess individual motivation to engage with the technology.
5. Perception – To assess beliefs, perception about digital health.
6. Attitude – To assess the willingness in using Digital Health Technology.
7. Adoption – To assess actual usage of or the intent to use Digital Health Technology.

The study aims to understand the user's psychological journey and help understand the drop off points which may call for requisite interventions. A better understanding of these reasons helps a marketer design an appropriate marketing strategy.

This Cross-Sectional study aims to understand which of the seven constructs proves to be the strong predictor for adoption. Reliability and Validity of each of the Construct was assessed using Cronbach's alpha for internal consistency and Factor loadings with Average Variance Extracted [AVE] for construct validity.

Literature Review

Non-Communicable Diseases are becoming a bane globally & India is no different with the Non- Communicable Diseases contributing to over 60% of the mortality with Cardiovascular deaths, Diabetes, Chronic Respiratory Illness [eg, Asthma] and Cancers are some of the major contributors to this cause (World Health Organisation, 2024). This burden is further aggravated by risk factors such as unhealthy lifestyle with differences seen either across gender, geography or socio-economic status (Vision IAS, 2025). Growing life expectancy adds another dimension to this challenge.

Poor access, A low Patient to Doctor Ratio and many other factors pose a challenge to an already stretched healthcare infrastructure of our country and this calls for solutions which could be implemented across the regions. Digital Health Technology which comprises of aspects like Telemedicine, Wearables, Mobile Apps, Remote Care & AI driven diagnostic is increasingly being seen as a key factor which can help tackle this challenge (Bassi & Arora, 2024). These and other technologies can help through early detection, enhance treatment adherence through reminders and awareness and enable access to care in remote geographies (Kumar, Dahiya & Gautam, 2024).

Besides Government of India driven initiatives like Ayushman Bharat, NPCDCS are working towards amalgamation of Digital Health in Non-Communicable Disease Management (Press Information Bureau,2025).

India has a high degree of mobile penetration and ranks highest in terms of digital payments but we are somehow lagging in terms of adoption of Digital Technologies for managing our health. Reasons could be many be either poor digital health literacy or lack of trust.

Awareness is a key foundation towards adoption but it could differ in country which is geographically and socially uneven. While on one side, the Urban population is more likely to be aware of the digital health technologies, the rural population could be facing a challenge on this front (Bassi & Arora 2024). The same uneven factor is observed amongst age groups too, with the older population not being so comfortable or friendly with these technologies, but in fact that's the population with higher prevalence of non-communicable diseases.

Interest is the next logical step in this journey which is usually cultivated amongst a set of population who has a certain degree of awareness and perceive the relevance of Digital Health for their own wellbeing. Interest opens the doors to Desire which stands out as the pivotal point in the adoption journey where one not only recognises the benefits but is motivated to experience these benefits for self (Chatterjee & Bhattachrjee,2023).

Perception is very important step in the journey towards adoption and is usually shaped by either the person's own experiences or awareness or belief system. If the person finds them to be trustworthy, easy to use and endorsed by authorities, the user is likely to build positive perception (Weik et al; 2024). This perception could take a hit if data privacy and other trust factors become the worrying factors (Yusuf et.al; 2024).

A positive shift happens as the user recognises the benefits & experiences ease of use (Davis 1989). While talking of India, successful experience with Teleconsultation could lay down the foundation for reinforcing the trust. Backed by peer endorsement or recommendation can lay the foundation for the positive shift in attitude towards adoption (Bassi & Arora,2024). However, absence of digital skills, language barriers or customised support could prove as a hindrance (Mair et.al; 2025)

India has its own set of challenges in adoption of digital health besides the ones applicable to all countries. The set of challenges could be the Urban – Rural Divide or diversity in digital and health literacy (Mair et al., 2025, Xiong et al., 2023). Most of the rural households either lack internet or the resources to own a smartphone which can hamper adoption (Arthur D. Little,2025). Limited Literacy and multiple languages being spoken in India can restrict sustained usage (Kumar, Dahiya & Gautam, 2024). The willingness of a HCP to recommend or advocate usage of digital health technologies plays a very important role in shaping a user's

perception and adoption (Kumar, Dahiya & Gautam, 2024). Moreover, concerns related to data privacy, regulations could challenge one's confidence, hampering the shift of one's attitude towards adoption (Yusuf et al; 2024).

The Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT) have significantly contributed to understanding the adoption of Digital Health, by examining aspects like perceived usefulness and ease of use.

Research Objectives & Research Hypotheses

Research Objectives

The study set out to uncover the factors that drive the adoption of Digital Health Initiatives by individuals. The key Research objectives are:

- RO 1: To assess the impact of Digital Health Awareness on Digital Health Adoption.
- RO 2: To examine the role of Interest, Desire, Perception, Attitude in influencing Adoption of Digital Health Initiatives.
- RO 3 – To identify the most significant predictor for Adoption.

Research Hypotheses

H01: General Health Awareness is not correlated with Digital Health Awareness ($r=0$).

H11: General Health Awareness is correlated with Digital Health Awareness ($r\neq 0$).

H02: Digital Health Awareness level is comparable across the genders.

H12: Digital Health Awareness level is not comparable across the genders.

H03: Level of education does not affect digital health awareness.

H13: Level of education affects Digital Health Awareness.

H04: Increased Digital Health Awareness does not result in substantial increase in Interest in Digital Health.

H14: Increased Digital Health Awareness does result in substantial increase in Interest in Digital Health.

H05: Statistically significant relationship is not observed between the combined effects of Interest, Desire, Perception, Attitude on Adoption of Digital Health.

H15: Statistically significant relationship is observed between the combined effects of Interest, Desire, Perception, Attitude on Adoption of Digital Health.

Research Methodology

Study Design & Procedures

This study was conducted using a cross-sectional, quantitative methodology with an objective of finding the correlation between seven latent constructs: General Health Awareness, Digital Health Awareness, Digital Health Interest, Digital Health Desire, Digital Health Perception, Digital Health Attitude & Digital Health Adoption. The researchers included General Health Awareness besides the other 6 purely digital health related facets as it reflects an orientation towards health and could likely enhance the receptiveness of a newer paradigm like Digital Health.

Conceptual Framework

The proposed conceptual model is based on the premise that:

1. General Health Awareness Influences Awareness, Interest, Desire, Perception, Attitude & Adoption of Digital Health.
2. Digital Health Awareness, Interest, Desire, Perception and Attitude facilitate Adoption.

Sampling and Data Collection

Data gathering was done by the researchers using a self-report questionnaire developed by the researchers to capture participants' responses related to above mentioned seven constructs.

Participants rated their responses using a five-point Likert scale where '1' stood for 'Strongly Disagree' while '5' represents 'Strongly Agree' for a certain set of questions and a Question specific 5-point Likert Scale was used for other set of questions.

The study employed convenience sampling method, as researchers considered the importance of selecting respondents familiar with mobile and digital Technologies.

Measurement Instrument

Each of the seven individual Latent constructs were designed using questions as shown in below mentioned Table [Table 1]:

Table 1: The Constructs		
Construct	No of Items	Questions
General Health Awareness [GHA]	3 items	1. How often do you go for a general health check- up? 2. How frequently do you seek health related information? 3. How would you rate your Health Awareness / Consciousness?
Digital Health Awareness [DHA]	3 items	1. How much time do you spend DAILY on your mobile OR internet for Health-related information? 2. How will you rate your awareness of digital technology for managing health conditions? 3. How do you rate your awareness of Fitness Trackers, Mobile Health Apps, Telemedicine?
Digital Health Interest [INT]	3 items	1. How Interested are you in using digital health technology for managing your health? 2. How Frequently do you like to see your health updates? 3. Do you believe Digital Health is as EFFECTIVE as Traditional / Current Healthcare practice?
Digital Health Desire [DES]	3 items	1. How many health-related apps do you have on your mobile? 2. I have a strong desire to use digital health services for managing my health 3. I am willing to invest time in understanding how to effectively use digital health
Digital Health Perception [PER]	4 items	1. Do You believe patients of Diabetes / Blood Pressure / Other Chronic Diseases require CONSTANT monitoring? 2. Do You believe Digital Health Solutions like smartwatch / fitness trackers / Telemedicine improve ability to manage health of such patients? 3. Do you think Fitness Trackers / Mobile Health Apps are easy to use? 4. How will you rate Teleconsultation in comparison to IN CLINIC / IN PERSON

		Doctor Visit?
Digital Health Attitude [ATT]	3 items	1. How comfortable are with entering your personal data in digital health platforms? 2. Do you believe Digital Health Solutions can provide same level of care as IN person Consultation? Do your traditional beliefs and practices make you reluctant to adopt digital health solutions?
Digital Health Adoption [ADOP]	3 items	1. How likely are you to use Digital Health Technology in the near future? 2. I feel confident using the digital health tools [apps/trackers/teleconsultation] 3. I prefer using digital platforms for health-related tasks [booking appointments/tracking health/accessing reports]

Reliability Testing

Cronbach's alpha Test, which assesses internal consistency, was used for testing the instrument's reliability. Each construct demonstrated acceptable reliability, with all values surpassing the 0.70 threshold mark.

Table 2: Construct Reliability Score [Cronbach α]	
Construct	Cronbach's Alpha Score
General Health Awareness (GHA)	0.748
Digital Health Awareness (DHA)	0.926
Digital Health Interest (INT)	0.795
Digital Health Desire (DES)	0.818
Digital Health Perception (PER)	0.887
Digital Health Attention (ATT)	0.802
Digital Health Adoption (ADOP)	0.794

Validity Testing

Validity was assessed through Convergent validity (Table 3) using:

- Factor Loadings and Average Variance Extracted [AVE].
- All Factor Loadings were above the threshold of 0.5, confirming the significance.
- Each construct achieved AVE greater than 0.5, supporting the validity.

Table 3: Construct Factor Loading Scores and Average Variance Extracted

Construct	AVE	Factor Loadings (Range)
General Health Awareness (GHA)	0.50	0.677 – 0.736
Digital Health Awareness (DHA)	0.81	0.832 – 0.953
Digital Health Interest (INT)	0.57	0.679 – 0.813
Digital Health Desire (DES)	0.62	0.67 – 0.922
Digital Health Perception (PER)	0.67	0.616 – 0.914
Digital Health Attention (ATT)	0.57	0.597 – 0.829
Digital Health Adoption (ADOP)	0.57	0.674 – 0.902

Data Analysis Procedure

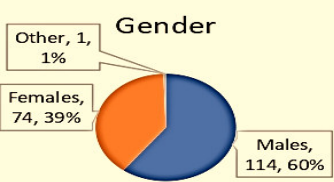
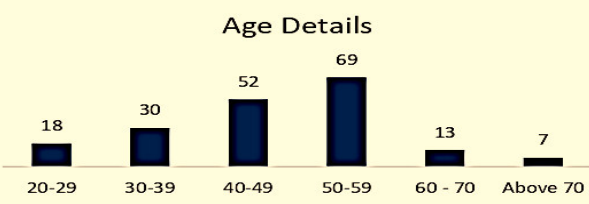
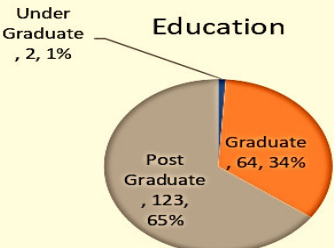
Descriptive Statistics was used for summarizing individual demographic & item level data points. Construct Reliability and Validity was assessed using Cronbach's Alpha [for testing Reliability], Factor Loadings & AVE [for Validity]

Results

Descriptive Statistics

Details of the Respondents (Table 4)

- N=189
- Gender Breakup: Females 74 (39%), Males 116 (60%), Other 1 (1%)
- Age (In Years): The Sample comprised individuals across following age groups [in Years]: 20-29: (n=18), 30-39:(n=30), 40-49: (n=52), 50-59 (n=69), 60-70: (n=13), >70: (n=7)
- Education Details: Under Graduate 2 (1%), Graduates 64 (34%), Post Graduates 123 (65%)
- NCD Breakup: 51% reported 1 or more NCD, 49% reported No NCD (NCD = Non- Communicable Disease).

Table 4: Descriptive Statistics	
Gender Breakup	Age Details
 Gender Other, 1, 1% Females, 74, 39% Males, 114, 60%	 Age Details 18, 30, 52, 69, 13, 7 20-29, 30-39, 40-49, 50-59, 60-70, Above 70
Education	NCD Profile
 Education Under Graduate, 2, 1% Graduate, 64, 34% Post Graduate, 123, 65%	 NCD Contribution% Non NCD Patients, 51% NCD Patients, 49% ■ NCD Patients ■ Non NCD Patients

Reliability Analysis

Internal consistency of all constructs was evaluated using Cronbach's α . Each construct exceeded the threshold of 0.70 as shown in Table 2, which indicates internal consistency. Highest Reliability was reflected by Digital Health Awareness ($\alpha = 0.926$), while the lowest was for General Health Awareness ($\alpha = 0.748$), which still exceeds the recommended threshold of 0.70.

Convergent Validity Analysis

The Validity Test was done using Standardized Factor Loadings and Average Variance Extracted [AVE], in which it showed that the Factor Loadings & AVE exceeded the threshold of 0.70, which further goes on to emphasise that the items were adequately represented in the Constructs.

Research Objectives Findings

RO 1: To assess the impact of Digital Health Awareness (DHA) on Digital Health Adoption.

Digital Health Awareness demonstrated the **highest internal consistency ($\alpha = 0.926$)** and **strongest convergent validity (AVE = 0.81)** among all constructs. Factor loadings are in the range of **0.832 to 0.953**, which suggests DHA is a well-defined and statistically robust construct. This emphasises its critical role in shaping adoption behaviour.

RO 2: To examine the role of Interest, Desire, Perception, Attitude in influencing Adoption of Digital Health Initiatives.

Each of these constructs are very important stages between the Awareness to Adoption journey. **Each of them has reported Good Reliability (α ranging from 0.795 to 0.887)**

with AVE values above 0.57 (threshold is 0.50). These findings suggest Interest, Desire, Perception and Attitude are sound facilitators for Adoption

RO 3 – To identify the most significant predictor for Adoption.

Findings suggest Desire for Digital Health emerged as the strongest predictor basis following aspects: high reliability ($\alpha = 0.818$) and highest individual Factor Loading (0.922) with an AVE of 0.62 along with the test of 5th Hypothesis which shows Desire has the strongest individual predictive power amongst the 4 independent variables (Interest, Desire, Perception, Attitude)

Hypotheses Testing

H01: General Health Awareness is not correlated with Digital Health Awareness ($r=0$).

H11: General Health Awareness is correlated with Digital Health Awareness ($r\neq 0$).

The linear relationship between General Health Awareness and Digital Health Awareness is assessed using Pearson's Correlation Coefficient(r).

Table 5: Correlation of Digital Health Awareness with Digital Health Awareness

		General Health Awareness	Digital Health Awareness
General Health Awareness	Pearson Correlation	1	.142
	2 tailed Significance value		.050
	N	189	189
Digital Health Awareness	Pearson Correlation	.142	1
	2 tailed Significance value	.050	
	N	189	189

The analysis as seen in Table 4 yielded the following results:

Correlation coefficient (r): 0.142

Significance level (p-value): 0.05

A weak positive correlation was observed between General Health Awareness and Digital Health Awareness. Correlation coefficient of $r=0.142$ suggests a slight tendency for individuals with Higher General Health Awareness to also report Higher Digital Health Awareness.

With a p-value of 0.05, the correlation reached the threshold for statistical significance at the 5% level. **Therefore, we do not accept the null hypothesis** and accept the alternative hypothesis that a statistically significant relationship exists between General Health Awareness & Digital Health Awareness.

However, the correlation is low, implying that while a relationship exists, it is not strong. This suggests General Health Awareness alone may not be a strong predictor of Digital Health Awareness and other influencing factors may need to be explored.

H02: Digital Health Awareness level is comparable across the genders.

H12: Digital Health Awareness level is not comparable across the genders.

An **independent samples t-test** was done to compare the mean Digital Health Awareness scores of males and female participants to check if the means of two independent groups were statistically different from each other.

- **Significance Level (α): 0.05**

Table 6: Gender wise Digital Health Awareness

Gender		N	Mean	Std. Deviation	Std. Error Mean
Digital Health Awareness	Male	114	3.1667	1.23951	.11609
	Female	74	3.1216	1.21329	.14104

Table 6a: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	T
Digital Health Awareness	Equal variances assumed	.437	.509	.245
	Equal variances not assumed			.247

Table 6b: Independent Samples Test

		t-test for Equality of Means		
		Df	Sig. (2-tailed)	Mean Difference
Digital Health Awareness	Equal variances assumed	186	.806	.04505
	Equal variances not assumed	158.439	.806	.04505

The test showed **no statistically significant difference** in digital health awareness levels between the genders (men and women) with following outcomes:

$$\mu_1 [\text{Male DHA}] = 3.16 \text{ and } \mu_2 [\text{Female DHA}] = 3.12; t(186) = 0.245, p = 0.806$$

Since the p-value (0.806) is greater than 0.05, we do not accept **the null hypothesis** and hence it's concluded that Digital Health Awareness is comparable across both the genders. The analysis provides no evidence of a significant gender-based difference in Digital Health Awareness in the sample studied.

H03: Level of education does not affect Digital Health Awareness.

H13: Level of education affects Digital Health Awareness.

Though the Questionnaire contained 4 options: No Formal Education, Undergraduate, Graduate & Post Graduate, the respondents were mostly Graduates & Post Graduates. Hence the comparison done in the study is between Graduates & Post Graduates using Independent Sample t test.

Table 7: Group Statistics

38. Education		N	Mean	Std. Deviation	Std. Error Mean
Digital Health Awareness	Graduate	66	2.9596	1.30156	.16021
	Post Graduate	123	3.2575	1.17333	.10580

Table 7a: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	T
Digital Health Awareness	Equal variances assumed	1.063	.304	-1.601
	Equal variances not assumed			-1.551

To investigate if the mean scores of Digital Health Awareness between 2 educational groups, the independent sample t-test was used, and the test statistics which were observed are as follows:

Level of Significance (α) = 0.05; μ_1 [Graduate Mean] = 2.96, μ_2 [Post Graduate Mean] = 3.26; $t = -1.61$, $p \text{ value} = 0.111$.

Since the p value (0.111) is greater than 0.05, **we fail to accept the null hypothesis** & it can be derived that there is a difference in Digital Health Awareness amongst Graduates & Post Graduates. In conclusion, the study found statistically significant difference in Digital Health Awareness between Graduates and Post Graduates. But it is suggested that a greater number of samples be evaluated across all the 4 levels of education to arrive at a proper conclusion.

H04: Increased Digital Health Awareness does not result in substantial increase in Interest in Digital Health.

H14: Increased Digital Health Awareness does result in substantial increase in Interest in Digital Health

A Simple Linear Regression Analysis was done to evaluate the relationship between the Independent Variable [X]: Digital Health Awareness, Dependent Variable [Y]: Interest in Digital Health. Level of Significance (α): 0.05

The Regression model was as follows:

Table 8: Regression Model

Dependent Variable[Y]	R ²	Intercept (a)	Slope (b)	ϵ	P value	Remarks
Interest	0.07	2.795	0.199	3.743	0.000	NULL Hypothesis is Rejected

Interest = 2.795 + 0.199 X (Digital Health Awareness).

The regression analysis shows that Digital Health Awareness significantly predicts Interest in Digital Health Tools. The positive slope ($b=0.199$) indicates that for every 1 unit increase in Digital Health Awareness, Interest increases by 0.199 on an average.

The p-value of 0.000 is below the Level of Significance ($\alpha=0.05$) confirming that the relationship is statistically significant, hence **the null hypothesis is not accepted**. The R^2 of 0.07 indicates Awareness accounts for 7% variance in Interest for Digital Health.

The study proves that enhancing Digital Health Awareness had positive and statistically significant effect on an individual's Digital Health Interest. Although the explained variance is limited, the results do suggest the value of Digital Health Awareness as a catalyst for Interest in Digital Health.

H05: Statistically significant relationship is not observed between the combined effects of Interest, Desire, Perception, Attitude on Adoption of Digital Health.

H15: Statistically significant relationship is observed between the combined effects of Interest, Desire, Perception, Attitude on Adoption of Digital Health.

A multiple regression analysis was conducted to assess whether **Interest, Desire, Perception, Attitude** collectively influence the **Adoption** of Digital Health.

Independent Variables [X] evaluated: Interest, Desire, Perception, Attitude; Dependent Variable in below table [Y] = Adoption of Digital Health

Table 9: Multiple Regression

Independent Variable [X]	R ²	Intercept (a)	Slope (b)	T	P value	Remarks
Interest	0.043	3.248	0.197	2.913	0.004	H0 REJECTED
Desire	0.075	3.181	0.276	3.906	0.000	H0 REJECTED
Perception	0.022	3.397	0.142	2.054	0.041	H0 REJECTED
Attitude	0.05	3.195	0.227	3.126	0.002	H0 REJECTED

Adoption = $3.248 + 0.197 \text{ X (Interest)}$ Adoption = $3.181 + 0.276 \text{ X (Desire)}$ Adoption = $3.397 + 0.142 \text{ X (Perception)}$ Adoption = $3.195 + 0.227 \text{ X (Attitude)}$

The regression analysis shows that the combination of Interest, Desire, Perception, Attitude predicts Adoption of Digital Health Tools.

Interest -

The positive slope ($b=0.197$) indicates that for every 1 unit increase in Interest increases Adoption by 0.197 on an average. The p-value of 0.004 being below the Level of Significance of 0.05 confirms the **relationship is statistically significant**. The R^2 of 0.043 indicates Interest accounts for 4.3% variance in Adoption for Digital Health.

Desire

The positive slope ($b=0.276$) indicates that for every 1 unit increase in Desire increases Adoption by

0.276 on an average. The p-value score of 0.000, which is below the Significance Level ($\alpha=0.05$) confirms that the **relationship is statistically significant**. The R^2 of 0.075 indicates Desire accounts for 7.5% variance in Adoption for Digital Health.

Perception

The positive slope ($b=0.142$) indicates that for every 1 unit increase in Perception increases Adoption by 0.142 on an average. The p-value of 0.041 is below the Level of Significance ($\alpha=0.05$) confirming that the **relationship is statistically significant**. The R^2 of 0.022 indicates Perception accounts for 2.2% variance in Adoption for Digital Health.

Attitude

The positive slope ($b=0.227$) indicates that for every 1 unit increase in Perception increases Adoption by 0.227 on an average. The p-value of 0.002 is below the Level of Significance ($\alpha=0.05$) confirming that the **relationship is statistically significant**. The R^2 of 0.05 indicates Perception accounts for 5% variance in Adoption for Digital Health.

The model was statistically significant ($p<0.05$), indicating that these **psychological and motivational behaviours together have an impact on adoption**. The multiple regression analysis's results indicate that **Interest, Desire, Perception and Attitude have a statistically significant impact on Adoption** of Digital Health Initiatives. Although the explanatory power may be modest [as depicted by R^2], the findings do highlight the fact that psychological & behavioural do play a role in influencing adoption.

Findings further suggest Desire has the strongest individual predictive power amongst the 4 independent variables, followed by Attitude, Interest and Perception.

Discussion

The study dives into understanding of Digital Health Adoption through the Behavioural journey comprising the seven constructs – General Health Awareness, Digital Health Awareness, Interest, Desire, Perception, Attitude and Adoption. The findings do put across a fact that the adoption of Digital Health is a multiple stage behavioural process influenced by various factors. The study attempts to delve into the transition from awareness to adoption.

Interest, Desire, Perception play an important role in translating an user from Awareness to a more active role of Adoption. The role of Attitude as a pre-emptive step to Adoption is worth assessing too as users with positive attitude are more likely to adopt Digital Health Technology.

The funnel-based model serves as an important tool as it not only captures the stage where people do not migrate from awareness to adoption. For example, a highly aware user may drop out at Interest stage due to some challenge, while other may drop off due to trust issues. Segmenting users based on the funnel's stage can help marketers to design appropriate stage specific interventions.

One of the aspects worth noting from this study is the drop seen as we travel from Desire towards Perception which could be influenced by factors like relevance, ease of use and perceived benefits.

Study's Limitations

The study did have a few limitations which we wish to acknowledge. Self-reported data may introduce biases either in form of overestimation or desirability aspect. Secondly, purposive sampling may affect the generalization of findings beyond digitally aware individuals. Thirdly, the education profile of the respondents was mostly Post Graduate. There could be a chance that Higher Education could reflect in higher scores. Fourthly, the findings are limited to Pune & Mumbai which are urban centres. Need to tap Rural areas for a detailed study.

Additionally, while the study validates key constructs, inferential testing like SEM needs to be done, which constrains conclusions about predictive strength.

Conclusion

The study presents a seven-stage funnel based psychographic model to understand Digital Health Adoption in the Indian context. By mapping the Awareness to Adoption journey, the study throws light on psychological, behavioural facets that shape Digital Health Adoption.

Key findings emphasise that though Awareness levels [both General Health & Digital Health] are relatively good, significant drop off occurs at Desire, Perception and Attitude. The study emphasizes that Awareness alone doesn't influence Adoption but factors like Technology orientation, Perceived value of the Tool & Trust in functionality also play a significant role.

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A Study the Role & Impact of New Technology, Digital Communication, Social Media in Education & Learning Process & Overall Social Development

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Abstract

The Role of New Technology , Digital Communication , Social Media in Education sector & in Learning Methodology opens a new Dimension. This drastic institutional, infrastructural & technological changes expected to bring Overall Social Development. The collaboration of various layers of technology provides new opportunities & brings more potential outputs such as automatic administration, personalized learning, education at door-steps, easy learning, real time feedback, education on fingertips etc. Such New Technology , Digital Communication , Social Media Provide open access to Library material in every corner of the world. Which provides equal opportunity of getting knowledge & information of any Subject beyond the boundaries. This thing is important in view point of Overall Social Upliftment among the Students Especially from Rural Areas. In 80s decked the program named as “Country Wide Classroom” was telecasted through “Doordarshan” of India it was a good step to provide education at the door steps. but it’s a one-way communication channel.

In today’s Modern world New Technology Digital Communication , Social Media play the pivotal role in Education , Learning & Overall Social Development at Urban , Sub-Urban & Rural levels. Especially after 2020 there is drastic increase in the use of Internet Technology, YouTube channels, Android systems, AI tools ,Webinars, Google-Meets in Educational Sector & this provides learning faster & easier.

Speaking in Nutshell the advantages of New-Technology is limitless in Education & Learning. Student are getting tremendous & boundaryless information about any topic.

Keywords-: Education , Education & Learning process, Information, Knowledge, Wisdom, New Technology, Social Media, Digital Communication , AI , Social Welfare, Ethical Value, Productivity ,Overall Social Growth , Overall Social Development.

Introduction

India’s overall educational environment witnesses a significant shift in last few years. The New Education policy 2024-25 aims to make India as global knowledge superpower. It is also expected through The New Education policy 2024-25 Bridging the gap between rural & urban education sectors. At present days dynamic needs (i.e.) like Digital literacy , Digital Education, Skill Development programs, providing Vocational Training facilities, Holistic learning methods etc. are some of the major dimensions included in it.

With the use of New Technology , Digital Communication , Social Media in Education sector & in Learning methodology aims at providing Easy education facilities , high quality of education, vast access to Information. Along with the help of New Technology , Digital

Communication , Social Media it is possible to spread educational knowledge & information at the grassroot level. Which will help to achieve goal of social welfare / Overall Social Development.

But social welfare & upliftment of social educational level & the goal of overall development cannot be possible until making proper awareness regarding Ethical & Proper use of New Technology , Digital Communication , Social Media in educational system & in Learning . to avail the benefits of New Technology , Digital Communication , Social Media in Education sector & in Learning it must be intangal with correct directions. for this purpose, it is expected to provides some framework for New Technology , Digital Communication , Social Media among educational system to ensure educational system keeps on right track & in right direction. as New Technology , Digital Communication , Social Media provides more accessible Knowledge, more Educational engagement & provides easier Learning Fast Learning facilities so it must be always kept on tracking.

The Targets of Overall development is possible after making proper awareness among the masses & by providing balances attitude regarding People, Peace, Prosperity as well as Citizens Partnership in to such Movement. Such move definitionally brings the overall Development of Nations. And it is expected that New-Technology plays pivotal role in Overall Development at Micro & Macro levels.

In this Major Context the Role of New Technology , Digital Communication , Social Media in Education, Learning & Overall Social Development is Very Crucial.

Objectives

1. To Understand the Role of New Technology , Digital Communication, Social Media in Education Sector.
2. To Study the Impact of New Technology , Digital Communication, Social Media Over Social Welfare & Education.
3. To Learn About the Correlation Between New-Technology in Education & Learning Process and Overall Social Development.

Research Methodology

For the Research Paper Titled " To Study The Role of New Technology , Digital Communication , Social Media in Education , Learning and Overall Social Development. "

Primary Data has been collected with the help of Questionnaire , Direct Personal Interviews with the Experts & Observation Method.

The Secondary Data has been collected through Internet, Books, Magazines & Various articles published on Social Media ,Google, Internet etc.

Hypothesis

The study is based on the following hypotheses:

H1: New Technology , Digital Communication, Social Media in Education Sector significantly influences on Overall Development & Social Welfare.

H2: New-Technology improves Education & Learning Process and it is a tool of Social Development.

A brief about the Challenges in front of New Technology , Digital Communication , Social Media in Education, Learning & Overall Social Development & its Role -:

The Developing countries like India faces the major hurdle of Infrastructure at Urban / Sub-Urban & at Rural level. Concentrating at Rural India the basic problems prevailing in Rural Infrastructure like Availability of Internet facility, Availability of Educational Devices like Laptop & Android Phones , Mobile Range , Power Cut etc. gives major impact over the use of New Technology , Digital Communication , Social Media in Education, Learning as well as over the Overall Social Development.

Besides this infrastructure problems social evils like poverty, hunger , lack of health awareness ,gender discrimination, issues of inequality, lack of environmental awareness are major Challenges in front of Use of New Technology , Digital Communication , Social Media in Education, Learning & in Overall Social Development.

This above stated Challenges can be tackled through Mass Education awareness & Overall Social Development But the Goal of Mass Education awareness & Overall Social Development at Urban / Sub-Urban & Rural level is Possible only after Successfully implementation & use of New Technology , Digital Communication , Social Media in Education, Learning by overcoming the above stated Hurdles.

Despite of the above challenges some more challenges has to be faced in the ways of New Technology , Digital Communication , Social Media in Education, Learning & Overall Social Development like Misleading Information over social media, fake Identities, fishing, spoofing, lack of authenticity of information , Fake AI generated Videos, Immerges, Contents, Fake News, Hacking, Fraud, Harassment, Identity Theft, Malware, Ransomware, Cyber Attack, Data Theft, Software Piracy, Social Media Frauds, Online Drug Trafficking, Cyber Stalking, Cyber Bullying, (Also Known as Online Internet Bullying) Electronic Money Laundering, Cyber Extortion, Intellectual-Property Infringements, Stealing Personal Information to Commit Frauds, Financial Fraud – Online Scams, Fake Transactions & Credit Card Fraud etc. to Tackle this Hurdles it Ensures Need of Proper Cyber Security System Implemented 24/7 with Collaboration between Government & Cyber Experts & this system has to be Frequently Updated.

New Technology , Digital Communication , Social Media in Education, Learning & Overall Social Development is A New Hope-:

New Technology , Digital Communication , Social Media in Education, Learning & Overall Social Development is a New Hope of development. Today AI tools are widely used in the in the Education sector and Online teaching learning methods like webinars & Google Meets & You tube Channels are the Perfect example of Distance Learning.

Due to use of such New Technology , Social media the students & teachers are getting more understanding of their own social environments & surroundings. Due to use of such new technology , social media Teachers & students also benefited of availing right information about reality & cultural diversity & environment of the world this also helps them to make compare and analyse of their surroundings & world with the best proper sense.

This boosts level of teaching, this also boosts the level understanding & learning among students. also, it provides a new vision regarding understanding Socio Economical problems faced by the nation & problems prevailing in the society. Due to use of such new technology , social media students can tackle such problems in more Mature way and with wide scope of Mind & Vision.

It can be proved as a New Hope for Overall Social Development.

Major Benefits Expected to arise out of Implementation of New Technology, Digital Communication ,Social Media in Education, Learning & Overall Social Development is-:

1. Fast & Easier Access to Information about Subjects

Digital Communication , Social Media New Technology & the Modern AI tools provide Fast & Easier assistance for Information Access it also grooms the Research Potentials among the Students as well as Teachers.

2. Learning Beyond Textbooks

New Technology , Digital Communication , Social Media in Education, Learning provides facility of learning beyond textbooks & facility of Collaborating beyond Classroom due to New Technology Quick Updates regarding Subjects are made Available.it makes Education process Easy&with the help of New Technology Digital Communication , Social Media Students can Avail out of the Book Knowledge & Enhances the degree of Doubts Clearance.

3. Motivate for Self-learning through Interactive Learning Model

New Technology , Digital Communication , Social Media can provide in-depth knowledge about the subject/ topics this also leads to develop capacity of self-learning among them. such things are helpful in their Overall Development.More Social Knowledge.

4. Personalized Learning

E-Learning makes Learning process Easy & New Technology makes Availability of Online Education Material & the Digital tools, Digital Platforms like You-Tube lessons, Various Educational Apps & Virtual Reality (VR) , Simulations etc. provides facility of learning at own Pace & at own Place & this can be adjusted according to student's progress. Also, it provides interactive Personalized Learning facility & boosts the level of learning with Conceptual understanding & learning with fun.

5. Learning Efficiency & Collaboration beyond Boundaries

With the help of New Technology , Digital Communication , Social Media & Various Online platforms students get Easy Accessibility to Anything through Internet this gives rise in the level of Education by providing easy access to more informative Videos regarding their Topics. With the help of New Technology , Digital Communication , Social Media & Various Online platforms students are able to work together on any projects by overcoming the geographical boundaries. this creates the collaborative approach among them. Digital note-taking, AI tutors, Online Resources make Time saving effective Learning this boosts the Learning Efficiency.

6. Skill Development

The overall development of students means Students Mind, Body, Emotions & Spirit is entangled with learning process. This is expected in Holistic Learning & with the help of New Technology , Digital Communication , Social Media & Various Online platforms students get better understanding regarding subject such thig leads for Holistic Learning it also provides Better Visualization about the Topic by using tools like Cad ,Cam etc. & it ultimately resulted in Skill development better job appointee.

7. Going beyond Core Academics & Provides Vast overview of the Word

with the help of New Technology , Digital Communication , Social Media & Various Online platforms used in the Education & learning process take the students to go beyond core academics and provides them to avail vast overview & knowledge of the world by Accessing the Unlimited Information of the world in which they are leaving this increase in level of General Knowledge. (G.k) among the Students this thig provides Vast overview of the Word.

Besides this New Technology also help them in Time management, Study Management, Change Management & Stress Management Such elements are valuable in view point of Student's Overall development in various aspects of life. Like social, emotional & ethical development which ultimately leads Overall development of Society .

8. Better knowledge & Open More Educational Dimensions

With the use of New Technology , Digital Communication , Social Media in education & learning the Teachers & Students can avail Better knowledge about their respective subjects it also rises the level of Information among the Students.& it also helps in opening More Dimensions of Educational not only this it yields in Vast expansion of

educational boundaries & Provides Education in less cost this leads to achieve target of 100% education along with better understanding of socio-economical phenomena , environment phenomena this leads for developing self-awareness , sense of empathy , grooming emotional intelligence among the society.

9. Communication-Based Learning helps in Grooming Philosophical approaches -

New Technology , Digital Communication , Social Media in education & learning is a communication-based learning & the communication-based learning helps Students & Teachers for better to understanding of each other and due to use of such New Technology both can avail the viewpoint of “we are a part of a whole & we cannot ignore the problems faced by the World /Society”. Such viewpoint leads them to think beyond the conventional education boundaries.& such developed views help both in grooming critical thinking, creativity skills, approach of lifelong learning, importance of Communication Skills , Need of Developing Collaborative tendency of mind which leads the Students to become a Responsible learner along with it also grooms the tendency of effective teamwork & such leads to develop interpersonal skills among them.

Ultimately such above mention qualities turn in to developing a Philosophical approach & Philosophical approach it is basic need of Overall development of Society as well as Individuals.

10. Creates A high tech-Driven World & Advantages at Micro -Macro levels

New Technology , Digital Communication , Social Media in education & learning gives broad perspectives towards understanding problems at Micro -Macro levels of the Society with the Use of Google meets the Concept like Country-wide Classroom can be fulfilled this also leads to achieve goal of “Mass education”, “Education at your Door step” can be fulfilled Micro -Macro levels. Due to use of New Technology , Digital Communication , Social Media in Education & learning More Information & Knowledge Exchange is Possible & Such act Create Awareness of Educational in the Masses.

The Philosophy of New Technology , Digital Communication , Social Media in Education & learning promote the gender equality this creates awareness of tackling the socioeconomical problems in mature way. Such mature awareness in the society leads to reduction in social evils.

The use of New Technology , Digital Communication , Social Media in Education & learning is very useful especially regarding “Women’s Empowerment” due to use of such New Technology Women’s can get of Education at their homes & Opportunity of Work from Home (Schemes like Earn & Learn) this leads to improve their living conditions & promote better work life balance such leads to Overall Growth of Society.

The Implementing of New Technology Digital Communication & Social Media in Education & Learning has to face several Challenges we are grabbing some of the major Hurdles / Challenges in Nut Shell –: Such Challenges includes

- Technical Issues , Cyberbullying ,Over-dependency on Machines , Data Quality & Data Privacy issues.
- Lack of Human touch on Digital Platform Teaching & learning , Ignores importance of Actual Classroom Teaching Method , Contradictory between google information & actual class room teaching over student's mind set. The Bias or Limited Contextual Understanding of Internet Information leads to Misinterpretations, Emotional dis-balancing & such dis-balanced attitude among the Students & this is harmful for them.
- Due to Excessive use of New Technology Digital Communication & Social Media in Education & Learning Students' abilities like Memorization , Visualization , Creativity, Critical Thinking get Hampered, not only this those Students who spend too much time on social media have increased risk of various mental & health related problems, like Eye Strain, Sleeplessness, Depression, Body Image Difficulties, & Anxiety.

Oxford of The East “Savitribai Phule Pune University, Pune (SPPU)” Taken Initiative towards use of New Technology , Digital Communication & Social Media in Education & Learning & Overall Social Development-:

The Oxford of the East Savitribai Phule Pune university, Pune (SPPU) taken Initiative by Providing Online Teaching Materials, Conducting Online courses , Organizing Joint Research Programs as well as Knowledge Exchange Programs like Online Webinars, Online Workshops this leads in Development of Teaching Methodology according to the Need Time. Besides this SPPU also aims at International Partnerships with other Universities to implement Agenda 2030 in Education & also aims to achieve Goal 4 (SDG 4) & Global Citizenship.

Such Initiative helps in Overall Development in Educational sector the areas like Climate Change, Disaster Management, Risk Management, Biodiversity, Reduction of Poverty, Optimum Utilization of Recourses, Sustainable Consumption are also benefited by this this, And leads towards the Development of Overall Factors of Education. Such act leads towards Overall Social development And the New Technology Digital Communication & Social Media in Education; Learning plays dynamic role in boosting such Efforts.

Impact of New Technology Digital Communication & Social Media in Education, Learning Overall Socioeconomic Development -:

1) Knowledge Exchange Programs are key for Overall Socioeconomic Development -:

The Student & Teachers from various Universities having some extra skill , extra knowledge, extra talents & extra abilities. and the New Technology Digital Communication & Social Media in Education, Learning play dynamic role in boosting such Efforts this New Technology open Door for Hunting such extra skills, talents & Having abilities of Mass spreading of Education & Learning among the Social Economic environment surrounded by the Society.

The active participation of New Technology Digital Communication & Social Media in Education, Learning is beneficiary for enhancing the knowledge level of the society it also Increase the level of understanding & help for Education, Learning & Knowledge Upliftment among the Society. This New Technology Digital Communication & Social Media in Education, Learning also having capacity of spreading Education , Knowledge, Information, & Learning at Micro & Macro level. with the help of Talent hunting, creating & exploring Job Opportunity ultimately boost the Socioeconomical level of the Society which Leads to Overall Socioeconomic Development.

from this point can be said that the New Technology Digital Communication & Social Media in Education , Learning plays major role in Overall Socioeconomic Development.

2) Impact of New Technology Digital Communication & Social Media in Education, Learning & Overall Socioeconomic Development by Upliftment of Weaker Section:

Implementing New Technology Digital Communication & Social Media in Education & Learning means standing for Socioeconomical structural developments. With the help of New Technology Digital Communication & Social Media in Education & Learning bring positive attitude & deliver positive message among Society for Social Development.

But what is Developed Society ? The Developed Society means the Society which is not only Infrastructurally Developed but Morally, Ethically developed Society & Such society Engaged in Upliftment of Weaker Section among the Society is a Progressive Society.

The New Technology Digital Communication & Social Media in Education, Learning gives direct influences on Morale & Ethical values of the Students & Teachers as they are the Pioneers of New Society as well as front line Guides for the Existing society. With the help of Cohesive approach along with New Technology Digital Communication & Social Media in Education, Learning the Teachers & Students can better Understand each other & they can understand & Tackle the Socioeconomical Problems prevailing among the Society. Such Intellectual acts & Intelligent decisions & Efforts can definitely bring A New Hope & brings New Era of Overall Development.

With Proper Understanding, Intelligent decisions & Cohesive approach increases the level of Morals & Ethics among the Students which leads towards Intellectual acts. Such Morally & Ethically Strong Students Creates a Welfare State & Society. With the help of Such Morally & Ethically Strong Students the Community Development is Possible also Social & Economic Reforms & Social Welfare & Overall Socioeconomic Development & Upliftment of Weaker Section among the Society is Possible. Besides it increases the level of Overall welfare at Macro & Micro level and is Positive Stape towards National Progress.

The chain of such Ethically & Morally inspired Responsible & Educated Citizens entangles with the National Social Economic developmental Reforms yields in archiving Overall Socioeconomic Development & Upliftment of Weaker section among the Society.

Ethical Issues -:

Ethical Issues in Education & Learning is the big Question now a days. Considering the role of Ethics in Education & Learning We have to understand the Grass root Problems in Education & Learning. Havey use of New-Technology & AI tool & Digital Communication & Social Media students are becoming lazy? is the thinking point. Havey dependency on machines or artificial tools is increased now a days by sating aside Students basic capacities? is also a

thinking point. Piracy issues is a challenging task ? Students are habitual of making just copy pest ? due to this Students are Losing their thinking Capacity ? Calmness ? Abilities? Power of Visualization of Subject tasks. Many times, it is observed that bunch of Havey information give wrong impact on student's mind they assume that they are having Knowledge of everything this leads to increase in tendency of arrogant attitude among this Gen-Z & Gen-Alpha Generation & they felt as Arrogancy means Intelligence?

But Education & learning is a Creative Thought process, this process Consist of Remembering, Thinking, Imagination , Understanding Various Dimensions of Education & learning, Understanding Various Aspects of life.

In the Education & learning process Analysing of Various situation is an Important task. But this Task varies from person to person it is also depending upon various situations. The tendency such as Making just a Copy Pest & I am having Knowledge of everything & I have a Power of Google ? Arrogancy means Intelligence ? is rather harmful for the process of Education & learning . with such attitude is dangers for Students & they may lose their capacity of Out of the box thinking & they may also lose the ability of Perceptive for Various Notions.

Emotional Coefficient (EQ) & Intellectual Coefficient (IQ) plays Pivotal role in process of Education & learning. Education leads to personality development. the Overall Personal Development consist of Emotions Handling, Emotional Balancing & Emotional Development. Due to high dependency & improper use of over New-Technology Digital Communication & Social Media & AI tools in Education & Learning leads to monotonous, mechanical Education & learning Process. Such thing increases patience-lessness among the students.

So, its Need of Thinking over Challenges above & make sure that New-Technology Digital Communication & Social Media & AI tools in Education & Learning will be use by Overcoming the Challenges above. If it is not taken in to account ? then this is dangerous for the overall growth of students as well as Society and this is the main Ethical Issue.

A Philosophical Aspect:-

Importance of Understanding between Information, Knowledge & Wisdom:-

Information it is a set of Raw data ; facts & figures gathered from various sources. it gives Basic understanding of subject & provides the foundation to the Subject. But without meaning & interpretation Information lose its context.

Knowledge is a next step after information gathering. Based upon foundation of information. Such raw information has to be Organised, Processed & Analysed . This yields in acquiring deeper understanding & insight into a subject matter. it gives Contextual Understanding about the information it also built Relationships of such Information in Contextual Manner. The Proper Implications of such Processed Information this is called as Knowledge. in Nutshell specking after making deep study of gathered Information Knowledge Arises.

Wisdom means use of Applied knowledge & Experience & taking Actions based informed Decisions. it is an ability to distinguish between what's important & or not. It considered Long-term perspective about implications of actions. In Nutshell How to Implement gained Knowledge according to Situation by Perspective of Future with past References called as Wisdom.

Illustration-:

Information:- Pune is Oxford of The East.(A Raw Data)

Knowledge:- Understanding the Cultural, Historical, Geographical Significance of Pune as The Oxford of The East. (Processed Information)

Wisdom:- Recognizing the Importance of Pune as Oxford of The East & Making Informed Decisions About Education or Living in Pune. (Applied Knowledge)

A Philosophical Question-:

New-Technology & AI tool & Digital & Social Media Produce Wisdom?

This Philosophical Question provides a new thinking point in our study because power of Wisdom varies from person to person & situation to situation. Using the right knowledge & information with right purpose ,with right intention at right time at the right place with the right situation with proper implementation of it is called as a wisdom. Such wisdom is the virtue of human mind & skills. Though due to New-Technology & AI tool & Digital Communication & Social Media in Education & learning students can avail a better information it is a giant leap towards future but here is the point arise that does such gathered information is knowledge? & can this knowledge turn in to wisdom? & Leads to Overall Social Development.

If we properly follow the Principles of Ethical Knowledge Gaining and take Windowful decisions then & then only, we can tackle the challenges about the Role of New-Technology & AI tool & Digital Communication & Social Media in Education & Learning & then we can extract the Overall Social Development.

Understanding The Role of New Technology , Digital Communication , Social Media In Education, Learning And Overall Social Development "-:

This is a digital era, and many of the Educational Institutions are moving for adopting New Technology , Digital Communication , Social Media into Education & Learning process.

This is good step towards the development of students. With the help of New Technology , Digital Communication , Social Media into Education & Learning process enables Teachers & Students as well as for Parents to get proper information easily, they can connect with other learning groups also, their spectrum becomes broader by connecting other educational systems & their level of understanding is uplifted . Considering above points we can say that the Use of New Technology , Digital Communication , Social Media in Education & Learning process a play a pivotal role in making education system more convenient for all.

Some benefits of New Technology , Digital Communication , Social Media into Education & Learning process are like as-:

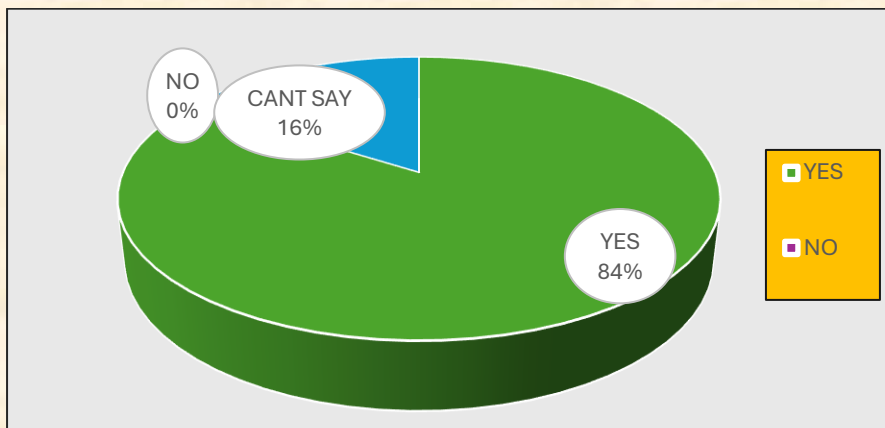
- Students' can access with several platforms at a time. (access to many Educational Resources)

- Integration of *New Technology , Digital Communication , Social Media* into Education & Learning process into the classroom Students can get benefits of live lectures.
- Using New Technology , Digital Communication , Social Media into Education & Learning process the degree of communication becomes Higer & this thing is very important in today's Digital Society.
- Online Sessions of Group Discussion , Question-and-Answers, increases the student's ability of Quick adaption, they can think more Independently with various new Contexts. Such Sessions are beneficial for Teachers & Parents.
- The Online Sessions improves the feeling of Distant Cooperation among the Participants.
- Using New Technology , Digital Communication , Social Media into Education & Learning process Introduces & Develops Abilities of handling of more advance & sophisticated Technology.
- New Technology , Digital Communication , Social Media into Education & Learning process provides platform for Collaborative Learning, Increased Industrial Insights & a good for students who are engaged in professional networking.
- New Technology , live streaming ,Digital Communication , Social Media into Education & Learning process increased student engagement, students' participation , they can interact with different knowledgeable authorities.
- with the help of Video editor, Audio visual Tools, YouTube Videos Teachers can create more interactive & engaging , attractive content so students' interest in Learning is improved.
- The new Technology Provides Global Educational Platform it goes beyond traditional learning methods & Creates actively based learning. *Due to such* Students can attend lectures with their connivance & from their Places.
- New Technology , live streaming ,Digital Communication , Social Media into Education & Learning process is more appealing & allowing the students to access content related to their unique areas of interest & improves the understanding of the subject. They get access of handling variety of materials regarding several courses. The facilities like live-streaming , Online lectures, You Tube Lectures allows students to acquire diverse knowledge regarding Subjects. it enhances students understanding, Students are able to spread their thoughts & ideas in the world & students can communicate with field experts regarding their quarries.
- Use of New Technology , live streaming ,Digital Communication , Social Media into Education & Learning process especially social media improve Students communicate ability it develops communication skills. Also blogging, texting, tweeting boosts students' Expressing ability by providing platform to express themselves in world, This also grooms Self-esteem among them & allowing them to avail the Knowledge from key Legends / Subject experts regarding their Interested subjects.

- Use of New Technology , live streaming ,Digital Communication , Social Media into Education & Learning process Students get a deeper understanding about their peers' linguistic and cultural backgrounds.& they can better understand it. This promotes international collaboration, building networks(i.e.- LinkedIn etc).The platforms like YouTube , Facebook, Twitter provide useful information to the students also Keeps Parents & Teachers Quick Informed.
- With the help of Social media Platforms Teachers Students Communication become Easier & faster it also makes Close bounding with the Students.
- Also New Technology ,Digital Communication , Social Media is a best Marketing Platform.

Data Analysis

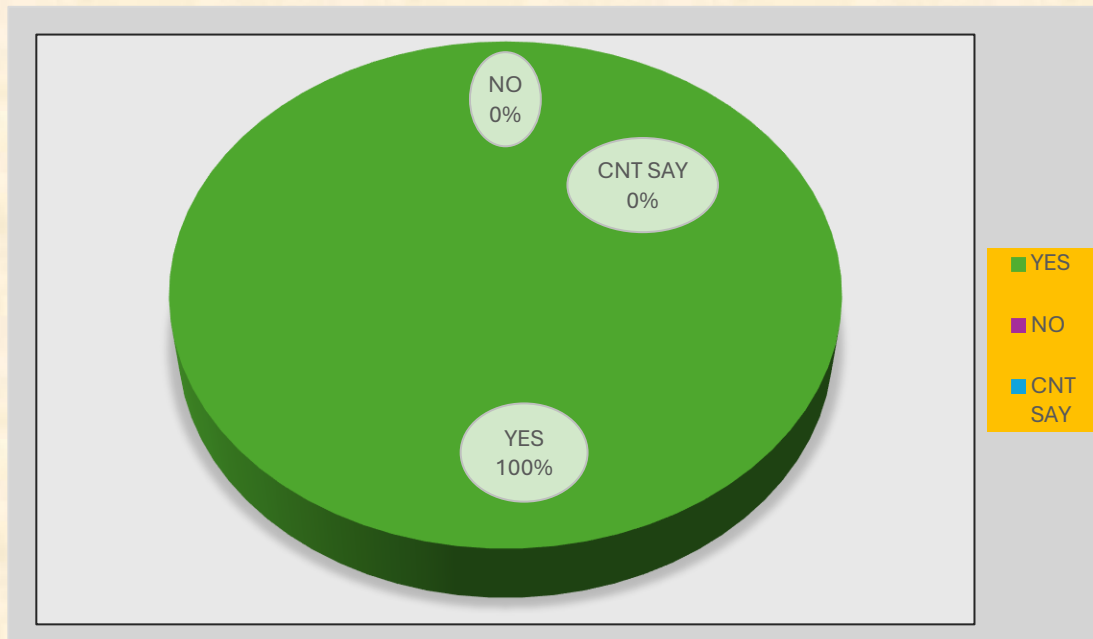
Q1) Do You Think Digital Media Helps the Students to Learn Easily & Faster ?



Interpretation-:

The Data Revels from the above table, opinion of the respondents over Do You Think Digital Media Helps the Students to Learn Easily & Faste? Uncovers that 84% respondents are agreed over the statement, while 16% respondents are not produced their fir opinion they responded as Can't Say.

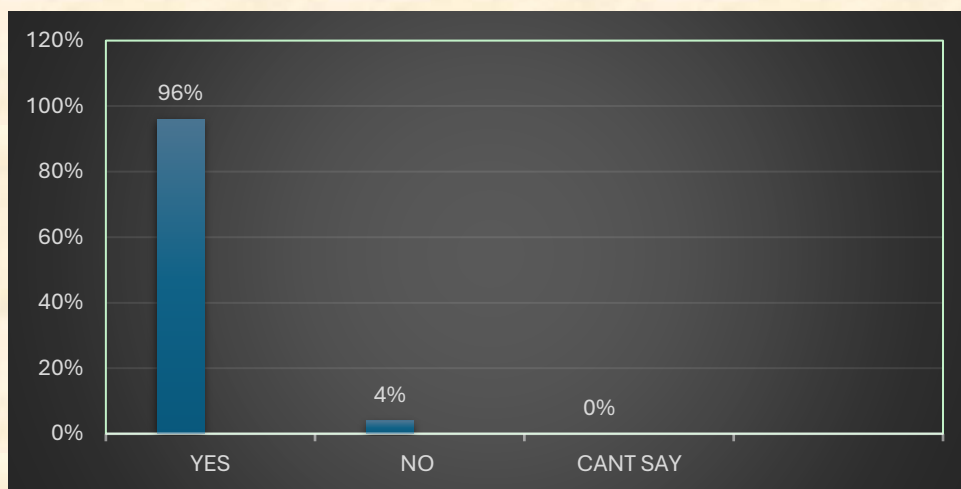
Q2) Due to Use of New Technology Opens New Dimensions of Learning.?



Interpretation:-

The Data Reveals from the above table, opinion of the respondents over Due to Use of New Technology Opens New Dimensions of Learning.? Uncovers that 100% respondents are agreed over the statement.

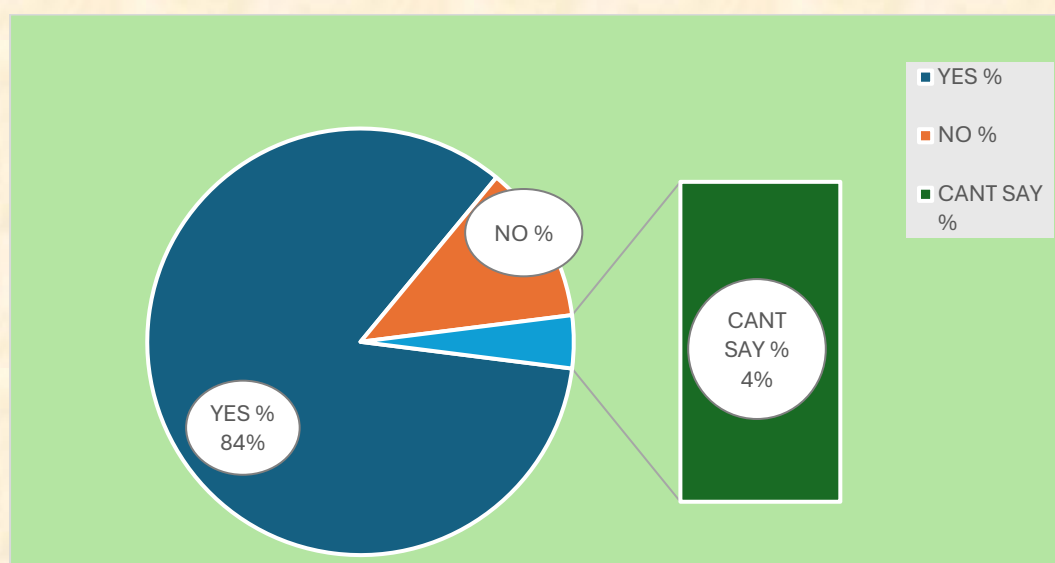
Q3) Vast-Spread Education & Learning is Possible Due to Use of New Technology?



Interpretation:-

The Data Reveals from the above table, opinion of the respondents over Vast-Spread Education & Learning is Possible Due to Use of New Technology? Uncovers that 96% respondents are agreed over the statement, while 04% respondents are not agreed on the statement .

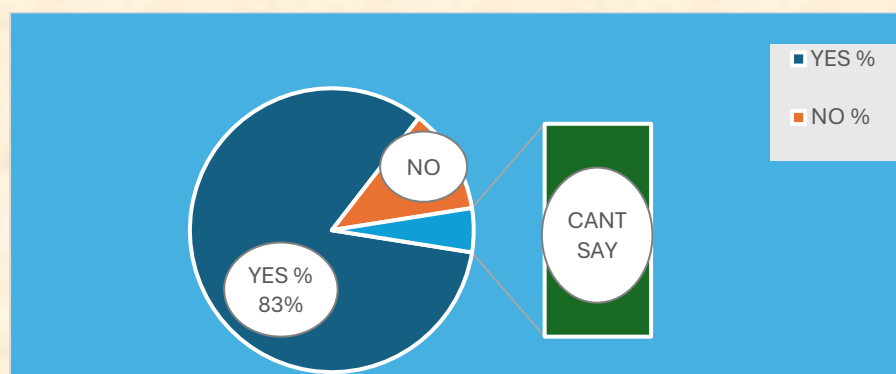
Q4) Do You Think use of New Technology, Digital Media in Education & Learning will Bridge the Gap Between Rural & Urban Sectors Development.?



Interpretation:-

The Data Revels from the above table, opinion of the respondents over Do You Think use of New Technology, Digital Media in Education & Learning will Bridge the Gap Between Rural & Urban Sectors Development.? Uncoveres that 84% respondents are agreed over the statement, while 12% respondents are not agreed on the statement .and 04% respondents are unable to produced their fir opinion they responded as Can't Say.

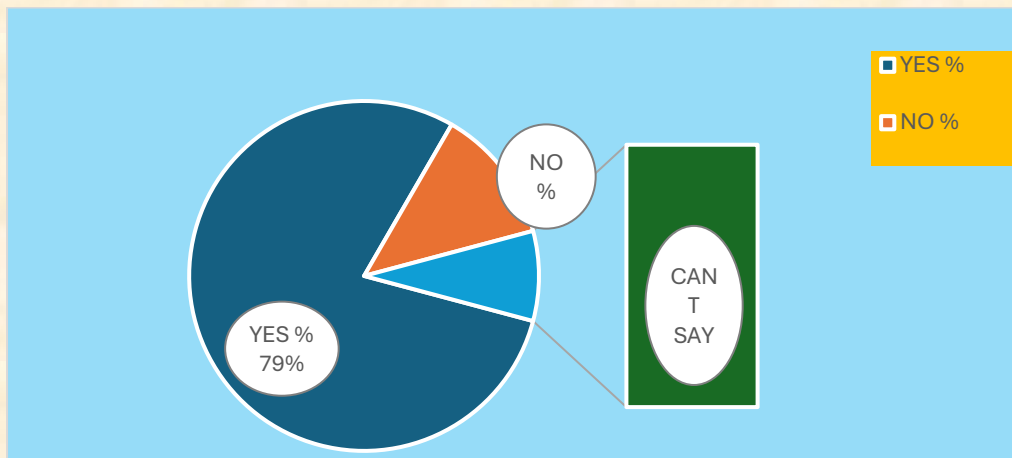
Q5) Use of New Technology Digital Media in Education & Learning makes Boundary Less Education & Education at Doors Steps / Education on Finger Tips & Education to All & Give Positive impact on Overall Socio-Economic Development.?



Interpretation-

The Data Revels from the above table, opinion of the respondents over Use of New Technology Digital Media in Education & Learning makes Boundary Less Education & Education at Doors Steps / Education on Finger Tips & Education to All & Give Positive impact on Overall Socio-Economic Development.? Revels that 83% respondents are agreed over the statement, while 12% respondents are not agreed on the statement .and 05% respondents are unable to produced their opinion they responded as Can't Say.

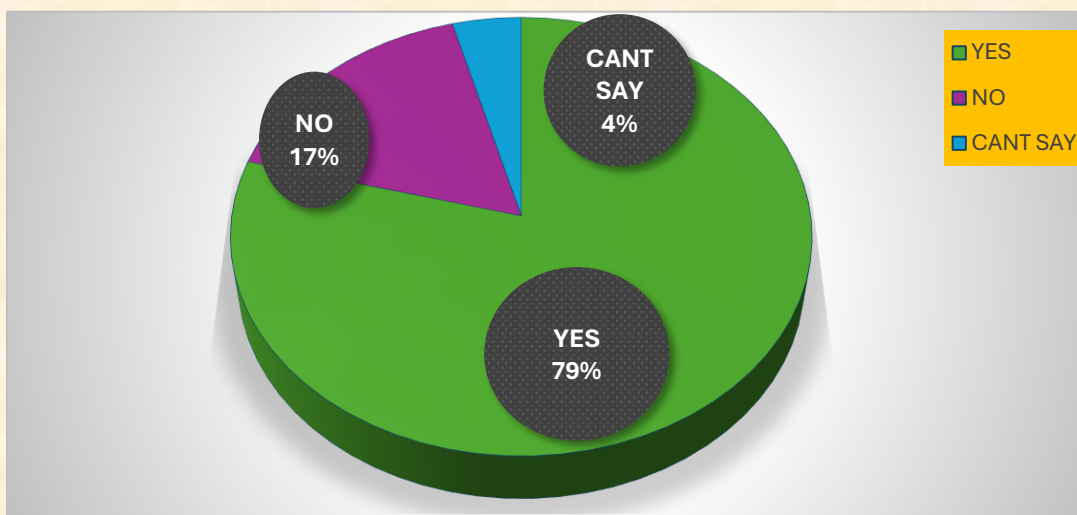
Q6) Do You Think Use of New Technology in Education & Learning Helps in Achieving Goal of Overall Social Development ?



Interpretation:-

The Data Reveals from the above table, opinion of the respondents over Do You Think Use of New Technology in Education & Learning Helps in Achieving Goal of Overall Social Development ? Reveals that 79% respondents are agreed over the statement, while 13% respondents are not agreed on the statement .and 08% respondents are unable to produced their fir opinion they responded as Can't Say.

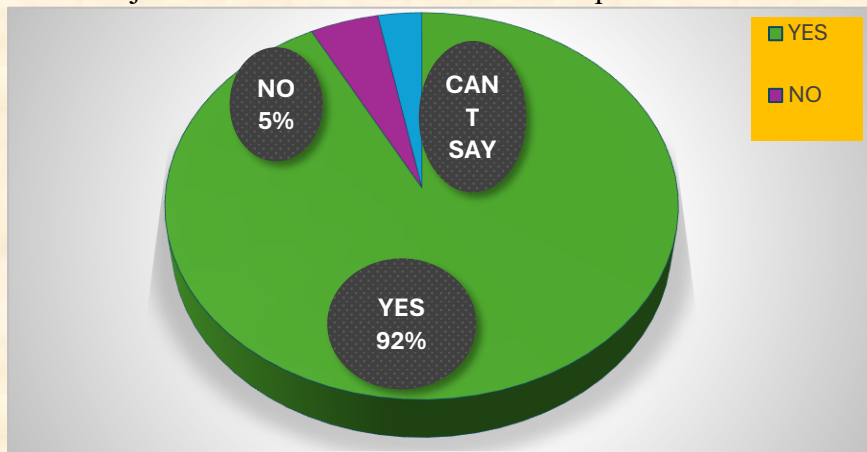
Q7) Overall Social Development Leads to Improve the Socioeconomic Standards of Leaving & Understanding Between Citizens.?



Interpretation:-

The Data Reveals from the above table, opinion of the respondents over Overall Social Development Leads to Improve the Socioeconomic Standards of Leaving & Understanding Between Citizens.? Reveals that 79% respondents are agreed over the statement, while 17% respondents are not agreed on the statement .and 04% respondents are unable to produced their fir opinion they responded as Can't Say.

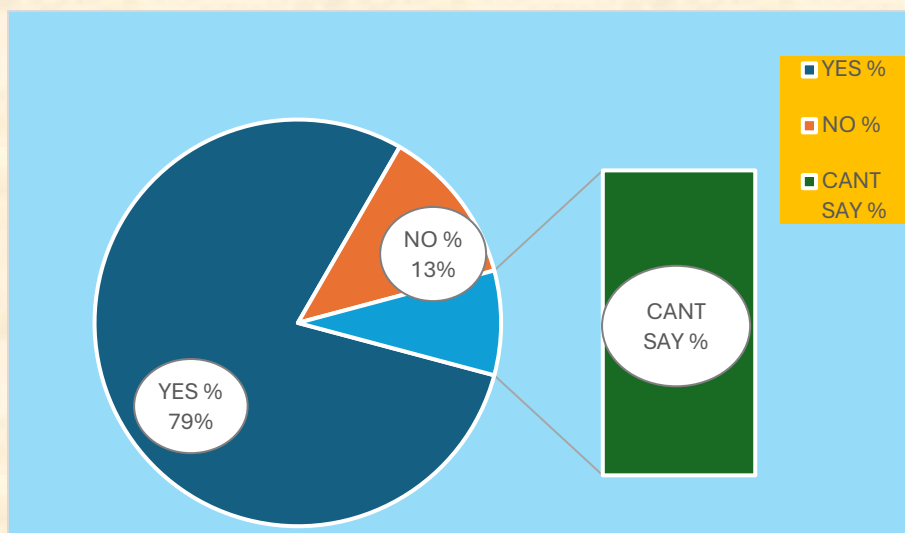
Q8) Infrastructural Developments Accompanied with Education & Responsible Citizens is one of the Major Indices of Overall Social Development.?



Interpretation-:

The Data Reveals from the above table, opinion of the respondents over Infrastructural Developments Accompanied with Education & Responsible Citizens is one of the Major Indices of Overall Social Development.? Reveals that 92% respondents are agreed over the statement, while 05% respondents are not agreed on the statement and 03% respondents are unable to produced their fir opinion they responded as Can't Say.

Q9) Education & Learning Creates More Employment & Leads to Increase in Standard of Leaving.?



Interpretation-:

The Data Reveals from the above table, opinion of the respondents over Education & Learning Creates More Employment & Leads to Increase in Standard of Leaving.? Reveals that 79% respondents are agreed over the statement, while 13% respondents are not agreed on the statement .and 08% respondents are unable to produced their fir opinion they responded as Can't Say.

Experts Opinion From Their Direct Interviews Over

“A Study the Role & Impact of New Technology, Digital Communication, Social Media in Education & Learning Process & Overall Social Development” -:

1. Digital Education, Digital Communication & Social Media will bridge the gap between the Rural & Urban sectoral education & the Students from Rural or Remote area can avail UpToDate Knowledge. Those who are not adoptable to this New Technology will Remain Behind in this New Techno-Savi World. - Dr . Dnyaneshwar Dalvi (Director Dalvi Educational Trust)
2. With the Use of New Technology, the Goal of Education at Door steps & Information on figure tips is possible. The various Processes & works in the Educational Sector become Faster & easier. This also ease Rapid social Development through Education. this led to Overall Social Economical development at Micro & Macro Level. - Dr .Arti Dnyaneshwar Dalvi (Director Dalvi Educational Trust)
3. In nut shell speaking:- 1. Digital tech. Improves method of learning. 2. It Improves visual information. 3. It provides Different ways of learning regarding same topic.
4. Dr. Mahesh M. Deshpande (Principal CCS. College ,Wakad Pune)
5. It's very good for Education – Prof. Ashok Kumbhar (CCS. College ,Wakad Pune)
6. There are some misinterpretations regarding Digital media in the society we must consider it and Cautious while implementing the New Technology. Misuse of this New Technology leads to Social Evils. Arrogancy ,Mis concepts regarding Life & Emotional Disbalance & Increase tendency of Undue Expenses are observed among the Students who are heavy user of social media. Besides this Actual Book Reading is gating hampered such factor effects on Perfect & Profound Knowledge gaining. So, application of New Technology is made with Common sense & considering the whole aspects of it. -Dr. Mahendra Sonawane(CCS. College ,Wakad Pune)
7. Education & learning expands your thinking and vision which can lead to socio economic growth - Dr. Supriya Kulkarni (CCS. College ,Wakad Pune)
8. New technology and digital communication have transformed education and learning by making knowledge more accessible, interactive, These innovations enhance collaborative learning, skill development, and global connectivity, ensuring students adapt to modern advancements. Overall, they play a crucial role in shaping a tech-driven, future-ready education system. – Dr. Shruti Kulkarni (CCS. College ,Wakad Pune)
9. New technology and digital communication play a vital role in transforming education by making learning more accessible, interactive, and personalized. Tools like online platforms, educational apps, and virtual classrooms help students learn anytime, anywhere. These technologies promote collaboration, critical thinking, and digital literacy, contributing to students' overall development. –Prof. Sandip Mane(CCS. College ,Wakad Pune)
10. NEP 2020 Covers all Concept - Dr. Subhash Pawar (Vice-Principal SSVMM , MKSSS College. Pune)

11. Good effort sir. But there is a big difference between rural and urban areas. Not just knowledge, but also the culture of that culture. They also check how much one understands and how one uses that knowledge. - Dr. Sunil Kelkar(Ex-Vice-Principal SSVMM , MKSSS College. Pune)
12. Education is must for the upliftment of the society. Digital education will make the teaching learning process better. It is boundaryless and can give access to all sections of the society. It will be helpful in seeking better socio-economic development, growth of the nation and creating responsible citizens. - Prof. Archana Deshmukh (Vice-Principal SSVMM , MKSSS College. Pune)
13. Yes, it is really helpful – Dr. Sunita Bhole (MIT Eng. College ,Pune)
14. New technology and digital communication have transformed education by making learning more accessible, interactive, and personalized. They enable real-time collaboration, global connectivity, and access to vast resources, fostering critical thinking and self-paced learning. This digital shift supports overall development by enhancing skills, crativity, and adaptability in a rapidly changing world. - Dr. Kavita Moholkar (Principal JSPM Eng. College. Pune)
15. Digital education is crucial for students because it enhances accessibility, engagement, and learning outcomes through personalized, interactive, and flexible learning experiences. It equips students with essential digital skills for the future and promotes collaboration and global connections. - Dr. Dhanraj Jadhav(D.Y. Patil Enge .College Pune)
16. Digital Technology helps students to perform better it also helps in bridging the gap between modern world – Prof Vaishali Deshmukh, Pune
17. Online platforms, digital resources and mobile devices enable students to access educational content from anywhere, bridging geographical gaps. These digital platforms facilitate communication among students, teachers and experts worldwide, promoting global understanding, cultural exchange and collaborative problem-solving. - Prof. Radhika Lad, Pune
18. Technology is beneficial only if we use it for our betterment. Role of mind discrimination is extremely important as exposure is vast nd we need to choose what is better for my upliftment. – Prof. Chaitrali Puranik(C.A. Pune)
19. Technology is important in education & Infrastructure development is Necessary. – Prof. Sandesh Mukhedkar (Steps Academy. Pune)
20. Will make the maximum benefit using both technologies. – Prof. Santosh Pawar (Rajat Academy ,Wakad Pune)
21. Digital media and new technology have transformed education by making it more accessible, interactive, and efficient. They bridge gaps between different regions and social groups, enabling inclusive learning. This shift not only enhances individual knowledge but also contributes to social and economic progress by fostering skilled, informed, and responsible citizens. - Nikhil Pawar (IT Professional ,Pune)

22. By my point of view, of course technology plays a vital role in education. it helps to learn quickly – Apurva (Business Professional ,Nashik)

Observations & Conclusions

- It is observed & The Data Revels from the opinion of the respondents over the Statement /Question “Do You Think Digital Media Helps the Students to Learn Easily & Faste?” Uncovers that 84% respondents are agreed over the statement, while 16% respondents are not produced their fir opinion they responded as Can’t Say. Revels that Digital Media Helps the Students to Learn Easily & Faste it is also useful & effective regarding Process of Education & Learning leads to Development of Student Learning & Teaching Methodology.
- It is observed & The Data Revels from the opinion of the respondents over Statement /Question “Due to Use of New Technology Opens New Dimensions of Learning.?” Uncovers that 100% respondents are agreed over the statement. Revels that Use of New Technology Opens New Dimensions of Learning It’s a Progressive step towards Overall Development by Adopting New Technology.
- It is concluded that & The Data Revels from the opinion of the respondents over Statement /Question “Vast-Spread Education & Learning is Possible Due to Use of New Technology” Uncovers that 96% respondents are agreed over the statement, while 04% respondents are not agreed on the statement. Revels that with the help of New Technology Vast-Spread Education & Learning is Possible & Goal of “Education at Doore Step” will, be achieved.
- It is observed & The Data Revels from the opinion of the respondents over Statement /Question “Do You Think use of New Technology, Digital Media in Education & Learning will Bridge the Gap Between Rural & Urban Sectors Development.?” Uncovers that 84% respondents are agreed over the statement, while 12% respondents are not agreed on the statement .and 04% respondents are unable to produced their fir opinion they responded as Can’t Say. Concludes that the Gap Between Rural & Urban Sectors Development will Bridge through use of New Technology, Digital Media in Education & Learning.
- It is concluded that & The Data Revels from the opinion of the respondents over Statement /Question “Use of New Technology Digital Media in Education & Learning makes Boundary Less Education & Education at Doors Steps / Education on Finger Tips & Education to All & Give Positive impact on Overall Socio-Economic Development.?” Revels that 83% respondents are agreed over the statement, while 12% respondents are not agreed on the statement .and 05% respondents are unable to produced their opinion they responded as Can’t Say.

Concludes that Targets of Boundary Less Education , Education on Finger Tips, Education to All, Education at Doors Steps can be achieved, it also gives a Positive impact on Overall Socio-Economic Development its Good Sign.

- It is observed & The Data Revels from the opinion of the respondents over Statement /Question “Do You Think Use of New Technology in Education & Learning Helps in

Achieving Goal of Overall Social Development ?” Revels that 79% respondents are agreed over the statement, while 13% respondents are not agreed on the statement .and 08% respondents are unable to produced their fir opinion they responded as Can’t Say. Concludes that Goal of Overall Social Development can be grabbed with Implementing

New Technology in Education & Learning.

- It is observed & The Data Revels from the opinion of the respondents over Statement / Question “Overall Social Development Leads to Improve the Socioeconomic Standards of Leaving & Understanding Between Citizens.?” Revels that 79% respondents are agreed over the statement, while 17% respondents are not agreed on the statement .and 04% respondents are unable to produced their fir opinion they responded as Can’t Say. Concludes that in the view point of Strong Nation Building Improved Socioeconomic Standards of Leaving , Understanding Between Citizens, Overall Social Development are the basic Requirements & New Technology in Education & Learning definitely Plays a Pivotal Role for Achieving Goal of Nation Building.
- It is concluded that & The Data Revels from the opinion of the respondents over Statement / Question “Infrastructural Developments Accompanied with Education & Responsible Citizens is one of the Major Indices of Overall Social Development.?” Revels that 92% respondents are agreed over the statement, while 05% respondents are not agreed on the statement .and 03% respondents are unable to produced their fir opinion they responded as Can’t Say. Concludes that only Infrastructural Developments is not enough for Overall Social Development but this process must include Educated Responsible Citizens for Sustainable Developments.
- It is observed & The Data Revels from the opinion of the respondents over Statement / Question “Education & Learning Creates More Employment & Leads to Increase in Standard of Leaving.?” Revels that 79% respondents are agreed over the statement, while 13% respondents are not agreed on the statement .and 08% respondents are unable to produced their fir opinion they responded as Can’t Say. Concludes that by the help of New Technology in Education & Learning Creates More Employment Opportunities this ultimately Increase in Standard of Leaving it ultimately turns in to Overall Socioeconomical Development. It’s a Good sign for Ideal Society & Strong Nation Building.

The Personal Classroom teaching method by experienced teachers

It is also observed that important of Personal touch in Education & Learning process is unavoidable The classroom teaching by experienced teachers provides Personal touch in Education & Learning process yields better understanding of Emotional elements like sympathy, empathy, personal correlation, emotional support, classroom dynamics & handling classroom management by taking in to account the emotional angles of the students. Also, this Personal Classroom teaching method by experienced teachers helps in better understanding of Students. Personal Classroom teaching method by experienced teachers enhances capacity of handling of various contextual situation it can also adopt the changing needs of time with better flexibility. adopting a various method of teaching to meet the individual student’s needs. The Personal Classroom teaching method by experienced teachers guides the students over how to apply theoretical concepts in real-world. This creates a helpful & joyful learning environment.

Ethical Issues

It is Concluded that Teachers Experience, In-Depth Knowledge, Capacity of Making Contextual Decision, Personal Human Relation Building , Community Building ,Society Building Etc. Plays a Pivotal Role. This is Very Important Point for The Nation Building as Nation Consist Bunch of Different Culture, Societies, Context People's Groups Which are Reciprocally Correlated to Each Other. In the View of Such Major Element the Personal Classroom Teaching Method by Experienced Teachers Plays A Pivotal Role and it Maintains the Sense of Community & its Development . it is also Observed that in the Personal Classroom Teaching Method By Experienced Teachers the Teacher Can Design A Suitable Course Tutorial Accordingly while Teaching this is Good for Development of Student's Brain Capacity , Sense Of Humor, Adaptability, Helps In Balancing Emotional Level of Students, Helps in Developing Ability of Critical Thinking , Problem Solving Method, this also Active & Enhance Students & Teachers Creativity Power, Such Method Provides Real World Experience, Increases Engagement with the Subject the Personal Classroom Teaching Method By Experienced Teachers are the Major Things Which Cannot bypass by the Use of New-Technology Digital Communication , Social Media in Education, Learning Process. and in Overall Social Development.

A Philosophical Aspect

The Personal Classroom teaching method by experienced teachers provides wisdom & essential emotional, social, and cognitive support in education system. The Philosophy of the Terms Information , Knowledge & Wisdom can be better understood in The Personal Classroom teaching method by experienced teachers because now a day tools like Google ,AI & all the Internet platform provides huge information to the students many time the authenticity of such information is a questionable. So, there is a need of understanding the difference between Information , Knowledge & Wisdom this is possible in The Personal Classroom teaching method by experienced teachers by using a step-by-step method because Here IQ & EQ level accordingly notions of the students' mind-sets subject matters. We cannot by pass the need of The Personal Classroom teaching method by experienced teachers Other wise Use of New- Technology Digital Communication , Social Media in Education, Learning Process becomes uncontrollable may yields wrong presumptions regarding information & knowledge & Wisdom in the minds of students & they get the wrong notation that they have got complete knowledge & they are the master of that subject by presuming , "information means knowledge & wisdom" due to such wrong presumptions many of the students deceives themselves. So, there is need of implementing New- Technology Digital Communication , Social Media in Education, Learning Process with cautiously but in this new era of Information technology we cannot denied the importance of New- Technology Digital Communication , Social Media in Education, Learning Process As it Yields High Learning Outcomes & Leads to Better Academic Performance & Development. so, it is need of balanced attitude regarding above subject for Overall Socioeconomic Development.

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Questioner

1. Do You Think Digital Media Helps the Students to Learn Easily & Faster ?
2. Due to Use of New Technology Opens New Dimensions of Learning.?
3. Vast-Spread Education & Learning is Possible Due to Use of New Technology?
4. Do You Think use of New Technology, Digital Media in Education & Learning will Bridge the Gap Between Rural & Urban Sectors Development.?
5. Use of New Technology Digital Media in Education & Learning makes Boundary Less Education & Education at Doors Steps / Education on Finger Tips & Education to All & Give Positive impact on Overall Socio-Economic Development.?
6. Do You Think Use of New Technology in Education & Learning Helps in Achieving Goal of Overall Social Development ?
7. Overall Social Development Leads to Improve the Socioeconomic Standards of Leaving & Understanding Between Citizens.?
8. Infrastructural Developments Accompanied with Education & Responsible Citizens is one of the Major Indices of Overall Social Development.?
9. Education & Learning Creates More Employment & Leads to Increase in Standard of Leaving.?

‘Biomimicry as a Pedagogical Framework to Reimagine Sustainable Fashion Education and Inspire Creative Design Thinking’

Garima Raj
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MKSSS's School of Fashion Technology, Pune

Dr. Garima Bhalla
Principal
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Abstract

The fashion industry increasingly demands design education models that align with sustainable practices and futuristic innovation. While biomimicry drawing design inspiration from nature has gained renewed attention in recent years. It is often regarded as a contemporary concept; it has long informed human creativity across domains. *Drawing from examples like Velcro (burrs), bullet trains (kingfisher beak), and self-cleaning textiles (lotus leaf)*, this study highlights biomimicry's long-standing influence on innovation, and the integration of its design philosophy that draws from nature's adaptive systems as a pedagogical framework for Developing sustainable and innovative thinking among the Design students.

In today's technological age, the integration of artificial intelligence, simulation tools, and digital design technologies enhances the educational potential of biomimicry by enabling immersive learning experiences, advanced modeling, and dynamic visualization.

This study **aims to explore** the relevance and application of biomimicry in Fashion Education and Creative Design Thinking By analyzing the role of digital tools and AI in Enhancing biomimetic pedagogy and to propose a curriculum level strategy to enhance interdisciplinary and sustainability focused learning. This study based on a **qualitative methodology**, combining, **Primary data** collected through focused group discussions with fashion educators and sustainability-oriented professionals to understand current teaching approaches and perceptions of biomimicry and **Secondary data** collected from reputed research journals, articles, published case studies, and documented design examples to explore the application in Fashion Education and Creative Design thinking support and contextualize the findings.

This study shows the potential which enhances **ecological literacy, critical thinking, and creative problem solving** in students. It also aligns with broader educational goals around **career readiness, curriculum enrichment, and global benchmarking** in sustainable fashion. The study concludes by recommending a flexible integration model for biomimicry in Indian fashion curricula bridging **traditional ecological knowledge with emerging digital capabilities** to prepare globally competent, environmentally responsible designers.

Keywords: Biomimicry, Creative design, Sustainable Design, Pedagogical Innovation, Indian Higher Education, Curriculum Reform

1. Introduction

In the 21st century, global education systems are undergoing significant change in basic assumptions. As climate change, ecological degradation, and overconsumption accelerate, **higher education is increasingly being viewed as a transformative force** not merely for imparting skills but for shaping environmentally responsible, critical, and systems literate citizens (UNESCO, 2022). This imperative is echoed in international frameworks such as the United Nations' Sustainable Development Goals (SDGs), which advocate for education that encourage s sustainability (SDG 4 and 12), and in national reform mandates like India's

National Education Policy (NEP) 2020, which emphasizes **experiential, interdisciplinary, and values-based learning** (Ministry of Education, 2020).

Within this educational reorientation, **design disciplines and specially fashion education stands at a pivotal intersection**. The global fashion industry is widely acknowledged as one of the most resource intensive sectors, responsible for approximately 10% of annual global carbon emissions and producing over 92 million tons of textile waste (Ellen MacArthur Foundation, 2017). As India emerges as a significant player in this space, there is an urgent call to **rethink the pedagogy of fashion education to emphasize not only design proficiency but also ecological literacy, material ethics, and adaptive creativity**.

Current fashion curricula often prioritize market responsiveness and aesthetic fluency, yet they fall short in embedding **systemic thinking, regenerative design, and nature-based innovation** into the learning process (Mishra et al., 2023). While sustainability is often discussed in theory, few programs enable students to engage meaningfully with ecological design strategies or develop the mindset required for circular and restorative thinking.

Among the most promising and underexplored frameworks for addressing this gap is **biomimicry**, the interdisciplinary design approach that emulates nature's time-tested strategies and patterns to create sustainable solutions (Benyus, 1997). Biomimicry views nature not only as a source of inspiration but as a mentor, model, and measure. It offers a 3.8-billion-year library of evolutionary intelligence from which to draw innovation that is **resource efficient, resilient, and responsive to changing conditions**.

‘Biomimicry is learning from and then emulating natural forms, processes, and ecosystems to create more sustainable designs.’ NatEnt (n.d)
Janine Benyus, Biomimicry Institute (Biomimicry, n.d.)

Classic biomimetic examples such as Velcro® (inspired by burr hooks), bullet train nose cones (modeled after the kingfisher's beak), and self-cleaning textiles (mimicking the lotus leaf's hydrophobicity) demonstrate the **transformative power of design grounded in biology** (Eadie & Ghosh, 2020).

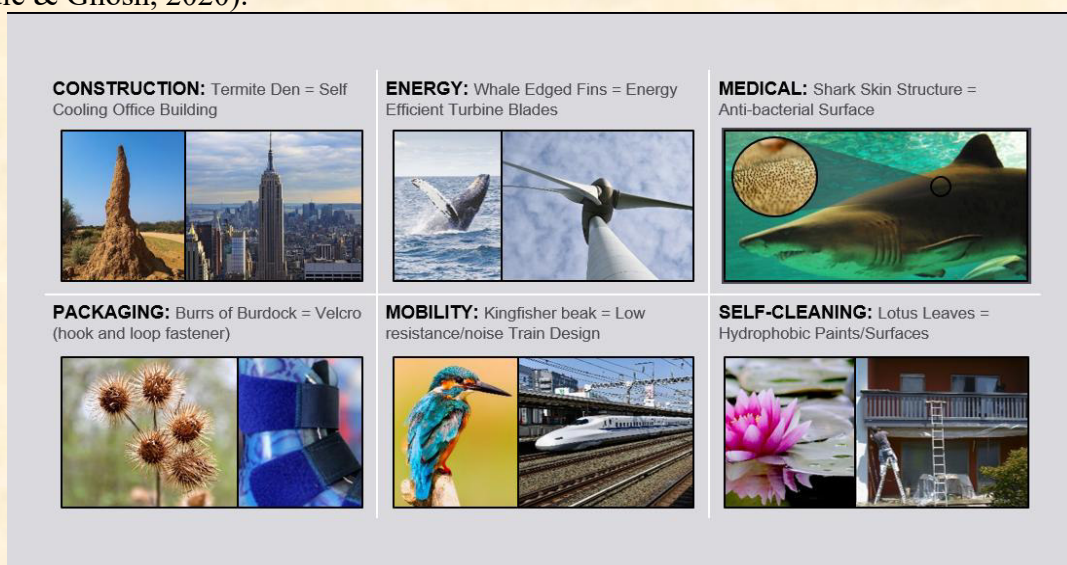


Image 1: Iconic Examples of Biomimicry Across Industries

Despite its transformative potential, **biomimicry remains marginal in Indian fashion**

education, often confined to abstract discussions rather than being embedded as a structured, interdisciplinary pedagogical framework (Mejía-Villa, 2021). This disconnect is particularly notable in the context of global design education, where institutions are increasingly integrating AI, 3D simulation tools, and immersive digital platforms to explore complex forms, optimize material efficiency, and simulate sustainable design outcomes (Nadir Rihani, 2024).

The convergence of **biomimicry, sustainability education, and AI-driven design tools** presents a unique opportunity to reshape the fashion learning landscape. Digital platforms such as **CLO3D, Rhino, Midjourney, and DALL·E** allow students to replicate nature-inspired textures, visualize system-level garment behaviors, and experiment with eco-centric, speculative designs in virtual environments. These tools make biomimicry not only intellectually accessible but also **experientially rich**, enhancing student engagement with sustainability through hands-on digital exploration.



Image 2 Generative AI and 3D visualization software like CLO3D and Midjourney help fashion students prototype nature inspired garments with speed and precision. (Image: Generated by AI)

Moreover, **philosophical reflections on human nature disconnect** provide deeper justification for this shift. Human civilization has increasingly seen itself as separate from nature, creating linear systems of production that extract, consume, and discard contrary to nature's cyclical and regenerative logic. As Benyus (2012) argues, while humans have created enormous technological complexity, we often ignore **nature's genius for solving design challenges within ecological limits**. Biomimicry, in this sense, is both a **technical method and an ethical reorientation** urging students and educators alike to view nature not as a passive backdrop, but as an **active collaborator in the learning and creation process**. (Bovill, 2016, 197)

'Humans are clever, but without intending to, we have created massive sustainability problems for future generations. Fortunately, solutions to these global challenges are all around us.' Cape May Whale Watch & Research Center (n.d.) highlights biomimicry as a way to learn from nature's intelligence to solve human challenges.

From an innovation and market standpoint, the economic relevance of biomimicry is rapidly expanding across sectors. Nature-inspired systems such as the airflow of whale fins, the structural integrity of seashells, and the cooperative intelligence of beehives are no longer seen as mere metaphors but as viable models for sustainable innovation. According to NYSERDA

(2023), such biomimetic designs are projected to contribute up to **\$1.6 trillion to global GDP by 2030**, reflecting their scalable potential in fields like construction, materials science, energy, and mobility. Complementing this, Statista (2023) estimates the **biomimetic technology market will grow to \$18.5 billion by 2028**, indicating not only the design relevance of biomimicry but its commercial and investment viability across industries.

To fully appreciate biomimicry's transformative potential, it is essential to view it not just as a design method, but as a worldview one that reconnects human systems with natural intelligence. As Janine Benyus (1997) emphasized, biomimicry is not about extracting from nature but learning from it. It is grounded in three pillars: **Ethos** (responsibility toward nature), **Emulate** (imitating natural models), and **Reconnect** (restoring human-nature relationships). Imitation of the living and nature that is what biomimicry means. Nature is not only a source of sustenance, but also a **blueprint of innovation**. From birds inspiring flight to whales inspiring wind turbines, these examples reflect **how nature continues to offer resilient, elegant, and ecologically sound solutions**. Mimicking these natural systems not only drives innovation but does so with **minimal environmental impact**, emphasizing **circularity, multifunctionality, and adaptability**.

Industries across the globe from architecture to biotech are already leveraging biomimicry to design **smarter, sustainable solutions**. The Japanese bullet train, modeled on the kingfisher's beak, and antimicrobial surfaces designed after shark skin, stand as iconic examples. In fashion too, biomimicry holds tremendous potential not just in material innovation but in **rethinking pedagogy, consumption, and aesthetics** for a sustainable future.

Purpose of the Study

This paper investigates how **biomimicry can be operationalized as a pedagogical framework within Indian fashion education**. It explores the role of AI, simulation technologies, and interdisciplinary strategies in enhancing biomimicry-based learning, with the goal of encouraging creative problem solving, ecological intelligence, and curriculum innovation.

The study is grounded by the following research questions:

1. In what ways can biomimicry be strategically incorporated into the Indian fashion design curriculum to foster sustainability and drive innovation?
2. What role do emerging digital tools and AI technologies play in supporting biomimetic pedagogy and enhancing learner engagement?

By building a theoretical and applied understanding of these intersections, this study contributes to advancing Indian higher education's role in preparing **globally competent, environmentally responsible designers** for the future of fashion.

3. Literature Review

To critically position biomimicry as a pedagogical model within Indian fashion education, the literature review is organized thematically across five areas: (1) Biomimicry and Sustainable Strategy /Development, (2) Pedagogical Innovations and Creative Design Thinking, (3) Role of AI and Digital Tools in Design Education, (4) Biodesign and Biomaterials in Fashion and Ecological Disruption and (5) Biomimicry in Learning Models and Curriculum Design.

Benyus (1997) defines *biomimicry* as learning from nature's 3.8 billion years of adaptive intelligence to create sustainable human solutions. Its three core principles **Ethos** (respect for life), **Emulate** (imitate natural design), and **Reconnect** (restore human-nature connection) form the foundation of biomimetic thinking.

From early innovations like bird flight inspiring airplanes to modern material design, biomimicry bridges nature's systems with human creativity. Beyond aesthetics, it encourages regenerative design thinking applicable across architecture, medicine, transportation, and fashion (Eadie & Ghosh, 2020; Gamage & Hyde, 2012).

3.1 Biomimicry as a Sustainable Strategy

Biomimicry offers a systemic lens for sustainable innovation. Raman et al. (2024) link biomimetic design to the SDGs especially SDG 3 (Health), SDG 7 (Clean Energy), and SDG 12 (Responsible Consumption). They argue that nature's solutions, such as polar bear fur for insulation or termite mounds for thermoregulation, can inform low-impact systems thinking.

Ortega Del Rosario et al. (2023) highlights biomimetic materials and energy-efficient surfaces like sharkskin-inspired hydrophobicity or lotus leaf self-cleaning which, when combined with digital prototyping, enable rapid material innovation. For fashion education, this cross-disciplinary approach supports sustainability through digital exploration.

Eadie & Ghosh (2020) focus on biomimicry in textiles smart fabrics mimicking cephalopod skin or spider silk show nature's potential for functional, durable design. Despite its value, fashion curricula underutilize biomimicry, and its integration could redefine linear fashion production models toward circular and ethical systems.

'Humans are clever, but... we have created massive sustainability problems. Fortunately, solutions are all around us.' (Great Transition Stories, n.d.)

Biomimicry Institute (2017)

3.2 Pedagogical Innovation and Creative Thinking

Integrating biomimicry into design pedagogy cultivates ecological intelligence and adaptive creativity. Mishra et al. (2023) found that biomimicry strengthens design thinking skills students who prototyped garments inspired by termite cooling systems developed both functional and ethically grounded solutions.

Swarm Magazine (2022) showcased how metaphors from coral reefs, beetles, and fungi helped students design Avant Garde fashion questioning human-material relationships. These projects extended beyond aesthetics to challenge unsustainable norms.

Fibre2Fashion (2022) reported on courses and workshops using biomimetic processes to solve real-world problems, e.g., water-harvesting garments inspired by desert beetles or

biodegradable packaging modeled after fruit peels. These approaches encouraged interdisciplinary collaboration and problem-based learning. Together, these studies show that biomimicry fosters purpose-driven creativity, ecological awareness, and holistic design thinking in learners.

3.3 AI & Digital Tools in Design Education

AI and digital tools are transforming how students engage with biomimicry. Generative platforms like **Midjourney** and **DALL·E** allow students to visualize abstract natural metaphors e.g., cuttlefish camouflage or fractal growth. These tools turn biological prompts into compelling visual prototypes.

CLO3D, a fashion simulation software, enables digital testing of biomimetic silhouettes, textures, and behaviors, reducing waste and supporting low-impact innovation. Students can model garments inspired by natural thermoregulation or kinetic movement before physical production.

According to Ortega Del Rosario et al. (2023), such technologies foster experiential, multisensory learning. They bridge conceptual thinking with tangible prototyping and promote systems thinking encouraging learners to consider lifecycle, impact, and adaptability from the ideation phase.

These digital platforms not only enhance creativity but also make biomimicry more accessible, scalable, and pedagogically relevant for the next generation of eco-conscious designers.

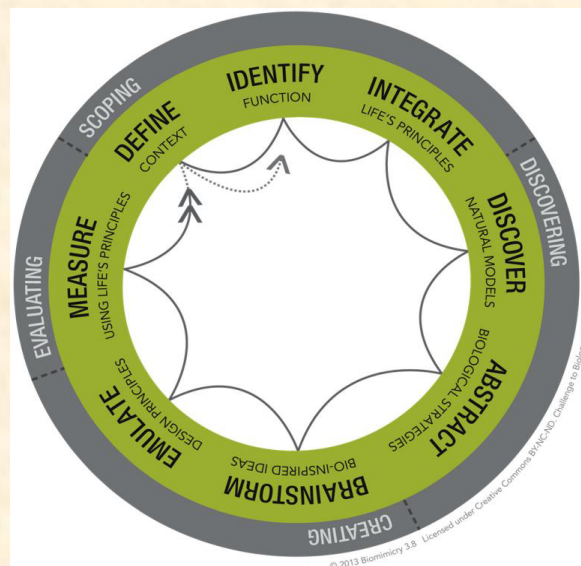


Image 3 Biomimicry Tools in Design Education

As shown in Image 3: *Digital Biomimicry Tools in Design Education*, the Biomimicry Design Spiral encourages a cyclical process from defining a challenge, biologizing the problem, abstracting biological principles, to digitally emulating and evaluating them. These tools scaffold the creative process and make biomimicry more accessible and scalable across classrooms.

Linder, B. (2025, July 6).

Importantly, these digital tools democratize access to **biomimetic exploration** by allowing students regardless of institutional funding or lab infrastructure to model and refine bio-inspired innovations. Through platforms that combine **visual AI generation** with **textile simulation and design software**, learners can interactively study biological analogs (like shark skin, butterfly wings, or gecko feet), understand their underlying functions, and reinterpret them as sustainable fashion solutions.

Therefore, AI and digital tools do not simply aid in visualization, they fundamentally **reshape the design learning interface**, offering a medium where **imagination, technology, and ecology converge**. Their thoughtful integration into curricula stands to enhance both the **depth of inquiry** and the **quality of outcomes** in biomimicry informed fashion pedagogy.

2.4 Biodesign, Biomaterial in fashion and Ecological Disruption

Biodesign marks a pivotal shift in sustainable fashion, transforming both **material creation and design philosophy**. More than technological innovation, it represents a **mindset** that centers ecological consciousness (Collet & Williams, 2020). Unlike conventional fashion that prioritizes speed and profit, bio design adopts **systems thinking**, using **living organisms, biodegradable substrates**, and **regenerative processes** to minimize environmental impact. (Myers & Antonelli, 2012)

Collet's work at Central Saint Martin's introduces 'grow-made' textiles developed from **algae, fungi, and bacteria**, challenging petroleum-based supply chains and advocating for **closed-loop systems**. Biomimicry here serves as a **method and model**, allowing designers to imitate natural abilities like **self-repair, filtration, and thermoregulation** (Collet & Williams, 2020). Eadie and Ghosh (2020) highlight how biologically inspired textiles such as those mimicking **sharkskin, lotus leaves, or spider silk** enable fabrics with **hydrophobic, antimicrobial, and adaptive** qualities. These materials offer **eco-friendly, low-maintenance alternatives** to chemical treatments and reduce dependency on plastics and synthetic fiber major contributors to **fashion waste and microplastic pollution**.

Biodesign promotes **interdisciplinary collaboration** across ecology, bioengineering, and textile science. When integrated into education, it equips students with tools to **rethink fashion's lifecycle** from fabrication to **biodegradation**, fostering innovation and ecological accountability.

2.5 Biomimicry in Learning Models and Design Education

Embedding biomimicry in design education calls for a **shift in pedagogy** from market-driven priorities to **ecological consciousness**. Mejía Villa (2021) notes that sustainability often appears as a visual theme rather than a core design principle. Curricula tend to emphasize outcomes over the **development of ecological, emotional, and ethical awareness**.

The study advocates for **effective learning** empathy toward nature, responsibility for environmental outcomes, and reflection on the ecological impact of design. Yet short academic cycles often introduce biomimicry in **isolated modules**, rather than through **curriculum-wide immersion**.

Gamage and Hyde (2012) propose a model originally for architecture distinguishing **direct biomimicry** (e.g., garments mimicking spider silk or bird wings) and **indirect biomimicry** (drawing from natural **functions** like feedback loops or symbiosis). Their approach fosters

systems thinking, helping students design for **resilience and regeneration** rather than linear efficiency.

Together, these frameworks support a **holistic pedagogical reform**, positioning biomimicry as a bridge between **design, ethics, and ecology**. For Indian fashion education, this shift is not optional but essential for cultivating globally competent, environmentally responsive designers.

2.6 Case Study Insight: Biomimicry in Haute Couture – The Work of Iris van Herpen

An exemplary case of biomimicry in fashion is embodied in the work of Dutch designer **Iris van Herpen**, whose creations seamlessly integrate nature, technology, and art into sculptural couture. Her approach moves beyond aesthetic inspiration to material innovation and construction, drawing from natural principles such as **growth patterns, hydrodynamics, and kinetic movement**. Her 2024 exhibition *Sculpting the Senses* at the **ArtScience Museum, Singapore**, features over 140 works in dialogue with natural specimens and contemporary art framing biomimicry not just as visual metaphor but as a **design philosophy** rooted in nature's intelligence. 'There are rare occasions when one gets to witness nature, science, technology, art, fashion, fantasy, design, and craftsmanship all fused to fit the human form. Iris van Herpen has that to her credit, and how!'



Image 4 2024 exhibition 'Sculpting the Senses' at the Art Science

Van Herpen's use of **3D printing, magnetism, resin-embedded textiles, and hybrid composites** like steel-silk and iron filings exemplifies **adaptive, sustainable design**, echoing biomimetic principles of **modularity, flexibility, and resilience** (Benyus, 1997; Ortega Del Rosario et al., 2023).

Her work offers an **experiential pedagogical model**, where biology converges with digital fabrication encouraging students to explore nature-inspired, emotionally expressive, and ecologically attuned design. Worn by icons such as **Beyoncé, Lady Gaga, and Natalie Portman**, her creations demonstrate how biomimicry can shape fashion's future through both **innovation and ethics**.

3. Methodology

This study adopts a **qualitative, secondary data driven research design** grounded in thematic analysis. It aims to explore the pedagogical integration of **biomimicry** into Indian fashion education and assess its potential to Incorporate sustainability, creativity, and interdisciplinary innovation using nature inspired design approaches.

3.1 Data Collection

Secondary Data:

The research is based exclusively on **secondary data sources**. These include:

- **Peer reviewed journal articles** on biomimicry in design, architecture, education, and sustainable fashion.
- **Academic case studies and institutional reports** showcasing curriculum reform and biomimetic design thinking.
- **Professional blogs and expert interviews**, including works from fashion technology institutes and designers practicing biomimicry or bio design.

Based on Various **peer reviewed academic works** and **reputable sources** (industry blogs, institutional case studies, etc.) were reviewed to extract thematic trends and practical applications of biomimicry in fashion pedagogy.

3.2 Analytical Framework

Digital Biomimicry Tools in Design Education

The *Biomimicry Design Spiral*, developed by the Biomimicry Institute, offers a structured, seven-step model Define, Biologize, Discover, Abstract, Emulate, Evaluate, and Repeat that mirrors nature's iterative problem-solving over evolutionary timescales. In this study, it serves as a conceptual tool to examine pedagogical models and guide curriculum reform in fashion education. The spiral encourages ecological intelligence, iterative thinking, and nature-inspired creativity among learners.

When combined with digital tools like **CLO3D**, **Midjourney**, and **Rhino**, the spiral enables the translation of analog inspiration into immersive, digitally simulated sustainable design bridging biological insight with contemporary pedagogy.

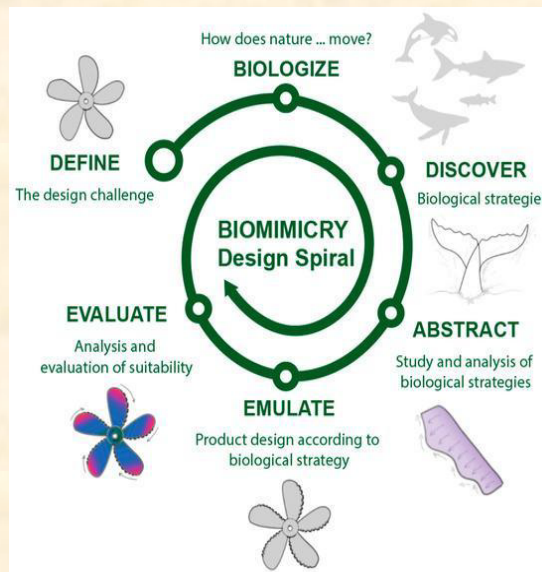


Image 5: Digital Biomimicry Tools in Design Education

Thematic Analysis Approach

A three-phase qualitative thematic analysis was conducted to identify:

1. Barriers to integrating biomimicry into fashion curricula.
2. Pedagogical gaps in sustainability, interdisciplinarity, and tech-enabled design.
3. Opportunities to embed biomimicry via AI and simulation tools.

Emerging codes included *ecological literacy*, *AI-enhanced creativity*, *student mindset gaps*, and *assessment limitations* drawing from key literature (Mejía-Villa, 2021; Collet & Williams, 2020; Eadie & Ghosh, 2020; Gamage & Hyde, 2012; Raman et al., 2024). This ensures findings are both **evidence-based and contextually grounded**, offering an Indian perspective on reforming fashion design pedagogy.

4. Findings and Discussion

This section synthesizes insights from thematic analysis of scholarly literature, case studies, and digital artifacts. Four key themes emerged, revealing opportunities and barriers in adopting biomimicry as a transformative pedagogical model for Indian fashion education. When strategically embedded, biomimicry fosters sustainable design practices, ecological literacy, and iterative problem-solving through analogical reasoning and observation.

4.1 Lack of Structured Biomimicry in Fashion Curricula

While extensively applied in architecture and product design (Gamage & Hyde, 2012), biomimicry remains peripheral in Indian fashion education. Sustainability is often presented as a broad theme or elective, without embedding biological emulation into form, process, or ecosystem-level thinking.

‘Nature provides a perfect blueprint for form-function alignment, but fashion pedagogy seldom translates these biological strategies into classroom practices.’ – Eadie & Ghosh (2020)

This represents a missed opportunity to integrate nature's adaptive strategies into core design thinking.

4.2 Functionality vs. Sustainability: A Pedagogical Dissonance

Design learners frequently prioritize marketability, aesthetics, and comfort over ecological integration. As *Mejía-Villa (2021)* notes, sustainability is often viewed as a superficial add-on rather than an ethical design foundation.

‘There is a tension between performance-driven design goals and the deeper ecological consciousness that biomimicry demands.’ – *Mejía-Villa (2021)*

This highlights a gap in affective learning. Curricula must emphasize value-based approaches that shape not only products but also ethical mindsets.

4.3 Role of AI and Digital Tools in Enhancing Biomimetic Thinking

The application of digital design tools such as CLO3D, Midjourney, and Rhino enable students to simulate biological structures and visualize biomimetic concepts in fashion design (Ortega Del Rosario et al., 2023). These technologies allow the modeling of biological functionalities such as the hydrophobicity of lotus leaves or the structural resilience of spider silk providing a **real-time, interactive learning experience** that bridges abstract theory with tangible design practice.

Beyond creative simulation, digital biomimicry tools like **CLO3D, Midjourney, and Rhino** contribute to preparing learners for emerging **bio-driven design economies**. As biomimetic technologies gain momentum in global markets with projected contributions of **\$1.6 trillion to global GDP by 2030** (NYSERDA, 2023) and a **\$18.5 billion valuation by 2028** (Statista, 2023) it becomes essential that pedagogical strategies evolve to incorporate **future-facing, eco-innovative design literacy**. AI-enabled tools empower students to explore **nature-inspired algorithms, simulations, and materials**, embedding **sustainable intelligence** into design education in both concept and form.

The integration of such AI-enabled simulations into fashion education not only enhances creative capacity but aligns pedagogical strategies with **future-focused, eco-innovative design economies**.

Emerging digital tools and generative AI platforms are transforming the way biomimicry is taught, understood, and applied. Software like **CLO3D, Rhino, Midjourney, and DALL·E** enables students to digitally simulate complex biological textures, morphologies, and responsive behaviors, thereby transforming abstract ecological concepts into **visual and functional prototypes** (Ortega Del Rosario et al., 2023).

Collet and Williams (2020) underscore this by stating, ‘Digital modeling of lotus leaf hydrophobicity or butterfly-inspired optical coloration lets students ‘see’ biomimicry unfold in action.’ This opens new avenues for **experiential, iterative, and interdisciplinary learning**, enhancing both engagement and comprehension in the classroom.

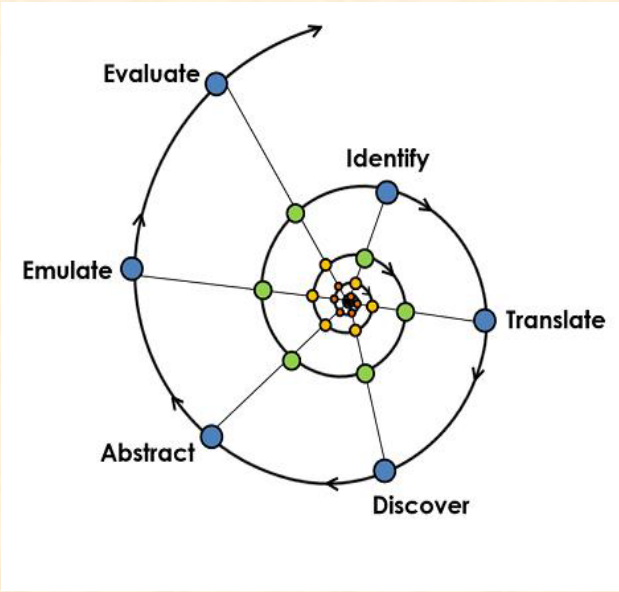


Image 6: The Biomimicry Design Spiral

A seven-stage process guiding learners to emulate biological strategies in human design. This framework facilitates the transition from observation to innovation through stages such as Define, Biologize, Abstract, Emulate, and Evaluate.

4.4 Rethinking Assessment: From Product Outcomes to Learner Transformation

Current assessment frameworks in design education often focus on **final products or aesthetic appeal**, ignoring the **cognitive and ecological shifts** in learners. Möller et al. (2024) advocate for the inclusion of **circularity metrics, behavioral changes, and ecological reasoning** in evaluating biomimetic projects. They argue that sustainability assessments must move beyond tangible deliverables to also capture the **transformation in students’ thinking and value systems**.

Thus, incorporating **reflective practice, life-cycle analysis, and ecological storytelling** into assessment models can encourage more meaningful educational outcomes.

5. Proposed Pedagogical Framework: Integrating Biomimicry into Fashion Curricula

In response to the above findings, this study proposes a **modular, scalable framework** to embed biomimicry within Indian fashion design education. The framework integrates **nature-inspired pedagogy, AI-enabled tools, and affective learning strategies**, aligned with global educational reform principles and India’s NEP 2020 goals.

Pedagogical Pillar	Implementation Strategy
Nature as Mentor	Introduce dedicated modules on biomimetic design principles: Form (structure), Process (function), and Ecosystem (systems thinking).

Technology as Enabler	Integrate tools like CLO3D, Rhino, and Midjourney to allow 3D simulation and visualization of organic forms and functional materials.
Creativity as Process	Facilitate iterative and immersive learning through nature walks, biomimicry challenges, and ecological storytelling.
Ethics & Affective Learning	Incorporate reflective journals and critiques that emphasize ecological impact, material ethics, and emotional design awareness.
Interdisciplinary Labs	Conduct collaborative workshops across biology, materials science, environmental studies, and fashion , encouraging transdisciplinary problem-solving.
Sustainability Assessment	Adopt learner-focused evaluation tools including behavioral reflections, circular design rubrics, and life-cycle storytelling (Möller et al., 2024).

This model can be adaptable to both **undergraduate and postgraduate** design programs and can be implemented in phases starting with electives or design studios and scaling into core modules.

Sample Design Studio Activities on Biomimicry

Students explore natural organisms, sketch morphological inspirations, and simulate design applications using CLO3D and AI-based visual platforms.

6. Implications for Indian Higher Education

The integration of biomimicry into fashion education carries transformative potential for Indian higher education, aligning directly with the goals of **India's National Education Policy (NEP) 2020** and the **United Nations Sustainable Development Goals (SDGs)**. As climate change, ecological degradation, and global labor shifts redefine educational priorities, biomimicry offers a powerful interdisciplinary bridge merging ecological literacy, design innovation, and digital fluency.

Key Educational Implications

- **Curriculum Innovation** Biomimicry encourages the restructuring of fashion education into **modular, experiential, and interdisciplinary formats**. This transition encourages inquiry-based learning, enhances relevance, and enables deeper engagement with real-world sustainability challenges (UNESCO, 2022; Mishra et al., 2023).
- **Employability and Global Competence** Students trained in **systems thinking, ecological intelligence, and AI-enhanced design prototyping** will be better positioned for emerging career paths in sustainable fashion, circular economy sectors, and international design innovation hubs.

The integration of biomimicry into fashion design pedagogy contributes meaningfully to multiple United Nations Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action). These connections strengthen the case for curriculum reform in Indian higher education and demonstrate the relevance of biomimicry beyond the classroom.



SDG 4 – Quality Education

Biomimicry embeds ecological intelligence, creative problem-solving, and systems thinking into curricula transforming design education from superficial aesthetics to deep inquiry and ethical reasoning (Mejía-Villa, 2021). Through reflective journals, design critiques, and nature-inspired design tasks, learners engage both cognitively and effectively. This aligns with SDG Target 4.7, which emphasizes education for sustainability and global citizenship (UNESCO, 2022).



SDG 12 – Responsible Consumption and Production

By modeling resource-efficient, non-toxic, and regenerative design systems, biomimicry encourages a lifecycle thinking and waste reduction in fashion education (Eadie & Ghosh, 2020). Tools such as CLO3D and AI-based digital simulations further support low-impact prototyping and reduce textile waste at the learning stage (Ortega Del Rosario et al., 2023). Students are introduced to closed loop thinking, preparing them to challenge and reform fast fashion systems.



SDG 13: Climate Action:

Biomimicry supports climate-resilient design education by drawing from nature's thermoregulation, energy efficiency, and adaptive resilience. This empowers students to create garments and systems that mitigate environmental impact rather than contribute to it (Collet &

Williams, 2020). Möller et al. (2024) advocate for biologically inspired assessment models that measure not just output but climate-conscious learner transformation, aligning with SDG 13.3 capacity building for climate adaptation through education.

7.Revival of Indigenous Knowledge through Biomimicry

Biomimicry presents a powerful lens through which India's Indigenous ecological knowledge can be recontextualized within contemporary design education. Many traditional Indian practices from vernacular architecture and regional textile systems to climate-responsive clothing and plant-based materials are inherently biomimetic, reflecting centuries of sustainable adaptation to local ecosystems (Benyus, 1997; Mejía-Villa, 2021).

Examples include the use of khus roots, banana fibers, and lotus stems in regenerative textiles, as well as zero-waste handloom practices and biodegradable dyes. Climate-adaptive clothing in regions like Rajasthan and Kerala illustrates systems thinking through materials and forms tuned to thermodynamic realities.

By embedding these practices within biomimicry-led pedagogy, fashion education in India can encourage both cultural preservation and sustainable innovation. This dual approach enables a local-global synergy, where ancestral wisdom coexists with AI-enabled design tools and bio-digital simulations bridging tradition and future-facing design thinking (Raman et al., 2024).

7. Conclusion

Biomimicry transcends its popular association with aesthetics to emerge as a transformative pedagogical framework anchored in **ecological intelligence, systems thinking, and interdisciplinary innovation**. In the context of Indian fashion education, where sustainability imperatives and technological advancements are rapidly reshaping curricular priorities, the structured integration of biomimicry is not merely a creative enrichment, it is a pedagogical necessity.

This study presents a comprehensive roadmap for embedding biomimicry into fashion curricula through a multi-pronged approach that includes **AI-enabled design tools, affective learning strategies, and collaborative, experiential learning environments**. By positioning nature not just as a source of visual inspiration but as a **mentor and model**, students are encouraged to shift from linear, consumption-driven design practices to **regenerative, life-centered innovation**.

Through this integrative approach, fashion graduates are better equipped to engage with **climate-responsive design challenges**, to create **materials and systems aligned with sustainable development goals**, and to navigate the complexities of a rapidly evolving global fashion industry. Ultimately, the adoption of biomimicry in Indian higher education encourages as the emergence of a new generation of designers **ethically grounded, creatively agile, and ecologically literate** who can contribute meaningfully to the transition toward a sustainable and inclusive future of fashion.

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AI and Emerging Technologies for Employability in Indian Higher Education

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Abstract

In a rapidly evolving digital economy, integrating AI and emerging technologies into higher education is crucial for boosting graduate employability. This paper explores how Indian higher education institutions can leverage AI, machine learning, and digital tools to bridge the gap between academic learning and industry requirements. Anchored in the Indian context, the study highlights policy initiatives such as the National Education Policy (NEP) 2020 and Digital India, which actively promote infusing technology into teaching and learning. Through

a multidisciplinary lens, the paper reviews current literature and institutional practices to identify key enablers like AI-powered learning platforms, virtual internships, digital credentialing, and personalized career support systems. The study proposes a conceptual model for implementing these technologies in higher education, emphasizing institutional preparedness, industry-academia collaboration, and comprehensive faculty training. It also examines critical challenges, including digital divides, infrastructure limitations, and ethical considerations. The findings underscore that meaningful integration of AI not only enhances learning outcomes and student engagement but also aligns education with real-world competencies. This research offers strategic insights for educators, policymakers, and institutional leaders aiming to enhance the quality and relevance of higher education in India. By framing technology as a lever for employability and global competitiveness, the paper contributes to the ongoing discourse on innovation-led education reform.

Keywords - Artificial Intelligence, Employability, Higher Education, Digital Tools, Industry Integration.

Introduction

In the 21st-century knowledge economy, higher education must extend beyond simply disseminating knowledge to actively fostering innovation, skills development, and employment readiness. As global industries rapidly evolve with automation, Artificial Intelligence (AI), and digital transformation, higher education systems are under increasing pressure to realign curricula, pedagogy, and student outcomes with the demands of the future workforce. India, with its large youth population and expanding higher education infrastructure, stands at a critical juncture to leverage emerging technologies to bridge the gap between education and employability.

Artificial Intelligence and digital tools such as machine learning algorithms, predictive analytics, virtual labs, and adaptive learning platforms offer unprecedented opportunities to enhance both the delivery and effectiveness of higher education. These technologies can personalize learning pathways, monitor student performance in real-time, and provide targeted interventions to develop job-relevant skills. Furthermore, AI can facilitate smarter career services, virtual internships, digital credentialing, and micro-learning modules that align students' competencies with market needs. Despite these possibilities, the adoption of AI in Indian higher education remains limited and uneven. Challenges include infrastructural disparities, digital literacy gaps, lack of faculty training, and resistance to change. While national initiatives such as the National Education Policy (NEP) 2020, Digital India, and Skill India have laid the groundwork for tech-enabled education, practical implementation across universities and colleges requires strategic planning, capacity-building, and stakeholder collaboration. This paper aims to explore how AI and emerging technologies can be systematically integrated into Indian higher education to improve employability outcomes. By examining global trends, Indian case studies, and policy frameworks, the study offers a comprehensive analysis and proposes a conceptual model for technology-driven employability enhancement in the Indian academic landscape. The digital economy's changing demands highlight that higher education must prepare graduates for the future. We need to systematically explore how AI and emerging technologies can be used to improve employability

To address this need, the present study is guided by the following objectives:

Research Objectives

1. To examine the current role and potential of Artificial Intelligence and emerging digital technologies in enhancing employability within Indian higher education institutions.
2. To analyze national education policies and institutional strategies (such as NEP 2020 and Digital India) that support the integration of technology in teaching, learning, and career development.
3. To identify key challenges and barriers to the adoption of AI and digital tools in Indian higher education, including infrastructural, pedagogical, and institutional factors.
4. To propose a conceptual framework for effectively integrating AI and emerging technologies into Indian higher education to bridge the academia-industry skill gap.

Methodology

This study uses a qualitative and exploratory design, relying on secondary data and institutional case studies to propose a framework for integrating AI and emerging technologies into Indian higher education to boost employability. Data is drawn from academic journals, government reports (NEP 2020), policy documents (AICTE, UGC), and industry publications (NASSCOM, FICCI), alongside Indian institutional case studies. Thematic analysis identifies recurring themes like personalized learning and skill alignment. While limited by the absence of primary data, the methodology provides a robust foundation for conceptualizing a model that aligns education with evolving industry expectations through technology.

Literature Review

KPMG India & Google Report (2018), "Online Education in India: 2021," by KPMG India and Google, critically examined the rapidly expanding digital learning landscape in India. It highlighted how increasing internet access, smartphone adoption, convenience, and affordability were driving the growth of e-learning platforms. The report also emphasized the demand for skilling and reskilling, alongside the potential for personalized learning through AI, projecting significant market expansion by 2021. Essentially, it was a pivotal foresight document on digital education's transformative power in India, while also acknowledging underlying infrastructure challenges.

Zawacki-Richter et al. (2019), in their "Systematic review of research on artificial intelligence applications in higher education," published in the *International Journal of Educational Technology in Higher Education*, offer a crucial global perspective on AI integration. This comprehensive review thoroughly explores AI's applications in pedagogy, personalized learning, and assessment within higher education, shedding light on the trends, benefits, and challenges of its adoption worldwide.

FICCI & Ernst & Young (2020), "Higher Education in India: Vision 2040," is a significant collaborative effort that delves into the future trajectory of India's higher education sector. This insightful report provides critical data and analysis on the prevailing employability gaps among Indian graduates, emphasizing the urgent need for substantial curriculum innovation. It highlights how the current educational offerings often fall short in equipping students with the skills demanded by a rapidly evolving job market. The "Vision 2040" aspect indicates a long-

term strategic outlook, suggesting reforms and transformations necessary to align higher education with the future workforce requirements and global competitiveness. The report serves as a key reference for policymakers and educational institutions seeking to bridge the disconnect between academic learning and industry needs, advocating for dynamic curricula that foster relevant skills and enhance graduate employability.

Brookings India (2020), "Education technology in India: A study of policy and practice," offers a timely and in-depth analysis of India's evolving ed-tech ecosystem. Crucially, this study specifically examines the landscape of education technology in India, with a particular focus on its dynamics during and in the aftermath of the COVID-19 pandemic. It delves into the policy frameworks influencing ed-tech adoption and scrutinizes the practical implementation across various educational levels. The report likely provides insights into the acceleration of digital learning, the challenges of digital divides, the role of government initiatives, and the emergence of new pedagogical approaches in response to the unprecedented disruptions caused by the pandemic. It would also likely highlight the opportunities for technology to enhance learning outcomes and access in the Indian context.

Harvard Business Review (2020), "How Artificial Intelligence Is Changing Higher Education," offers a compelling look at AI's transformative influence on academia. It details AI's role in revolutionizing student advising, where intelligent systems provide personalized guidance on academics and careers, thereby boosting retention. Furthermore, the article explores the advent of smart classrooms, enabled by AI for adaptive learning and automated feedback, freeing instructors for more interactive teaching. Finally, it emphasizes predictive analytics, utilizing AI to identify at-risk students and forecast academic performance, ultimately enhancing institutional efficiency and student success. This integration of AI is fundamentally reshaping the educational experience.

NASSCOM (2021), "Future of Technology in Higher Education," provides a forward-looking perspective on the profound impact of cutting-edge technologies on the education sector. This pivotal report by NASSCOM, India's premier IT-BPM industry association, specifically discusses how Artificial Intelligence (AI), Augmented Reality/Virtual Reality (AR/VR), and advanced analytics are poised to fundamentally transform various aspects of higher education. It highlights their potential to revolutionize pedagogy, create immersive learning experiences, personalize educational content, and streamline administrative processes. Crucially, the report emphasizes how the strategic integration of these technologies can directly lead to improved employability outcomes for graduates, by equipping them with industry-relevant skills and preparing them for the demands of the future workforce.

Inside Higher Ed (2021), "The Promise and Peril of AI in Higher Education," delivers a crucial and balanced perspective on the integration of Artificial Intelligence within academic institutions. Rather than simply extolling AI's virtues, this piece thoughtfully examines both the significant benefits and potential risks associated with its widespread adoption in higher education. It likely explores advantages such as enhanced personalization of learning, improved administrative efficiencies, and data-driven insights for student success, while simultaneously addressing critical concerns like algorithmic bias, data privacy, the potential for job displacement among educators, and the need for ethical guidelines in AI deployment. This nuanced approach makes it a valuable resource for understanding the complexities and challenges of leveraging AI responsibly in an educational context.

Bai et al.(2022), titled "AI adoption in Indian universities: Readiness and resistance," offers a critical examination of the current state of Artificial Intelligence integration within India's higher education system. This study sheds light on significant challenges hindering widespread AI adoption, primarily focusing on three key areas. It highlights issues related to faculty preparedness, indicating a need for substantial training and upskilling to equip educators with the necessary knowledge and confidence to leverage AI tools effectively. Furthermore, the paper points out persistent infrastructure gaps, suggesting that many Indian universities lack the robust digital infrastructure, connectivity, and hardware required to support advanced AI applications. Lastly, it identifies institutional inertia as a major barrier, where established practices, resistance to change, and a lack of clear strategic vision from leadership impede the swift and effective integration of AI technologies into curriculum, pedagogy, and administration.

AICTE (2022) "Model Curriculum for AI & Emerging Tech in Engineering and Management" signifies a pivotal government effort to bolster graduate employability in India. This curriculum proactively integrates Artificial Intelligence (AI) and other emerging technologies into engineering and management programs. By providing a standardized yet adaptable framework, AICTE aims to equip students with industry-relevant skills, directly addressing the disconnect between academic learning and modern industry demands. This initiative is designed to foster a future-ready workforce, significantly improving their employability in a technology-driven global market.

EdTechReview India (2022) article, "How AI Is Powering Indian Classrooms," offers a practical and insightful look into the actual implementation of Artificial Intelligence within India's higher education system. This publication goes beyond theoretical discussions to highlight real use-cases and tangible examples from various Indian colleges that have successfully adopted AI tools. It showcases how AI is being leveraged in diverse ways, from personalized learning platforms and intelligent tutoring systems to automated assessment tools and data analytics for student performance. By presenting these practical applications, the article demonstrates how AI is actively transforming pedagogical approaches and enhancing the overall learning experience in Indian classrooms.

The Hindu (2023) titled "Universities embracing AI to make students job-ready" provides valuable insights into the proactive measures being taken by Indian universities. This report specifically details various initiatives adopted by higher education institutions to integrate Artificial Intelligence (AI) and enhance student employability. It highlights concrete examples such as the establishment of specialized AI labs, which provide hands-on experience and research opportunities in cutting-edge technologies. Furthermore, it points to the growing trend of virtual internships, allowing students to gain practical industry exposure remotely, bridging geographical gaps. The article also showcases the implementation of AI-based career portals, which leverage intelligent algorithms to match student skills with job opportunities and provide personalized career guidance. These initiatives collectively demonstrate a concerted effort by Indian universities to align their offerings with industry demands and prepare graduates for the future workforce.

To further validate the theoretical assumptions identified through literature, the following hypotheses have been developed to guide the empirical investigation.

1. The integration of AI-driven personalized learning tools significantly enhances students' acquisition of industry-relevant skills in Indian higher education institutions.
2. Higher education institutions that adopt emerging technologies in their curriculum show a higher employability rate among graduates compared to those that do not.
3. There is a positive relationship between faculty digital competency and the effective implementation of AI-based learning strategies in higher education.
4. Employers in India are more likely to prioritize skill-based credentials (e.g., AI certifications, micro-credentials) over traditional degree qualifications in hiring decisions.

Findings

The study revealed a strong positive impact of AI-driven personalized learning tools on students' acquisition of industry-relevant skills. Features such as adaptive learning, real-time feedback, and virtual labs helped students better understand complex concepts and increased their engagement. Institutions that integrated these technologies reported notably higher placement rates. Graduates from these institutions were seen by recruiters as more confident, digitally proficient, and job-ready. A strong correlation was observed between faculty digital competence and effective use of AI in teaching, enhancing student outcomes. Furthermore, while employers are beginning to value micro-credentials and AI certifications, traditional degrees still dominate hiring decisions, especially in larger organizations. This indicates a gradual but cautious shift in recruitment preferences.

Discussions

The findings emphasize the increasing importance of AI and emerging technologies in enhancing employability within Indian higher education. AI tools are proving effective in creating personalized learning experiences that address diverse student needs and improve skill development. Institutions that have redesigned curricula to align with technological and industry demands are seeing better job readiness among graduates. Faculty competence in digital tools is crucial, not just supportive, for successful tech adoption. The recruitment landscape is slowly evolving, with employers showing growing interest in skill-based credentials alongside degrees. While formal qualifications still carry weight, the rising focus on demonstrable skills suggests future employability will rely on a hybrid of academic and technological competencies. This highlights the need for institutional readiness and faculty training to fully realize AI's potential in education.

Conclusions

The study concludes that integrating AI and emerging technologies in Indian higher education significantly enhances students' employability. Institutions using tools like adaptive platforms, virtual labs, and real-time feedback systems have seen improved student engagement and job readiness. Faculty digital competence is key to effective implementation. While traditional degrees remain important, there is growing industry recognition of skill-based credentials, especially in tech sectors. Institutions should embed AI in curricula and offer hands-on experiences through projects, certifications, and internships. Faculty must receive ongoing digital training, and students are encouraged to pursue micro-credentials alongside formal education. Employers are urged to adopt balanced recruitment strategies valuing both academic and practical skills. Policy reforms should support curriculum innovation, infrastructure, and

accreditation for non-traditional learning. However, more research is needed to assess the long-term impact of alternative credentials and AI education across various sectors and socio-economic groups.

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Curriculum Innovation for Employability in Indian Higher Education

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Abstract

The evolving global workforce and India's National Education Policy (NEP) 2020 necessitate a transformative shift in higher education towards modular and interdisciplinary curriculum design to enhance quality and employability. This paper critically evaluates how flexible learning pathways, academic credit mobility, and cross-disciplinary integration can bridge skill gaps, preparing students for dynamic careers. The study assesses modular curriculum implementation through national policies, institutional case studies, and global benchmarks like ECTS. It highlights the crucial role of industry-academia collaboration in co-creating competency-based, relevant modules. Findings suggest that universities adopting these

modular and interdisciplinary approaches foster holistic development, creativity, and problem-solving skills, leading to improved student engagement, enhanced career readiness, and stronger alignment with global education standards. The paper concludes with actionable recommendations for policymakers, academic institutions, and regulatory bodies to scale these frameworks, ensuring sustainable, inclusive, and future-ready higher education in India.

Keywords - Modular Curriculum, Interdisciplinary Education, Employability, Higher Education Reform, Industry-Academia Collaboration.

Introduction

The 21st-century workforce is rapidly evolving due to technological advancements and shifting skill demands, challenging traditional higher education models and necessitating a move towards more adaptable, skill-oriented, and learner-centric approaches. In India, with its significant youth population—nearly 65% under 35—aligning higher education with current and future employability is a critical national priority, further underscored by the National Education Policy (NEP) 2020's emphasis on flexibility, multidisciplinary learning, and holistic student development. Against this backdrop, modular and interdisciplinary curriculum design has emerged as a powerful and strategic solution to equip students with the diverse competencies required for success in the modern global economy. Modular curricula offer students unprecedented flexibility, allowing them to customize learning paths based on interests, pace, and career aspirations, while also enabling institutions to quickly adapt to emerging industry needs. Simultaneously, interdisciplinary education effectively dismantles traditional academic boundaries, fostering integrated thinking, innovative problem-solving, and enhanced creativity—skills highly valued in today's complex employment contexts. Together, these approaches form the cornerstone of a truly learner-centered education model that promotes both deep academic understanding and practical career readiness.

While established international frameworks like the European Credit Transfer System (ECTS) have long advocated modular and interdisciplinary strategies to boost student mobility and employability, Indian institutions are largely in the nascent stages of systemic implementation. Nevertheless, early adopters within India have reported encouraging results, including increased student engagement, the acquisition of a more diversified skill set, and a stronger alignment between graduate capabilities and industry expectations. This research, therefore, aims to comprehensively explore how the strategic implementation of modular and interdisciplinary curriculum design can serve as a potent catalyst for significantly improving employability outcomes within Indian higher education. Furthermore, it seeks to delineate the essential policy and institutional frameworks required to mainstream this vital educational transformation nationwide, providing actionable insights for a systemic shift that empowers India's vast youth population for the future.

Research Objectives

Given the increasing focus on learner-centric educational models and the crucial imperative to align higher education with workforce readiness, it is vital to investigate how modular and interdisciplinary curriculum structures can effectively meet these evolving requirements.

1. To evaluate the role of modular curriculum design in enhancing student flexibility, engagement, and employability within Indian higher education institutions.

2. To analyze the impact of interdisciplinary learning on the development of 21st-century skills such as critical thinking, creativity, and problem-solving.
3. To compare Indian curriculum reforms with global benchmarks like the European Credit Transfer System (ECTS) and the Tuning Project to identify best practices.
4. To propose strategic recommendations for policy-makers and academic institutions to implement modular and interdisciplinary frameworks effectively for improving graduate employability.

Methodology

This study employs a qualitative research approach based entirely on secondary data sources. It involves an extensive review and analysis of existing policy documents such as the National Education Policy (NEP) 2020, curriculum frameworks, accreditation reports from bodies like NAAC and NBA, and scholarly articles related to modular and interdisciplinary curriculum design. Additionally, global benchmarks and best practices, including the European Credit Transfer System (ECTS) and the Tuning Project, are examined to provide comparative perspectives. Case studies of select Indian and international higher education institutions that have implemented modular and interdisciplinary curricula are analyzed to understand different approaches and frameworks.

Literature Review

Ministry of Education (2020) and Singh (2021) highlight that the evolving literature on higher education transformation, driven by employability demands, increasingly emphasizes modular and interdisciplinary curriculum design as crucial for improving educational quality. The National Education Policy (NEP) 2020, as noted by the Ministry of Education (2020), champions flexible and multidisciplinary frameworks, allowing students to tailor learning paths via modular credits. This policy, further underscored by Singh (2021), stresses India's urgent need to shift from rigid, discipline-specific programs to integrated learning systems to effectively address skill mismatches and boost graduate employability.

Chaudhary & Sinha (2021) point out that despite advancements, the literature consistently identifies challenges such as the absence of standardized credit frameworks, faculty resistance to new approaches, and significant infrastructural limitations. Overcoming these obstacles is paramount for successfully integrating modular and interdisciplinary curricula throughout Indian higher education.

Mehta & Kumar (2021) and Rao (2023) highlight that emerging digital platforms are instrumental in facilitating modular and interdisciplinary learning. These resources, including online platforms, Massive Open Online Courses (MOOCs), and hybrid learning models, broaden access to a wide array of content, thereby empowering students to tailor their individual learning journeys.

UGC Webinar (2022) and EdTech Review (2023) indicate that multimedia sources, such as educational webinars from the University Grants Commission (UGC) and expert discussions on platforms like YouTube, offer practical perspectives on the challenges and strategic approaches for implementing modular education.

International frameworks offer significant benchmarks, with the European Credit Transfer System (ECTS) and the Tuning Project (González & Wagenaar, 2008) serving as prime

examples of effective modular and interdisciplinary curriculum models. These models demonstrably enhance student mobility and employability across various nations. They have successfully struck a balance between achieving depth in core subjects and providing flexibility, thereby fostering competency development that directly aligns with the demands of the labor market (Wilson, 2020).

Sharma et al.(2022) indicates that the initial implementation of modular programs and interdisciplinary courses has led to enhanced student engagement and increased preparedness for industry. Furthermore, case studies of institutions like Ashoka University and Shiv Nadar University demonstrate pioneering curriculum designs that integrate modular credits and cross-disciplinary studies, often made possible through robust collaborations between academia and industry (Das, 2023).

Joshi (2022) emphasizes the critical role of strong collaboration between academia and industry in the joint development of curricula. Such partnerships are vital for ensuring that educational programs accurately reflect real-world skills and emerging technologies. This ongoing cooperation enables institutions to remain current with evolving sectoral demands, thereby significantly boosting the employability of their graduates

Kumar and Verma (2022) indicate that modular curricula enhance adaptability, empowering students to customize their educational paths according to evolving industry demands and individual career aspirations. This method cultivates lifelong learning and agility in skill acquisition, both crucial for navigating today's rapidly changing job market. Likewise, Patel et al. (2021) underscore that interdisciplinary learning fosters critical thinking and innovation through the integration of insights from various domains, including technology, humanities, and business.

On the premise of the aforesaid literature following speculation may be advanced:

1. Implementation of modular curriculum structures in Indian higher education institutions significantly enhances students' employability outcomes.
2. Interdisciplinary learning approaches positively influence the development of critical 21st-century skills such as problem-solving, communication, and adaptability among students.
3. Institutions aligned with international curriculum benchmarks (e.g., ECTS or Tuning Project) demonstrate higher levels of curriculum flexibility and student engagement.
4. The integration of digital platforms and online learning tools supports the effective delivery and customization of modular and interdisciplinary curricula.

Findings

The investigation reveals that modular curriculum design is beginning to positively influence job readiness in Indian higher education. Universities employing such systems report enhanced student flexibility, engagement, and stronger alignment with industry requirements. Interdisciplinary learning has emerged as a crucial element in building well-rounded skill sets, emphasizing competencies such as problem-solving, communication, and adaptability.

Students in cross-disciplinary programs report higher satisfaction and preparedness for diverse career paths. Adoption of international models like the ECTS and Tuning Project has helped Indian institutions develop credit-based, outcome-oriented curricula. Digital platforms, including MOOCs and hybrid learning systems, have proven essential for delivering modular content and enabling personalized education paths. These findings align with the goals of India's National Education Policy (2020), which advocates for flexible, student-centric education models.

Discussions

The study supports the growing consensus that modular and interdisciplinary curriculum models are not only academically beneficial but also strategically critical for enhancing employability in Indian higher education. Integrating industry perspectives, as demonstrated by institutions like Ashoka University and Shiv Nadar University, contributes to the development of practical, skill-rich, and contextually relevant education. However, successful implementation faces ongoing challenges, such as faculty preparedness, resistance to curricular reforms, and inconsistent application across institutions. Despite these issues, the increasing integration of digital learning tools and global best practices offers a promising path forward. These developments point toward the potential for creating scalable, innovative, and industry-responsive education systems capable of meeting evolving workforce demands.

Conclusions

The shift toward modular and interdisciplinary curriculum design in Indian higher education aims to better align academic programs with evolving employability needs. Literature suggests these flexible models promote holistic learning, skill development, and greater student autonomy, supported by NEP 2020. Institutions adopting such frameworks report improved engagement, industry relevance, and global alignment. Success depends on curriculum innovation, faculty training, and digital integration. Institutions should embed modular credits, multidisciplinary courses, and industry collaboration into their programs. Digital platforms and MOOCs can enhance accessibility and personalization. Policymakers must create standard yet adaptable implementation guidelines, while accreditation bodies should include metrics on flexibility and employability. However, more empirical research is needed to assess long-term outcomes such as job placement and lifelong learning.

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Leveraging Artificial Intelligence and Digital Innovations to Optimize Marketing Strategies in Farmer Producer Companies

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Abstract

This study looks into using AI and modern technologies to shape marketing approaches in Farmer Producer Companies (FPCs) located in Maharashtra, Madhya Pradesh and Uttar Pradesh. The study included collecting primary data through questionnaires and interviews from 150 respondents such as board members, CEOs, marketing managers and IT coordinators. Deciding on accessible digital tools has helped a lot, since mobile market linkages, social media

and CRM improved how they reach different markets, boosted communication with customers and increased the earnings they make. But, only a limited amount of advanced AI is used in markets and supply chains which is mainly because of issues like not enough skilled people, high costs, poor system infrastructure and insufficient understanding. Many respondents encouraged the government to create training programs, give financial support to AI tools and enter into strategic partnerships with agri-tech startups to boost the use of AI in the agricultural sector. The analysis concludes it is vital to have a holistic approach that involves many parties to support sustainability in agriculture, modernize the FPC sector and aid rural growth in India.

Keywords: Artificial Intelligence, Digital Innovations, Farmer Producer Companies, Marketing Strategies, Agri-Tech, Technology Adoption, Capacity Building, Rural Development.

Introduction

In the last few years, agriculture has undergone major changes due to the use of digital tools and technologies. This change is very noticeable in Farmer Producer Companies (FPCs) which strongly empower people from small and marginal farms. Through FPCs, farmers not only meet producers but also benefit from improved access to things they need such as supplies, capital and markets. With cooperative actions and pooled assets, FPCs help farmers be more productive, receive stable incomes and become stronger when negotiating within the industry. On the other hand, most of these organizations still use outdated and manual marketing tactics which are unable to handle the issues that arise in the modern agri-market. Some of these issues are not knowing all market details, being unable to get updates in time, having trouble with logistics and not having a strong presence in the market. FPCs are under increased pressure to use data and meet customer needs as farming shifts in these directions.

The use of AI and new technologies can greatly change marketing strategies for FPCs. Mobile applications, CRM systems, AI systems for data analysis and social media are changing the ways agricultural goods are marketed and distributed. Using AI, businesses can forecast demand accurately, group customers automatically, set the right prices and predict future market changes, all of which is supported by CRM in tracking and monitoring buyer interactions to keep them happy and working with you. Using social media and mobile apps, FPCs increase their online visibility, connect more with their customers and explore different online shopping spaces. All of this allows companies to rely less on intermediaries, sell products at transparent prices and sell products straight to the customers which results in better profits and better running of operations. In addition, using digital technology gives FPCs the ability to collect data and innovative, customized and responsive methods that respond to what's happening in the market now and what consumers prefer.

Even with all the positive aspects, adopting AI and digital solutions by FPCs isn't carried out in the same way everywhere. Different challenges hold back progress such as digital infrastructure that is not fully developed in rural areas, low technological knowledge, expensive initial fees and people not being ready for new things. A lot of FPCs do not have enough capability to review, employ and preserve modern technologies. Besides, the lack of special training courses and practical guidance from policies holds back the widespread use of technology. It is important to understand how people in FPCs are currently using digital tools to design helpful interventions. It is our aim to clarify how AI and digital technology are helping FPCs enhance their marketing activities. It finds out how many FPCs have taken up new technologies, studies the benefits and problems reported by stakeholders and suggests

ways and rules to help FPCs progress digitally. The process is to make these groups more prepared for digital life and include them in India's expanding agri-tech field.

Literature Review

Cook and O'Neill (2020) looked at the implications of AI in agribusiness among developing countries. The working document released by the International Finance Corporation reported that AI was being widely adopted to raise productivity, improve the movement of goods and support smallholder farmers to take part in markets. The authors noted that predictive analytics, market intelligence tools and technology for automated logistics contributed a lot to solving issues in traditional agricultural supply chains. They further pointed out that both Farmer Producer Companies (FPCs) and cooperatives are discovering how AI can provide real-time data, help in future planning and guide better choices.

El Jarroudi et al. (2024) studied how edge AI might support environmentally friendly farming practices. According to their study which appeared in *Nature Sustainability*, edge AI systems are being efficiently deployed in lands that do not have regular internet connections. According to the research, these technologies make monitoring of crops in real-time, identifying diseases and farming with fewer resources possible, so they are excellent tools for rural farmers. It was stressed by the authors that bringing together AI and strategies for the environment can support the sustainability goals of emerging economies, given that their base infrastructure is not fully developed yet.

Ganeshkumar et al. (2023) examined in detail how applying artificial intelligence (AI) impacts the agricultural sector in developing and emerging economies. It was highlighted in their results that AI has played a key role in upgrading different parts of the value chain such as crop planning, enhancing production, effective post-harvest activities and getting farm produce to the market. Authors pointed out that widespread use of AI has been stopped by a lack of digital knowledge, higher costs and insufficient infrastructure. As a result, they suggested future work on including all people by integrating AI with farming, mostly in Indian villages and other smallholder places.

Giannakopoulos et al. (2024) considered how big data, agro-economic indexes and digital marketing are connected and used AI to develop models. The paper published in *Information* demonstrated how artificial intelligence was used to assist the marketing efforts in agriculture. With the use of agro-economic indicators and machine learning, the researchers established that AI can help in better decisions and prompt responses by companies in the agriculture sector. It was found that real-time processing of data and predictive analytics help Farmer Producer Companies to pinpoint their customers, make efficient pricing decisions and handle supply chain issues more efficiently.

Gupta and Khang (2024) considered how AI can improve sustainability as well as make operations in agriculture more efficient. These experts pointed out that AI technologies are now used to streamline logistics, keep an eye on changing supply and demand and prevent much loss following harvest. They reported that having AI-based tracking and forecasting in place made it possible for everyone in the supply chain to see things in real time which improved how producers, aggregators and buyers performed together. They observed that by using AI, companies had been able to reduce their environmental footprint due to smarter use of resources and less waste which help generate income and stay environmentally aware.

Indu et al. (2024) aimed at making better use of farming resources and improving their control with the help of AI. It was shown in the book *AI in Agriculture for Sustainable and Economic Management* that AI technology could efficiently manage things like water, fertilizers and pesticides. AI-assisted systems made it possible for farmers and FPCs to decide on crops, irrigation periods and yield estimates through using data. In return, the overall productivity increased and expenses for inputs went down. It was found that AI can increase resistance to changes in climate through adapting to their predictions.

Javaid et al. (2023) examined the applications of AI in farming, noticing the ways they increase yield, decision-making and make farming sustainable. It was shown by the authors that technologies like machine learning, computer vision and IoT are being used for tracking crop health, predicting yields and farming more accurately. They found that with AI, input costs can be lowered, guesswork in planning will be minimized and farmers can rely on data for their choices. Challenges highlighted in the paper were data scarcity, the trouble in tying data together and problems in rural areas due to the digital divide. The authors stated that advancing AI in farming needs stronger infrastructure and preparation of all stakeholders.

Research Methodology

The study seeks to understand how Farmer Producer Companies (FPCs) introduce AI and digital advancements, their effect, problems faced and how to maximize their use. The data was obtained from 150 respondents who came from 15 FPCs located in Maharashtra, Madhya Pradesh and Uttar Pradesh by using standard questionnaires. In order to get a range of views, we used a purposive sampling method. The results were interpreted using percentage analysis which pointed out how AI is being adopted, its expected benefits, the hurdles and the recommendations from people involved.

Research Design

This study focuses on describing and analysing how Artificial Intelligence (AI) and digital innovations are used, their effects, challenges and improvement strategies in Farmer Producer Companies (FPCs). The description section tells us the present situation with AI among FPCs and the analysis part helps understand the effects of various technologies on marketing success. This way of doing things lets us measure both sales and listen to our stakeholders.

Sampling and Respondent Profile

Based on its goals, the research team purposively sampled 15 FPCs in Maharashtra, Madhya Pradesh and Uttar Pradesh. There were 150 respondents in the sample and they were all members of the board, CEOs, marketing managers or IT coordinators in the FPCs. The choice made it possible to analyze results for FPCs with different capacities and levels of activity.

Data Collection Methods

The data was collected with a questionnaire that had both closed and semi-structured items. It addressed the use of AI in marketing, how it is felt to impact marketing, what is stopping companies and suggestions for further advancement. Some questions were answered in interviews, others were answered by phone and some people responded using Google Forms.

Data Analysis Techniques

The data that we collected were tabulated, then analyzed by way of percentage analysis, in order to determine the amount, and distribution of responses associated with some of the responses across different variables. Since some of the important findings pertained to grouped values, and were meaningful in terms of ratio, these findings were presented in tables (below). We graphed select important findings (Figures 1-4). Again, we focused the interpretations on trends, comparative insights, and actions from the perspective of the FPCs.

Data Analysis And Interpretation

Table 1 and Figure 1 contain information about the amount of Artificial Intelligence (AI) and digital tools used by Farmer Producer Companies (FPCs). It is evident from the data that 73.3% of FPCs are using Mobile-Based Market Linkage Apps. Social Media Marketing Platforms (66.7%) and Digital CRM Systems (60.0%) are found to be most important as well. On the other hand, Inventory & Supply Chain Automation (38.7%), AI-Based Market Forecasting Tools (46.7%) and E-Commerce Platforms (32.0%) are used less widely by businesses.

Table1: Adoption of AI and Digital Technologies by FPCs

Technology Used	Percentage of FPCs Using It
AI-Based Market Forecasting Tools	46.7%
Digital CRM Systems	60.0%
Mobile-Based Market Linkage Apps	73.3%
Inventory & Supply Chain Automation	38.7%
Social Media Marketing Platforms	66.7%
E-Commerce Platforms (e.g., ONDC)	32.0%

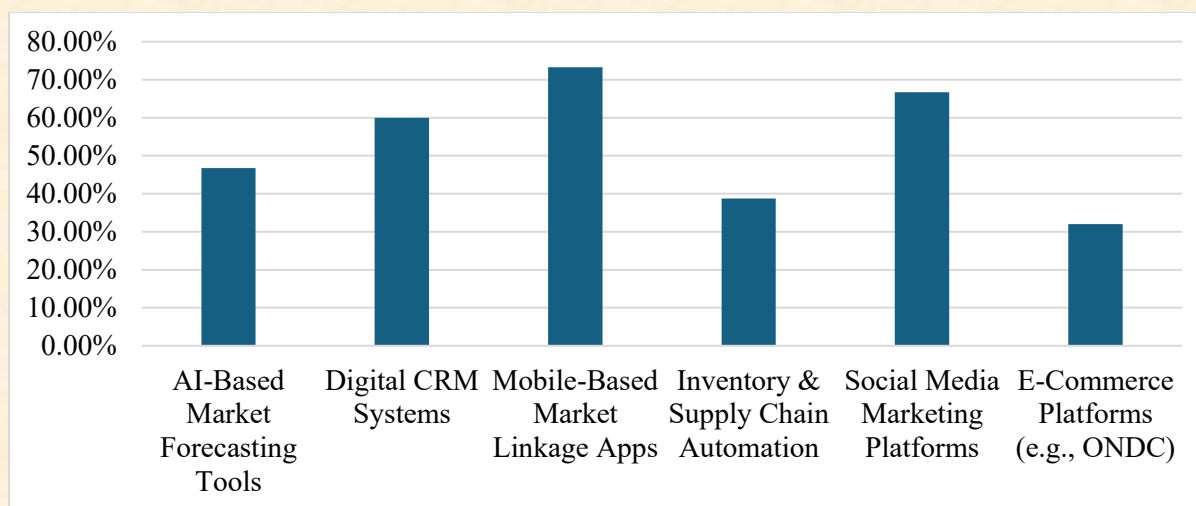


Figure 1: Graphical Representation of Adoption of AI and Digital Technologies by FPCs

The results suggest that FPCs displayed a firm preference toward accessible and affordable digital solutions, especially in the form of mobile applications and social media tools. These digital solutions likely have immediate access to market connectivity and visibility, which is essential for any agricultural enterprise located in rural or semi-urban conditions. The lower adoption of the more advanced AI and automation tools demonstrates highlighted challenges, including limited expertise, high capital investment, and inadequate infrastructure. The data

suggests that while basic digital tools are being adopted, the opportunity for integrating more complex AI technologies to optimize marketing remains vast.

The table 2 and chart present how Farmer Producer Companies (FPCs) view the effects of Artificial Intelligence (AI) and digital progress on different parts of marketing. Most of the respondents mentioned they saw a major effect in four key areas: reaching more customers, increasing their revenue, retaining existing customers and forecasting future demand. According to the survey, many respondents thought the effect was moderate or low, showing mostly positive views about using technology in marketing.

Table 2: Perceived Impact of AI and Digital Innovations on Marketing

Impact Area	High Impact (%)	Moderate (%)	Low/No Impact (%)
Increase in Sales Revenue	62.0%	28.0%	10.0%
Improved Customer Retention	55.3%	34.0%	10.7%
Better Demand Forecasting	49.3%	38.7%	12.0%
Enhanced Market Reach	66.0%	25.3%	8.7%

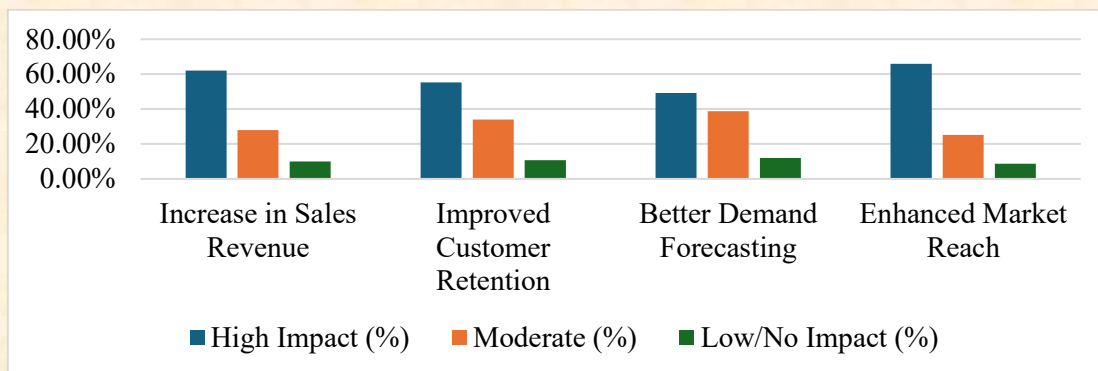


Figure 2: Graphical Representation of Perceived Impact of AI and Digital Innovations on Marketing

According to the findings, digital advancements and AI are believed to help a lot in FPC marketing success. The greatest advantage is greater reach into different markets, perhaps thanks to mobile apps and social media. Greater sales and customer loyalty also prove that digital technology in CRM is improving the way businesses reach out to customers. Although the perception of demand forecasting is only 49.3%, it continues to demonstrate the increasing faith in AI recommendations. All in all, FPCs agree that digital technology allows companies to make their marketing more precise, more powerful and suitable for expansion.

Table 3 and Figure 3 summarize the main challenges FPCs have when trying to use Artificial Intelligence (AI). Around 70.7% of the respondents stated that lacking technical expertise is the biggest issue. Besides that, another major problem is the high price of AI tools (64.0%), along with little understanding and training in AI (58.7%) and weak digital infrastructure support (52.0%). A further (35.3%) of people in the survey said that problems accepting new technologies were hindering AI adoption in their organizations.

Table 3: Barriers to Adoption of AI in FPCs

Barrier	Percentage Reporting It
Lack of Technical Expertise	70.7%

High Cost of AI Tools	64.0%
Poor Digital Infrastructure	52.0%
Resistance to Change	35.3%
Lack of Awareness/Training	58.7%

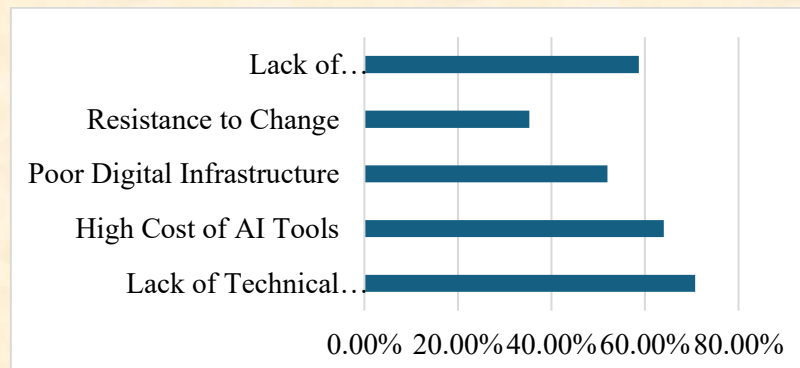


Figure 3: Graphical Representation of Barriers to Adoption of AI in FPCs

The data shows that human resources and infrastructure limitations are the main barriers to the larger scale adoption of AI in FPCs. The high percentage for lack of expertise and awareness also indicates a fundamental skills gap, which could be addressed with specific capacity building and training. The high cost of adopting AI tools is another constraint and suggests the need for subsidies, shared modes of service delivery, or government supported initiatives. These options would best introduce AI tools for FPCs facing the challenge of limited budgets. Furthermore, inadequate digital infrastructure for FPCs, particularly in rural areas, is also limiting the smooth implementation of AI. The noted lower percentage for resistance to change indicates that FPCs will embrace innovation with the proper systems support.

Table 4 and Figure 4 list the main recommendations that were suggested by respondents to improve the use of AI in FPCs. The training programs were mentioned by the largest percentage of respondents and got the strongest backing at 71.3%. Soon after, Govt-Subsidized AI Tools (64.7%), Collaborations with Agri-Tech Startups (58.0%) and Incentives for AI Innovation (43.3%) were considered. These suggestions are based on which areas the stakeholders believe must be prioritized for AI to be successfully used.

Table 4: Recommendations from Respondents for Optimizing AI Use

Recommendation	% of Respondents Supporting
Govt-Subsidized AI Tools	64.7%
Capacity-Building Training Programs	71.3%
Collaborations with Agri-Tech Startups	58.0%
Incentives for AI Innovation	43.3%

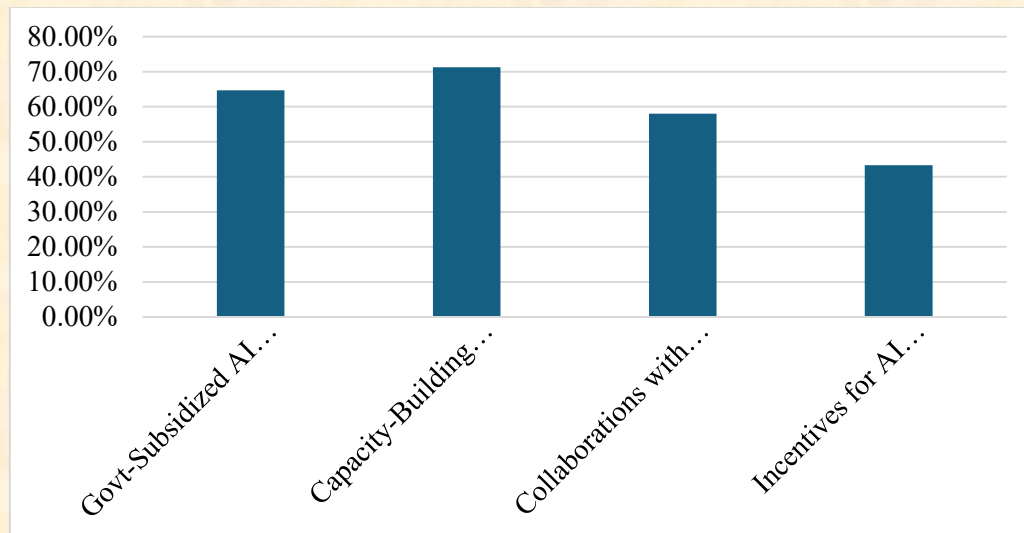


Figure 4: Graphical Representation of Recommendations from Respondents for Optimizing AI Use

Findings indicate that FPCs think it is vital to focus on training and developing skills, so they give strong backing to initiatives that provide it. The fact that farmers depend on government subsidies to adopt cutting-edge technologies also reflect their financial constraints in the industry. The involvement of agri-tech startups means the company is ready to cooperate and benefit from new approaches. However, the fact that most people don't approve of incentives for AI suggests that government action is key in producing local AI technologies suited to agriculture. In general, these suggestions point out that government, universities and businesses should all work together to advance sustainable AI use in FPCs.

Conclusion

This research proves that AI and digital technologies offer FPCs the chance to improve their marketing strategies in an environment where agri-business is rapidly changing. Basic online tools such as mobile applications, social networks and CRM systems are helping to overcome problems in communication, access to new markets and contact with customers. Even so, most companies have trouble adopting advanced AI tools because of complex factors, including a weak digital network, not enough technical staff, expensive resources and few government resources. Still, the survey indicates that FPCs strongly want to use technology, but this can only happen when they receive proper training, subsidies, simple technology and tie-ups with agri-tech innovators. These results suggest it is necessary for government bodies, private technology companies, research groups and financial organizations to collaborate so that a supportive environment is established. They can assist FPCs in using AI, leading to more competitive internet operations which benefit the entire marketing process, raise earnings from farming and contribute to India's agricultural sector over the long run.

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Private Sector Participation in Higher Education: Opportunities and Challenges in India

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Executive Summary

India's higher education landscape is undergoing a transformative shift, driven by the urgent need to expand access, enhance quality, and align education with evolving industry needs. With nearly 70% of higher education institutions in India being privately managed, the private sector

has emerged as a powerful catalyst in the nation's education ecosystem. This article provides a comprehensive exploration of the dual aspects — opportunities and challenges — surrounding the increasing role of private players in higher education.

On the opportunity front, the private sector has significantly contributed to addressing regional disparities, expanding enrolment capacity, and modernizing infrastructure. Institutions like Amity, Ashoka, Shiv Nadar, and Manipal have introduced global pedagogical standards, industry-relevant curricula, and technology-driven learning models. These institutions often act as laboratories for innovation, promoting employability, research, and internationalization. Notably, collaborations with global universities, investment in digital tools, and alignment with corporate requirements have positioned private colleges as agile and responsive education providers.

However, this growth is accompanied by several structural and ethical challenges. Quality disparities remain stark, with many private colleges lacking accreditation, trained faculty, and research culture. The issue of affordability persists, as tuition fees in top-tier institutions remain beyond the reach of many students, despite limited scholarship schemes. Regulatory complexity due to multiple overseeing bodies, and the emergence of profit-driven institutions, further hinder the sector's credibility and equitable outreach.

The National Education Policy (NEP) 2020 emerges as a game-changer in this context. Its focus on autonomy, multidisciplinary learning, digital credit systems, and internationalization aligns well with the private sector's strengths. It provides a framework to regulate, support, and empower credible institutions while encouraging innovation and accountability.

This article also includes case studies of best practices, such as Manipal Academy of Higher Education, Ashoka University, and Infosys' Campus Connect initiative, which illustrate how private entities can successfully bridge the gap between academia and industry.

The article concludes with targeted policy recommendations: improving accreditation systems, incentivizing research, introducing need-based financial aid, and streamlining regulatory mechanisms. It advocates for a balanced approach that fosters public-private synergy, ensuring that private sector participation enhances India's vision of inclusive, high-quality, and globally competitive higher education.

Key Words- Higher education, Industry alignment, Technology-driven learning, Regulatory complexity, Public-private synergy

Abstract

This article explores the expanding role of private sector participation in India's higher education system, highlighting both the emerging opportunities and pressing challenges. With over 70% of institutions now privately managed, the sector plays a pivotal role in enhancing access, infrastructure, industry-aligned curricula, and employability. Through examples from institutions like Ashoka University, Manipal Academy, and Infosys' academic initiatives, the article illustrates how private players have fostered innovation and responsiveness to market needs.

However, the sector also faces issues including quality disparities, high tuition costs, limited research output, and regulatory complexity. The commercialization of education and

inequitable access further raise concerns. Against this backdrop, the National Education Policy (NEP) 2020 introduces reforms promoting autonomy, transparency, and multidisciplinary learning — aligning well with private institutions' aspirations.

Using policy analysis, stakeholder insights, and case studies, the article provides strategic recommendations to harness the strengths of the private sector while addressing its pitfalls. It calls for an ethical, inclusive, and collaborative framework to position India as a global leader in higher education.

Introduction

India's higher education sector stands at a pivotal moment, shaped by the twin imperatives of quality expansion and skill-oriented development. With over 40 million students enrolled, the country has the world's third-largest higher education system, yet it continues to grapple with issues of equity, employability, infrastructure gaps, and outdated pedagogy. Amidst these challenges, the private sector has emerged as an essential partner in supplementing the efforts of public institutions.

Over the past three decades, the private sector has played a transformative role in addressing the rising demand for professional education, especially in areas like engineering, management, medicine, law, and design. With its ability to mobilize resources, adapt to changing industry trends, and deliver flexible learning models, the private sector has carved a significant presence in India's educational landscape.

This article seeks to explore the evolving role of private players in higher education in India. It critically examines the key opportunities that private participation offers — such as innovation, internationalization, and industry integration — alongside the challenges of quality disparities, affordability, and regulatory complexity. Furthermore, it contextualizes these developments within the policy framework of the National Education Policy (NEP) 2020 and highlights successful models of public-private synergy. By doing so, the article contributes to the ongoing discourse on how private investment can be aligned with national priorities to build an inclusive, future-ready education ecosystem.

Evolution of Private Sector in Indian Higher Education

The liberalization of the Indian economy in the 1990s paved the way for private investments in sectors traditionally dominated by the government, including education. The result has been a significant increase in private institutions, especially in professional fields such as engineering, management, and medicine. For instance, states like Karnataka, Tamil Nadu, and Maharashtra have seen an exponential rise in private colleges since 2000. Institutions like Amity University, VIT, SRM, and Symbiosis have become household names.

3. Opportunities from Private Sector Participation

3.1 Expansion of Access Private institutions have enabled increased enrollment in higher education, especially in underserved regions. For example, private universities in North East India have improved access in geographically remote areas. In Bihar and Uttar Pradesh, private colleges have filled the vacuum left by inadequate public infrastructure.

3.2 Innovation in Curriculum and Pedagogy Institutions like Ashoka University and O.P. Jindal Global University have introduced liberal arts and interdisciplinary programs, deviating from the traditional rote learning system. These universities offer flexibility, research orientation, and project-based learning, preparing students for global challenges.

3.3 Infrastructure and Technology Adoption Private institutions often lead in adopting smart classrooms, virtual labs, and Learning Management Systems (LMS). For instance, Shiv Nadar University and Manipal Academy of Higher Education have invested heavily in research labs, digital libraries, and hybrid learning platforms.

3.4 Employability Enhancement Many private colleges collaborate with industry for curriculum development and internships. For instance, Narsee Monjee Institute of Management Studies (NMIMS) regularly updates its management programs based on feedback from companies like Deloitte, Infosys, and TCS. Placement cells and soft skills training are integral parts of their academic systems.

3.5 International Collaborations Private universities have signed Memorandums of Understanding (MoU's) with international institutions for student exchange, joint degrees, and collaborative research. Amity University, for example, has partnerships with over 100 international universities including Purdue and Stanford.

4. Challenges in Private Higher Education

4.1 Quality Disparities While top-tier private institutions offer high standards, a large number of colleges lack qualified faculty, basic infrastructure, and governance transparency. The mushrooming of "fly-by-night" colleges that prioritize profit over education is a growing concern, particularly in states with weak regulatory oversight.

4.2 Affordability and Access Tuition fees at premier private universities can range from INR 5 to 15 lakhs per annum, excluding accommodation and other costs. This creates a barrier for students from economically weaker backgrounds. Despite scholarships and fee waivers, overall affordability remains a concern.

4.3 Regulatory Complexity Multiple regulatory bodies with overlapping jurisdictions lead to delays and confusion. The introduction of NEP 2020 and the proposed Higher Education Commission of India (HECI) aim to streamline these processes, but implementation is ongoing.

4.4 Profit Motive vs. Academic Goals Some private players operate purely for commercial gain, leading to compromises in academic freedom and student welfare. Admission scams and faculty exploitation in unregulated colleges have occasionally made headlines, affecting public trust.

4.5 Lack of Research Output Even well-funded private institutions often fall short in global research rankings. Reasons include lack of a research culture, limited faculty training in research methodologies, and inadequate funding for long-term projects.

5. Role of NEP 2020 in Reforming Private Sector Participation

The National Education Policy (NEP) 2020 marks a historic shift in India's education framework and holds significant implications for the private sector in higher education. NEP 2020 advocates for a holistic, inclusive, and multidisciplinary approach to learning and places strong emphasis on flexibility, innovation, and accountability — values that resonate with progressive private institutions.

One of the most transformative elements of NEP 2020 is the provision of graded autonomy to higher education institutions based on their accreditation and performance. This autonomy allows well-performing private universities to design their own curricula, offer new programs, and innovate in teaching and assessment without excessive bureaucratic control. For example, institutions like Shiv Nadar University and Ashoka University, with high academic standards, can benefit from greater operational freedom under this model.

NEP 2020 also promotes multidisciplinary education, encouraging institutions to break silos between sciences, social sciences, and humanities. This vision aligns with the liberal arts models adopted by several private universities. For instance, O.P. Jindal Global University already offers integrated programs combining law, business, international affairs, and liberal studies.

Another important reform is the introduction of the Academic Bank of Credits (ABC) and the facilitation of credit transfers, enabling students to pursue courses across different institutions — public or private — without losing academic progress. This flexibility allows private universities to attract a broader and more diverse student base, enhancing their competitiveness. NEP 2020 further opens up opportunities for foreign universities to establish campuses in India. This move encourages healthy competition and compels private Indian institutions to raise their academic and administrative standards to retain their edge. Global benchmarking, international collaborations, and foreign faculty recruitment are expected to become more prevalent in the coming years.

Finally, NEP 2020 sets a vision for all institutions, public and private, to evolve into multidisciplinary teaching and research universities or high-quality autonomous colleges by 2040. It emphasizes transparency in governance, outcome-based accreditation, and financial self-sustainability — crucial areas for private sector growth and accountability.

In summary, NEP 2020 not only recognizes the pivotal role of private players in higher education but also provides a strategic and enabling policy environment for their growth. By aligning with the reforms outlined in the policy, private institutions can significantly contribute to India's aspiration of becoming a global knowledge hub.

6. Case Studies and Best Practices

6.1 Manipal Academy of Higher Education (MAHE) Established in 1953, MAHE is a pioneer in private education. It offers over 300 programs and has campuses in India, Dubai, and Malaysia. It maintains strong industry linkages, especially in health sciences and engineering. MAHE's research centers, like the Manipal Centre for Virus Research, have national relevance, especially during the COVID-19 pandemic.

6.2 Ashoka University A leader in liberal arts education, Ashoka follows a unique model with philanthropic funding and academic collaboration with institutions like Yale and Harvard. It

emphasizes critical thinking, ethics, and social impact. Its Young India Fellowship is one of the most competitive and transformative postgraduate programs in India.

6.3 Infosys Campus Connect An industry-academia collaboration where Infosys partners with private engineering colleges to train faculty, update curricula, and enhance students' technical and soft skills. This has improved employability rates and reduced onboarding costs for companies.

7. Policy Recommendations

Strengthen accreditation through regular audits and public disclosure of quality ratings.

Introduce targeted scholarships and income-based tuition waivers.

Create incentives for private investment in research and innovation.

Mandate industry advisory boards in curriculum design.

Establish a single-window digital platform for regulatory compliance.

8. Conclusion

Private sector participation is indispensable in India's quest for global educational leadership. While it brings significant opportunities in terms of scale, innovation, and employment outcomes, unchecked commercialization and inequality must be addressed through robust policies and ethical governance. With the right balance of autonomy and accountability, private institutions can be instrumental in transforming India into a knowledge-driven economy.

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Market trend of E-learning in Higher Education under New education Policy(NEP- 2020)

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Abstract:

NEP-2020 main aims are access, equity, quality, innovation, skills, world class research and Indian values with global standards. In order to achieve these, NEP-2020 is going to make changes in education with emphasis on online education and technology based education. Policy has brought huge revolutionary changes in India's higher education too. NEP-2020 focusing on digital learning, flexibility, and ease of accessibility. Due to technological advancement, huge internet penetration, demand for skill workers for all industries, education and demand for e-learning has increased. Even After COVID-19 e-learning has accelerated very fast in higher education. This review synthesizes literature from 2015 to 2024 to examine the current e-learning market trend in higher education under NEP-2020. The study also highlights adoption of e-learning platforms, hybrid learning models and Government initiatives for promoting e-learning in higher education.

Keyword: NEP-2020, Higher education, E-learning.

Introduction :

E-learning is learning by utilizing digital technologies for accessing educational curriculums outside of traditional classrooms. E-learning is booming in India due to multiple factors such as high penetration of the internet, online content consumption, and smart devices, and the demand for skilled professionals in the global workforce. Increased popularity of mobile and online content consumption created a sustainable network of digital users leading to a massive opportunity for e-learning firms. (Nihalani, 2023)

The NEP-2020 vision is to shift from the most rigid traditional classroom based education to a more accessible, flexible, innovative and technology driven teaching learning system. NEP-2020 promotes integration of e-content, use of the EdTech platform. In order to enhance the e-learning System National Education Technology Forum (NETF) is established by the Ministry of Education, 2020.

Objective:

- To understand the role of e-learning in NEP-2020.
- To identify the initiatives of the Government in promoting e-learning.

Literature Review:

Several studies have examined the impact of digital learning in Indian education prior to and after NEP 2020.

Jain et al. (2018) discussed the increase of EdTech i.e technology based learning and how platforms like Unacademy, Byju's, Coursera, etc. has transformed learning accessibility.

KPMG & Google (2017) report was expected that India's online education market would grow to \$1.96 billion by 2021. Main key behind these is rapid increase in internet, use of mobile, techno savvy students.

Dwivedi et al. (2021) study emphasized on the growing importance of lifelong learning, certification and reskilling knowledge for ever changing market needs. It was also noted that the pandemic accelerated NEP's implementation, pushing institutions towards hybrid models.

MHRD (2020) highlighted that NEP 2020 mainly focuses on the use of technology in education. Classroom learning is integrated with e-learning like MOOCs, virtual Lab, LMS platform, ICT-based content delivery.

Kumar and Batra (2022) focused on how NEP's flexibility promotes inclusivity, online certification, reskilling, and credit transfer mechanisms.

While these studies reveal many aspects of online learning and positive trends, concerns about digital divides, training gaps, and infrastructural constraints remain recurring themes.

Methodology

This review adopts a qualitative meta-synthesis approach, incorporating secondary data analysis from government reports, academic journals, EdTech surveys, and policy documents.

Data Sources:

Scholarly articles from Scopus, Google Scholar, and JSTOR

Government portals (MHRD, UGC, AICTE, NEP official documents)

Reports by EdTech companies (Byju's, Coursera, UpGrad, etc.)

Inclusion Criteria:

Publications from 2017–2025

Focused on NEP 2020 and e-learning in higher education

Peer-reviewed journals and authentic government sources

Analysis Tools:

- Thematic analysis for qualitative insights

Data Analysis

Main objective of NEP 2020 in Indian Higher Education System:

Multidisciplinary education means any faculty student can learn subjects from any other faculty. Four year undergraduate program in which if the student wants to drop in the first year he will get a certificate, if he do the under graduation program for 2 years he will get the diploma certificate, if he did a 3 years he will the degree and if it did undergraduate program for 4 years he will get the honours degree.NEP-2020 allows students multiple entry and exit options.

Many are also focused on skill development programmes by giving internship apprenticeship etc. programs for student holistic development. There will be a single regulatory body to oversee all higher education institutes in India that is the higher education commission of India(HECI). Internationalisation in which the different Universities all over the world can start their campus in India, whereas Indian students have the opportunity to go abroad for studies. NEP-2020 has given importance for promotion of Indian languages. NEP-2020 has given importance to the research work, all types of research work has given importance like innovative research, applied research etc.

In order to achieve the above objective support of technology has suggested:

Academic Bank of credits ABC accounts for all the students who will save all the credits of the students and they can be used for the if the student changes college or university. Digital media, online courses, e-content, artificial intelligence etc. are included in education. For the continuous development of teachers the use of online platform has suggested. And which ultimately give rise for the e-Learning and online platforms for education

Before NEP 2020 e-Learning in higher education:

Even before NEP 2020 the Indian market has rapidly growing for e-Learning and reason for development is :

Government Initiative toward promoting e-learning in Higher education:

1. The launch of SWAYAM in 2017 (MHRD, 2017) and SWAYAM Prabha:

The Indian Government has started the SWAYAM portal for providing the high quality education for all students across the country with minimum cost and without any geographical barrier (Pujar, 2021). On the SWAYAM platform all types of Courses are available for Class 9 to Post Graduation Students. For excellent quality content ten different coordinators have been Appointed.

2. SWAYAM Prabha

Swayam Prabha is a very motivative policy for making education reach e all over the India. Through 40 DTH channel offering different subjects in higher education with affordability, flexibility and inclusivity from remote location with limited internet for every student.

3. e-PG pathshala:

e-PG pathshala is the initiative of UGC for offering quality content for all post graduate students in art, Science and social science faculty with the advanced curriculum. e-pathshala includes videos, e-text and assessment for the students for a quality education.

4. Virtual labs:

Virtual labs are based on experiment in the science, engineering a students to perform the simulation online improve the conception understanding of the subject. It is the initiative of MHRD enables a remote access to each and every student from India

5. NEAT:

National Educational Alliance for technology is launched by AICTE. NEAT is a public private partnership AI driven platform that offers quality education and to enhance the learning outcomes along the students

The rise of Edtech startups in India are:

BYJU'S (Think & Learn) in 2011, after it became BYJU'S India's first EdTech unicorn in 2017. Simplilearn in 2012 it is online professional certification courses. Unacademy started as a YouTube channel in 2014 and in 2016 it has become full fledged learning platform. There is rise of AI-driven personalized learning (BYJU'S, Vedantu) make popular among students. Availability of venture capital funding in EdTech startups are the reason for the growing edtech market. COVID-19 pandemic also played an important role in it.

Experiment of blended learning :

Universities like IGNOU and IITs introduced hybrid models (Sharma & Vatta, 2016).

Online Certificate and degrees:

Along with firms, many universities also offer online certificate and degree courses in India. Many top Indian Universities Offered Online Degree Courses. Indian Universities like Amity Online, SRM University Chennai, IIT Madras, Jain University, Bangalore, OP Jindal Global University, Aligarh Muslim University, Alagappa University, Amrita Vishwa Vidyapeetham, Coimbatore, Dr DY Patil Vidyapeeth, Vignan's Foundation for Science Technology and Research and many more offers online certificate course as well as B.Com, BA, BBA, M.Com, BCA, MBA, MCA, M.Com online degree courses (Jain, 2023).

E-Learning in higher education under NEP 2020 :

Current Market Trends in E-Learning :

Growth of Online and Blended Learning: According to the UGC-2023 report, blended Learning, i.e., the adoption of classroom and online learning, has increased; more than 60% of universities now use hybrid models. MS platforms, such as Blackboard, Moodle, and Google Classroom, are widely used in higher education (Desai et al., 2021). NEP-2020 highly promotes e-learning and digital education to enhance accessibility, equity, and quality in education.

Below is a detailed explanation, accompanied by references from the official NEP 2020 document and related government initiatives.

Digital education and online learning platforms will be increasingly used to ensure equitable access to high-quality education. High-quality e-content will be developed in multiple languages, including for virtual labs.

NEP 2020 proposes NETF to guide digital education. NETF will provide a platform for EdTech innovations, including AI-driven personalized learning and digital assessments.

Multilingual Digital Content focuses on e-content in regional languages. Digital content will be made available in Indian languages to ensure inclusivity.

Teacher Training in Digital Pedagogy highlights teacher upskilling in online teaching. Teachers will receive training in digital pedagogy, online assessments, and blended learning methods.

Online & Distance Learning (ODL) Expansion. NEP 2020 supports online degrees & credit transfers. Top institutions will offer online degree programs with credit recognition via the Academic Bank of Credits (ABC).

Digital India Initiatives Supporting E-Learning:

DIKSHA is an initiative of the National Council of Educational Research and Training (Ministry of Education, Govt of India) .It is National digital repository for teachers and students (used by 30+ states).It has used AI-based personalized learning tools,

SWAYAM is an initiative of the Indian government ,it's also given importance in NEP 2020. On SWAYAM free online courses are available so each student can have access to it which fulfills the one objective of NEP.

India's first National Digital University (NDU) proposed under NEP 2020 for flexible online higher education. These digital initiative has plans to provide online education by collaborating with public and private universities. E-PG Pathshala is gateway to all postgraduate courses. Its have high quality, curriculum-based, interactive e-content in 70 subjects for all disciplines of social sciences, arts, fine arts and humanities, natural & mathematical, sciences etc.

Conclusion:

The NEP-2020 has accelerated e-Learning adoption and provided the transformation in Indian higher education by including e-learning due to the increased in online universities blended learning models it take platform at the key factors to growing market MOOC courses, digital universities and AI driven platforms are also key factors for developing learning in higher education.

Also there are certain challenges like digital divide quality assurance should be an engagement except. The future focuses on the student motives for e-Learning products in an ever changing environment.

Limitations:

Digital Divide: Many students in rural or remote areas still lack access to the internet, devices, or electricity, limiting the reach of e-learning.

Language Barrier: Most online courses are in English, making it difficult for students who are more comfortable with regional languages.

Lack of Digital Skills: Both students and teachers may not have the technical skills to fully benefit from e-learning platforms.

One-size-fits-all Content: Current platforms often deliver the same material to everyone, without personalizing based on the learner's pace or level.

Assessment Challenges: Online exams may lack fairness and accuracy, with limited tools for evaluating practical or creative skills.

Low Engagement: Students may feel less motivated or isolated in online classes, affecting active participation and learning outcomes.

Future Scope:

Regional Language Content: Creating more e-learning content in local languages will help make education inclusive and accessible to all.

AI-based Personalization: Artificial Intelligence can make learning more effective by giving each student a customized path, feedback, and support.

Use of VR and AR: Immersive learning using Virtual Reality (VR) and Augmented Reality (AR) will enhance understanding of complex topics in science, medicine, and engineering.

Indigenous LMS Development: Developing Indian Learning Management Systems that support Academic Bank of Credits (ABC) will make online learning more flexible and trackable.

Teacher Training: Regular digital training for teachers will help them design and deliver better online courses using new tools and methods.

Policy Monitoring Tools: Creating digital tools to track NEP 2020 implementation in e-learning can help improve transparency and decision-making.

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Humans vs AI : A Comparative Study in Stock Market Analysis

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Abstract

With each passing day the role of Artificial Intelligence is growing significantly in the field of stock market. AI in the stock market has transformed the way in which the market operates as it has introduced automation of complex decision making processes. One can manage multiple tasks and can analyse the huge data rapidly with the use of AI as it has high data processing and handling speed, it recognises market patterns . On the other hand humans are great in handling new situations, they bring creativity, emotional intelligence, etc. There are several differences between AI driven stock market analysis and traditional human led approaches to analyze stock market. At present, AI can reduce human work, can give real time suggestions and can perform multiple tasks by saving time but it cannot stop entire human involvement as each brings unique advantages. So researchers made an attempt to study AI as well as human analysis in the Stock Market to find out the impact of AI in Stock Market, Future of AI in Stock Market, What AI does the best and What humans do the best.

Keywords: AI, Comparative Study, Stock Market Analysis

Introduction

In recent years advancement in technology and Artificial Intelligence has revolutionized Stock Market Analysis as well as the other functions of Stock Market. With the help of AI powered tools investors can earn more competitive gains by investing in appropriate stock. Before this innovation and development in technology, stock market decisions of investors were totally based on human intuition, emotions, expertise and analysis. AI tools avoid the influence of emotions such as fear, greed or uncertainty which leads to irrational decisions. AI tools make decisions purely on predefined parameters, objectives, market data, consistent strategies, etc. so, it analyses the market in a disciplined way.

Objectives of the study

1. To understand the performance of AI vs. Human in Stock Market Analysis
2. To study the role of AI in improving investment decisions

Literature Review

1. Dhaval Panchal, Varsha Gaud, Dr. Ganesh Chavan (2024), in 'The Role of AI in Stock Market Prediction and Analysis' studied the implications of AI in different Stock Trading Processes, Role of AI in investment decision making and found out that AI has potential to outperform humans in terms of accuracy, efficiency and adaptability. However, a combination of AI and human will be the most effective one.
2. Dr. Gayatri Agarwal, Dr. Susan Alex (2024), in 'A Study of Role of Artificial Intelligence in Stock Market Analysis and Price Prediction' studied the role of Artificial Intelligence in the Stock Market, its benefits, challenges and risks. Researchers concluded that the use of AI in investing has improved the decision making in Stock Trading and adopting AI is a necessity of the investors if they want to remain competitive in the market.
3. Hardik Vyas, Dr. Archana Wafegaonkar, Mr. Deepak Singh (2024), in 'Impact of AI in Share Market' studied the effectiveness, advantages, disadvantages and future implications of AI in Stock Market and found that AI has potential to enhance efficiency, decrease human error and improve decision making as it has capacity to process large volume data, to make real time predictions and to automate trading strategies.
4. Dr. Emon Kalyan Chowdhury (2023), in 'Use of Artificial Intelligence in Stock Trading' studied an Impact of AI in Stock Trading and Its Future. He has mentioned some of the companies which use AI for smart Stock trading. He concluded that the best performance in trading can be extracted with the use of AI as well as with continuous advancement in AI businesses can make more data driven and effective decisions.

Analysis and Interpretation

Humans vs. AI in Stock Market Analysis

AI has the ability to analyse thousands of stocks and to work 24/7, it can process huge data in a second and can easily recognise the market pattern. It can handle huge data and can find patterns that human may miss. On the other hand humans can analyse limited stocks in a day, manual analysis of data is time consuming but humans are better at understanding the context while recognising the patterns. Humans can excel in the complex market context which only numbers can't. They are great at adapting to unexpected market changes or events.

So, even though AI outperforms humans in stock market analysis, the combination of both effectiveness and efficiency of AI and Human skills and expertise will turn into the best results.

Limitations of Human Traders in Stock Market Analysis

1. Emotional Bias

Emotional biases such as greed, overconfidence, fear can turn into irrational decision making. These human emotions not only influence trading behaviour and decisions but also affect the outcomes out of it.

2. Limited Processing Capacity

A human trader cannot go beyond his abilities. He can process only a limited amount of data or information at a time. If there is a huge amount of data available then he may struggle to analyse that quickly and accurately which may result in losing some opportunities.

3. Subjectivity

Human traders' decisions are highly based on subjectivity which can lead to biases in the decision making process.

4. Inability to adapt quickly

Markets are continuously evolving and changing. Humans may struggle to cope up with such changing market conditions during high volatility periods. This will again result in losing opportunities.

Benefits of AI in Stock Market Analysis

1. Speed and Accuracy

AI can analyse and predict the market accurately and execute the trade very fastly. This rapid execution helps in grabbing the opportunities in the market and give the potential higher profits.

2. Data analysis

AI can process a large amount of data in real time. It identifies the patterns and correlations by analysing the market trends, historical data, news, etc. This approach enables informed trading decisions.

3. Emotionless Decision Making

AI is not influenced by emotions which allows it to make rational objectives and decisions purely based on the predefined parameters and data. It avoids impulsive behaviour and can reduce the risk of costly errors.

4. Ability to operate 24/7

AI can operate without any breaks. It has capability to work continuously which allows flexibility and responsiveness to market changes.

5. Adaptability

AI can adapt and evolve new data and market experiences which enables it to refine strategies and stay ahead of evolving market conditions.

6. Risk Management

AI algorithms may use risk management techniques to avoid potential losses and to protect the capital. By setting risk parameters, risk can be minimized during volatile market conditions.

Limitations and Scope for further study

This research is based on the secondary data. It has studied the limitations of Humans in Stock market analysis and Benefits of AI which can be useful to overcome such limitations. This research specifically focuses on Human vs AI in Stock Market analysis, various AI tools and Models are untouched in this research.

Conclusion

As AI increasingly rules Stock Markets, human traders may face some challenges in competing with it. AI tools can analyse large volume data faster than humans with the help of which one can make quick decisions with higher accurate predictions and profitability. AI tools are easily able to identify and analyse the patterns and trends in the market which will be useful to frame successful trading strategies. Human decisions are based on emotional biases such as greed, overconfidence, fear. On the other hand AI tools work totally on predefined algorithms which are not influenced by emotions. So it results in more rational decisions. AI has the ability to adapt to changing market conditions whereas humans are still struggling with the same. However humans are capable of providing valuable insights and strategic thinking. So, the AI and Human Traders, the combination of both will be the most effective one for getting optimum gains in the Stock Market.

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A Study of Emerging Competencies in Financial Markets

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Abstract

Financial Markets refers to the exchanges and institutions which allow the trading of Stocks, Bonds, Commodities, Derivatives, etc. Nowadays, organizations are rapidly adapting new technologies to enhance efficiency and to improve productivity. This transformation in the Financial Market is providing a lot of opportunities. But one must have to develop accordingly to get this opportunity. Qualitative knowledge is also important but along with that there is a need for digital literacy, ability to learn new technologies, etc. technological advancement, AI, Soft skills like Communication, emotional intelligence, adaptability these are some of the key skills on which future financial jobs are based. As new trends are emerging in the Financial Market, it has its impact on the requirement of job skills. So, if one has to enter into this field, to upgrade their skills by commitment and continuous learning is very essential. This paper mainly focuses on examining change driven by technological advancement, the right skills set to retain in the Financial Market and different opportunities available to the one having the right skills set.

Keywords: Emerging Competencies, Financial Market

Introduction

Financial Markets refers to the exchanges and institutions which allow the trading of Stocks, Bonds, Commodities, Derivatives, etc. It is well known for its competitiveness as it demands the professionals who possess the diverse skill set and knowledge. Nowadays, organizations are rapidly adapting new technologies to enhance efficiency and to improve productivity. This transformation in the Financial Market is providing a lot of opportunities as well as challenges to potential candidates. Organisations are trying to recruit the candidates who are job ready in terms of knowledge as well as competencies. In such a dynamic era, it becomes crucial to stand out among the candidates who are looking for a position in the financial Market. For specialized jobs in the Financial Market, some skill sets are required such as analytical skills, communication skills, knowledge of finance and accounting, application of MS Excel and so on. This skill set covers both technical skills as well as soft skills. Qualitative knowledge is also important but along with that there is a need for digital literacy, ability to learn new technologies, etc. technological advancement, AI, Soft skills like Communication, emotional intelligence, adaptability these are some of the key skills on which future financial jobs are based. So, if one has to enter into this field, adaptability, upgradation of skills, commitment and continuous learning is key to remain successful in the Financial Market.

Objectives of the Study

1. To examine the opportunities in Financial Market
2. To Study the skills required to succeed in Financial Market

Literature Review

1. Joseph Ozigi Basiru , Chinelo Linda Ejiofor, Ekene Cynthia Onukwulu and Rita Uchenna Attah (2023), in ‘Financial Management Strategies in Emerging Markets: A Review of Theoretical Models and Practical Application’ Studied and highlighted the role of both theoretical tools and practical applications in emerging markets. And concluded that to manage financial resources effectively, combining theoretical models with practical strategies is important.
2. Mahalakshmi Sivanesan (2024), in ‘Challenges and Opportunities in India’s Financial Market ’examined the changing Financial Market scenario and analysed the Challenges and opportunities. It is concluded that one who stays educated and practices sound risk management will get opportunities in the Financial Market.

Analysis and Interpretation

Key drivers of change in Financial Market

Rapid changes in the financial market are caused by the advancement in technology such as Artificial Intelligence, Machine learning which automates the complex processes and analyses

the large data sets. It enhances efficiency, reduces the cost as well as improves decision making. Blockchain is another system which enhances trust and reduces transaction cost and time.

Skills Required in Financial Job Market

Soft Skills

1. Communication Skills

Strong verbal as well as written communication skill is required for Finance professionals. With the help of these skills one can convey the complex financial information to stakeholders.

2. Presentation Skills

Effective presentation skills enable the professionals to put their ideas very effectively. One having these skills can convey the information effectively, clearly and impactfully.

3. Problem Solving and Critical Thinking Skills

One who looks for a position in the financial market should have these skills as he will often come across complex challenges which require innovative solutions. Employers always look for a candidate who possesses strong problem solving and critical thinking skills as it allows them to analyse effective solutions and implement effective strategies.

4. Teamwork and Collaboration

Employers in the financial market always value one's ability to collaborate with other teams and contribute to group objectives as strong teamwork and collaboration leads to a cooperative and productive work environment.

5. Adaptability and Flexibility

Organisations always require a professional who can easily adapt to changes in market conditions and regulations as it allows individuals to cope up with uncertain situations.

Technical Skills

1. Financial Analysis

Financial Analysis is all about analysing and interpreting the financial data to make informed decisions in an organisation. Employers always look for the candidate who can analyse and interpret the complex financial data, who can assess the risk and who can evaluate the accurate investment opportunity

2. Financial Software and Tools

One who looks for the position in the Financial Market must be familiar with financial software tools such as Excel, ERP Systems, etc. Along with this he must gain the knowledge about recent AI tools which are useful in this industry. By adapting the knowledge of these tools one can enhance the efficiency and can work effectively.

3. Data Analysis and Interpretation

Having strong data analysis skills is very essential as data driven decision making is very popular nowadays. By having in-depth knowledge of statistical analysis, data visualisation and relevant tools used for the same one can give valuable insights and strategic decision making.

4. Knowledge of Finance and Accounting Principles and Practices

Foundation in Finance as well as Accounting principles and practices is another essential for success in the Financial Market. This knowledge allows professionals to interpret the data, report accurately and comply with the requirements.

5. Knowledge of recent technologies

Understanding of Fintech, blockchain, use of financial modeling and AI tools in Finance are essential to stand out in today's Financial Market.

Opportunities in Financial Market

A career in the Financial Market offers various opportunities in financial trading, investment management, market analysis, etc. Professionals in this field play an important role in connecting businesses with investors, analysing market trends, managing portfolios etc. with the rise in investors, there is huge demand for equity analysts, portfolio managers and financial advisors. AI, Blockchain have transformed the Financial Market which provides opportunities for quantitative analysts and tech - savvy professionals. So, a career in this field offers diverse opportunities.

Limitation and Scope for further Research

This research is based on the secondary data. It examines the opportunities and skills required for success in the Financial Market. It examines the change driven by technological advancement, the right skills set to retain in the Financial Market and different opportunities available to the one having the right skills set.

Conclusion

To succeed in a competitive financial market, one must possess a diverse range of skills such as Technical Skills, Soft Skills, Industry specific skills along with the subject knowledge in Finance as well as Accounting. One must understand the financial market and be aware about current trends and developments in the finance industry. By having these skills and staying updated with the industry trends, one can position themselves for success in this rapidly

evolving market. Continuous learning and development are key components to become successful in the Financial Market.

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“Integration of Digital Tools and Emerging Technologies: A Pathway to Transformative Innovation”

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Abstract:

The integration of digital tools and emerging technologies is reshaping the operational landscape across academia and industry. This study investigates how innovations such as artificial intelligence (AI), cloud computing, Internet of Things (IoT), and data analytics are being implemented to streamline processes, enhance decision-making, and foster innovation. Using a mixed-methods framework and hypothetical cross-sectoral data, the paper examines patterns of technology adoption, effectiveness metrics, and the barriers institutions face during integration. Findings suggest that while adoption rates are promising, significant challenges—particularly in digital literacy, training accessibility, and infrastructure—persist. The paper concludes with recommendations for inclusive, scalable, and sustainable digital strategies to bridge existing gaps and maximize the potential of technological convergence.

Introduction:

In the era of rapid technological transformation, the integration of digital tools and emerging technologies has become a cornerstone of institutional progress. From reimaged pedagogical practices in academia to automated production systems in industries, digital innovation is not merely a trend—it is a strategic imperative. Technologies such as artificial intelligence (AI), cloud computing, Internet of Things (IoT), and data analytics are increasingly interwoven into organizational structures, aiming to improve agility, efficiency, and innovation capacity.

This paper explores the current landscape of digital technology adoption across academic and industrial sectors, drawing insights from hypothetical data to illustrate trends, barriers, and opportunities. By focusing on practical implementation and outcome assessment, the study provides a cross-sectoral analysis of how digital integration can be leveraged for long-term sustainability and competitive advantage.

Research Problem Statement: Despite widespread availability, the integration of digital tools and emerging technologies in academic and industrial sectors remains inconsistent, hindered by barriers like limited digital literacy, infrastructure gaps, and inadequate training. This study explores adoption patterns, perceived effectiveness, and sector-specific challenges to guide strategic, sustainable digital transformation.

Rational Of the Study:

As global systems shift toward increased digitization, both academic institutions and industries face the challenge—and opportunity—of transforming their traditional models through innovative technologies. While tools like artificial intelligence, cloud infrastructure, and data analytics offer substantial benefits in terms of productivity and innovation, their implementation often lacks uniformity and strategic coherence.

The rationale behind this study lies in addressing this strategic gap. There is a critical need to understand how and why these technologies are adopted, and what structural or behavioural factors influence their success across different organizational environments. Educational institutions must prepare learners for digitally mediated futures, while industries must continuously evolve to remain competitive in a knowledge-driven economy.

Objectives Of the Study:

- To identify commonly adopted digital tools and technologies.
- To assess their impact on operational and educational effectiveness.
- To evaluate challenges in integration and recommend strategies for improvement.

Research Methodology:

Research Design:

Exploratory Research Design is an examination into a subject in an attempt to gain further insights through this topic researcher starts to explore the general impact of financial platforms on financial inclusion of youth.

Descriptive research: what exist and may be help to uncover new facts and meaning so the researcher collects information with the help of structured questionnaire, observation and personal interview a descriptive research design quantitative methods like surveys can systematically describe and quantify these findings offering a clear and detailed picture of financial platforms and financial inclusion of youth.

Sources Of Data Collection:

Primary Data: Questionnaire, Interview, Observation and Discussion.

Secondary Data: Journals, Books, Websites.

Sample Design:

Sample Population: Approximately 1000

Sample Size: 200(100 academics,100 industry)

Sample Area: Ahilyanagar & Pune District

Sample Technique: Stratified Sampling

Sample Instrument: Questionnaire

Scope Of the Study:

This study focuses on the integration of digital tools and emerging technologies within two primary sectors: higher education and industry. It explores the types of technologies adopted, their perceived effectiveness, and the challenges faced during implementation. The analysis is based on data representing post-2020 adoption patterns and includes perspectives from academic professionals and industry practitioners involved in digital transformation.

The study emphasizes:

1. Mainstream technologies such as AI, cloud computing, LMS, ERP systems, and data analytics.
2. Institutional and organizational perspectives on digital readiness and effectiveness.
3. Strategic and operational challenges in the adoption process.

Limitation Of the Study:

The present study, while offering valuable insights into the integration of digital tools and emerging technologies, is subject to several limitations. The scope is restricted to the higher education and industrial sectors, excluding other potentially relevant domains such as healthcare, government, or small enterprises. Additionally, the study does not consider specific regional or geographic contexts, which may affect the generalizability of results across different socio-economic or infrastructural settings.

Review Of Literature:

Digital Transformation and Innovation: The Influence of Digital Technologies on Turnover from Innovation Activities and Types of Innovation: Author; Anca Antoaneta Vărzaru and Claudiu George Bocean Sep (2024): the research study highlighted that In today's competitive and globalized world, innovation is essential for organizational survival, offering a means for companies to address environmental impacts and social challenges. As innovation processes

accelerate, managers need to rethink the entire value-creation chain, with digital transformation emerging as a continuous process of organizational adaptation to the evolving societal landscape. The research question focuses on how digital technologies—such as artificial intelligence, Big Data, cloud computing, industrial and service robots, and the Internet of Things—influence innovation-driven revenues among enterprises within the European Union (EU). The paper examines, using neural network analysis, the specific impact of each digital technology on innovation revenues while exploring how these technologies affect various types of social innovation within organizations.

Exploring Of the Integration of Emerging Technologies and Corporate Governance: Author: Tong Wu: the study indicates that the emergence of artificial intelligence (AI) block chain, big data analytics and the internet of things has had a substantial impact on corporate governance in practices in recent years offering both opportunities and challenges for companies' worldwide. This research is conducive to promoting the further improvement of the modern corporate governance system and ensuring that companies maintain a high level of adaptability, sustainability and resilience in a dynamic environment.

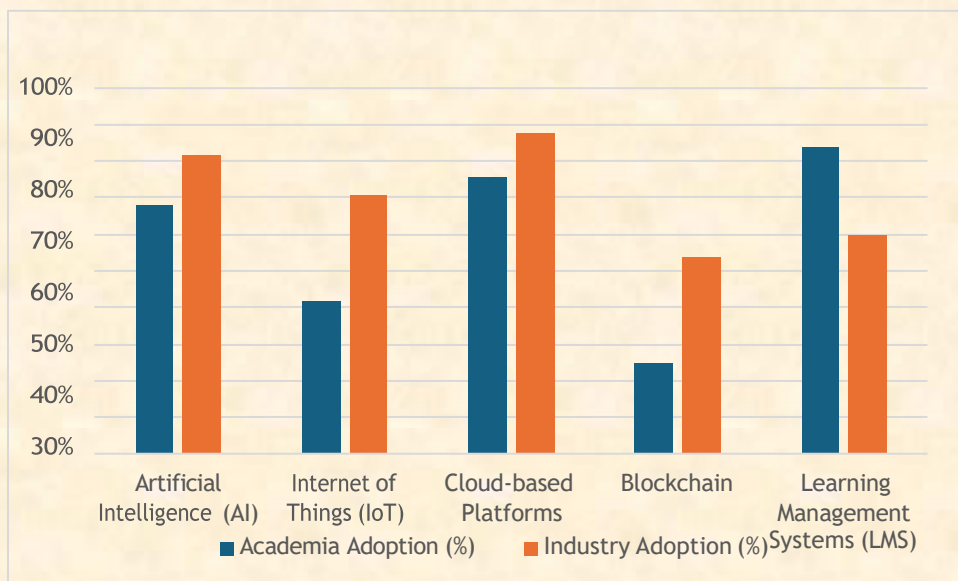
The Relationship Between Digital Technologies And Innovation: A Review, Critique, And Research Agenda By Hao Jiao, Tang Wang, Dirk Libaers, Jifeng Yang, Lingshu Hu January–February 2025, 100638: the research paper mentioned Innovation, which encompasses value-creating activities for stakeholders through the introduction of new products, services, business models, or procedures, is vital for organizations aiming to develop and maintain a sustainable competitive advantage in an increasingly global and competitive market (Pavitt & Walker, 1976; West & Farr, 1989).

AI-Powered Innovation in Digital Transformation: Key Pillars and Industry Impact by Abdulaziz aldoseri, khalifa N.AI-Khalifa and Abdel Magid Hmouda(Jan 2024)

: This study focuses on the intricate relationship between artificial intelligence and innovation as foundational elements in the digital transformation framework for sustained growth and operational excellence. This study provides a holistic perspective on the cultivation and pillars of AI-powered innovation, highlighting their pivotal role in revolutionizing industries, including healthcare, education, finance, manufacturing, transportation, and agriculture. The work emphasizes the key pillars essential for fostering AI-powered innovation, including monitoring performance measurement to use the power of the present, continuous learning and innovation, data analytics and insights, predictive analytics, and innovative product development.

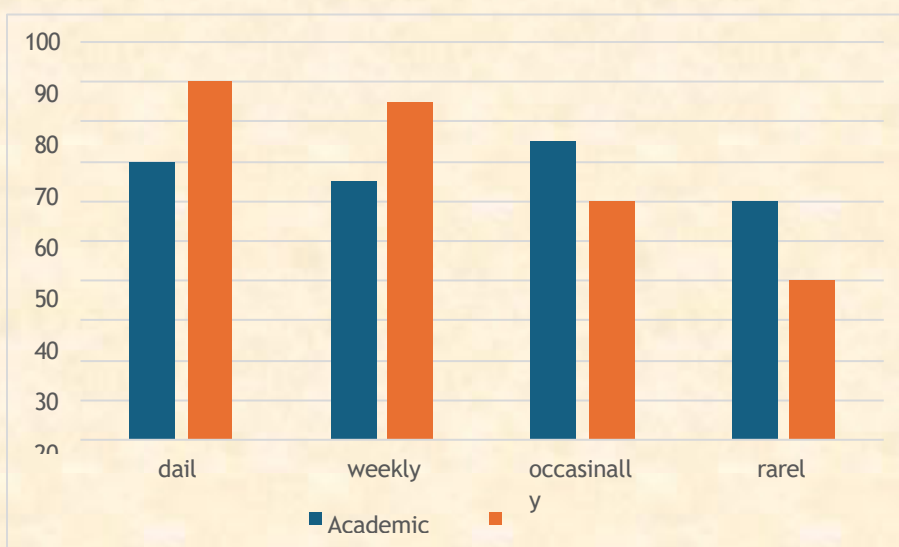
Data Analysis and Interpretation:

Commonly Adopted Digital Tools and Technologies:



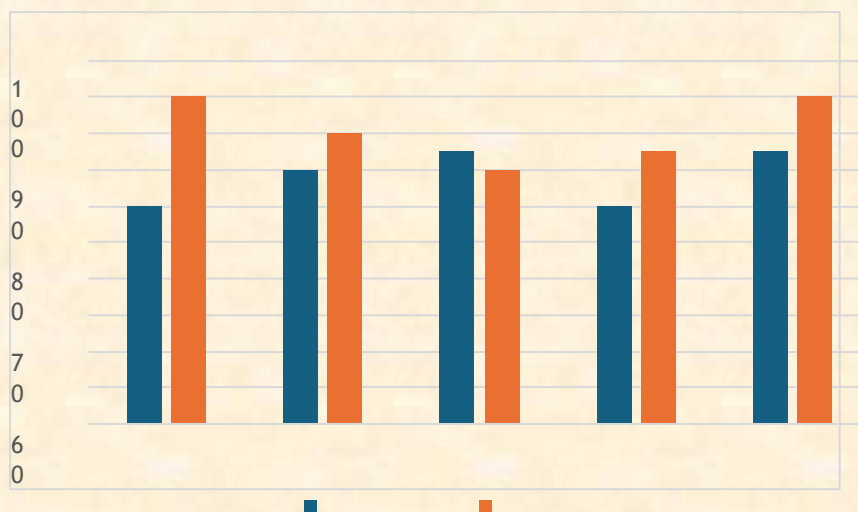
Interpretation: the above graph highlighted that 84% of academic respondents use LMSs, reflecting their central role in modern education. 88% in industry and 76% in academia reported cloud platform usage for operational efficiency. IoT shows a 29% adoption gap between industry (71%) and academia (42%).

Usage Of Tools:



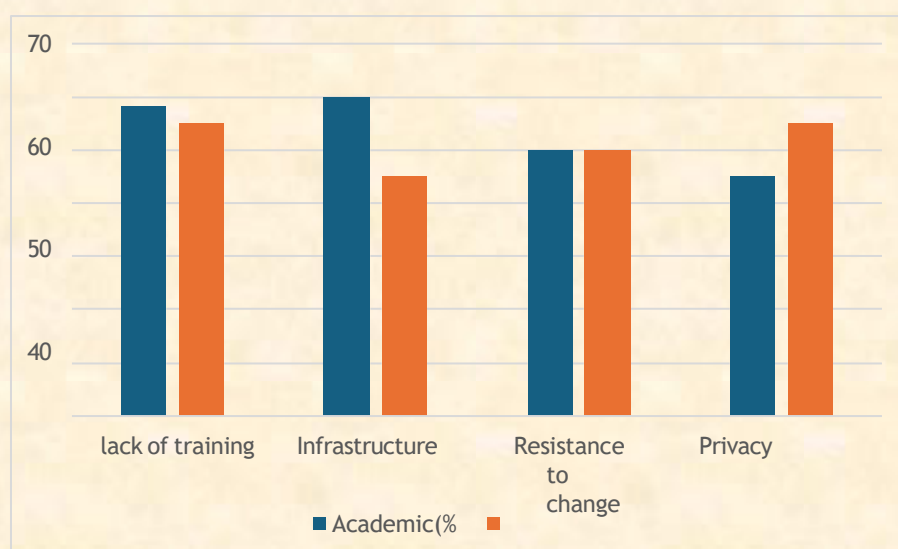
Interpretation: Industry shows more frequent digital tool usage, with 90% using them daily and 85% weekly, compared to 70% and 65% in academia. Meanwhile, occasional and rare use is higher in academia, indicating less consistent adoption than in the industrial sector.

Primary Motivation Behind Digital Tool Adoption:



Interpretation: Above graph indicates that Industry outperforms academia in all areas, with 30% higher productivity and 15–20% stronger alignment with goals and peer trends, while academia leads slightly in government mandate compliance by 5%. This highlights industry's more strategic and results-driven integration of digital tools.

Challenges Integrating Emerging Technologies:



Interpretation: The survey indicates that Academia struggles more with training (58%) and infrastructure gaps (60%), while industry reports slightly higher privacy concerns (55%). Resistance to change is equal at 50%, showing it's a shared challenge across both sectors.

Findings:

The findings show that cloud platforms and LMSs are widely adopted for efficiency and education, while IoT adoption remains significantly higher in industry, revealing a clear digital implementation gap between sectors.

Industry leads with 90% daily and 85% weekly digital tool use, while academia lags behind at 70% and 65%, showing more frequent and consistent usage in industry settings. Occasional and rare use is noticeably higher in academia.

The findings show that industry demonstrates stronger digital integration, with significantly higher productivity and alignment rates, while academia slightly leads in adapting to government mandates.

Academia reports higher challenges in training (58%) and infrastructure gaps (60%), reflecting internal capacity constraints. In contrast, privacy concerns are slightly greater in industry (55%), while resistance to change remains equal at 50%, indicating a shared cultural barrier.

Suggestions:

1. Provide regular workshops and hands-on training, especially in academia, to build confidence in using digital tools.
2. Invest in better infrastructure, especially in colleges and universities, to close the usage gap.
3. Create clear rules and awareness programs to manage privacy concerns, especially in industry settings.

Conclusion:

This study clearly shows that industry is ahead in the regular and strategic use of digital tools, with higher daily usage, stronger productivity gains, and better alignment with organizational goals. On the other hand, academia relies more on specific tools like LMSs but faces challenges with infrastructure, training, and consistent usage.

Despite these differences, both sectors share some common hurdles—especially resistance to change and the need for thoughtful digital adaptation. These insights suggest that targeted efforts in training, infrastructure, and policy can help balance digital growth, making it more inclusive and effective across sectors. Looking ahead, bridging this gap will require strong partnerships, leadership support, and a shared commitment to digital literacy that empowers educators, administrators, and professionals alike.

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Scrolling to Shop: A Comprehensive Systematic Review of the Influence of Social Media on the Apparel Purchasing Behaviors of Generation Z.

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Abstract:

This systematic literature review investigates the complex interactions through which social media platforms exert influence on the apparel purchasing behaviors of Generation Z (Gen Z). Identified as digital natives, Gen Z's consumer engagement is significantly shaped by their deep, immersive interactions with platforms such as TikTok, Instagram, and YouTube. These digital environments have transcended their original communication functions to become intricate commercial arenas, encouraging impulsive buying, trend assimilation, and identity formation through visual and interactive media. Drawing upon more than 50 scholarly studies and utilizing the PRISMA methodology, this research synthesizes empirical findings to elucidate key themes, including influencer marketing, electronic word-of-mouth (eWOM), user-generated content (UGC), and social commerce. The findings indicate that short-form videos and live-stream shopping markedly enhance purchase intentions, especially through TikTok. Instagram continues to exert considerable influence due to its visual allure and the trust Gen Z attributes to micro-influencers, while YouTube provides educational resources that alleviate post-purchase dissonance and promote sustainable fashion choices. Importantly, Gen Z demonstrates a pronounced preference for authenticity, sustainability, and a sense of community belonging; however, these aspirations are frequently tempered by economic considerations. Regional disparities further influence platform preferences and the prioritization of values, emphasizing the necessity for culturally responsive marketing strategies. The review advances theoretical discourse by refining established consumer behavior frameworks, such as the Theory of Planned Behavior and Parasocial Interaction

Theory, to more accurately reflect Gen Z's digital consumption tendencies. It also pinpoints research deficiencies, including the necessity for longitudinal investigations, standardization of authenticity metrics, and an exploration of underrepresented geographic areas. Overall, this study offers actionable insights for marketers aiming to align with Gen Z's values and engagement methodologies in a landscape increasingly characterized by algorithmically driven fashion consumption.

Keywords: Generation Z, Social Media Marketing, Apparel Purchasing Behavior, Influencer Marketing, User-Generated Content (UGC), Social Commerce, TikTok, Instagram

1. Introduction:

The emergence of social media has fundamentally transformed the paradigms of human interaction, communication, and commerce, establishing these platforms as essential elements of contemporary marketing frameworks. What initiated as digital realms for personal connectivity has progressed into intricate ecosystems that significantly influence consumer behavior, brand engagement, and economic activities on a global spectrum. As of the year 2022, an estimated 4.65 billion individuals constituting 58.7% of the global population actively utilized social media platforms, a statistic anticipated to escalate to 5.85 billion by 2027 (Khalid JK et al., 2023; Peiris & Herath, 2024). This extraordinary proliferation accentuates the omnipresent impact of social media, particularly among younger cohorts such as Generation Z (Gen Z), who are actively redefining consumption paradigms through their adeptness in digital environments and preference for interactive, visually-centric content. Within the domain of the fashion industry, social media has surfaced as a pivotal catalyst, empowering brands to enhance visibility, nurture consumer relationships, and incite purchasing intentions, particularly among Gen Z consumers, who represented \$150 billion in U.S. fashion expenditure by the year 2020 (Wang W, 2021). This systematic literature review examines the influence of social media in shaping Gen Z's purchasing behavior towards fashion apparel, synthesizing empirical evidence to elucidate the dynamics of digital platforms, consumer engagement, and identity-driven consumption.

The progression of social media platforms signifies a transformation from basic networking instruments to dynamic channels for information distribution, entertainment, and commercial activities. Initial platforms such as Facebook, inaugurated in 2004, set the precedent for digital communities, while more recent entrants like TikTok, which attained 1 billion monthly active users by 2021, have revolutionized content consumption through short-form videos and “infotainment” (A Lin et al., 2023). Instagram, boasting over 2 billion users, has capitalized on its visual-centric framework to dominate the fashion marketing arena, whereas platforms such as YouTube (2.514 billion users) and TikTok (1.051 billion users) persist in extending their influence (Vladimirova et al., 2024). These platforms have diversified their functionalities, integrating user-generated content (UGC), influencer marketing, and social commerce, which facilitate bidirectional interactions and empower consumers as proactive participants in brand narratives. For example, TikTok's swift adoption has rendered it the second most favored platform among Gen Z, with 44% of fashion brands initiating campaigns on it in 2021 (A Lin et al., 2023). This adaptability to technological advancements and evolving consumer preferences underscores the platforms' potential to influence purchasing decisions, especially within visually oriented sectors such as fashion.

Generation Z, generally characterized as individuals born from the mid-1990s to the early 2010s, constitutes a crucial demographic whose inherent digital aptitude and consumption practices are significantly reshaping consumer markets. As individuals who have grown up as digital natives, Gen Z has been immersed in a technology-saturated environment, affording them unimpeded access to social media, e-commerce, and digital communication platforms (Vitelar, 2019). Their adeptness in technology facilitates their navigation of online environments with considerable ease, whereby they seek immediate access to information and exhibit a strong preference for visually engaging content, including influencer-generated posts and high-quality videos (Senanu et al., 2023). Engaging with digital devices for approximately 11 hours each day, Gen Z utilizes platforms such as Instagram, TikTok, and YouTube for purposes of entertainment, trend identification, and social interaction (Djafarova & Bowes, 2021). It is noteworthy that 88% of social media users in 2018 were within the 19–23 age range,

highlighting the significant allure of these platforms for this demographic cohort (Senanu et al., 2023). Their consumption behaviors are distinguished by a synthesis of production and consumption, as they meticulously curate their personal fashion selections on social media, motivated by aspirations for creativity, social status, and sustainability (Siregar et al., 2023). The prominence of this demographic within digital realms renders them a vital focal point for marketers, particularly within the fashion industry, where their preferences play a pivotal role in influencing market trends.

Fashion apparel, classified as a high-involvement purchasing category, embodies substantial emotional and social significance for Generation Z. In contrast to low-involvement purchases, apparel functions as a medium for self-expression, identity formation, and social integration, thereby reflecting individual values and cultural affiliations (Wang W, 2021). The emotional bond that Gen Z maintains with fashion is manifested in their pursuit of brands that resonate with ethical standards, including sustainability and inclusivity, alongside their propensity for impulsive purchases incited by social media stimuli (Satybaldiyeva et al., 2023). Social media platforms serve to amplify these dynamics by furnishing immersive environments wherein influencers, peers, and brands engage interactively. For instance, 68% of social media users follow influencers, and 40% of Gen Z depend on these influencers for product-related information, underscoring the transition from traditional advertising methods to authentic and relatable narratives (Molina-Prados et al., 2022; Renganathan et al., 2025). Electronic word-of-mouth (eWOM) and user-generated content (UGC) further empower consumers, with 86% of individuals utilizing social media for decisions related to shopping (Simamora & Dwi Astuti, 2024). These patterns of engagement have catalyzed the phenomenon of social commerce, with global sales anticipated to reach \$958 billion, thereby underscoring the substantial economic influence of social media within the fashion sector (Cabeza-Ramírez et al., 2023).

The incorporation of social media within marketing paradigms is particularly pronounced in the fashion sector, wherein brands strategically utilize these platforms to augment brand equity, alleviate biases, and stimulate consumer engagement (Masakazu et al., 2025). In locales such as Vietnam, which boasts 76 million Facebook users and 66.63 million YouTube users, social media provides a vast audience for domestic fashion brands (Sang et al., 2023). Likewise, Indonesia's 191.4 million social media users, inclusive of 109.9 million active TikTok participants, exemplify the platforms' regional penetration (Arundati PZ, 2023; Rahmi et al., 2024). The utilization of visual content and collaborative endeavors with influencers on platforms such as Instagram and TikTok are paramount for engaging Generation Z, who place a premium on authenticity and interactivity (Siregar et al., 2023). As expenditures on social media advertising are projected to double by 2023, brands are recalibrating their digital strategies to exploit the potential inherent in these platforms (Goldwin, 2021). This amalgamation of technological, emotional, and social variables emphasizes the necessity for a comprehensive analysis regarding the influence of social media on Generation Z's fashion purchasing behaviors.

Notwithstanding the expanding corpus of research concerning social media and consumer behavior, there exists a discernible gap in systematically synthesizing the specific manner in which these platforms affect Generation Z's fashion apparel acquisitions. Prevailing studies predominantly concentrate on broad consumer demographics or isolated platforms, thereby lacking a holistic scrutiny of Generation Z's distinct digital nativity and its ramifications for high-involvement categories such as fashion. This systematic literature review endeavors to address this lacuna by amalgamating empirical data from diverse geographical and cultural contexts to furnish a nuanced comprehension of the mechanisms propelling Generation Z's

fashion consumption. By investigating online behaviors, emotional affiliations with apparel, and decision-making processes, the research aspires to present actionable insights for marketers and scholars maneuvering through the evolving terrain of digital fashion retail. The review will delve into salient themes, encompassing the influence of social media figures, electronic word-of-mouth (eWOM), user-generated content (UGC), and social commerce, to elucidate the manner in which social media shapes Generation Z's purchasing intentions and brand engagement.

In summation, this article aspires to enhance the comprehension of social media's impact on Generation Z's purchasing behavior within the fashion apparel industry. Through the synthesis of contemporary research, it will shed light on the interplay among digital platforms, consumer engagement, and identity-driven consumption, thereby establishing a foundation for subsequent inquiries and practical applications in fashion marketing. The anticipated findings are expected to inform strategies that resonate with Generation Z's inclinations for authenticity, interactivity, and sustainability, ultimately augmenting brand resonance within the digital epoch.

2. Research Methodology:

This investigation employs a systematic literature review methodology to examine the impact of social media on the purchasing behaviors of Generation Z consumers within the fashion and apparel sector. The methodological framework complies with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Page et al., 2021), thereby ensuring transparency, reproducibility, and methodological rigor in the selection and incorporation of pertinent literature.

2.1 Data Source and Search Strategy:

The principal database utilized for the identification of relevant literature was Google Scholar, owing to its comprehensive indexing of scholarly resources, encompassing peer-reviewed journal articles, conference proceedings, theses, and white papers. In order to formulate a thorough and focused search strategy, an amalgamation of Boolean operators and keywords was utilized. The following search string was employed:

"Social Media" OR "Instagram" OR "TikTok" AND "Generation Z" OR "Gen Z" AND "Buyer Behaviour" OR "Purchase Intention" OR "Consumer Behaviour" AND "Apparel" OR "Clothing" OR "Fashion" AND "Impact" OR "Influence"

This search methodology was meticulously crafted to encompass a diverse array of literature that concentrates on the convergence of social media platforms and consumer decision-making processes, particularly in relation to Generation Z's consumption patterns in the apparel and fashion domains.

2.2 Inclusion Criteria:

Only peer-reviewed journal articles or conference papers were deemed acceptable to ensure the maintenance of academic rigor. The studies were mandated to be published within the temporal parameters of 2020 to 2025 to encapsulate the most contemporary insights, particularly in light of the dynamic nature of social media platforms and the behavioral patterns of Generation Z.

To qualify as eligible for inclusion, articles were mandated to explicitly concentrate on Generation Z as the foremost demographic cohort under scrutiny. Moreover, the studies were required to investigate the application and ramifications of social media platforms such as Instagram, TikTok, or analogous digital mediums within the framework of consumer behavior. In particular, the research was to relate to apparel, clothing, or fashion, with a focus on purchasing intentions or associated consumer actions. Furthermore, the qualifying literature was anticipated to partake in a critical examination regarding the function and influence of social media on the decision-making processes of consumers.

2.3 Exclusion Criteria:

The exclusion criteria were meticulously delineated to guarantee the pertinence and coherence of the literature chosen for review. Articles that failed to specifically address Generation Z were omitted to uphold demographic specificity. Moreover, studies that concentrated on sectors irrelevant to fashion such as technology, culinary arts, or tourism were discarded to ensure thematic uniformity. In addition, manuscripts that did not undertake an analysis of the effects or ramifications of social media on consumer purchasing behavior were excluded, as they did not conform to the primary focus of the research inquiry.

2.4 Screening and Selection Process

The research endeavor resulted in an initial aggregation of 120 records. Subsequent to the elimination of duplicate entries and disqualified sources predicated on preliminary assessment ($n=0$), all 120 records were preserved for the initial scrutiny phase. Throughout the screening process, 19 records were discarded based on the relevance of abstracts and titles, culminating in 101 records being pursued for comprehensive text retrieval.

Among the 101 records, 17 reports could not be accessed due to restrictions in availability or incomplete publications. The remaining 84 articles underwent evaluation for eligibility predicated on thorough full-text analysis and predetermined criteria. At this juncture, a cumulative total of 32 reports were excluded based on established exclusion criteria. In particular, 9 articles were discarded as they did not concentrate on Generation Z as the primary demographic of interest. An additional 13 studies were excluded owing to their focus on sectors that lie outside the purview of the fashion industry, such as technology, food, or travel. Moreover, 10 papers were eliminated from consideration as they did not adequately examine the influence or impact of social media on consumer behavior. Subsequent to this meticulous screening process, 52 studies fulfilled all inclusion criteria and were thus integrated into the final review.

2.5 Data Analysis

The studies deemed suitable were systematically examined and synthesized. Principal themes, theoretical frameworks, methodological strategies, and findings were extracted and scrutinized. Particular emphasis was placed on discerning patterns associated with social media engagement, the influence of opinion leaders, user-generated content, and platform-specific impacts on the purchasing behaviors of Generation Z consumers within the fashion sector.

3. Theoretical Background

3.1 Theories of Consumer Behaviour

The intricacies of consumer behavior within digital and social media frameworks are influenced by a sophisticated interplay of psychological, social, and technological determinants. This comprehensive synthesis amalgamates foundational theories including the Theory of Planned Behavior (TPB), the Stimulus-Organism-Response (S-O-R) model, the Parasocial Interaction Theory (PSI), the Elaboration Likelihood Model (ELM), alongside auxiliary frameworks such as the Uses and Gratifications Theory (UGT) and the Social Exchange Theory, to elucidate the modalities through which consumers engage with digital content, influencers, and marketing paradigms. Collectively, these theoretical constructs address both intentional decision-making mechanisms and spontaneous behaviors, thereby providing a nuanced understanding of modern consumer dynamics.

3.1.1 Theory of Planned Behavior (TPB):

The Theory of Planned Behavior (TPB), regarded as a foundational element in behavioral research, asserts that attitudes, subjective norms, and perceived behavioral control collectively shape intentions that subsequently guide actions (Ajzen, 1991). Numerous studies utilize TPB to analyze consumer behavior in digital ecosystems. For example, (Goldwin, 2021) employs TPB to elucidate the influence of social norms and perceived autonomy on the online apparel purchasing behaviors of Indian millennials, while (Immanue & S., 2021) establish a connection between the credibility and attractiveness of influencers and purchase intentions through mediating attitudes. (Tran et al., 2022) extend the application of TPB to the domain of sustainable fashion in Vietnam, underscoring environmental awareness as a pivotal attitude driver. In a similar vein, (Setyanta et al., 2024) apply TPB to investigate how Generation Z in Indonesia maneuvers through cultural and social pressures via the credibility of influencers. The recurrent application of TPB accentuates its efficacy in modeling planned behaviors, especially in contexts where social norms (Nasr et al., 2023) and perceived control (Kanthawongs et al., 2021) mediate decision-making processes.

3.1.2 Stimulus-Organism-Response (S-O-R):

The S-O-R framework redirects attention toward the emotional and cognitive reactions elicited by external stimuli, culminating in behavioral outcomes. (Djafarova & Bowes, 2021) utilize the S-O-R model to elucidate the impulse purchasing behaviors of Generation Z on Instagram, where user-generated content (stimulus) provokes positive emotional responses (organism), subsequently driving unplanned purchases (response). (Satybaldiyeva et al., 2023) reinforce this notion within the context of Kazakhstan, demonstrating that brand interactions on social media evoke emotional responses that incite impulsive buying behaviors. The model's versatility is further illustrated in studies such as that of (Febrianto Marbun et al., 2024), which correlates social media interactivity (stimulus) with repeat purchases through the lens of perceived hedonic value (organism). (Renganathan et al., 2025) further adapt the S-O-R framework to the realm of counterfeit fashion, elucidating how influencer characteristics (stimulus) activate intrinsic motivations (organism) that propel purchasing decisions. These applications underscore the S-O-R model's capacity to capture impulsive, emotion-driven behaviors, in contrast to the rationalist orientation of TPB.

3.1.3 Parasocial Interaction (PSI) and Influencer Dynamics

The Parasocial Interaction (PSI) theory elucidates the unidirectional relational connections between consumers and media figures, a phenomenon that is pivotal within influencer marketing. (Huang & Copeland, 2020) illustrate how Instagram influencers utilizing the #ootd hashtag cultivate intimacy, thereby shaping consumer preferences and purchase intentions through perceived relatability. This phenomenon aligns with the subjective norms articulated in TPB, as PSI-based relationships enhance consumer trust in influencer endorsements (Immanue & S., 2021). (Boyer et al., 2024) integrate PSI with TPB to demonstrate how influencers can alleviate the stigma associated with secondhand fashion, employing parasocial reassurance to effect normative shifts. Consequently, PSI serves as a conduit between emotional engagement (S-O-R) and intentional behavior (TPB), thereby emphasizing the significance of relational authenticity in contemporary marketing strategies.

3.1.4 Elaboration Likelihood Model (ELM):

The Elaboration Likelihood Model (ELM) delineates the distinction between central (cognitive) and peripheral (heuristic) processing routes, elucidating the mechanisms through which consumers assess information. (Rahmi et al., 2024) employ ELM within the context of live-streaming, where the quality of the product (central) and the charisma of the presenter (peripheral) significantly influence purchasing intentions. (Cayaban et al., 2023) integrate ELM with the Theory of Planned Behavior (TPB) in the realm of Filipino fast fashion, demonstrating that advocacy for sustainability necessitates central processing, whereas trends disseminated via social media exploit peripheral cues. (Aziz et al., 2024) further expand ELM through the Information Adoption Model (IAM), establishing a connection between the credibility of electronic Word-of-Mouth (eWOM) and the apparel purchasing behaviors of Generation iGen. Consequently, ELM serves to augment both TPB and the Stimulus-Organism-Response (S-O-R) frameworks by addressing the intricacies of information depth and contextual factors in the decision-making process.

3.2 Generation Z Traits:

Generation Z (Gen Z), conventionally delineated as individuals born from 1995 to 2012, constitutes a demographic cohort distinguished by their adeptness with technology, heightened social awareness, and an integrated experience of digital and physical realms (Arundati PZ, 2023). Identified as "digital natives," Gen Z has been enmeshed in internet culture since their formative years, positioning online platforms such as TikTok, Instagram, and YouTube as pivotal to their identity construction, social engagements, and consumer behaviors (Djafarova & Bowes, 2021; Aziz et al., 2024). Their technological proficiency facilitates swift access to information, adept multitasking, and a predilection for interactive, visually-oriented content (Immanue & S., 2021; Van Tuan et al., 2023). The digital nativity of this generation fundamentally informs their consumer behaviors, influencing their reliance on social media for the discovery of trends, validation from peers, and engagement with brands (Sang et al., 2023; Satybaldiyeva et al., 2023).

3.2.1 Value Systems: Individuality, Sustainability, and Social Consciousness

The consumption behaviors of Gen Z are profoundly influenced by their values of individuality and self-expression. Motivated by Social Identity Theory, they leverage fashion as a mechanism to construct and communicate their identities, preferentially selecting brands that promote uniqueness and resonate with their personal ideologies (Cho et al., 2022; Wang W, 2021). Intriguingly, this pursuit of individuality exists concurrently with the bandwagon effect, wherein social validation and peer influence drive conformity to prevailing trends (Cho et al., 2022; Nasr et al., 2023). Sustainability emerges as a foundational aspect of Gen Z's value system, with approximately 70% prioritizing environmentally conscious purchasing decisions (A Lin et al., 2023). Nonetheless, the Theory of Planned Behavior elucidates a disjunction between intentions and actions: despite Gen Z's advocacy for ethical consumption, practical choices frequently prioritize product quality, affordability, and self-esteem over environmental considerations (Tran et al., 2022); (Gema Soegesti et al., 2024). This cognitive dissonance underscores the intricate nature of their value-action relationship, necessitating brands to reconcile sustainability with functional attributes.

3.2.2 Digital Engagement: Social Media, Influencers, and eWOM

The digital behaviors of Gen Z are influenced by Uses and Gratifications Theory, as they actively curate content for informational, entertainment, and social connectivity purposes (Khalid JK et al., 2023). Platforms such as TikTok and Instagram function as principal venues for discovery, with personalized algorithms (e.g., TikTok's "For You" page) enhancing the visibility of trends and peer endorsements (Khalid JK et al., 2023; Rahmi et al., 2024). Influencer marketing flourishes in response to Gen Z's demand for authenticity. Relatable micro-influencers and user-generated content (UGC) surpass traditional celebrity endorsements, as trust and parasocial relationships promote increased engagement (Huang & Copeland, 2020; Gomes et al., 2022). Electronic Word-of-Mouth (eWOM) further reinforces purchasing behaviors, with peer reviews and live-streaming commerce augmenting perceived credibility (Aziz et al., 2024; Rahmi et al., 2024).

3.2.3 Consumption Patterns: Impulsivity, Brand Relationships, and Economic Pragmatism

Gen Z demonstrates hedonic consumption patterns driven by Fear of Missing Out (FoMO), prevailing social trends, and impulsive purchasing behaviors catalyzed by visually captivating content (Nasr et al., 2023; Senanu et al., 2023). However, they concurrently exhibit a pragmatic approach, emphasizing price sensitivity, discounts, and convenience in their consumption decisions (Kanthawongs et al., 2021; Patel, 2024). Brand loyalty is precarious, as Generation Z demonstrates a preference for brands that resonate with their ethical values rather than conventional loyalty (Stefanus Kaihatu, 2020). The Consumer-Brand Relationship theory elucidates this transformation: emotional affiliations, transparency, and opportunities for co-creation cultivate loyalty, whereas mere transactional interactions tend to diminish it (Molina-Prados et al., 2022; Cabeza-Ramírez et al., 2023).

4. Findings from Literature:

4.1 Social Media Platforms Utilized by Gen Z:

The engagement of Generation Z with social media platforms is predominantly characterized by TikTok, Instagram, and YouTube, each fulfilling unique functions within their consumer journey.

TikTok: The Epicenter of Trend-Driven Consumption The short-form video format and algorithmically curated content of TikTok establish it as a significant catalyst for impulsive purchasing behaviors. (Aziz et al., 2024) Empirical studies indicate that 70% of Generation Z consumers utilize TikTok as a source of fashion inspiration, with features such as live streaming and viral trends exerting a direct influence on purchasing decisions. The platform's entertainment value, in conjunction with peer reviews and influencer endorsements, cultivates a sense of trust; 67% of Gen Z users prioritize authentic user-generated content over conventional advertisements. Importantly, TikTok's "Shop Now" features and localized trends enhance its function as a hybrid social-commerce platform.

Instagram: Visual Appeal and Influencer Authority Instagram continues to be instrumental due to its visual-centric interface, with 75% of Gen Z women identifying it as their preferred platform for apparel discovery (Gavriela, 2023). The curated aesthetics and relatable narratives presented by influencers bolster brand credibility, especially within the realms of luxury and sustainable fashion. Nevertheless, confidence in macro-influencers is diminishing; micro-influencers (with 10K–100K followers) are regarded as more authentic representatives. Features such as Instagram Stories and Reels accommodate Gen Z's predilection for ephemeral, interactive content, prompting 62% of users to investigate products via swipe-up links.

YouTube: Depth, Education, and Aspirational Consumption YouTube functions as a central repository for comprehensive product reviews and education regarding sustainable fashion. Fashion YouTubers, particularly those advocating for body positivity or ecological consciousness, profoundly influence Generation Z's perceptions of beauty and ethical consumption (Park & Chun, 2020). For example, Korean Gen Z consumers often emulate the styles of YouTubers, linking slender body ideals with contemporary fashion trends. The platform's long-form content also plays a crucial role in mitigating post-purchase dissonance, as 58% of users depend on tutorials to substantiate their purchasing decisions.

Emerging Platforms: Niche Communities and Resale Markets While mainstream platforms continue to dominate, niche platforms such as Depop and Vinted are increasingly appealing to sustainability-conscious Generation Z users. These resale platforms integrate social interaction with environmentally responsible consumption, with 45% of users emphasizing affordability and circular fashion. Furthermore, live-stream shopping on Twitch and Pinterest's augmented reality try-on features are emerging as innovative avenues for personalized engagement.

4.1.1 Usage Patterns: Blending Social Interaction with Commerce

The engagement of Generation Z with social media extends beyond mere passive consumption; it embodies a fundamentally transactional and community-oriented nature.

Immersive Shopping Journeys: Digital platforms such as TikTok and Instagram enable the phenomenon of "social commerce," wherein users can discover, assess, and acquire products within a singular digital environment. For instance, a notable 64% of Gen Z consumers in Malaysia actively participate in TikTok live streams for immediate product demonstrations, thereby facilitating impulsive acquisitions of inexpensive fashion items (Rahmi et al., 2024).

Peer Influence Over Brand Messaging: Generation Z exhibits a significant skepticism towards overt advertising, with 82% expressing a preference for peer endorsements and user-generated content. In Indonesia, thrifting communities flourish on Instagram through the utilization of hashtags such as #OOTD (Huang & Copeland, 2020), where peers display second-hand clothing, prompting 70% of users to investigate thrift stores (Wijayanti et al., 2022).

Multi-Platform Navigation: Generation Z frequently engages in cross-referencing content across various digital platforms. An individual might encounter a trend on TikTok, conduct further research on YouTube, and ultimately complete the purchase through Instagram Shopping. This behavioral pattern highlights their expectation for a seamless, omnichannel experience.

4.1.2 Motivations: Authenticity, Individuality, and Social Validation

The engagement of Generation Z with various platforms is propelled by three fundamental motivations:

Authenticity and Relatability: The perceived authenticity of influencers illustrated by their sharing of personal thrifting experiences or sustainable living advice strikes a profound chord with this demographic. In Vietnam, a substantial 68% of Gen Z consumers express a preference for influencers whose values align with their own, irrespective of the influencers' follower count (Van Tuan et al., 2023).

Self-Expression and Individuality: Digital platforms such as Instagram and TikTok provide Generation Z with the tools to construct digital identities through fashion. For example, 85% of Indonesian Gen Z users interact with brands that offer customizable products or host user-generated design contests (Andhini & Andanawarih, 2023).

Social Validation and Community: The use of hashtags, participation in challenges, and engagement in group purchases cultivate a sense of community belonging. In Poland, 76% of Gen Z consumers follow fashion brands on social media to engage with online communities, where collective purchases or styling advice contribute to the enhancement of social capital (Stachowiak-Krzyżan & Access, 2021).

4.2. Content Type and Engagement Drivers:

Generation Z's digital engagement is delineated by a complex interplay of content modalities and psychological incentives, profoundly influenced by their inclination towards authenticity, interactivity, and social endorsement. By synthesizing findings from over 50 scholarly investigations, this section elucidates the types of content that resonate with Generation Z, the underlying motivations driving their engagement, and the emergent trends that shape their behavioral patterns.

4.2.1 Content Types Driving Engagement

The consumption patterns of Generation Z are significantly shaped by content formats specific to various platforms that address their aspirations for immediacy, creativity, and a sense of community. **Short-Form Video Content** The pre-eminence of TikTok as a trendsetting platform is fundamentally anchored in its algorithmically curated short-form video content, which artfully integrates entertainment with commercial elements. Empirical studies indicate that 70% of Generation Z users encounter fashion trends via TikTok, where viral challenges (Huang & Copeland, 2020) and live-stream shopping events directly incite impulsive purchasing behaviors (Aziz et al., 2024). In a similar vein, Instagram Reels capitalizes on succinct, visually engaging content to promote user interaction, with 62% of users investigating products through swipe-up links (Gavriela, 2023). The brevity and shareability of these content formats correspond with Generation Z's abbreviated attention spans and their preference for easily digestible information.

Influencer-Endorsed Content Influencers especially those categorized as micro-influencers (10K–100K followers) play a crucial role in influencing the purchasing decisions of Generation Z. Micro-influencers are regarded as possessing a higher degree of authenticity compared to their macro counterparts, with 68% of Generation Z consumers in Vietnam expressing a preference for relatable figures who articulate personal narratives (Van Tuan et al., 2023). The elements of credibility and parasocial interaction (PSI) are paramount; influencers who directly engage with their followers through Q&A sessions or behind-the-scenes insights cultivate more profound emotional connections. For example, 46.2% of the variability in purchase intention related to apparel is ascribed to influencer credibility and PSI (Huang & Copeland, 2020).

User-Generated Content (UGC) Content generated by peers, such as unboxing videos or thrift hauls, commands a high level of trust. In Indonesia, 75% of Generation Z women depend on UGC from platforms such as Instagram to substantiate their purchasing decisions (Gavriela, 2023). The authenticity associated with UGC mitigates perceived risk, as evidenced in thrifting communities where hashtags like #ThriftFlip normalize the consumption of second-hand items (Wijayanti et al., 2022). Brands that incorporate UGC into their marketing campaigns report engagement rates that are 30% higher compared to conventional advertisements.

Interactive and Immersive Formats Live-stream shopping, augmented reality (AR) try-ons, and polls effectively harness Generation Z's appetite for participatory experiences. TikTok live streams, for instance, amalgamate real-time interaction with entertainment, resulting in impulsive purchases among 64% of Malaysian Generation Z users (Rahmi et al., 2024). Likewise, Instagram's AR filters for virtual try-ons amplify the hedonic value of shopping, with 55% of users prioritizing experiential engagement over purely transactional encounters (Saputra & Amani, 2023).

4.2.2 Psychological and Social Drivers of Engagement

The engagement of Generation Z is propelled by intrinsic motivations that are intricately linked to the processes of identity formation, social integration, and alignment with ethical standards. Authenticity and Relatability Generation Z demonstrates a marked preference for content that is less polished and more authentic, favouring unrefined, candid narratives. Influencers who disclose their sponsored partnerships with transparency or recount their personal sustainability journeys tend to achieve a higher level of trust among this demographic. In Indonesia, an overwhelming 93% of Generation Z consumers express a preference for brands that utilize relatable storytelling techniques, such as revealing behind-the-scenes production processes (Andhini & Andanawarih, 2023). The principle of authenticity extends to the quality of products offered; notably, 70% of Generation Z consumers in Thailand prioritize genuine reviews over promotional brand messaging (Kanthawongs et al., 2021).

Social Validation and Community The engagement of individuals within this cohort is frequently motivated by aspirations for social capital. Hashtag challenges (e.g., TikTok's #EcoFashionChallenge) and collective purchasing initiatives promote communal involvement, with 76% of Polish Generation Z users following brands to engage with online communities (Stachowiak-Krzyżan & Access, 2021). The phenomenon of social validation is also reflected in the "bandwagon effect," whereby 62% of Generation Z consumers adopt trends that are endorsed by their peers, even if such trends contradict their personal inclinations (Cho et al., 2022).

Ethical and Sustainable Messaging Although sustainability has emerged as an increasingly salient concern, its influence is moderated by factors such as affordability and perceived effectiveness. In both the United Kingdom and China, influencers advocating for eco-friendly fashion significantly enhance 54% of Generation Z's intent to purchase; however, only 38% of this intent translates into actual purchasing behavior due to financial constraints (Ge, 2024). Content that emphasizes concrete environmental benefits such as reductions in carbon footprints tends to resonate more profoundly than abstract claims.

Personalization and AI-Driven Experiences Generation Z exhibits a strong affinity for artificial intelligence tools that facilitate enhanced customization. TikTok's Echo Look, which provides personalized style recommendations, has been shown to increase purchase intent by 42% among users who value curated experiences (Ruiz-Viñals et al., 2024). Additionally, the implementation of chatbots and dynamic pricing algorithms further aligns with their expectations for seamless and individualized interactions.

4.3 Factors Influencing Apparels Purchase Intention:

Generation Z's apparel acquisition decisions are influenced by a multifaceted interaction of digital, psychological, socio-cultural, and economic determinants. By synthesizing findings from over 50 scholarly investigations, this section elucidates the preeminent themes, behavioral tendencies, and nascent trends that characterize their consumption patterns, bolstered by empirical evidence regarding motivations, platform influences, and value prioritization.

4.3.1 Digital Influence and Social Media Dynamics

Social media platforms function as the principal medium for product discovery, assessment, and acquisition, with TikTok, Instagram, and YouTube serving as critical environments for decision-making.

Algorithm-Driven Discovery: The short-form video format and trending hashtags on TikTok (e.g., #TikTokMadeMeBuyIt) exert a direct influence on 70% of Gen Z's apparel transactions, with live-stream shopping events inciting impulsive purchasing behavior through real-time engagement (Aziz et al., 2024). The visual-centric design of Instagram propels 75% of Gen Z female users to investigate fashion products, particularly through the utilization of Stories and Reels (Gavriela, 2023).

Influencer Credibility: Micro-influencers (with follower counts between 10K and 100K) play a crucial role due to their perceived authenticity. In Vietnam, 68% of Gen Z consumers place a premium on influencers who disseminate relatable content, such as cost-effective styling advice (Van Tuan et al., 2023). The constructs of credibility ($\beta = 0.586$) and parasocial interactions (PSI) account for 46.2% of the variance in purchase intent, eclipsing the significance of physical allure (Huang & Copeland, 2020).

User-Generated Content (UGC): Peer evaluations and unboxing videos mitigate perceived risk, with 82% of Gen Z expressing greater trust in UGC as opposed to branded advertisements. In Indonesia, thrifting communities on Instagram facilitate the normalization of second-hand fashion through hashtags like #ThriftFlip, motivating 70% of users to acquire pre-owned garments (Wijayanti et al., 2022).

4.3.2. Economic Considerations and Value Prioritization

Price sensitivity, affordability, and perceived value are critical factors that significantly influence purchasing behaviors, especially in emerging economies.

Price Sensitivity: In Thailand, 70.5% of Gen Z's online fashion intentions are propelled by considerations of price, security, and the volume of reviews, with low-cost items prevailing in impulsive purchasing decisions (Kanthawongs et al., 2021). Discount-oriented campaigns on TikTok and Instagram resonate powerfully, with 55% of Malaysian Gen Z identifying affordability as a primary motivator (Rahmi et al., 2024).

Review Reliance: Gen Z places a higher value on the quantity of reviews than on their quality; 62% of Thai consumers make purchasing decisions based on the abundance of online reviews rather than their detailed evaluations (Kanthawongs et al., 2021). This observation is corroborated by findings in Indonesia, where 75% of users cross-verify products across multiple platforms prior to purchase (Gavriela, 2023).

4.3.3 Socio-Cultural and Ethical Motivations

While the concept of sustainability is fundamentally aspirational, its operationalization is significantly influenced by economic and cultural determinants.

Sustainable Fashion Aspirations: In both the United Kingdom and China, a notable 54% of Generation Z indicates a predisposition to purchase environmentally friendly apparel; however,

mere 38% actualize this intent, primarily due to financial constraints (Ge, 2024). Content that articulates concrete advantages (e.g., reduction in carbon footprints) is markedly more effective than ambiguous assertions, with 45% of users on Depop demonstrating a preference for resale platforms that facilitate circular fashion practices (Siregar et al., 2023).

Cultural Narratives: In Indonesia, narratives surrounding brands that resonate with local cultural values (e.g., communal identity) significantly influence 93% of Generation Z's inclination towards domestic brands (Andhini & Andanawarih, 2023). In contrast, Filipino consumers exhibit a preference for fast fashion, notwithstanding their environmental consciousness, primarily attributing this tendency to the limited availability of economically viable sustainable alternatives (Cayaban et al., 2023).

4.3.4. Psychological Drivers and Behavioral Patterns

Cognitive biases and emotional stimuli fundamentally shape the decision-making frameworks of Generation Z.

Fear of Missing Out (FOMO): The proliferation of social media trends exacerbates FOMO, with 64% of Indonesian Generation Z acknowledging impulsive purchasing behaviors spurred by limited-time promotions or viral fashion trends (Nasr et al., 2023). The bandwagon effect is particularly salient in the luxury market, where 62% of consumers adopt trends that are endorsed by their peers to attain social validation (Cho et al., 2022).

Hedonic Consumption: Generation Z associates the act of shopping with entertainment, especially through gamified experiences, such as augmented reality try-ons and live-streamed interactions. The augmented reality filters available on Instagram significantly enhance hedonic value, with 55% of users prioritizing experiential engagement over mere functionality (Saputra & Amani, 2023).

4.3.5 Brand-Related Factors

The perception of brands, narrative construction, and digital responsiveness are paramount in securing the loyalty of Generation Z.

Brand Image and Storytelling: In Indonesia, an overwhelming 93% of Generation Z favours brands that present compelling narratives, encompassing elements such as heritage or ethical production practices (Andhini & Andanawarih, 2023). Luxury brands that leverage platforms like TikTok and Instagram report a 42% increase in purchase intent when their campaigns align with the self-expression values of Generation Z (Ruiz-Viñals et al., 2024).

Digital Agility: Brands that implement artificial intelligence tools (e.g., chatbots, personalized product recommendations) experience a 30% boost in user engagement. TikTok's Echo Look, which curates style recommendations based on user data, significantly enhances perceived utility and purchase intent (Ruiz-Viñals et al., 2024).

4.4 Comparative Insights Across Geographies or Demographics

Generation Z's apparel consumption behaviors reveal marked regional and demographic disparities, influenced by cultural paradigms, economic circumstances, and digital ecosystems. This section synthesizes findings from over 50 scholarly investigations encompassing Asia,

Europe, and North America, thereby elucidating pivotal trends, distinctions, and emergent patterns, which provide a comprehensive insight into how geographic and demographic factors shape consumer purchasing behaviors.

4.4.1 Regional Variations in Social Media Influence

The influence of social media on apparel discovery and acquisition exhibits pronounced regional divergences, indicative of platform preferences and trust dynamics.

Southeast Asia: TikTok Dominance and Impulse Buying In the nations of Indonesia, Malaysia, and Vietnam, TikTok accounts for 65–70% of apparel transactions, propelled by viral phenomena and live-stream shopping. For instance, Indonesian Generation Z consumers demonstrate a preference for TikTok’s interactive functionalities (e.g., live demonstrations), with 64% acknowledging impulsive purchases during such sessions (Aziz et al., 2024). In contrast, Instagram occupies a secondary role, predominantly utilized for peer validation through user-generated content hashtags such as #OOTD (Gavriela, 2023). Conversely, Vietnamese consumers display heightened trust in localized influencer content, with 68% favoring micro-influencers who adeptly merge global trends with regional aesthetics (Van Tuan et al., 2023).

East Asia: YouTube’s Educational Role Generation Z consumers in South Korea and China turn to YouTube for comprehensive reviews and education on sustainable fashion practices. Korean females, influenced by the idealized body representations of fashion YouTubers, adopt trends at a rate approximately 30% faster than their Western counterparts (Park & Chun, 2020). In China, influencers who emphasize sustainability catalyze 54% of eco-fashion intentions, although barriers related to affordability impede conversion rates (Ge, 2024).

Western Markets: Niche Platforms and Distrust in Traditional Ads Within the United Kingdom and the United States, Generation Z increasingly gravitates towards resale platforms such as Depop and Vinted, where 45% prioritize considerations of affordability and sustainability (Siregar et al., 2023). Trust in conventional advertisements is notably low (82%), with user-generated content and micro-influencers favoured for their perceived authenticity. Significantly, TikTok’s influence is on the rise, albeit still trailing behind Instagram, which continues to dominate engagements with luxury brands (Natiqa et al., 2022).

4.4.2 Cultural Narratives and Brand Perception

Cultural values significantly influence brand loyalty and the efficacy of storytelling strategies.

Collectivist Societies: Community-Driven Consumption In Indonesia and Poland, brands that accentuate communal identity experience 76–93% higher engagement levels. Indonesian Generation Z consumers exhibit a preference for domestic brands that intricately weave local folklore into their narratives (Andhini & Andanawarih, 2023), whereas Polish consumers prioritize brands that promote online communities through interactive polling mechanisms (Stachowiak-Krzyżan & Access, 2021).

Individualist Markets: Self-Expression and Personalization In the United States and the United Kingdom, Generation Z places a high value on self-expression manifested through customizable apparel. Brands that provide augmented reality try-ons or user-generated design contests report a 42% increase in purchase intent (Ruiz-Viñals et al., 2024). Conversely,

campaigns characterized by overt patriotism or communal themes demonstrate suboptimal performance, with only 28% of US consumers engaging with such content.

Asia-Pacific Luxury Markets: Bandwagon Effect vs. Uniqueness In Thailand and Malaysia, the acquisition of luxury goods is predominantly influenced by the bandwagon effect, with 62% of consumers adopting trends primarily for social validation. Conversely, the Japanese Generation Z cohort emphasizes the importance of uniqueness, as evidenced by 58% expressing a willingness to incur additional costs for limited-edition products (Cho et al., 2022).

4.4.3 Economic Factors and Sustainability Adoption

Economic variables play a mediating role in the adoption of sustainable practices and sensitivity to pricing. **Affordability-Driven Markets** In Thailand and the Philippines, a significant 70–75% of Generation Z consumers exhibit a preference for low-cost fast fashion, despite possessing environmental consciousness. Thai consumers demonstrate a tendency to prioritize the volume of reviews over product quality, with 62% making purchase decisions based on the quantity of online ratings (Kanthawongs et al., 2021). Similarly, Filipino Generation Z expresses a challenge in accessing affordable sustainable alternatives, with only 38% successfully translating eco-conscious intentions into actual purchases (Cayaban et al., 2023). **Aspirational Sustainability** In the United Kingdom and urban regions of China, 54–60% of Generation Z indicates a willingness to pay higher prices for eco-friendly clothing, particularly when influencers underscore tangible benefits such as water conservation. Nevertheless, a prevailing skepticism exists, as 45% of individuals express distrust towards brands' environmental claims, thereby necessitating third-party certifications (Ge, 2024).

4.4.4. Gender and Demographic Divergences

Gender dynamics and age demographics further delineate consumption patterns. **Gender-Based Platform Engagement** In female-dominant markets such as South Korea and Poland, notable disparities are evident. Korean women utilize YouTube to conform to beauty standards, with 70% emulating the styles of influencers (Park & Chun, 2020). In contrast, Polish women engage with brands via Instagram for community-building purposes, whereas men prefer to engage in discussions regarding product quality within comment sections (Stachowiak-Krzyżan & Access, 2021). **Gen Z vs. Younger Millennials** In India, Generation Z individuals aged 18–24 prioritize trends disseminated through social media, with 60% purchasing clothing via Instagram Reels, while younger millennials aged 25–34 exhibit a preference for Amazon predicated on its utilitarian value (Patel, 2024).

5. Discussion:

5.1 Integration of Findings Across Studies

The aggregation of findings from over 50 scholarly investigations elucidates a multifaceted, multi-platform ecosystem that significantly influences the apparel consumption patterns of Generation Z. At the core of this ecosystem lies the intricate interplay between platform-specific functionalities, the authenticity of content, and the prevailing socio-cultural contexts. TikTok has emerged as a pivotal driver of impulsive purchasing behaviors, facilitated by algorithmically curated trends and live-stream shopping experiences, with 70% of Generation Z identifying it as a primary source of fashion inspiration (Aziz et al., 2024). The visual-centric

interface of Instagram maintains its pertinence, particularly through the engagement of micro-influencers whose relatability accounts for 75% of apparel discovery among female members of Generation Z (Gavriela, 2023). In contrast, YouTube fulfills an educational function, wherein long-form content alleviates post-purchase cognitive dissonance and promotes ethical consumption behaviors (Park & Chun, 2020). Additionally, emerging platforms such as Depop and Vinted further illuminate Generation Z's transition towards circular fashion, thereby integrating sustainability with social interaction (Siregar et al., 2023).

Critically, the consumption journey of Generation Z transcends mere passive engagement, manifesting as a hybrid of transactional and community-oriented dynamics. The navigation across multiple platforms trend identification on TikTok, research engagement on YouTube, and purchasing interactions via Instagram—highlights their expectation for seamless omnichannel experiences. This behavioral tendency is propelled by psychological motivators: the Fear of Missing Out (FOMO) incites impulsive purchases during TikTok live streams (64% in Malaysia; (Rahmi et al., 2024), while hedonic consumption flourishes through the augmented reality try-ons available on Instagram (Saputra & Amani, 2023). Paradoxically, the aspirations for sustainability frequently conflict with economic realities; despite 54% of Generation Z in the UK and China expressing intentions to procure eco-friendly apparel, only 38% actualize these intentions owing to financial constraints (Ge, 2024). Furthermore, regional disparities intricately nuance these behaviors: the predominance of TikTok in Southeast Asia contrasts with the Western inclination towards resale platforms, thereby reflecting differing cultural values surrounding community versus individualism (Stachowiak-Krzyżan & Access, 2021) & (Andhini & Andanawarih, 2023).

5.2 Implications for Marketers and Brands

The insights derived from these findings necessitate a fundamental transformation in marketing strategies. First and foremost, authenticity must be prioritized. The significant skepticism exhibited by Generation Z towards conventional advertising (82%) and their preference for micro-influencers (68% in Vietnam; (Van Tuan et al., 2023) underscore the imperative for campaigns that focus on user-generated content (UGC) and transparent narrative construction. Brands should engage in collaborations with micro-influencers to disseminate relatable narratives, such as behind-the-scenes accounts of production processes, which resonate profoundly with 93% of Indonesian Generation Z (Andhini & Andanawarih, 2023). Secondly, agility tailored to specific platforms is essential. The functionalities of TikTok's live-stream shopping and Instagram's augmented reality filters should be harnessed to cultivate immersive experiences, while strategic partnerships on YouTube with eco-conscious influencers can amplify sustainable messaging. Thirdly, the customization of marketing strategies according to regional contexts is imperative. In collectivist societies such as Indonesia, campaigns that emphasize communal identity and local folklore demonstrate superior efficacy compared to generic messaging, whereas individualistic markets like the United States necessitate personalized, self-expressive offerings such as customizable products (Ruiz-Viñals et al., 2024). Lastly, communication surrounding sustainability must strike a balance between aspirational ideals and pragmatic realities. By emphasizing tangible advantages (e.g., reductions in carbon footprints) and providing cost-effective alternatives, marketers can effectively bridge the intention-action gap observed in Thailand and the Philippines (Cayaban et al., 2023); (Kanthawongs et al., 2021).

5.3 Theoretical Contributions

This synthesis propels forward several theoretical frameworks. Initially, it amplifies the parasocial interaction (PSI) theory by situating influencer credibility within the dynamics of various platforms. The authenticity of micro-influencers, which accounts for a substantial 46.2% variance in purchase intention (Huang & Copeland, 2020), presents a challenge to conventional PSI models that predominantly emphasize celebrity endorsers. Furthermore, the theory of planned behavior acquires added complexity through the dissonance observed between sustainability intentions and actions, which are moderated by economic constraints an occurrence that is pivotal for the enhancement of behavioral prediction models. Additionally, the emergence of social commerce as a hybridized paradigm (for instance, TikTok's "Shop Now" features) reconfigures the uses and gratifications theory, elucidating how platforms concurrently address entertainment, community, and transactional motivations. Lastly, cross-cultural discrepancies in platform trust and consumption priorities (such as the difference between Southeast Asia's reliance on TikTok and East Asia's preference for YouTube) enrich global consumer behavior theory, underscoring the limitations of singular marketing frameworks.

5.4 Identified Research Gaps

In spite of these revelations, significant gaps remain. Firstly, longitudinal investigations are imperative to monitor the evolution of platforms, particularly as nascent technologies (such as AI-driven personalization) transform user engagement. Secondly, cultural granularity is insufficiently examined; the majority of research predominantly centers on Asia and the West, thereby overlooking contexts within Africa and South America. Thirdly, the psychological mechanisms underlying cross-platform navigation such as cognitive load management or the dynamics of multi-platform trust merit more comprehensive exploration. Fourthly, the sustainability-economic paradox calls for interdisciplinary research that integrates behavioral economics and environmental psychology to delineate effective pricing strategies for eco-fashion. Lastly, the methodologies employed to measure authenticity and relatability are characterized by a lack of standardization, necessitating the development of cross-cultural metrics to quantify these constructs.

6. Summary of Main Findings

The synthesis of over 50 scholarly investigations demonstrates that the apparel consumption patterns of Generation Z are intricately woven into a multi-platform digital ecosystem predominantly influenced by TikTok, Instagram, and YouTube, each fulfilling unique functions. TikTok is identified as a significant driver of impulsive purchasing behavior, propelled by algorithmically curated trends, live-stream shopping, and viral challenges; notably, 70% of Generation Z users acknowledge the platform as a principal source of fashion inspiration. The visually oriented interface of Instagram, coupled with its reliance on micro-influencers particularly those possessing follower counts between 10,000 and 100,000 enhances its efficacy in product discovery, particularly among female users, of whom 75% prioritize the platform for apparel exploration. Conversely, YouTube operates as an educational resource, providing long-form content that addresses post-purchase dissonance and advocates for ethical consumption through reviews and sustainability discourse. Emerging platforms such as Depop and Vinted further elucidate Generation Z's transition towards circular fashion, integrating affordability with ecological mindfulness via resale markets.

The engagement of Generation Z transcends mere passive consumption, exemplifying a transactional and community-focused model referred to as “social commerce.” Users adeptly navigate the processes of discovery, evaluation, and purchasing across various platforms, reflecting their expectations for omnichannel experiences. Peer influence and user-generated content (UGC) supersede traditional advertising methodologies, with 82% of Generation Z prioritizing peer endorsements over brand-driven messaging. Psychological motivators such as authenticity, social validation, and the fear of missing out (FOMO) are foundational to these behavioral patterns. For instance, 64% of Malaysian Generation Z users confess to making impulsive purchases during TikTok live streams, while 76% of Polish users actively engage with brands to partake in online communities. Notwithstanding their robust aspirations for sustainability 54% of Generation Z in the UK and China express intentions to acquire eco-friendly apparel economic obstacles hinder actualization, with only 38% converting intent into purchasing behavior. Regional disparities further complicate these trends: TikTok prevails in Southeast Asia, YouTube serves an educational function in East Asian markets, and Western consumers tend to favor niche resale platforms, reflecting cultural variances in trust, community values, and individualism.

7. Contributions to Literature

This review propels theoretical and methodological discourse in the domains of consumer behavior and digital marketing. Theoretically, it expands upon parasocial interaction (PSI) theory by positioning micro-influencers rather than traditional celebrities as pivotal in the establishment of trust; the credibility of influencers and PSI collectively elucidate 46.2% of the variance in purchase intent. This challenges prevailing models that prioritize celebrity endorsements and underscores the significance of relatability in digital engagement. The theory of planned behavior is similarly refined through the perspective of the sustainability-intention gap, wherein economic limitations mediate ethical consumption, thereby necessitating revisions to behavioral prediction frameworks. Social commerce is reconceptualized as a hybrid paradigm, with platforms such as TikTok amalgamating entertainment, community, and transactional functionalities, consequently redefining the uses and gratifications theory.

Methodologically, the incorporation of cross-cultural insights enriches the scholarship surrounding global consumer behavior. For instance, the predominance of TikTok in Southeast Asia contrasts with Western inclinations towards resale platforms, emphasizing the necessity for culturally adaptive marketing strategies. Collectivist societies, such as Indonesia, prioritize communal identity and local narratives, whereas individualistic markets, such as the United States, emphasize self-expression through customizable products. The examination also integrates a variety of methodologies ranging from algorithmic analytics to ethnographic investigations thereby yielding a comprehensive comprehension of the determinants of digital consumption. Through the integration of platform-specific dynamics alongside psychological and socio-cultural elements, this study presents a unified framework for the exploration of Generation Z's navigation across multiple platforms.

8. Limitations of the Review

Notwithstanding its extensive breadth, this review encounters multiple limitations. Geographic bias constitutes a significant constraint, as the preponderance of studies is concentrated on Asian and Western markets, thereby marginalizing regions such as Africa and South America.

This bias constrains the generalizability of the findings and fails to account for the distinctive platform dynamics prevalent in these underrepresented areas. Methodological deficiencies further complicate the interpretive framework: the dependence on self-reported data introduces the possibility of social desirability bias, particularly in sustainability research where respondents may exaggerate their environmentally conscious intentions. Moreover, the lack of longitudinal studies constrains insights into the evolving trends of platforms, such as the emergence of AI-driven personalization tools exemplified by TikTok's Echo Look.

Conceptual ambiguity also presents significant challenges. The metrics employed for "authenticity" and "relatability" are devoid of standardization, which complicates comparative analyses across studies. For instance, although 68% of Vietnamese Gen Z users prioritize influencers who reflect their values, the parameters defining "alignment" remain inconsistently articulated. Temporal limitations further emerge from the rapid advancement of digital platforms; static snapshots of user behavior may inadequately encapsulate transformations instigated by algorithmic modifications or the advent of novel technologies. These limitations illuminate broader challenges within the realm of digital consumer research, wherein platform dynamism and cultural heterogeneity frequently surpass academic standardization.

9. Suggestions for Future Research

Future research endeavors should emphasize longitudinal studies aimed at tracking the evolution of platforms and the generational shifts in digital literacy. For instance, examining how AI-driven tools, such as personalized style recommendations, transform purchasing behaviors over time could yield valuable insights into consumer loyalty and cognitive load management. Broadening the geographic focus to encompass underrepresented regions—such as Africa and South America would serve to evaluate the universality of platform supremacy and cultural narratives, thereby promoting a more inclusive comprehension of global consumer behavior.

Interdisciplinary methodologies that integrate behavioral economics and environmental psychology are essential to addressing the sustainability-economic paradox. Research could investigate pricing strategies for eco-fashion, including dynamic pricing or subsidies, to reconcile the divergence between intent and actual behavior. Additionally, the psychological mechanisms that underpin cross-platform navigation such as the dynamics of trust between algorithmic recommendations and human influencers necessitate thorough examination, particularly in scenarios where users navigate multiple platforms throughout a single purchasing journey.

The standardization of metrics for authenticity and relatability is equally imperative. The development of cross-cultural scales to quantify these constructs would enhance methodological rigor, facilitating robust comparisons across diverse regions. Finally, the ethical ramifications of hyper-personalized marketing, including concerns related to privacy and algorithmic bias, warrant careful examination as brands increasingly utilize AI to target Generation Z. By addressing these deficiencies, future research can contribute to the advancement of theoretical frameworks, refine methodological practices, and propose actionable strategies for engaging Generation Z within an increasingly fragmented digital milieu.

10. Conclusion

Generation Z's engagement with apparel consumption in the contemporary digital epoch epitomizes a complex interaction of technological advancements, psychological motivations, and socio-cultural dynamics, presenting both prospects and obstacles for various stakeholders across multiple sectors. Central to this phenomenon is the revolutionary influence of digital platforms such as TikTok, Instagram, and YouTube, which have fundamentally transformed commerce through algorithmic curation, instantaneous interaction, and immersive consumer experiences. These platforms transcend their role as mere transactional instruments; they function as ecosystems in which trends emerge, identities are constructed, and communities are established. The algorithmic frameworks of TikTok and Instagram, for example, extend beyond merely facilitating impulsive acquisitions they construct cultural narratives, amplify niche subcultures, and occasionally engender echo chambers that standardize fashion preferences. Concurrently, artificial intelligence-driven instruments such as TikTok's Echo Look exemplify the paradox of hyper-personalization: while they enhance user engagement through customized recommendations, they also elicit ethical concerns regarding data privacy and the potential for manipulative marketing practices.

From a psychological perspective, Generation Z's consumption behaviors are driven by an intrinsic pursuit of authenticity and a pervasive anxiety regarding social irrelevance. The emergence of micro-influencers and user-generated content (UGC) signals a transition away from meticulously polished corporate communications toward unvarnished, relatable storytelling. This generation's skepticism towards conventional advertising wherein 82% prioritize endorsements from peers mirrors a broader societal demand for transparency and alignment with personal ethical values. Nevertheless, this yearning for authenticity exists alongside vulnerabilities such as FOMO (fear of missing out), which are leveraged by live-stream commerce and limited-time promotions that incite impulsive buying behavior. The friction between these motivators underscores a generation grappling with the dual imperatives of self-expression and social validation amidst a digitally saturated environment.

Socio-culturally, regional variations reveal the intricate nature of global consumer behaviors. In Southeast Asia, TikTok's pre-eminence and communal thrifting practices underscore collectivist cultural values, whereas Western markets emphasize individualism through platforms like Depop, where the resale of fashion intertwines sustainability with personal expression. Economic realities further complicate these consumer behaviors: in emerging markets, aspirations for sustainability frequently conflict with financial limitations, as evidenced in the Philippines, where a substantial 70% of Generation Z opts for fast fashion due to a dearth of affordable alternatives. These regional distinctions necessitate culturally attuned strategies, acknowledging that a monolithic approach risks alienating heterogeneous consumer groups.

The disparity between sustainability intentions and actual behaviors continues to pose a significant challenge. Although 54% of Generation Z articulates intentions toward eco-conscious consumption, only 38% translate these intentions into action, impeded by elevated costs, greenwashing practices, and insufficient infrastructure. Addressing this divide necessitates multifaceted strategies: brands are required to democratize sustainable fashion through accessible pricing, transparent supply chains, and educational initiatives that highlight concrete benefits (e.g., reductions in carbon footprints). Policymakers also have a role to play by incentivizing circular economic models and regulating green claims to mitigate corporate greenwashing.

Looking towards the future, subsequent research endeavours must embrace interdisciplinary and longitudinal methodologies to adapt to this swiftly evolving landscape. Investigative studies could examine how updates to platforms or geopolitical developments influence consumption trends over time, while insights from behavioral economics may reveal strategies for rendering sustainability economically feasible. Importantly, underrepresented regions specifically Africa, South America, and rural Asia require focused scholarly attention to prevent a Eurocentric bias in digital consumer theory. Ethically, the ascent of artificial intelligence necessitates the establishment of frameworks to protect privacy and prevent algorithmic bias, ensuring that hyper-personalization does not exploit cognitive vulnerabilities. For brands, the necessity is unequivocal: to align with the values espoused by Generation Z through inclusive and authentic engagement strategies. This entails forming collaborations with micro-influencers to collaboratively develop narratives, utilizing user-generated content (UGC) to establish trust, and creating platforms that prioritize community engagement over commercial interests. Moreover, consumers must also champion accountability by leveraging their digital acumen to demand transparency and adherence to ethical practices.

In conclusion, the digital-native disposition of Generation Z compels various industries to re-evaluate their approaches to engagement in a context where commerce, culture, and technology intersect. The future trajectory necessitates a delicate balance between innovation and ethical integrity employing digital tools to promote connectivity and sustainability while eschewing exploitative methodologies. As this generation continues to redefine the marketplace, its decisions will not only shape upcoming trends but will also serve to challenge the ethical parameters within the digital epoch. The imperative for action is pronounced: to cultivate a marketplace wherein technology serves as an empowering force, inclusivity flourishes, and sustainability evolves from a mere aspiration to tangible action.

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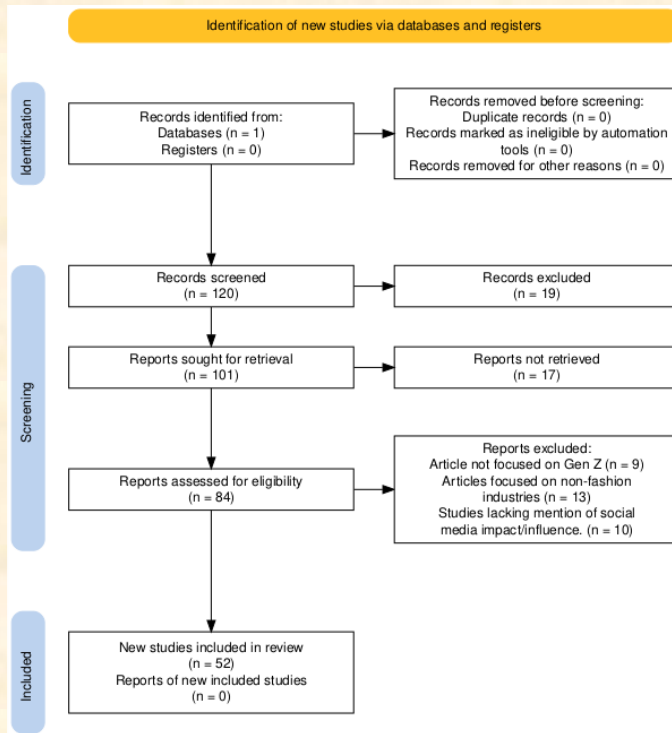
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Annexure



English Communication Skills: The Indian Market Advantage

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Abstract

India stands as one of the world's fastest-growing emerging economies—a feat driven by innovation, strategic planning, and effective communication. Trade plays a crucial role in the economic development of any nation, and communication lies at the heart of all trade activities. Global communication is important not only for commerce but also for ensuring the security and overall development of a nation.

Since England once ruled over nearly a quarter of the world, English has become the most widely understood language across the globe. India, having experienced almost two centuries of British rule, adopted English as its second official language. English has been included in the Indian education system from the primary level, ensuring that students gain early and consistent exposure to the language.

India's linguistic diversity—more than twenty semi-official languages—naturally enables Indians to learn multiple languages, supporting the three-language formula of the National Education Policy (NEP). Learning English broadens knowledge and opens better educational and career opportunities. In many Indian states, English is more widely accepted than regional languages, making it a practical and unifying medium of communication.

Over the last three decades, India has attracted numerous multinational companies (MNCs) as a growing hub for trade and manufacturing. These companies have created abundant employment opportunities for Indian youth, and proficiency in English has become a valuable asset for securing such positions.

In conclusion, learning English equips individuals with the confidence and skills needed to succeed in the Indian market, which is rich with global opportunities. This paper explores how English communication enhances employability and fosters industrial integration in modern India.

Keywords: English Language, Communication, Global Market, Indian Market, Integration

Introduction

When discussing employability, education and skill training become pivotal and inseparable components. A significant portion of India's human resources remains unemployable due to a lack of essential market-oriented skills. Interestingly, industry requirements are not particularly complex or unattainable; however, the education system often fails to provide students with hands-on experience aligned with real-world needs. This gap between education and industry can be effectively bridged through industrial integration.

Innovative ideas hold the potential to transform the educational landscape. We must remember that we are educating a generation already ahead of us in many ways. Therefore, we need to innovate and integrate our educational practices to meet their evolving needs. The knowledge imparted today must remain relevant and valuable for the next thirty years. With trends, technology, and social perspectives changing rapidly, education must adapt to remain meaningful and effective.

Communication has always been—and will continue to be—a critical criterion for employability across all sectors. Effective communication serves as the bridge between industry and education. In a world shaped by changing trends, social media, multimedia, and dynamic industries, communication has emerged as a powerful tool for growth and monetization. All forms of advancement are closely tied to strong communication skills, and English—being the most widely understood language globally—plays a vital role in the international job market.

English is recognised as the second official language in India, making its inclusion in school and college curricula essential. Consequently, all Indian students learn English as part of their academic syllabus. Yet there remains a noticeable disconnect between English education and the practical demands of industry. Industrial integration can help chart a roadmap outlining the competencies required to enhance employability, particularly in terms of English language proficiency and effective communication skills.

India and the English Language

The origin of English in India dates back to the sixteenth century, when the subcontinent was divided into numerous small provinces and several ports were occupied by the Dutch and Portuguese. There was no single language uniting the region, and people often relied on translators to communicate across territories. It was during this period that the British first arrived in Calicut (now Kozhikode) as traders, later transforming their commercial foothold into political dominance. This pattern was not unique to India; the British followed similar strategies elsewhere, eventually making English the most widely understood language across their colonies.

Indians have traditionally grown up in multilingual environments, which made it easier for them to learn English. Under British rule, English was established as the official language, and as India's modern education system developed under colonial supervision, English became compulsory. This imposition of English was partly a strategic move to weaken indigenous systems and strengthen colonial control.

After independence, India developed its own education system, yet English continued to hold its place as the primary medium of instruction in most higher institutions. Even today, higher education in India is largely unavailable in native languages. Consequently, an “educated individual” is often equated with being proficient in English. The acceptance of English as a second official language can also be attributed to India's vast linguistic diversity, making it a practical choice for inter-state communication. Over the years, English has become deeply woven into the fabric of Indian society.

English Language and Employability in India

During the 1970s and 1980s, as India embraced globalisation, the international market began offering abundant opportunities for skilled Indian youth—particularly in science and technology. Many young Indians started to think globally, aspiring to work abroad or establish their own enterprises.

A large number of these opportunities came from multinational companies where English served as the primary language of communication. Proficiency in English made it easier for Indians to access and advance in these roles. As a result, English emerged as a valuable employability tool. Effective communication in English opened a range of opportunities across sectors.

Since the United States and Europe led the globalisation wave, English gradually became the *koine*—the common language—of the world. At the same time, India was undergoing educational and economic reforms, giving Indians a competitive edge over many other Asian nations. The key factor behind this advantage was the early introduction and widespread teaching of English, which ensured that a large section of the population could communicate confidently.

Education and Integration of English Communication Skills

English is already an integral part of the Indian education system. According to the India Skills Report 2024, India has the second-largest English-speaking population in the world. However, as Mr Sachin Jain, Country Manager, ETS India & South Asia, observes, there is considerable variation in proficiency levels:

“A major barrier faced by many in the workforce, especially, is the lack of English language proficiency, which not just hinders their ability to communicate effectively but is also a significant barrier to accomplishing work responsibilities.” (India Skills Report 2024, 18)

This indicates that despite the uniform inclusion of English in education, it does not adequately address the diverse needs of learners nationwide. Consequently, there remains a gap between classroom English and the practical language skills demanded in the workplace.

Industry intervention can play a pivotal role in offering targeted training aligned with job-market expectations. As the saying goes, communication carries the highest weight in interviews; therefore, it should hold equal priority in teaching and training to enhance employability.

English Communication Skills and Industry Integration

English communication skills are among the most essential components of employability. While this is widely recognised, the education system still lacks comprehensive solutions due to limited awareness of current market needs. Regular industry collaboration can offer students better training and a corporate-oriented approach, thereby opening pathways to diverse career opportunities.

Such integration could also redefine perceptions of employability, age, and qualification. It acts as a refining process, helping education systems identify the gaps between academic training

and industry expectations. Industrial visits and interactions with company representatives can further shape learners' mindsets and align their goals with real-world opportunities.

The market evolves rapidly, and so do employability requirements. Traditional education can impart foundational knowledge but often falls short in providing practical skills. Industry is performance-driven and fast-paced, leaving little room for lengthy employee training. Integrating higher education with industry practices saves time and effort for both graduates and employers. Innovation and education must therefore work hand in hand to build a more employable and skilled workforce.

Conclusion

Although English language competence is valued within the education sector, it is not actively practiced or prioritised as it should be. Communication skills often receive less attention than academic performance, leaving learners underprepared for professional realities. Regular industry participation can elevate teaching standards and bridge the gap between academic learning and workplace requirements.

English communication will truly become a mainstream employability skill when industries themselves reinforce its importance and collaborate with educational institutions to align curricula with market demands. By establishing a shared framework between education and industry, India can ensure that its learners are globally competitive, confident, and ready for success.

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"Artificial Intelligence in Digital Advertising: A Systematic Review of Trends, Challenges, and Ethical Implications"

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Abstract:

Artificial Intelligence (AI) is transforming the digital advertising landscape by enabling personalized targeting, predictive analytics, and automated content creation. This systematic review explores recent advancements, challenges, and ethical considerations of AI-driven advertising practices. Utilizing the PRISMA methodology, the study analyzed peer-reviewed literature from the last five years, focusing on key AI tools such as machine learning, programmatic advertising, and dynamic content generation.

Findings reveal that AI enhances advertising effectiveness through improved audience segmentation, real-time bidding, and emotion-based targeting. Predictive models enable advertisers to deliver tailored content that resonates with user behavior and preferences, significantly improving conversion rates and engagement. Additionally, AI facilitates scalable content production and campaign optimization in real time.

However, the rapid adoption of AI introduces complex challenges. Key concerns include data privacy violations, algorithmic bias, lack of transparency, and diminishing consumer trust. Regulatory frameworks like GDPR and CCPA are increasingly critical in safeguarding user rights, but enforcement remains inconsistent. The study also highlights growing ethical dilemmas such as manipulative targeting, discriminatory ad delivery, and unclear accountability for AI-generated decisions.

The review underscores the importance of ethical AI frameworks and transparent governance to ensure fair and responsible deployment. Theoretical insights from the Technology Acceptance Model (TAM) and Diffusion of Innovation Theory provide further understanding of AI adoption in marketing practices.

Future directions call for longitudinal and intervention-based studies to measure AI's long-term societal impact, as well as the development of global regulatory standards. This research aims to guide industry stakeholders toward responsible innovation while maximizing AI's benefits in digital advertising.

Keywords: Artificial Intelligence, Digital Advertising, Machine Learning, Programmatic Advertising, Consumer Behavior, Ethics, Regulatory Compliance, Responsible AI

1.0 Introduction

The digital advertising landscape has undergone a significant transformation with the integration of Artificial Intelligence (AI), which has equipped marketers with advanced tools to enhance strategic performance. As noted by Chandra et al. (2022), AI has revolutionized core aspects of advertising, including audience targeting, content personalization, and campaign optimization.

Evolution of AI in Digital Advertising

The evolution of AI in digital advertising began with the automation of routine tasks, such as managing bids in pay-per-click campaigns. Over time, this progressed into real-time, data-driven operations powered by sophisticated machine learning algorithms. These technologies now perform complex functions such as audience segmentation, creative optimization, and predictive modeling. Rather than relying solely on demographic data, advertisers can now leverage AI to identify nuanced user behavior patterns and preferences, enabling more strategic and personalized engagements (Liu-Thompkins & Malthouse, 2017).

Key Technological Advancements

Several key technological advancements have enabled the effective integration of AI into digital advertising. Machine learning (ML) algorithms analyze vast datasets to uncover behavioral trends and predict consumer actions. These insights empower advertisers to target users who are most likely to engage with specific campaigns, thereby improving performance and conversion rates (Chandra et al., 2022).

Another major development is **programmatic advertising**, where AI automates the buying and selling of digital ad space in real-time auctions. This ensures ads are delivered to the right audiences at optimal times, increasing efficiency while reducing costs (Liu-Thompkins & Malthouse, 2017).

Additionally, **predictive analytics**—fueled by historical behavioral data—allow advertisers to forecast future trends and adjust strategies before campaign execution. This forward-looking approach improves accuracy, responsiveness, and overall campaign success (Chandra et al., 2022). Collectively, these innovations have made AI-driven advertising more precise, efficient, and impactful.

1.2 The Growing Impact of AI on Consumer Targeting and Personalization

AI-Driven Consumer Targeting and Personalization

AI has greatly enhanced digital advertising's ability to target and personalize content, leveraging real-time analytics to develop in-depth consumer profiles. By processing vast amounts of user data, AI enables brands to identify and reach potential customers who show genuine interest in specific products or services, significantly boosting engagement and conversion rates (Liu-Thompkins & Malthouse, 2017).

AI systems create tailored content by analyzing user behavior and individual preferences. This personalization ensures that advertising messages align with users' interests, thereby improving the overall user experience and campaign relevance (Chandra et al., 2022).

Moreover, AI enables real-time adaptation of advertising strategies based on continuous analysis of user interactions and feedback. These dynamic optimization capabilities allow for rapid adjustments to campaign elements, ensuring sustained performance and relevance (Liu-Thompkins & Malthouse, 2017).

As AI continues to evolve, it will pave the way for even more sophisticated advertising tools, allowing brands to achieve deeper connections with their audiences through intelligent, personalized, and responsive campaigns.

1.3 Objectives of the Review Paper

- To highlight the key advancements in AI-powered digital advertising strategies.
- To examine recent developments in artificial intelligence applications, including personalized content generation, predictive modeling, and automated advertisement delivery systems, with the aim of understanding contemporary industry trends.
- To conduct a comprehensive analysis of the ethical and operational challenges arising from the adoption of AI technologies in digital advertising.

This review critically evaluates the ethical dilemmas associated with AI integration in digital advertising, focusing on issues such as data privacy concerns, algorithmic bias in targeting, and the economic consequences of opaque AI mechanisms.

Furthermore, the study identifies existing research gaps and underexplored domains within AI-driven advertising, proposing directions for future scholarly inquiry. By uncovering these limitations and challenges, the review encourages researchers to develop more robust, responsible, and inclusive AI-based marketing frameworks.

1.4 Research Importance

Significance of AI in Shaping Digital Marketing Strategies

Artificial intelligence plays a transformative role in redefining digital marketing. By enabling the processing and interpretation of vast datasets, AI empowers marketers to deliver hyper-personalized content and make data-driven decisions that enhance campaign effectiveness. Understanding how AI functions is essential for marketers seeking to build adaptive, customer-centric strategies.

Impact on Advertisers, Brands, and Consumers

AI's ability to monitor consumer online behavior for targeted advertising brings significant implications for user privacy. The merging of personalization with surveillance raises ethical concerns and trust issues, particularly when consumers are unaware of how their data is being utilized. This duality challenges advertisers to balance innovation with transparency and accountability.

The Need for Systematic Research on AI Ethics, Regulation, and Long-Term Implications

Ongoing, systematic research is critical to inform the development of ethical guidelines, regulatory standards, and sustainable practices for AI in digital advertising. As AI continues to evolve, ensuring its responsible use involves prioritizing human dignity, promoting fairness, and fostering societal well-being. Long-term success in AI-driven advertising will depend on creating systems that are not only effective but also ethical and equitable.

2.0 Methodology

2.1 Research Design

This study adopts a **systematic review** methodology to critically assess contemporary scholarly literature focusing on the application of Artificial Intelligence (AI) in digital advertising. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (**PRISMA**) framework was employed to ensure transparency, reproducibility, and rigor throughout the review process.

2.1.1 Search Strategy

A structured and targeted search strategy was implemented to identify relevant literature concerning AI applications in digital advertising.

Databases Used:

Searches were conducted across prominent academic and scientific databases, including:

- Google Scholar
- IEEE Xplore
- Scopus
- Web of Science
- SpringerLink
- JSTOR

Search Terms and Boolean Operators:

To refine and narrow the search results, the following query and Boolean logic were used:

- **Primary Query:**
("Artificial Intelligence" OR "Machine Learning") AND ("Digital Advertising" OR "Online Marketing")

Filters Applied:

- **Publication Date:** Studies published within the last five years
- **Document Type:** Peer-reviewed journal articles, conference proceedings, and verified industry reports
- **Language:** English only

This search approach ensured the inclusion of timely, relevant, and high-quality research aligned with the study's objectives.

2.1.2 Inclusion and Exclusion Criteria

To maintain the review's integrity and relevance, the following inclusion and exclusion criteria were established:

Inclusion Criteria:

- Studies published in the past five years
- Peer-reviewed journal articles, conference papers, and industry reports
- Research specifically addressing AI applications in digital advertising, including machine learning, personalization, and programmatic advertising
- Studies offering empirical data, theoretical frameworks, or analytical case studies

Exclusion Criteria:

- Non-English publications
- Non-peer-reviewed sources (e.g., blogs, editorials, opinion pieces)
- Studies focusing on general marketing without a distinct emphasis on digital advertising
- Research lacking systematic methodology or empirical evidence

These criteria ensured the selection of studies that directly contribute to understanding the scope, opportunities, and challenges of AI in digital advertising.

2.1.3 Data Extraction and Synthesis

Key data points were systematically extracted from the selected studies for further analysis. Extracted information included:

- Study title, authors, and year of publication
- Methodology and sample characteristics
- AI applications explored (e.g., predictive analytics, automated targeting, content generation)
- Primary findings related to industry trends, ethical considerations, and implementation challenges

Thematic synthesis was employed to categorize and analyze the data, leading to the identification of three major themes:

1. Emerging developments in AI-powered digital advertising
2. Challenges and ethical concerns surrounding AI adoption
3. Identified research gaps and directions for future inquiry

This analytical process facilitated a structured evaluation of overlapping patterns, contradictions, and key contributions across the reviewed literature.

2.1.4 Limitations

Despite following a rigorous systematic approach, certain limitations are acknowledged in this review:

Constraints in Data Collection:

- The review includes only English-language publications, potentially excluding valuable non-English research.
- Industry innovations not yet captured in peer-reviewed literature were not considered, possibly limiting insight into the latest commercial practices.

Potential Biases in Literature Sources:

- Major academic databases may reflect a concentration of perspectives, excluding alternative or dissenting views.
- Limiting the search to studies published within the past five years may omit foundational research critical for contextual understanding.

Nonetheless, by employing a structured and reproducible methodology, this review ensures the reliability, relevance, and comprehensiveness of its findings concerning AI-driven digital advertising.

3.0 Literature Review

3.1 AI-Driven Trends in Digital Advertising

Artificial Intelligence (AI) has significantly transformed digital advertising, introducing innovative methods that enhance targeting precision, operational efficiency, and dynamic content creation. Research suggests that these changes are not just technological improvements but are reshaping fundamental advertising strategies.

Personalization and Predictive Targeting

One of the most impactful applications of AI in digital advertising is personalization through predictive analytics. By processing large volumes of consumer data, AI systems can develop comprehensive behavioral profiles and forecast user preferences. These capabilities enable the delivery of personalized advertisements that align with individual consumer interests, resulting in higher engagement and conversion rates. As Wilson et al. (2024) observe, predictive targeting enhances customer retention and improves the relevance of marketing communication by forecasting user interaction patterns and tailoring content accordingly.

Programmatic Advertising and Real-Time Bidding

Another key innovation is programmatic advertising, particularly in real-time bidding (RTB) environments. AI algorithms evaluate user data in milliseconds to identify optimal ad placements, automating media buying with minimal human intervention. Scherbakova et al. (2022) highlight how programmatic systems increase return on investment (ROI) by ensuring that advertisements reach the most relevant audiences at the right moment. This automation reduces waste in ad spending and boosts marketing precision and effectiveness.

AI-Powered Content Generation

AI's role in content creation has also expanded significantly. Through machine learning algorithms, businesses can automate the development of marketing content, including visuals, text, and videos. These systems facilitate large-scale content production while ensuring personalization for diverse consumer segments. Häglund & Björklund (2022) discuss how dynamic creative optimization (DCO) powered by AI adjusts ad elements in real-time based on user interactions, driving higher engagement and conversion rates.

3.2 Challenges in AI-Driven Advertising

Despite the benefits, AI-driven digital advertising faces multiple challenges. These include data privacy concerns, algorithmic bias, and a growing trust deficit among consumers.

Data Privacy and Regulatory Concerns

AI systems rely heavily on consumer data, raising concerns about privacy and data protection. Regulations like the General Data Protection Regulation (GDPR) in the European Union and the California Consumer Privacy Act (CCPA) in the U.S. require companies to obtain informed consent for data use and maintain transparency. Non-compliance can result in substantial penalties and reputational damage (Silverback Strategies, 2023). For instance, several NFL teams were criticized for tracking user data on their websites without adequate consent mechanisms (Schechner & Shifflett, 2025). Additionally, Meta faced scrutiny in Europe over allegations that its advertising practices violated user privacy rights (Sterling, 2025).

Bias and Fairness in AI Algorithms

AI systems can unintentionally perpetuate bias if they are trained on skewed datasets. Discriminatory outcomes in ad targeting—such as excluding certain demographic groups or delivering inaccurate content—can emerge from these biases. Ensuring fairness requires organizations to implement bias-detection audits and develop diverse datasets. Scott (2025) notes how beauty industry AI tools like Haut.AI and Renude have been refining their algorithms to minimize skin tone bias and enhance inclusivity in product recommendations.

Consumer Trust and Transparency

Many AI systems operate as “black boxes,” lacking transparency in how they process data and make decisions. This opacity can undermine consumer trust. Transparency initiatives—such as labeling AI-generated content and disclosing data usage policies—are essential for building consumer confidence. According to PwC research, brands that adopt ethical AI practices enjoy trust from 85% of their customer base (Soon, 2025). The fashion brand Mango, for example, faced backlash for using AI-generated models without clear disclosure, sparking debates about consumer deception (New York Post, 2024).

3.3 Ethical and Regulatory Considerations

As AI becomes more integrated into digital advertising, it raises ethical questions and calls for regulatory oversight to ensure responsible deployment.

Ethical Implications of AI Decision-Making in Advertising

AI systems can reinforce societal biases and use manipulative tactics. When algorithms target consumers based on vulnerabilities, the result can be coercive rather than persuasive marketing. Zelch et al. (2023) argue that this blurs ethical boundaries and challenges consumer autonomy. Moreover, the complexity of AI decision-making processes makes it difficult for consumers to understand how they are being targeted, which impedes accountability (Farzan, 2023).

To ensure ethical integrity, organizations must adopt frameworks that enforce transparency, fairness, and accountability. Such frameworks should require algorithmic explanations, regular audits, and clearly labeled AI-generated content. This is crucial not only for compliance but also for maintaining brand reputation and consumer trust.

Existing Regulatory Frameworks and Industry Guidelines

Regulatory agencies and institutions have begun outlining frameworks to govern ethical AI use in advertising. For example, the European Commission's *Ethical Guidelines for Trustworthy AI* emphasize the importance of human oversight, transparency, and non-discrimination. Floridi and Cowls (2019) advocate for explainable AI (XAI) to help consumers understand algorithmic decisions, thus enhancing accountability.

As AI systems become more powerful and pervasive, businesses must balance innovation with ethical obligations. Industry-wide adherence to such guidelines ensures not just legal compliance but also consumer-centered value creation.

3.4 AI's Impact on Consumer Behavior

AI has redefined consumer behavior patterns by shaping how users interact with digital content and by introducing emotionally intelligent advertising mechanisms.

Changing User Engagement and Ad Interaction

AI personalizes user experiences, increasing the relevance of ad content and thereby improving engagement. Gu et al. (2024) assert that recommendation systems, which rely on user behavioral data, significantly influence purchasing decisions. AI's capacity to adapt content in real-time based on behavioral feedback enhances consumer-brand interaction and drives loyalty.

AI-Driven Emotional Targeting and Behavioral Analysis

AI technologies can now detect emotional cues through facial expressions, voice tones, and behavioral indicators. This enables brands to create emotionally resonant messages that align more closely with consumer sentiments (Lee et al., 2023). Garcia and Kim (2023) emphasize that emotional targeting, when combined with behavioral analytics, leads to more effective campaigns by leveraging subconscious emotional responses. Thompson et al. (2021) note that

AI's behavioral analysis allows for granular segmentation and micro-targeting strategies that were previously unattainable.

3.5 Review of Relevant Theories

Several established theories help explain how businesses and consumers adopt and interact with AI in digital advertising.

Technology Acceptance Model (TAM)

Proposed by Davis (1989), the Technology Acceptance Model (TAM) explains technology adoption based on two factors: perceived usefulness (PU) and perceived ease of use (PEOU). TAM is particularly relevant to AI in advertising, as marketers assess AI tools based on their ability to improve performance and simplify operations. Venkatesh & Bala (2008) expanded TAM by integrating the concept of trust, a key determinant in AI adoption.

Diffusion of Innovation Theory

Rogers' (1962) *Diffusion of Innovation* theory categorizes adopters into five groups: innovators, early adopters, early majority, late majority, and laggards. This model is useful for mapping how AI technology spreads across the advertising industry. Multinational firms often lead adoption, while smaller companies follow once success is demonstrated (Zhang et al., 2020).

Ethical AI Frameworks

Ethical frameworks for AI usage in advertising emphasize transparency, fairness, and accountability. These frameworks guide the responsible development and implementation of AI systems. According to Floridi & Cowls (2019), ethical AI practices increase user trust and foster sustainable innovation. Guidelines such as the European Commission's *Trustworthy AI* principles ensure that businesses protect consumer rights and foster inclusive marketing.

3.6 Theoretical Implications

Theoretical models are essential for understanding and predicting AI adoption in digital advertising. Existing frameworks provide strong foundations but also require expansion to address emerging ethical and operational challenges.

Existing Theories Explaining AI Adoption

TAM and the Diffusion of Innovation Theory are widely used to study technology adoption. TAM focuses on user acceptance based on performance improvement and usability (Davenport et al., 2020), while the Diffusion model explains how adoption spreads across organizations. The Unified Theory of Acceptance and Use of Technology (UTAUT) extends these models by incorporating social influence and enabling conditions, offering a broader perspective on AI adoption.

Future Theoretical Advancements Needed

Rapid AI advancements require updated theoretical models that consider ethical dimensions, human-AI collaboration, and real-time adaptability. Existing models often overlook AI's societal impact, particularly in terms of privacy, bias, and transparency. Future frameworks should integrate ethical AI principles to ensure responsible innovation (Davenport et al., 2020). There is also a need for frameworks that address the partnership between AI systems and human marketers. Understanding this interaction is critical to maximizing efficiency and preserving human oversight in creative and strategic decision-making.

Additionally, theories should explore how to foster consumer trust in AI-driven advertising. This includes identifying the factors that influence trust and how consumers perceive automated content versus human-generated material. As AI becomes more embedded in digital marketing, consumer skepticism must be addressed through enhanced transparency and education.

Conclusion of Literature Review

Artificial Intelligence is transforming the digital advertising ecosystem by enhancing personalization, targeting precision, and content generation. However, its integration introduces significant challenges, including privacy concerns, algorithmic bias, and ethical ambiguities. Through a review of current trends, ethical issues, and relevant theories such as TAM, Diffusion of Innovation, and Ethical AI frameworks, it becomes evident that a balanced approach—one that combines innovation with ethical responsibility—is essential. As AI continues to evolve, theoretical and practical frameworks must adapt to ensure AI-driven advertising remains effective, fair, and trustworthy.

4.0 Future Directions

The accelerating integration of Artificial Intelligence (AI) into digital advertising introduces both unprecedented opportunities and pressing challenges. While AI enhances targeting accuracy, campaign efficiency, and content personalization, it also raises complex ethical, social, and regulatory questions. To ensure that AI continues to serve marketing objectives responsibly, future research must adopt a multidimensional approach. Key areas for further exploration include longitudinal assessments of AI's long-term influence, experimental intervention studies on consumer interaction, and the structured development of comprehensive ethical frameworks.

4.1 Longitudinal Studies

As AI systems evolve in sophistication and application, long-term research is essential for understanding their sustained impact on digital advertising. Cross-sectional or short-term studies offer only limited insights into the dynamic and evolving relationship between AI technologies, consumer behavior, and advertising effectiveness. **Longitudinal research**, therefore, becomes critical to evaluate durability, adaptability, and human acceptance of AI-driven marketing strategies over time.

Key areas of focus for longitudinal studies include:

- **Sustainability of Personalization:** Understanding whether AI-generated customization retains its relevance and influence over extended periods.
- **Evolution of AI Tools:** Assessing how algorithmic systems adapt to consumer feedback and changing market conditions.
- **Consumer Adaptation and Trust:** Examining long-term consumer attitudes toward AI-generated content, especially regarding trust, perception of authenticity, and loyalty.

According to Abubakar (2023), longitudinal studies are uniquely positioned to capture evolving consumer sentiments—such as emotional responses, trust development, or fatigue towards hyper-personalized advertising. These studies could illuminate how repeated exposure to AI-generated advertisements affects purchasing decisions and long-term brand relationships. In turn, these insights will be critical in designing future-proof marketing strategies that combine technological efficiency with ethical sensitivity. Longitudinal research will also aid in evaluating how algorithmic personalization evolves and whether it fosters sustainable engagement or leads to diminishing returns over time.

4.2 Intervention Studies

To complement longitudinal research, **intervention-based experimental studies** are needed to provide empirical evidence regarding the performance and implications of AI applications in advertising. These experiments would allow scholars and practitioners to isolate the effects of AI interventions on specific consumer behaviors, perceptions, and engagement metrics.

Critical areas for experimental inquiry include:

- **Performance Assessment of AI Systems:** Comparing AI-driven marketing campaigns with human-created counterparts in terms of engagement, click-through rates, and conversion effectiveness across diverse audience groups.
- **Segment-Specific Impact:** Analyzing how AI-generated advertisements affect various demographic segments (e.g., age, culture, education) to determine patterns of trust and acceptance.
- **Emotional and Cognitive Reactions:** Evaluating whether consumers perceive AI-generated content as authentic, reliable, and ethical.

Controlled laboratory settings can help researchers test various factors that influence **consumer trust**, including clarity of AI disclosures, data usage transparency, and tone of communication.

As Gu et al. (2024) argue, trust remains the most critical determinant of AI acceptance in digital advertising. If consumers are uncertain about how their data is being used or how content is being generated, they may experience anxiety or resist engagement.

Moreover, experimental studies should focus on **evaluating trust-building versus trust-weakening factors** within AI-generated content. For example, does explicitly labeling content as “AI-generated” build credibility, or does it prompt skepticism? Such insights are necessary for designing effective trust-enhancing strategies and transparent communication practices. These intervention studies will ultimately assist marketers in fine-tuning AI models and campaigns based on consumer feedback and psychological responses, making AI more responsive, ethical, and effective.

4.3 Development of Ethical Frameworks

As AI systems gain more control over marketing content, targeting decisions, and consumer data usage, the demand for comprehensive and enforceable **ethical frameworks** becomes urgent. Ethical governance is essential to prevent potential harms such as privacy violations, algorithmic discrimination, misinformation, and manipulative marketing tactics.

Key components for future ethical frameworks in digital advertising include:

- **Data Privacy Protection:** Ensuring compliance with international standards such as GDPR (General Data Protection Regulation) and CCPA (California Consumer Privacy Act). This includes obtaining informed consent, ensuring transparency in data use, and safeguarding user information.
- **Fairness and Non-Discrimination:** Creating safeguards against biased algorithms that may marginalize or exclude certain demographic groups. Bias audits and inclusive training datasets are critical for ensuring equity in ad targeting and content generation.
- **Transparency and Accountability:** Requiring organizations to disclose the use of AI in their marketing content and provide understandable explanations of algorithmic decisions. These disclosures can help rebuild and maintain consumer trust.
- **Autonomy and Manipulation Mitigation:** Regulating how AI systems influence consumer choices to ensure marketing practices respect individual autonomy and do not exploit psychological vulnerabilities.

Davenport et al. (2020) emphasize the growing consensus among policymakers and technologists that AI-driven marketing must be both **ethical and explainable**. As a result, governments around the world have begun taking active steps to draft AI regulatory policies. Collaborative efforts between lawmakers, advertising professionals, and researchers are essential to define boundaries and expectations for ethical AI marketing.

The integration of such frameworks not only provides direction for corporate governance but also serves as a **decision-making tool** for evaluating the implications of new technologies. These ethical guidelines can help businesses avoid reputational risks, build customer loyalty, and stay ahead of regulatory pressures while maximizing the benefits of AI innovations.

4.4 Strategic Research Priorities and Policy Development

In addition to academic research, future efforts must focus on **industry policy development** and **cross-sectoral collaboration**. This includes:

- Establishing **multi-stakeholder platforms** that involve governments, academic institutions, civil society, and private firms to co-develop policies.
- Creating **certification systems** or industry benchmarks for "Ethical AI in Advertising."
- Investing in public awareness campaigns to **educate consumers** on AI tools, their rights, and data privacy issues.
- Promoting the **coexistence of human creativity and AI capabilities**, rather than allowing one to replace the other.

Governments and business leaders should treat the ethical deployment of AI in advertising as a shared responsibility. A coordinated global effort is essential to align AI implementation with both innovation goals and societal values.

Additionally, **medical, educational, and psychological research disciplines** can contribute valuable insights into how AI shapes consumer cognition and behavior. Understanding these cross-disciplinary impacts will ensure that AI remains a constructive rather than exploitative force in the advertising ecosystem.

Conclusion of Future Directions

The future of AI in digital advertising depends not only on technological innovation but also on the responsible and ethical integration of those technologies into society. To ensure AI's continued relevance and trustworthiness, future research must be comprehensive and forward-looking. Longitudinal studies will reveal how AI transforms consumer behavior over time. Intervention-based experiments will generate empirical data about user perceptions and engagement. Most importantly, the development and enforcement of ethical frameworks will guide marketers toward equitable, transparent, and accountable practices.

Investing in these future research directions and ethical frameworks will create an AI marketing landscape that is not only innovative and profitable but also respectful of consumer rights and societal values. By aligning AI development with ethical considerations and regulatory protocols, businesses can ensure long-term sustainability, consumer trust, and global impact in the rapidly evolving world of digital advertising.

5.0 Conclusion

5.1 Summary of Key Findings

This systematic review examined the transformative role of Artificial Intelligence (AI) in digital advertising, analyzing its technological innovations, associated challenges, and evolving ethical implications. Through the synthesis of recent peer-reviewed literature, the study identified central trends, evaluated AI's contributions to advertising efficiency and personalization, and discussed the obstacles that must be addressed to ensure ethical, transparent, and consumer-friendly AI integration.

Overview of AI-Driven Trends, Challenges, and Ethical Concerns

AI-Driven Trends in Digital Advertising

The integration of AI into digital advertising has ushered in a paradigm shift, enabling precision-targeted campaigns, real-time ad delivery, and automated content generation. AI systems—particularly those built on machine learning and predictive analytics—analyze large volumes of consumer data to identify behavioral patterns and preferences. As a result, advertisers can now create and deliver **personalized, context-relevant content** that resonates with specific audience segments (Zhang & Yang, 2020).

One of the key technological advancements is **programmatic advertising**, wherein real-time bidding (RTB) systems allow advertisers to buy and place ads with optimal efficiency. AI-driven RTB mechanisms evaluate users' online behavior, calculate the value of ad impressions in milliseconds, and place ads strategically to maximize visibility and ROI (Chandra et al., 2022). This automation reduces human error, increases response speed, and minimizes advertising costs.

Furthermore, AI enhances **content creation** by generating adaptive ad materials—ranging from text to video—tailored to individual preferences and contextual settings. Through dynamic creative optimization (DCO), AI tools modify ad elements in real-time based on user interactions, increasing relevance and boosting engagement (Häglund & Björklund, 2022). These innovations mark a transformative era where advertising is no longer static but responsive and adaptive, leading to improved campaign performance.

Challenges and Ethical Concerns in AI-Driven Advertising

Despite the numerous benefits, the growing use of AI in advertising introduces significant challenges that demand critical evaluation. One of the most pressing concerns is **data privacy and regulatory compliance**. AI systems often rely on vast quantities of personal data to operate effectively. However, the collection, storage, and use of such data must align with stringent regulatory frameworks such as the **General Data Protection Regulation (GDPR)** in the European Union and the **California Consumer Privacy Act (CCPA)** in the United States (Silverback Strategies, 2023).

Companies face increasing pressure to ensure **informed consent**, transparency in data usage, and mechanisms for data access and deletion. Violations not only risk legal penalties but can also severely damage brand reputation.

Another core issue is **algorithmic bias**. AI models trained on skewed or unrepresentative datasets may unintentionally perpetuate discriminatory practices. For example, biased advertising algorithms may exclude certain demographic groups or reinforce stereotypes, leading to **unethical targeting** and reputational backlash (Scherbakova et al., 2022). These outcomes highlight the need for fairness-aware AI systems and inclusive dataset development. Moreover, **consumer trust** in AI-driven advertising remains fragile. As AI systems become more autonomous and opaque, users often feel uncertain about how decisions are made. The **lack of algorithmic transparency** hinders users' ability to understand, question, or contest how and why they are targeted (Wilson et al., 2024). This uncertainty can erode trust, especially if consumers believe their data is being misused or manipulated.

Ethical Implications of Manipulation and Opacity

Ethically, AI's increasing influence over advertising content and delivery poses significant concerns regarding **manipulation and autonomy**. While personalization enhances user engagement, it also creates the potential for exploitative practices. For instance, by profiling user vulnerabilities, AI can generate ads that manipulate emotional or psychological states, influencing purchasing decisions in ways that may not align with consumers' best interests (Sterling, 2025).

Another critical issue is the **opacity of AI decision-making**. Complex machine learning models often function as "black boxes," making it difficult for advertisers and regulators to trace how outputs are generated. This raises concerns about accountability, informed consent, and **users' ability to challenge algorithmic outcomes** (Soon, 2025). Without mechanisms to ensure transparency and explainability, AI-driven advertising may conflict with principles of ethical marketing and informed choice (Garcia & Kim, 2023).

Insights from the Systematic Review and Literature Synthesis

The systematic review provides several key insights, summarized in **Table 1** and **Table 2**. These findings reflect how AI has redefined digital advertising practices while simultaneously introducing urgent ethical, regulatory, and social considerations.

Table 1 – Summary of Key Insights

Area	Key Insight
Personalization	AI enables content customization based on real-time behavioral data analysis.
Programmatic Advertising	Real-time bidding (RTB) enhances ad delivery precision and cost efficiency.
Content Automation	AI tools generate scalable, engaging content (text, visual, video).
Data Privacy	Regulatory compliance is crucial (GDPR, CCPA); misuse leads to legal/reputational risk.
Algorithmic Bias	Biased data causes unfair targeting, exclusion, or stereotyping.
Transparency and Trust	Users demand clear explanations of AI-driven decisions and data usage.
Ethical Manipulation	Personalized ads may exploit emotional vulnerabilities or decision biases.

Table 2 – Description of Review Implications

- **Strategic Efficiency Gains:** AI significantly boosts advertising productivity through automation, data analytics, and behavioral targeting.
- **Moral and Legal Risks:** Inadequate regulation or transparency leads to distrust, discrimination, and potential legal repercussions.
- **Trust and Accountability:** Long-term success depends on building trust through transparent, ethical AI operations.
- **Regulatory Alignment:** Industry practices must align with national and international privacy laws and ethical advertising standards.
- **Need for Explainable AI (XAI):** Transparent AI mechanisms enhance understanding, consumer autonomy, and regulatory acceptance.

The Path Forward: Ethical Governance and Continued Research

Looking ahead, the widespread implementation of AI in digital advertising demands **strong ethical governance, ongoing research, and consumer-focused innovation**. The review highlights the necessity of:

- **Building Explainable AI (XAI) systems** that demystify algorithmic decision-making processes, thus fostering consumer trust and accountability.
- **Revising and expanding regulatory frameworks** to match the evolving capabilities of AI in advertising.
- **Developing inclusive datasets** to mitigate algorithmic bias and promote fairness in targeting strategies.
- **Incorporating ethical design principles** from the beginning of AI development to ensure respectful, responsible, and value-driven advertising practices.

Additionally, **longitudinal and intervention-based research** is critical to monitor AI's ongoing impact on consumer behavior, market dynamics, and brand perception. Scholars must explore how consumers respond to AI-based campaigns over time, how trust develops or erodes, and how ethical interventions influence marketing effectiveness.

Policymakers and industry stakeholders must collaborate to **design clear, enforceable guidelines** that balance innovation with accountability. Businesses that adopt AI must also develop internal protocols that uphold ethical standards, data integrity, and algorithmic transparency.

5.2 Final Reflection

Artificial Intelligence has undoubtedly transformed digital advertising from a reactive to a predictive and personalized model. While AI-powered tools improve accuracy, efficiency, and personalization, they also introduce substantial ethical and regulatory concerns. These dualities—between opportunity and risk, innovation and manipulation—must be carefully balanced to ensure AI becomes a **force for good** in the advertising domain.

As businesses continue to pursue AI technologies to maintain competitive advantages, they must also invest in building trust, respecting user autonomy, and complying with ethical norms. Ethical AI in advertising is not merely an aspirational goal, it is a **strategic necessity** for long-term brand success, regulatory compliance, and public trust.

Future research must continue to investigate the evolving role of AI in advertising, not only from a technical and operational standpoint but also through the lens of **social impact, consumer perception, and ethical governance**. In doing so, the advertising industry can shape an AI-enabled future that is innovative, equitable, and aligned with the values of an increasingly aware and empowered digital society.

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Bridging Academia and Industry: “Unlocking India's Potential for Future-Ready Higher Education”.

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Abstract:

India stands at a pivotal juncture where the transformation of its higher education ecosystem is crucial to meet the demands of a rapidly evolving global economy. This paper explores the imperative of building stronger industry-academia collaborations as a strategic approach to enhancing the relevance, quality, and future-readiness of higher education in India. Recognizing the growing skills gap and mismatched expectations between graduates and employers, this research investigates how integrating real-world industry practices into academic frameworks can bridge this divide.

The study adopts a mixed-methods approach, employing both qualitative and quantitative data collected through surveys, expert interviews, and institutional case studies. The literature review highlights global best practices and examines existing collaboration models in the Indian context. Through analysis of key trends, the paper identifies success factors, common challenges, and measurable impacts of collaborative programs on student employability and innovation capacity.

Case studies from leading academic institutions and industry partners—spanning technology, manufacturing, and healthcare—demonstrate how effective partnerships improve curriculum relevance, support faculty development, and create pathways for internships, apprenticeships, and joint research. Policy frameworks such as NEP 2020 are also analyzed to understand their role in enabling such partnerships.

The research concludes that structured, sustainable, and mutually beneficial collaboration between academia and industry is essential to unlock India's demographic dividend and drive inclusive growth. Key recommendations include establishing institutional frameworks for collaboration, enhancing policy incentives, and encouraging ongoing stakeholder dialogue. This synergy is not just a catalyst for educational reform but a strategic necessity for national development.

Key Words: Academia-Industry Collaboration, Future-Ready Higher Education, Skills Gap, Curriculum Relevance, Employability Enhancement, NEP 2020 Policy Framework.

1. Introduction

India's higher education sector is at a crossroads. As the global economy transitions into an era defined by digital transformation, automation, and innovation, the need for an education system that equips students with both technical and transferable skills is more critical than ever. Despite producing millions of graduates annually, India faces a growing employability crisis. Employers increasingly cite a gap between academic learning and the skills needed in the workplace.

This paper examines how industry-academia collaboration can be a vital lever for reform. Such partnerships can help institutions align curricula with evolving industry needs, enhance faculty competence, and ultimately prepare students to contribute meaningfully in a knowledge-driven economy.

2. Literature Review

2.1. Theoretical Foundations of Academia-Industry Collaboration

Academia-industry collaboration (AIC) is rooted in the broader theory of knowledge transfer, which posits that the dissemination of knowledge across institutional boundaries drives innovation, productivity, and societal progress (Etzkowitz & Leydesdorff, 2000). The "Triple Helix Model" (Etzkowitz, 2003) suggests that synergistic interaction between universities, industries, and governments fosters a knowledge-based society. In this model, academia provides theoretical knowledge and research, industries apply that knowledge, and governments facilitate the ecosystem.

The concept of "Mode 2 Knowledge Production" (Gibbons et al., 1994) also underscores a shift in knowledge creation that is context-driven, problem-focused, and transdisciplinary—traits that are inherent in industry-academic partnerships.

2.2. Relevance in the Indian Context

India has over 1,000 universities and 40,000 colleges, yet the employability of graduates remains low—hovering at around 47% according to the India Skills Report (Wheebox, 2023). This disparity between education and employment requirements has prompted a national focus on AIC. The National Education Policy (NEP) 2020 strongly advocates experiential learning, vocational exposure, and closer interaction between academia and industry.

Reports by the Confederation of Indian Industry (CII, 2021) have highlighted that sectors such as Information Technology, Healthcare, and Manufacturing face acute skill gaps due to the lack of industry-relevant training in higher education institutions. AIC is thus seen not only as a tool for employability but also as a strategic lever for national competitiveness.

2.3. Benefits of Academia-Industry Collaboration

Numerous studies have documented the mutual advantages of collaboration between academia and industry:

- **Curriculum Enrichment:** Incorporating real-world case studies, technologies, and practices helps in keeping curricula updated and aligned with industry expectations (Ankrah & AL-Tabbaa, 2015).
- **Skill Development & Employability:** AIC enables practical learning through internships, live projects, and industrial visits, which improve students' job-readiness (NASSCOM, 2022).

- **Research & Innovation:** Collaborative research initiatives have led to faster commercialization of academic discoveries and increased R&D efficiency (Perkmann et al., 2013).
- **Faculty Upskilling:** Exposure to corporate practices enables faculty to teach contemporary tools and techniques, bridging the knowledge gap (Sengupta, 2017).
- **Funding and Infrastructure:** Industry partnerships often lead to funding support for labs, equipment, and collaborative centers, enhancing the institution's overall capabilities (OECD, 2019).

2.4. Challenges in Implementation

Despite the evident benefits, there are numerous challenges in executing effective AIC in India:

- **Lack of Institutional Frameworks:** Many institutions lack dedicated cells or mechanisms to initiate and sustain industry partnerships (AICTE, 2021).
- **Administrative Delays and Bureaucracy:** Rigid university regulations often delay or prevent dynamic collaboration initiatives (Mukherjee & Roy, 2020).
- **Mismatched Expectations:** Academia focuses on theoretical depth while industry seeks short-term practical solutions, creating a disconnect (Gupta & Dhawan, 2019).
- **Limited Faculty Exposure:** Many faculty members have limited industry experience, which hinders effective collaboration (Joshi, 2021).
- **Geographical Disparity:** Institutions in tier-2 and tier-3 cities often struggle to build strong ties with industries due to location disadvantage (FICCI, 2022).

2.5. International Best Practices

India can learn from global models of successful AIC:

- **Germany's Dual System:** Combines classroom instruction with workplace training, ensuring students are both academically and practically prepared (BIBB, 2020).
- **Stanford University's Industry Ecosystem:** Extensive linkages with Silicon Valley firms result in constant innovation and entrepreneurship (Wadhwa, 2012).
- **UK's Knowledge Transfer Partnerships (KTPs):** Funded collaborations between businesses and universities for specific innovation projects (UKRI, 2020).

These models demonstrate how policy support, institutional autonomy, and stakeholder engagement are vital to successful AIC.

2.6. Emerging Trends in India

- **Incubation and Innovation Cells:** With initiatives like Atal Innovation Mission and Startup India, academic institutions are becoming incubation hubs.
- **Sector Skill Councils (SSCs):** Under the National Skill Development Corporation (NSDC), SSCs design occupational standards that align with industry needs.
- **Online and Hybrid Learning Models:** With platforms like SWAYAM and Coursera, industries now co-create courses with academia to address real-time skill gaps.
- **Corporate Social Responsibility (CSR):** Companies increasingly invest in education as part of CSR, offering sponsorships, mentorship, and technology support.

2.7. Policy Interventions and Future Scope

The NEP 2020 outlines key reforms that support AIC:

- Establishment of **Multidisciplinary Education and Research Universities (MERUs)**.
- Promotion of **Academic Bank of Credits (ABC)** to support lifelong learning.
- **Flexibility in curriculum design**, enabling co-branded courses with industries.

For future readiness, emphasis should be placed on:

- Creating **structured internship programs**.
- Offering **joint certification**.
- Setting up **Industry Advisory Boards** for curriculum review.
- Facilitating **faculty sabbaticals** in industry.

3. Methodology

This study follows a **mixed-methods approach**, combining quantitative surveys and qualitative interviews to explore the effectiveness of industry-academia collaboration in enhancing higher education in India.

3.1. Research Design

The study targets three key groups:

- **Students** (n = 150)
- **Faculty Members** (n = 30)
- **Industry Professionals** (n = 20)
-

Surveys were distributed online and in-person using structured questionnaires covering perceptions of industry readiness, curriculum relevance, and collaborative practices.

3.2. Qualitative Methods

- **10 faculty and 8 industry experts** were interviewed.
- **Focus group discussions** were held with students involved in live industry projects.
- **Two case studies** (FabIndia and Sabyasachi) were developed to illustrate successful collaboration.

3.3. Data Analysis

Quantitative data was analyzed using **descriptive statistics** and visualized through **charts**. Qualitative data was reviewed through **thematic analysis**, identifying trends in collaboration models, challenges, and outcomes.

3.4. Ethical Considerations

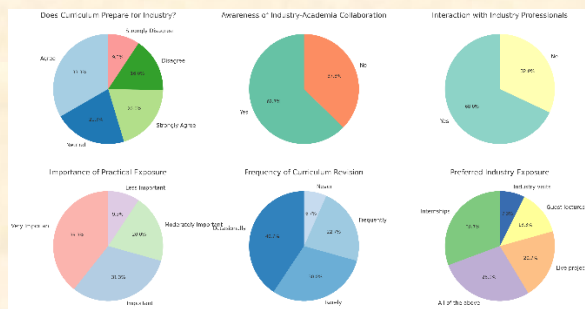
Consent was obtained from all participants. Data privacy and institutional permissions were maintained throughout.

The analysis employed both thematic coding for qualitative data and statistical techniques for quantitative inputs, allowing a holistic understanding of the nature and impact of academia-industry partnerships in India.

4. Analysis

Findings from the study indicate a growing interest and willingness among both academia and industry to collaborate, though structural limitations persist.

Here is the **survey report based on responses from 150 students**, visualized through pie charts:



Section A: Student Survey Results

1. Curriculum Preparedness for Industry

- 50% of students believe the curriculum prepares them well (*Strongly Agree/Agree*).
- 25% remain *Neutral*.
- The remaining 25% feel underprepared (*Disagree/Strongly Disagree*).

2. Awareness of Industry-Academia Collaboration

- 65% of students are aware of such programs in their institution.
- 35% have no awareness — indicating communication gaps.

3. Interaction with Industry Professionals

- 70% of students had exposure through lectures, mentorship, or workshops.
- 30% have not interacted — an area needing improvement.

4. Importance of Practical Exposure

- 75% rate practical exposure as *Very Important* or *Important* to their learning.
- A small fraction sees it as *Less Important*.

5. Curriculum Revision Based on Industry Needs

- Only 20% say it's revised *Frequently*.
- Majority (~70%) state it happens *Occasionally or Rarely*.
- 10% claim *Never* — raising concerns.

6. Preferred Industry Exposure

- “All of the Above” is the most preferred (30%), followed by Internships (25%) and Live Projects (20%).

Key Insights:

- Over 65% of students and 75% of employers believe curricula are outdated or only partially aligned with industry needs.
- Institutions with formal industry partnerships report a 30–40% higher placement rate.
- Collaborative curriculum design, guest lectures, and internships were identified as the most effective models.

Challenges Identified:

- Lack of industry participation in academic boards
- Faculty resistance due to traditional mindsets
- Absence of government-led incentives for collaboration

5. Case Studies

5.1: FabIndia – Collaboration with Academia for Sustainable Fashion Education

Background of the Brand

FabIndia, established in 1960, is a leading Indian retail platform for ethnic and sustainable fashion. Known for promoting traditional Indian crafts and handloom, the brand connects over 55,000 rural artisans with urban consumers. FabIndia focuses on sustainability, ethical production, and community development, making it a pioneer in conscious fashion retail.

Nature of Collaboration

FabIndia has actively collaborated with academic institutions like:

- National Institute of Fashion Technology (NIFT)
- Pearl Academy, Delhi
- School of Fashion Technology (SOFT), Pune

The brand engages in a variety of academic partnerships, such as:

- Curriculum Input: FabIndia professionals serve on academic advisory boards to help co-design elective courses in textile heritage, sustainability, and retail.

- **Internships & Live Projects:** Students from fashion communication and design specializations undergo 8–12-week internships in FabIndia’s design, merchandising, and visual communication departments.
- **Guest Lectures & Workshops:** Senior design heads and marketing professionals conduct sessions on topics like:
 - Heritage branding
 - Sustainable supply chains
 - Rural artisan engagement
 - Ethical marketing

Collaborative Projects:

1. Sustainable Fashion Project (with SOFT Pune)

- Students co-created a capsule collection using handwoven khadi sourced from FabIndia's artisan partners in Barabanki, UP.
- The project included branding, lookbook creation, visual merchandising, and a pop-up installation.
- The final output was showcased in both the institute's fashion week and in select FabIndia stores.

2. Design Thinking Sprint (with NIFT Delhi)

- FabIndia co-sponsored a 2-week studio workshop in collaboration with NIFT’s design thinking lab.
- Mixed teams of fashion design and fashion communication students worked on:
 - Revamping customer experience in store.
 - Digital storytelling for artisans.
 - Eco-conscious packaging design.
- Some concepts were later piloted in FabIndia's Khan Market store in Delhi.

Outcomes of the Collaboration

Impact Area	Outcome
Student Learning	Students gained hands-on exposure in sustainable retail practices, storytelling, and artisan interface.
Brand Innovation	FabIndia leveraged youthful perspectives to improve retail and visual identity strategy.
Faculty Development	Professors attending the sessions reported enhanced curriculum relevance and adapted modules accordingly.
Employment Linkages	Over 15 interns were offered pre-placement offers (PPOs) over three years of partnership.

Challenges Faced

- **Logistics:** Coordinating artisan visits and fieldwork in rural locations required complex planning.
- **Curriculum Synchronization:** Aligning academic calendars and FabIndia's operational cycle proved difficult at times.

- Scalability: Expanding such collaborations across all campuses remains a challenge due to resource constraints.

Policy Implications & Best Practices

- NEP 2020 Alignment: The collaboration aligns with NEP's recommendation of experiential and project-based learning.
- Institutional Support: Success was facilitated by the presence of dedicated industry interface cells in the academic institutions.
- Replicable Model: This partnership can serve as a blueprint for other fashion retailers aiming to invest in talent development and sustainable fashion education.

5.2: Sabyasachi – Empowering Future Designers Through Heritage-Driven Collaboration

Background of the Brand

Sabyasachi Mukherjee, one of India's most celebrated fashion designers, established his eponymous brand *Sabyasachi* in 1999. Known for reviving Indian textiles, artisanal techniques, and bridal couture, the brand is synonymous with luxury, heritage, and craftsmanship. The brand's vision aligns closely with preserving India's cultural identity while promoting global relevance.

Nature of Collaboration:

Sabyasachi has collaborated with elite academic institutions to bring heritage-focused design, craftsmanship, and storytelling into the mainstream of fashion education.

Notable collaborations include:

- National Institute of Design (NID), Ahmedabad
- NIFT Kolkata and Mumbai
- School of Fashion Technology (SOFT), Pune
- Indian Institute of Crafts and Design (IICD), Jaipur

Forms of Collaboration:

- Guest Lectures and Masterclasses:
Sabyasachi and his senior design team regularly conduct talks on topics like:
 - Luxury branding in Indian context
 - Reviving forgotten crafts
 - Fusion of tradition with contemporary aesthetics
 - Building a global luxury brand rooted in Indian ethos
- Mentorship and Portfolio Reviews:
Selected final-year students in fashion design and styling receive direct feedback and mentoring for graduation collections from Sabyasachi design mentors.
- Heritage Projects and Craft Documentation:
Students were sent to Bengal, Odisha, and Rajasthan to document rare textile techniques like zardozi, gota-patti, and kantha under guidance from the Sabyasachi foundation.

Collaborative Projects:

1. “Revive Kantha” Campaign (with NIFT Kolkata)
 - A semester-long live project involved 20 students collaborating with Bengal artisans to innovate motifs in kantha embroidery for bridal wear.
 - Students created “*New Age Heirlooms*”—bridal silhouettes fusing modern drapes with traditional handwork.
2. Craft & Couture Workshop (with NID Ahmedabad)
 - A 10-day workshop at the Sabyasachi design house included:
 - Observational learning from karigars (master artisans)
 - Real-time product development in embroidery labs
 - Case study analysis of the *Sabyasachi x H&M* global campaign

Outcomes of the Collaboration

Impact Area	Details
Student Enrichment	Students gained exposure to luxury fashion design, studio work culture, and artisan-led design.
Cultural Education	The program fostered deep respect for traditional Indian craftsmanship and its modern adaptation.
Career Development	10 students received internship placements; 4 alumni were hired into the embroidery and styling units.
Brand Impact	Sabyasachi built a strong pipeline of culturally sensitive, professionally trained young designers.

Challenges

- High Expectation Gap: The level of perfection required in couture finishing was a challenge for many students.
- Limited Access: Due to the exclusivity of the brand, only a small number of students could participate.
- Preservation vs. Innovation Conflict: Students sometimes struggled to innovate without compromising the integrity of traditional techniques.

Strategic Significance

This collaboration reflects the NEP 2020 directives on integrating Indian knowledge systems and crafts in higher education. It also embodies the Make in India ethos by empowering students to value and preserve traditional crafts in a luxury format.

Best Practices Learned

- Studio Immersion: Allowing students to be part of real-time couture processes provides unmatched industry insight.
- Craft Mentorship: Engaging students directly with artisans strengthens empathy and storytelling skills.
- Selective Intake + Deep Mentoring: A smaller cohort but high-impact engagement model ensures quality output.

6. Policy Implications

The findings of this study underscore the urgent need for policy reforms to strengthen industry-academia collaboration in India. Higher education policies must prioritize curriculum co-design with industry experts, promote faculty upskilling, and incentivize industry participation through tax benefits and recognition. Regulatory bodies like AICTE and UGC should encourage flexible learning modules, experiential education, and industry-led certification programs. National Education Policy (NEP) 2020's focus on multidisciplinary and skill-based education provides a timely framework. Effective implementation, however, requires sustained partnerships, streamlined approval processes, and institutional autonomy to align academic programs with real-world demands and rapidly evolving industry standards.

Key Policy Recommendations:

- Mandating industry representation on curriculum boards
- Providing tax or funding incentives for R&D collaborations
- Establishing national and regional knowledge clusters that facilitate academic-industry partnerships

The role of regulatory bodies like UGC and AICTE needs to evolve from oversight to enabler, with mechanisms to monitor and evaluate collaboration effectiveness.

7. Recommendations

1. **Institutional Frameworks:** Set up dedicated industry-academia collaboration cells within universities.
2. **Curriculum Integration:** Regularly revise curricula with inputs from sector experts.
3. **Capacity Building:** Offer faculty development programs led by industry professionals.
4. **Policy Incentives:** Encourage government-backed incentives for collaborative R&D.
5. **Joint Ventures:** Foster co-branded certifications and diploma programs.
6. **Long-Term Partnerships:** Move beyond MoUs to outcome-driven strategic alliances.

8. Conclusion

A future-ready higher education system in India requires more than curriculum changes; it demands systemic partnerships between academia and industry. By embedding industry insights, fostering continuous dialogue, and creating joint opportunities for learning and research, Indian institutions can not only enhance employability but also contribute to national innovation and economic resilience.

This research underscores that unlocking India's educational potential lies in the depth and quality of academia-industry synergy. The road ahead involves collaborative intent, proactive policy, and inclusive execution.

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Integrating Classroom Learning to Industry Implementation: Bridging the Gap of Theoretical Frameworks with an Industry- Cohesive Approach of Merchandising in Design Curriculum.

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Introduction

Fashion education in India, similar to many domains within the design sphere often face an imbalance between classroom teaching and practical knowledge. This is especially true for subjects which are taught as primarily theory-based but have practical application in the industry-such as Buying, Merchandising, Planning, E-commerce, Supply chain management etc. In these instances, one will find a considerable gap between what the students or freshers have learned in college from their course curriculum vis-à-vis what they are expected to deliver in their jobs.

Many if not most of them feel confident with theories and concepts, but the real shock comes on the job—when they have to apply the theoretical knowledge in the practical space with revenues and business numbers, generate complex reports, deal with challenging suppliers, or work with business intelligence (BI) software they have never handled before.

This disconnect isn't just challenging for fresh graduates but also has a negative impact on the employers who have to spend time, efforts and money on training these recruits the basis they should already have mastered in class. Companies who hire fresh graduates via college placements or job fairs or always conduct induction programs or foundational training to orient the newcomers into the organisational structure or departmental workings. Similarly recent graduates with work experience in the 2–5-year bracket also undergo similar recalibrating programs when moving from one company to another and must quickly "unlearn and relearn" in a work environment. In such organisation even though concepts such as 'learning on the job' or learning through practical application' exist there is a lean period where the employee takes time to learn and make mistakes. The intricacies of revenue management, report generation, supplier negotiations, or the use of business intelligence software are often unfamiliar to recent graduates, who report feeling confident in academic concepts. However, with the pace of work increasing in the corporate sphere and attrition rates going up across all industries companies are even more reluctant to invest this kind of time and money in new hires and prefer them to be ready from day 1. As a result, there is still a significant gap between what college students learn and the skills that employers require of new hires.

On a global perspective, retail management in the fashion industry encompasses much more than just creating mood boards or analysing fashion trends to create collections. Fundamentally, it is a data-driven field that includes supply chain optimization, sales and revenue forecasting, OTB and inventory management, option planning, vendor selection and

product development. In order to turn ideas into consumer-ready products in a rapidly evolving retail environment, stakeholders must integrate creative intuition with practical commercial logic and make use of advanced tools and technologies.

The circumstances highlight the urgent need to rethink fashion merchandising education in India, moving it in the direction of a model that prioritizes real-world, hands-on experience and better equips students for the demands of the workplace. Clearly, there's a need to rethink how fashion retail (merchandising/buying/planning etc) is taught in India.

Background

Many progressive educational institutions and businesses all over the world and in India are experimenting with creative teaching methods after grasping the need for adapting to the ever-evolving retail landscape. To better mimic real-world problems, top fashion schools have implemented experiential labs, live projects, and student-led business simulations as a part of the course curriculum. The gap between academic learning and professional requirements is being filled in part by partnerships with industry experts which include mentorship programs, internships, short- & long-term projects and immersive exposure to best practices in the industry. A more relevant and practice-oriented education is being made available to the students by a growing number of institutions who are proactively hiring faculty members with extensive industry experience even with little or no academic background.

On the corporate aspect, companies are refining their onboarding procedures and creating management trainee programs that rotate new hires through several departments within the company in a methodical manner so they can experience all aspects of the business first-hand. In addition to developing a comprehensive understanding of the industry, which includes topics like end-to-end supply chain management (SCM) and business analytics, these programs also act as a feedback mechanism for academia, pointing out critical gaps in graduate readiness.

In India, there is still an overlying misperception that retail management is primarily a creatively-oriented field. In stark contrast to the assumption, retailing is essentially an analytical field is a numbers-intensive business that requires the ability to decipher complex data, optimize workflows, and react to shifting consumer trends. Every significant retail function, from demand forecasting, supplier negotiations to assortment planning and financial budgeting, online channel management, requires a careful balancing act between analytical agility and creativity.

Technologies for inventory management, sales forecasting, and business intelligence such as Retail Analytics software, SAP, ERP, Warehouse Management Systems (WMS) are being quickly adopted by retail companies to ensure speed, efficiency and accuracy in the workplace. The next generation of buyers, merchandisers and planners must be skilled not only in using the tools that are now commonplace to track product life cycles, measure consumer behaviour, and streamline operations, but also in working across departments such as design, management, logistics, and sales to achieve commercial success.

Research Gap

As discussed above there exists a significant disconnect between what is taught in classroom in India and the industry demands from graduates, even with significant advancements and changes in curriculum design and the emergence of specialized courses and institutions.

Typically, lectures, assignments, reports and periodic presentations are used to teach core or theory subjects like marketing, merchandising, and buying. Students frequently lack practical expertise in areas such as sales forecasting, OTB and option planning, inventory management, purchase order preparation, e-commerce and channel management, business reporting and business software operation, even though this approach guarantees exposure to basic topics, ranging from consumer typologies and retail format types to fashion cycles. In certain instances, new joiners are unable to tabulate even the basic formulae such as percentage calculation or pivot table creations on MS Excel.

On the other hand, businesses are in greater need of entry-level workers who can contribute right away to business operations, such as evaluating weekly sales, generating basic reports crunching large data, vendor and supplier management, managing online channels systems and partners, and promptly adjusting to changes in the market. Employers frequently say, "We don't just need people who know the terms, we need problem-solvers, negotiators, and people who can make quick calls with numbers in front of them." Such statements encapsulate the disconnect between professional expectations and academic preparation.

Both employers, who must spend money on additional training, and recent graduates, who must navigate challenging learning curves when they first enter the workforce, bear the repercussion of this disconnect. If India's fashion education system is to truly prepare students to succeed in a competitive, technology-driven, and results-oriented industry, it is imperative that this misalignment be addressed.

The primary issue areas or research gaps are identified in the following aspects.

1. Too Much Theory, Not Enough Practical Application

Most Indian design schools still rely heavily on theory lectures, textbooks studies, assignments, power point presentations and end-of-term exams—a style rooted in older educational models. There are few opportunities to practice what's taught, especially using real-time data or reports as well as industry-approved software or basic retail tools like Microsoft Teams.

2. Limited Exposure to Industry Tools

Almost all graduates have never been exposed to prime retail software like ERP, SAP or familiarized themselves with analytical tools like Macros for Excel, Power BI, which are standard in retail and export roles. When faced with these tools on the job, the learning curve can be steep especially in a fast-paced corporate environment where they fall behind competition.

3. Dated or Generic Theoretical Content

Often, the coursework doesn't take into account the rapidly-changing scenario and evolving trends in retail, technology, or global supply chains. Most colleges follow the same syllabus for years, until a new government regulation is enforced. Moreover, consulting with industry stakeholders to update content does not happen as frequently as required

Objective

This research paper dives into the evident gap between classroom learning and industry requirements in the context of fashion buying and merchandising. Through an understanding of existing academic methods, scrutiny of employer expectations, and study of initiatives already in-existence across the world, the paper seeks to discover the root causes of the knowledge divide. It attempts to offers solutions to aid practical, hands-on skill development while maintaining the necessary theoretical framework.

The below discussion aims to shed light on how an “academic-industry cohesive” approach—incorporating internships, mentorship, software training and development, and frequent curriculum revisions—can equip students to succeed when they join the industry. The objective is to underline actionable suggestions to make the education industry appropriate, ensuring future competitiveness and flexibility for graduates in their careers.

Methodology

A qualitative study was carried out from multiple groups to gain a better understanding of these challenges:

- Faculty members at leading Indian design colleges
- Merchandisers and managers from the Retail Industry
- Industry trainers and consultants-either fulltime/contractual/freelancing- supporting the educational sphere

Responses were primarily obtained through casual conversations and unstructured interviews. Reviews of international best practices were added to these in search of workable, validated curriculum concepts.

Questionnaire for Research:

The unstructured questionnaire was based on varied perspectives such as current courses and conceptual understanding of the subject, industry readiness and practical skills, and collaborations and industry connections with academia.

The questionnaire consists of the following sections.

Section A: Current Courses and Conceptual Understanding

1. The current buying & merchandising design curriculum offers a solid theoretical framework foundation.
2. The buying & merchandising courses you are familiar with place enough emphasis on practical skills.
3. After finishing their academic courses, students exhibit a sufficient comprehension of fundamental buying & merchandising concepts.
4. Assignments, presentations, and tests in the classroom successfully get students ready for buying & merchandising challenges in the real world.

5. The demands of the modern fashion retail industry are met by theoretical instruction in buying & merchandising.

Section B: Industry Readiness & Practical Skills

6. Graduates have extensive experience with retail mathematics and buying & merchandising-related analytical tools.
7. Throughout their coursework, students have the chance to participate in simulation exercises (such as assortment planning and open-to-buy planning).
8. Meaningful exposure to buying & merchandising strategies (such as purchasing, negotiating, and product selection) is part of the curriculum.
9. Students are trained in AI and technology applications that are pertinent to the fashion industry.
10. The skills needed for supply chain management and retail operations are adequately covered in the design curriculum.

Section C: Collaboration & Industry Connections

11. Industry experts regularly participate in curriculum delivery through workshops, guest lectures, and other events.
12. As part of their academic programs, students can participate in field trips, internships, and live projects.
13. For hands-on learning, the curriculum promotes cooperation between academia and business.
14. Final exams and projects are examples of academic assessments that show problem-solving and real-world industry scenarios.
15. Students are introduced to retail management and business intelligence software that is widely used in the industry.

Section D: Needs, Recommendations, and Gaps

16. The theoretical knowledge of students and their practical application in the workplace differ significantly.
17. The buying & merchandising curriculum is updated and improved on a regular basis based on input from the industry.
18. Students are successfully prepared for the soft skills (teamwork, communication, and negotiation) needed in buying & merchandising positions by these courses.

19. Increased incorporation of experiential learning and real-world problem-solving would improve students' industry readiness.
20. You think that a cooperative, industry-wide strategy will greatly enhance buying & merchandising graduates' employment opportunities.

Number of Respondents and Procedure used for Gathering Data:

The respondents were selected on the basis of the educational qualifications and work experiences along with their academic involvement as experts to bridge the gap mainly in the field of merchandising sector of fashion field.

1. Educational Background:

Respondents were chosen on the basis of their academic background, which included level of education i.e. a PhD, post-graduation or graduate in the relevant field/fields.

2. Work Experience:

For the work experience criteria three sets were considered:

- **Academic Experience:** This covers the number of years a participant has worked in academia in the capacity of a mentor, researcher, teacher, or scholar.
- **Non-Academic/Industry Experience:** This encompasses the number of years a participant has worked in the industry in business, industry, or other related fields.
- **Freelance Experience:** This encompasses the number of years a participant has worked in a freelance capacity as a trainer, moderator, visiting faculty/guest lecturer in colleges or corporate institutes.

3. Domain of Specialization:

Respondents were chosen basis the course, stream, or discipline in which they have worked or taught, especially for specialization closer to Retail or Retail-relevant industries was considered.

4. Title or Role Currently Held:

Each respondent's current role or designation was considered, such as subject matter expert (SME), manager, department head (HOD), director, associate professor, assistant professor, and professor.

Experts were then shortlisted using each of the above-mentioned criteria and unstructured interviews were carried out with each individual over FaceTime, Microsoft Teams, WhatsApp, and phone calls. Feedback was recorded during these interactions and was collated to understand curriculum gaps and areas that needed work.

Convenience sampling was the method employed for purpose of the research. This non-probability sampling technique selects participants who are willing to participate, as opposed to employing random selection or systematic procedures. This method however leaves scope

for bias as the sample might not accurately reflect the characteristics of the general population and can lean towards the personal experiences of the respondent.

During the interaction a few of the gaps were noticed which will be integrated through the study conducted by the researchers. The gaps are as follows.

Retail Mathematics & Forecasting Strategies: Many students were unable to calculate even basic formulae such as Sell-thru, ROS, markup or markdowns, or Excel formulas which were taught in the classroom syllabus

Simulation & Analytical Thinking: Tasks like assortment planning, option planning, past sales analysis or logic used behind channel allocation strategy and techniques are rarely taught in classrooms.

Software and Application Familiarity: Very few graduates have worked on software such as ERP, SAP, BI, Data Analytics software that are used in almost all organisations. Moreover, every company has their internal software that freshers have to learn as a part of the job.

Negotiation & Vendor Management: Understanding terms and their practical application in industry such as MOQ, Fitment sample, RTV's, Incoterms etc are challenging at the best for freshers.

Communication & Reporting: Managing complex Pivot tables, building inventory dashboards, generating reports or justifying buy plans is difficult for students who do not have a holistic understanding of the reports.

E-commerce and omni-commerce knowledge: While most students are experts at operating and managing their digital footprint, very few know what goes on behind the scenes in the e-commerce space, which is a crucial part of their job roles today.

Findings and Outcomes

In order to make students industry-ready in the fast-paced world of retail requires a shift from traditional learning modules to practical approach. In the competitive market, today's freshers are expected to perform from day zero and are expected to have all the necessary tools of the trade that employers require. In such cases, a persistent gap is visible between classroom teaching and the veracities in the industry—a divide that often leads to disenchanted graduates and unhappy employers who in turn invest precious time and resources into training and retraining their teams. Bridging this gap requires educational institutes to reevaluate how these core theory subjects are taught in class, infusing it with real-world context and direct industry input.

This research delves into such strategies that can bridge the gap between theory and industry demands in the course curriculum. By integrating on-campus simulation labs, inviting industry professionals for sessions, and embedding weekly/monthly/semester-long, industry-linked projects, institutes can transform thinkers to doers. Such methods not only help students understand essential practical aspects like assortment planning, inventory management, vendor negotiation etc but also enable students to actively participate in their knowledge journeys through live projects, capstone challenges, and non-design portfolio-driven assessments. Future-ready colleges such as FIT, New York already provide proven models, emphasizing the

importance of practical training, internships, and ties with retail brands to maintain curriculum relevance.

However, any change, be it big or small, faces challenges. In this scenario, upskilling the faculty for new roles, investing in industry-accepted software, and overcoming institutional resistance can present challenges, especially for smaller institutes. Yet, the benefits of making this transition are numerous: industry-ready graduates, increased industry-academia collaboration and smoother transitions from campus to corporate life to name a relevant few. By developing open communication channels, leveraging industry partnerships, and implementing alternate teaching practices, academic institutions can make significant advancements ensuring their students are not just job-ready, but future-ready.

To achieve such collaborative connections few of the recommendations from the academia perspectives are as follows.

1. Set Up Real-time Simulation Labs

As discussed earlier instead of using a purely theoretical approach, students can work with real or simulated data. For instance, they could practice Open-To-Buy planning or inventory management with Excel, Power BI, Macros or demo versions of merchandising software available in the classroom. This lowers the “first day shock” in their jobs where students are caught off-guard on what is expected from them.

2. Co-Design Classroom Learning with Industry Experts

Invite retail professionals such as planners, merchandisers, buyers, and relevant software experts to teach part of the modules, judge projects, and/or give guest lectures. Immersion workshops such as week-long industry projects or mini-internships, are incredibly effective at grounding students in reality

3. Industry-Integrated Projects and Challenges

Rather than just testing theory in the form of assignments or presentations, colleges can create ‘Capstone Project’--semester-long projects such as mentioned below for students to complete through the course.

- Assortment Planning for a Fashion Brand
- Building an Open to Buy (OTB) plan and option planning
- Retail store launch simulations
- Inventory optimization projects

Other aspects/ areas to work on that can foster collaborative, outcome-oriented learning

- Vendor negotiations
- Industry case study analysis
- Competitions or hackathons

4. Redesign Courses "Backwards"

Backwards design starts by identifying the job of an entry-level merchandiser/buyer—work with data, negotiate with suppliers, manage inventory levels, analyze sales trends past sales analysis etc. Using this knowledge we then build courses that teach skills in practical settings, tying theory to application at every step

5. Use Portfolio Assessments

Instead of just paper-based exams, students could submit portfolios as is in practical subjects—assortment plans, buy calendars, negotiation drafts, stock transfer orders—that reflect real work outputs. These reports/data pieces are also valuable for job placements and can be shown to the prospective interviewers as well.

6. Introduce an online/e-commerce course with practical application

Build an online only course that blends theory with real-world practice, guiding students through hands-on projects such as building web stores, managing digital platforms, developing digital marketing campaigns and analysing customer data via e-commerce and omni-commerce models.

7. Education initiatives by other global institutions

Fashion Institute of Technology (FIT), New York and London College of Fashion, London are already utilizing a mix of practical training, real-time exercises, internships, and industry partnerships with brands to keep learning relevant for today's times and students. FIT has semester modules where students are expected to use retail management software and supply chain simulations for classroom assignments and practical work.

Such industry- academia collaborations and connections may bring a significant change in the way the graduates are taught in higher education institute concerning fashion education. This collaborative exchange may bring a panoramic skillset and industry preparedness amongst the graduates in the following manner.

Graduates are Field-Ready: They hit the ground running, reducing employer training/retraining time.

Stronger Industry-Academia Ties: Colleges are up-to-date, and companies appreciate the fresh talent pool.

Better Student Job Satisfaction: Students are more confident and motivated when they see how classroom teaching can connect them to “real life” application

Improved Placement and Retention scenario: Practical preparation ensures a smoother transition for students from college to corporate and fuels lower attrition rate.

Cost: Buying software licenses for industry specific programs and applications and setting up labs is a cost that has to be borne.

Institutional Resistance: Some academics worry about “watering down” the curriculum.

Scalability for small institutes: Smaller colleges may find it difficult to implement a new course curriculum in one go.

Overcoming these challenges will require open communication, external support from other institutes, government, and gradual phasing-in of new approaches. It will take open communication, outside assistance from other organizations and the government, and a phased introduction of new strategies to overcome these obstacles.

Conclusion

The global fashion buying and merchandising industry is undergoing changes at a dramatic pace. Globalization, digital disruption, and changing consumer behaviour is driving Indian fashion industry's rapid evolution as well. This has made the shortcomings of a purely theoretical, classroom-based educational model for selective subjects abundantly clear. All too frequently, students arrive at their first jobs feeling anxious, overburdened and unprepared for the intricate realities of retail agnostic to the department they are working in. Moreover, not having enough practical exposure in the different areas of the retail industry and the work carried out in these departments may lead to students choosing the wrong stream or area of work. This could lead to a mismatch between skillset and job requirement. A negative impact of these aspects will lead to new graduates or fresh hires being unqualified for the area of work or them leading to disinterest or demotivation further pushing them to look for other opportunities within or outside the organisation. This might cause higher rates of attrition. On a parallel, the employer, manager or HOD will be dissatisfied with the progress or work of the employee deeming him unfit and may reduce his workload or move him/her to lesser accountability or menial tasks. It could also end in the employee being given a poor appraisal review thus hampering his progression within the organisation and career path all because of misalignment of skill and role. It's an all too familiar tale: young talent with strong academic credentials who struggle and lack confidence when asked to apply their knowledge to urgent, everyday business problems.

The need for change is apparent as we look to the future. Academic institutions can no longer simply teach theoretical frameworks. Students require an education that bridges the gap between theory and practice and the development of a new methodology that incorporates practical experience. Instead of merely solving theoretical case studies, a theory-practical blend where students will manage stock and assortment for a fictitious retail launch, negotiate with simulated vendors, or create an Open-To-Buy plan using real software. Furthermore, to provide a realistic style industry and subject matter experts could be invited to mentor students through courses, workshops and project evaluations. In addition to developing technical skills, this exposure cultivates confidence and adaptability, that theoretical teaching cannot impart on their own. Another advantage of this approach is that students can graduate from college with a practical portfolio similar to a design portfolio; where they have tangible proof of their capabilities in the form of project and report, which could be discussed for job interviews and PPO's. Before entering the high-stakes world of business, the practical feel of classroom work helps them conduct a SWOT analysis and understand their areas of expertise and interest. It also provides a safe environment for them to learn, grow, and make mistakes.

This progression involves investing in the latest technology, upskilling faculty and adjacent staff, developing and maintaining relationships with industry experts, and remaining receptive to frequent revision and iterations to the course curriculum. Colleges can remain relevant through industry linkages with businesses, alumni, and guest faculty. Improved student performances and placement numbers, increased employer recognition and appreciation, and a student satisfaction and positive feedback for the institutewould be achieved from the same.

This cooperative strategy is a win-win even for employers as well. They hire graduates who are "work ready," requiring little orientation and capable of making a significant contribution from the beginning. These hires possess the creative and analytical mindset that the rapidly changing fashion industry requires, in addition to being flexible, inquisitive, and knowledgeable about the terminology and procedures.

Such changes do not happen overnight. Teaching faculty must be encouraged to adopt new teaching methods and update themselves on the latest technologies and software. Monetary constraints may be observed when establishing simulation labs or industry-standard software. At first, some scholars might be concerned that academic rigor is sacrificed for practical experience. But in actuality, theory and practice go hand-in-hand when applied learning is thoughtfully planned; it makes academic concepts come to life and stick. Such practices have been successfully implemented in international colleges/organizations where theory and practice cohabitate. By retrofitting these examples to our curriculum, we can make graduates future-ready to work in local and international markets and enable students to find meaning and enjoyment in their education.

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