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# DIGITAL MARKET & AI: RECENT TRENDS & IT'S IMPACT



A Student Initiative Towards Research

**ANUSHODHAN**

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# **DIGITAL MARKET & AI : RECENT TRENDS & IT'S IMPACT**

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## ***Digital Market & AI : Recent Trends & It's Impact***

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## **Message by President, RSET and Chairman, Governing Council**



**Shri. Ashokji Saraf**

I am pleased to know that our institution has organised **Anushodhan 2025 - A RESEARCH-ORIENTED ACADEMIC INITIATIVE** that reflects our continued commitment to promoting a culture of research, innovation, and scholarly excellence.

In the present knowledge-driven era, research plays a pivotal role in shaping academic growth and societal progress. *Anushodhan 2025* provides a meaningful platform for faculty members, researchers, and students to engage with contemporary issues, exchange ideas, and contribute original perspectives across diverse disciplines.

Such initiatives encourage analytical thinking, academic rigor, and collaborative learning. They also motivate young researchers to move beyond conventional learning and actively participate in knowledge creation. By fostering interdisciplinary dialogue and research-based learning, *Anushodhan* strengthens the foundation of higher education and innovation within the institution.

I appreciate the sincere efforts of the Editorial Team, faculty coordinators, and student contributors whose dedication has made this initiative possible. I am confident that *Anushodhan 2025* will serve as an enriching academic experience for all participants and contribute positively to the research ecosystem.

I sincerely wish GSCC continued success and growth in the direction for the long term.

My best wishes to the team.

## Massage by I/C Principal



### Dr. Seema Agarwal

(*Ghanshyamdas Saraf College of Arts & Commerce*)

It gives me great pleasure to note that our institution institution **successfully organized Anushodhan 2025**, a research-oriented academic initiative aimed at promoting scholarly inquiry, critical thinking, and intellectual engagement among faculty members and students.

In the contemporary academic environment, research is an essential component of quality higher education. **Anushodhan 2025 provided a valuable platform** for researchers and learners to explore emerging trends, present innovative ideas, and engage in meaningful academic discussions. Such initiatives **encouraged a research-driven mindset** and strengthened the integration of teaching, learning, and research.

This initiative **reflected the institution's strong commitment** to nurturing creativity, analytical skills, and interdisciplinary collaboration. By encouraging active participation in research activities, **Anushodhan empowered students** to move beyond classroom learning and contribute meaningfully to knowledge creation and academic excellence.

I sincerely **appreciated the dedicated efforts** of the organizing committee, faculty coordinators, and student volunteers who worked diligently to make this initiative a success. I am confident that **Anushodhan 2025 proved to be an enriching and rewarding academic experience** for all participants.

I extend my best wishes to the entire team for the **successful conduct of this initiative** and for their continued efforts in strengthening the research culture of the institution.

## **DIGITAL MARKET & AI : RECENT TRENDS & IT'S IMPACT**

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## Index

| Sr.<br>No. | Title & Authors   | Page<br>no. |
|------------|---|-------------|
| 1.         | A Study on Ethical Implications of AI in Consumer Data Collection and Marketing<br><b>Asst. Prof. Shilpa Sharma &amp; Parth Dangiya</b>   | 1           |
| 2.         | A Study on the Integration of AI In Digital Marketing and its Impact on Consumer Behavior<br><b>Dr. Anju Bohra &amp; Ms. Thanushree Vittal Bangera</b>                                    | 14          |
| 3.         | Understanding Genz: A Sentiment Analysis through Social Listening Tools<br><b>Prof. Prajna Shetty &amp; Navika Luthra</b>   | 26          |
| 4.         | Assessing the Role of User Trust and Interface Simplicity in Fintech Usage on E-Commerce Platforms<br><b>Asst. Prof. Ramson Menezes &amp; Miss Ankitha Shetty</b>                         | 38          |
| 5.         | The Influence of Surrogate Advertising on Consumers: Traditional Practices, AI-Driven Social Media Trends, and Ethical Concerns<br><b>Dr. Rupa Vishal Shah &amp; Ms. Pratima Upadhyay</b> | 44          |
| 6.         | Constitutional Validity of Artificial Intelligence<br><b>Prof. Namrata Pathak &amp; Gaur Akash Vijay Kumar</b>  | 50          |
| 7.         | A Study on the Role of Artificial Intelligence (AI) in the Mutual Fund Business<br><b>Prof. Anita Agarwal &amp; Karan Vyas</b>  | 59          |
| 8          | The Impact of Artificial Intelligence on Consumer Buying Behaviour in Digital Marketing<br><b>Prof. Mehrab Khan &amp; Bhoomi Trivedi</b>  | 68          |
| 9          | The Rise of Sentient AI in Marketing: Exploring the Potential of Emotion-Based Strategies<br><b>Dr. Megha Krishna Khedekar &amp; Prem Mali</b>  | 73          |
| 10         | When Marketing Thinks and Feels: The Rise of Sentient AI and Emotion Based Marketing<br><b>Prof. Yogita Naik Khatti &amp; Ms. Resham Bhattarai</b>  | 86          |
| 11         | Study on Ethical Concerns in AI-Driven Digital Marketing: A Focus on Data Privacy, Transparency, and the Skills Gap<br><b>Sangeeta Sahoo &amp; Kirti Mishra</b>                           | 97          |
| 12         | AI-Driven Mock Interviews & Group Discussions: Navigating Gen Z's Professional Development Landscape<br><b>Dr. Mmahek Chhabria &amp; Manas Mehta</b>                                      | 111         |
| 13         | The Synergy of AI and Digital Marketing: Emerging Trends and Future Implications<br><b>Prof. Seema Hanchate &amp; Ms. Parvati Dhone</b>   | 130         |
| 14         | Learners in The Loop: Exploring the Shift from Teacher-Led to AI-Personalized Education and its Impact on Student Experience<br><b>Prof. Niyati Kalyanpur &amp; Mr. Bhavesh Biru</b>      | 142         |
| 15         | AI in Digital Marketing - Jobs in Flux<br><b>Prof. Yogita Mahimkar &amp; Ms. Kasak Jain</b>   | 150         |

|    |  |     |
|----|--|-----|
| 16 | Role of AI in Chemistry<br><b>Dr. Hina Shaikh &amp; Ms. Muskan Mukri</b>   | 155 |
| 17 | The Dark Side of AI-Driven Learning: Ethical Dilemmas in Student Use of Chatgpt for Coursework<br><b>Ms. Nikita Mascarenhas &amp; Ms. Janvi Gotad</b>  | 159 |
| 18 | AI Tools in the Hands of Gen Z: Opportunities and Ethical Pitfalls in Learning Digital Marketing<br><b>Mr. Rahul Sanjay Khadtare &amp; Ms. Nikita Mascarenhas</b>  | 164 |
| 19 | AI Knows Me Too Well: Gen Z's Comfort Level with Hyper-Personalized Ads on E-Commerce Platforms<br><b>Mr. Ameey Chavan &amp; Ms. Nikita Mascarenhas</b>  | 171 |
| 20 | Digital Marketing and AI: Recent Trends and it's Impacts - A Study on Social Media and AI Integration on Gen Z From Mumbai Region<br><b>Mrs. Priyanka Patil &amp; Ms. Bushra Parvez Shaikh</b>                                 | 175 |
| 21 | Cancel Culture and Brand Survival: Can AI Help Brands Navigate Digital Backlash?<br><b>Prof. Smitin Belchada &amp; Ms. Tiya Kar</b>  | 182 |
| 22 | A Study on AI in Education: A Boon or Threat to Traditional Teaching Jobs in Mumbai<br><b>Ms. Ranjeeta Rahul Prajapati &amp; Ms. Pratiksha Rajendra Yeram</b>  | 193 |
| 23 | A Study on How AI-Powered Recommendations Shape Consumer Decisions on Social Media Platforms in Thane City<br><b>Ms. Gauri Pandey &amp; Mr. Ankit H. Gupta</b>   | 201 |
| 24 | Impact of Artificial Intelligence in Education Industry of India<br><b>Akshay Manve &amp; Kashish Rathod</b>   | 208 |
| 25 | AI in Indian E-Commerce: Advancing Personalization, Automation, and Operational Efficiency<br><b>Mrs. Nisha Mahajan &amp; Ms. Vrundali Bala</b>  | 213 |
| 26 | The Role of Artificial Intelligence in Social Media Algorithms and its Influence on Consumer Behaviour among College Students of M.L. Dahanukar College of Commerce<br><b>Ms. Neha Gopinath Ajrekar &amp; Mr. Rahul Pandey</b> | 218 |
| 27 | How AI Adoption Reshapes Porter's Five Forces in Competitive Markets: An Empirical Study<br><b>Anoushka Mirgnani &amp; Carissa Lemos</b>   | 228 |
| 28 | Analysis on Use and Impact of AI on Student Learning, Engagement and Performance<br><b>Mrs. Pooja Gupta &amp; Riddhi Poojari</b>   | 234 |
| 29 | Impact of AI-Based Resume Screening on College Students for Job Search Strategies<br><b>Dr. Maya Hande &amp; Ekara Qureshi</b>   | 240 |
| 30 | A Study on AI Integration in Guerrilla Marketing: Transforming Street Strategies into Digital Disruptions<br><b>Dr. Alpa Upadhyay &amp; Ms. Sanika Pai</b>   | 246 |
| 31 | Impact of Digital Marketing Campaigns on Public Vs. Private Pension Scheme Enrollment<br><b>Mr. Pankaj Bhaiyalal Maurya &amp; Ansari Muskaan Mumtaz</b>  | 252 |

|    |   |     |
|----|---|-----|
| 32 | Social Media: Emerging Trends and their Multidimensional Effect<br><b>Anusha M.</b>   | 263 |
| 33 | AI Based Vehicle Counting and Detection Software for Traffic Management<br><b>Sandeepkumar J. Vishwakarma &amp; Vishal Gupta</b>  | 269 |
| 34 | Artificial Intelligence Vs. Human Intuition: Shaping Consumer Behavior in Traditional Markets<br><b>Prof. Sheetal Hiren Vora &amp; Manthan Ravindra Gawande</b>   | 275 |
| 35 | Everyday Artificial Intelligence: Analyzing the Role, Perceptions, and Ethical Use of AI Tools in Academic Practices of Mumbai's Undergraduate Students<br><b>Prof. Ashwin Kataria &amp; Piyush Joshi</b> | 280 |
| 36 | Role of Value-Added Courses in Employability Skill Development Leading to Skill Improvement in the Vuca World<br><b>Dr. Hema Mehta &amp; Mr. Daksh Jain</b>   | 287 |
| 37 | AI in Pricing and Product Recommendations: Transforming Traditional Market Dynamics<br><b>Prof. Sneha Shah &amp; Aditya Soni</b>  | 294 |
| 38 | Impact of Leadership Styles on Organizational Effectiveness and Efficiency: An Empirical Study<br><b>Prof. Shriya Pandit &amp; Mr. Sahil Singh</b>  | 300 |
| 39 | IRIS: Leveraging AI and IoT for Real-Time Crowd Monitoring in Mumbai Suburban Trains<br><b>Prof. Mansi Dangarwala &amp; Insha Shaikh</b>  | 313 |
| 40 | The Impact of Artificial Intelligence on Social Media in Mumbai<br><b>Asst. Prof. Sonali Khade &amp; Ms. Huda Tajir</b>   | 324 |

## A STUDY ON ETHICAL IMPLICATIONS OF AI IN CONSUMER DATA COLLECTION AND MARKETING

Mentor

**Asst. Prof. Shilpa Sharma**

Mentee

**Parth Dangiya**

*Ghanshyamdas Saraf College of Arts & Commerce*

### **Abstract:**

*India is an agricultural country. Agriculture is playing very essential role in creating employment in India. Industrial work has also good share in National Income of India. Nowadays, the share of Industry is more than the share of Agriculture in the economy of our country. Business and the profession are two sides of the commercial world. Charted accountants, lawyers, Doctors class holders are some examples of professions and Sole Proprietors, partnership firms and companies are examples of businesses. The service Sectors business is also running successfully in India. TATA, Reliance, Infosys, Wipro, HCL groups HDFC Bank, ICICI Bank etc., and the latest origins of Unicorns like e-retailer Flipkart, mobile wallet company Paytm, hotel aggregator OYO rooms, ride sharer Ola cabs, and food deliverers Swiggy are good examples of successful entrepreneurship through business and Services in India. An idea which decides the basis of your business and guidelines for business is called Start-Up. Start- ups are producing commodities for the purpose of Sale and rendering services in the market with some percentage of profit. For start-ups, they need various things like business ideas, business plans, secure funding, i.e. Capital, coordination with the right people, legal requirements, business location. Labour force, Marketing Strategies and Customer idea. From all these factors, all are important, but one of the most important elements is securing funds, i.e. capital. There are various sources of finance available for start -ups in India. Also, on 15 August 2015, the Indian government declared Start-up India activity and on 16 Jan 2016 it was given by finance service Arun Jaitley. This program is giving guidelines for new Start-ups and providing funds for Capital for start-ups. This paper covers studies about start -ups, finance, Sources of finance, Start-up India Portal. Various sources of finance. Funding available for Start Up has been studied here. From the study it is seen that lots of ways of securing funds are now available for new a startup. Proper capital budgeting and financial planning will increase the success rate of start-ups.*

**Keyboard:** Start-ups, Entrepreneurship, Finance, Financing to Start-Ups, India

## **Introduction:**

In recent years, Artificial Intelligence (AI) has become a transformative force in the field of marketing, enabling companies to analyse massive volumes of consumer data, automate decision-making, and deliver highly personalized content. AI-driven technologies such as machine learning, natural language processing, and predictive analytics allow marketers to track behaviour, predict preferences, and influence purchasing decisions with unprecedented accuracy. While these capabilities offer substantial commercial benefits, they simultaneously raise serious ethical questions related to consumer privacy, informed consent, data security, algorithmic bias, and manipulation.

The widespread use of AI in consumer data collection has led to growing concern among researchers, regulators, and the public about the ethical implications of these practices. Consumers often remain unaware of how their personal information is being gathered, analysed, and monetized. In many cases, data is harvested passively through digital platforms, with limited transparency or consent. Furthermore, algorithms trained on biased or incomplete datasets can lead to discriminatory outcomes, reinforcing existing social inequalities.

As AI systems become more autonomous and integrated into everyday consumer interactions from online shopping and targeted ads to voice assistants and recommendation engines the need for ethical safeguards becomes more urgent. This study aims to explore these ethical challenges by examining the practices, perceptions, and regulatory frameworks surrounding AI-driven marketing. Specifically, the research seeks to understand how organizations can balance innovation with responsibility, protect consumer rights, and build trust in the digital marketplace.

This investigation is particularly relevant in a time when governments and international bodies are beginning to craft legislation to govern AI use. By identifying key ethical concerns and evaluating current practices, this research contributes to the broader discourse on responsible AI, offering insights that can inform policymakers, business leaders, and consumers alike.

## **Literature Review:**

### **1. AI in Marketing: Capabilities and Applications**

Artificial Intelligence has become integral to modern marketing strategies, enabling capabilities such as customer segmentation, real-time personalization, sentiment analysis, and Chabot automation. Kumar et al. (2021) emphasize that AI's ability to process large datasets allows companies to understand customer behavior patterns and improve targeting accuracy. However, this same capability to extract deep consumer insights presents

ethical concerns regarding surveillance, data overreach, and psychological profiling (Zuboff, 2019).

## **2. Consumer Data Privacy and Consent**

The issue of consumer data privacy has been widely discussed in both academic and policy literature. Tadajewski and Brownlie (2008) argue that the commercialization of personal data undermines traditional privacy boundaries. Studies by Martin and Murphy (2017) show that most consumers are unaware of how their data is being used or stored, raising concerns about whether consent is truly informed or meaningful. Regulations such as the General Data Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA) attempt to address these concerns, but their implementation and enforcement remain inconsistent across sectors and geographies.

## **3. Informed Consent and Dark Patterns**

Consent in digital environments has often been criticized as performative rather than substantive. Mathur et al. (2019) found that many websites and apps use “dark patterns”—deceptive interface designs that nudge users into agreeing to data collection. These practices, when paired with AI-driven personalization, blur the line between ethical marketing and manipulation. Such consent mechanisms challenge the principle of autonomy and call for stricter ethical standards in AI design and user interaction.

## **4. Algorithmic Bias and Fairness in Targeting**

AI systems are only as unbiased as the data they are trained on. Noble (2018) warns that algorithms used in consumer profiling may perpetuate racial, gender, or economic biases, unintentionally excluding or misrepresenting certain groups. Eubanks (2017) illustrates this with examples of automated systems in welfare and finance, which disproportionately disadvantage marginalized communities. In marketing, biased AI can result in unfair ad delivery, pricing discrimination, or stereotypical content presentation.

## **5. Ethical Frameworks and Governance**

Numerous organizations and scholars have proposed ethical frameworks for AI development and deployment. Floridi et al. (2018) recommend principles such as beneficence, non-maleficence, autonomy, and justice as foundations for ethical AI. Jobin et al. (2019) reviewed over 80 AI ethics guidelines worldwide and noted a strong consensus on values like transparency, accountability, and fairness. However, the translation of these principles into actionable governance remains a challenge, especially in dynamic environments like digital marketing.

## 6. AI and Consumer Manipulation

Personalized marketing powered by AI can sometimes cross ethical lines by influencing or even manipulating consumer choices. Kaptein and Eckles (2012) describe “persuasive technology” as both a powerful marketing tool and a potential ethical hazard. When consumers are unaware of how and why they are being targeted, the line between persuasion and manipulation becomes blurred. Research by Matz and Netzer (2017) shows that AI systems can predict personality traits and use them to tailor content in ways that may exploit psychological vulnerabilities.

## 7. Corporate Social Responsibility and Trust

The ethical deployment of AI in marketing also intersects with corporate social responsibility (CSR). Consumers increasingly expect brands to act responsibly in their use of technology. A study by PwC (2020) found that trust is a critical factor in consumer acceptance of AI applications. Companies that prioritize ethical design, transparency, and respect for consumer rights are more likely to build long-term loyalty and mitigate reputational risks (Martin et al., 2021).

## 8. Cross-Cultural Ethical Variations

Ethical standards and expectations surrounding AI and data privacy vary by culture. Hofstede's (2001) cultural dimensions theory suggests that values like individualism, power distance, and uncertainty avoidance influence how people perceive technology and privacy. For example, consumers in Western countries may demand stronger privacy protections, while those in collectivist cultures might prioritize security or convenience. Therefore, ethical AI deployment in marketing must consider cultural context and local regulatory norms.

### Objective of the Study:

- To examine consumer perceptions associated with AI-based data collection in marketing. of privacy risks
- To identify ethical concerns surrounding AI-based personalization and behavioural targeting in marketing.
- To investigate whether AI compromises consumer autonomy through manipulative or overly personalized marketing tactics.
- To explore the need for global ethical standards for AI applications in marketing and advertising.
- To identify best practices for ethical AI deployment in consumer data analysis and targeting.
- To evaluate the role of corporate social responsibility (CSR) in shaping ethical AI marketing strategies.

## **Research Methodology:**

The study has been done primarily on mixed method study on the basis of Primary data and Secondary data from the information available in books, Journals, published work and reports.

- Research type: Applied and Descriptive Research
- Data base: Primary data and Secondary data

## **Scope of the Study:**

The scope of this research includes an in-depth exploration of the ethical dimensions related to the use of Artificial Intelligence (AI) in collecting consumer data and applying it in marketing practices. This study focuses on:

### **1. Consumer Perspective:**

Understanding consumers' awareness, consent, and perception regarding how AI systems collect and use their personal data.

### **2. Corporate Practices:**

Examining how businesses and marketers employ AI tools in customer profiling, personalization, and targeting, and whether these practices align with ethical standards.

### **3. Data Privacy and Security:**

Assessing how AI impacts data protection, privacy rights, and the potential risks of breaches or unauthorized use.

### **4. Regulatory and Legal Frameworks:**

Evaluating existing regulations and their adequacy in addressing ethical concerns related to AI in marketing.

### **5. Stakeholders:**

The research involves insights from consumers, marketers, data scientists, and policymakers.

## **Significance:**

### **1. Protecting Consumer Rights:**

It highlights the importance of ethical AI usage to safeguard consumers' privacy, autonomy, and trust.

### **2. Raising Awareness:**

The study informs consumers about how their data is being used and the ethical concerns they should be aware of.

### **3. Improving Corporate Accountability:**

It encourages businesses to adopt ethical practices in AI-driven marketing and data handling.

### **4. Informing Policymakers:**

The findings may guide policymakers in designing better legal frameworks and standards for AI in digital marketing.

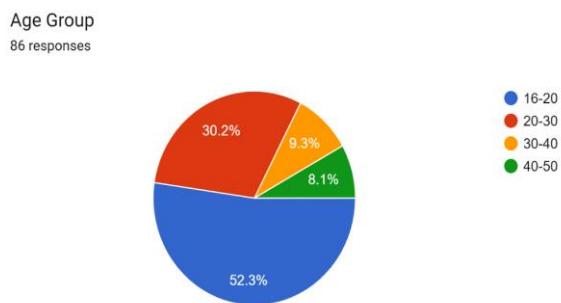
## 5. Promoting Responsible Innovation:

The study supports ethical AI development, ensuring innovation benefits both businesses and society without exploitation or harm.

### Data Analysis and Interpretation:

#### Age Group:

|              |              |
|--------------|--------------|
| <b>16-20</b> | <b>52.3%</b> |
| <b>20-30</b> | <b>30.2%</b> |
| <b>30-40</b> | <b>9.3%</b>  |
| <b>40-50</b> | <b>8.1%</b>  |



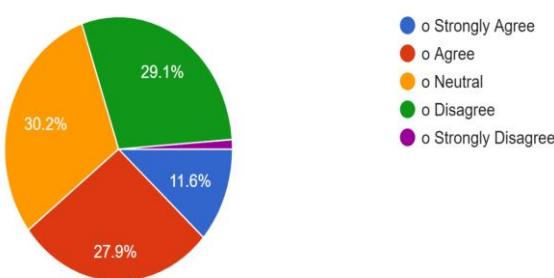
#### AI in marketing challenges:

|                       |              |
|-----------------------|--------------|
| <b>Strongly Agree</b> | <b>23.3%</b> |
| <b>Agree</b>          | <b>48.8%</b> |
| <b>Neutral</b>        | <b>23.3%</b> |

#### Consumer awareness on their data collected and used by AI:

|                       |              |
|-----------------------|--------------|
| <b>Strongly Agree</b> | <b>11.6%</b> |
| <b>Agree</b>          | <b>27.9%</b> |
| <b>Neutral</b>        | <b>30.2%</b> |
| <b>Disagree</b>       | <b>29.1%</b> |

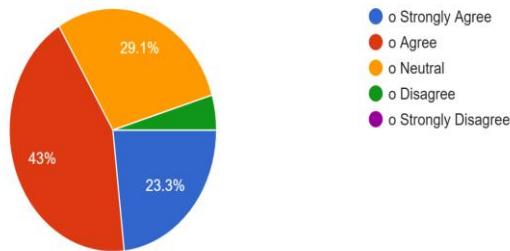
Most consumers are aware of how their data is collected and used by AI.  
86 responses



### Personalized AI marketing not compromise ethical standard:

|                       |              |
|-----------------------|--------------|
| <b>Strongly Agree</b> | <b>23.3%</b> |
| <b>Agree</b>          | <b>43%</b>   |
| <b>Neutral</b>        | <b>29.1%</b> |

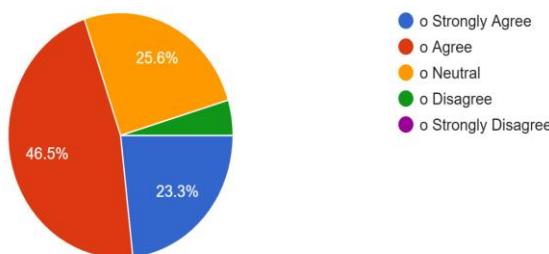
Personalized AI marketing should not compromise ethical standards  
86 responses



### Universal ethical framework necessary for AI-based :

|                       |              |
|-----------------------|--------------|
| <b>Strongly Agree</b> | <b>23.3%</b> |
| <b>Agree</b>          | <b>46.5%</b> |
| <b>Neutral</b>        | <b>25.6%</b> |

A universal ethical framework is necessary for AI-based consumer data usage.  
86 responses



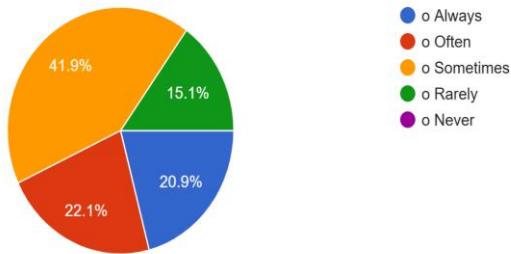
### Company transparency for AI uses in consumer data:

|                       |              |
|-----------------------|--------------|
| <b>Strongly Agree</b> | <b>14%</b>   |
| <b>Agree</b>          | <b>48.8%</b> |
| <b>Neutral</b>        | <b>17.4%</b> |
| <b>Neutral</b>        | <b>18.6%</b> |

### Informed Consent before collecting data through AI:

|                  |              |
|------------------|--------------|
| <b>Always</b>    | <b>20.9%</b> |
| <b>Often</b>     | <b>22.1%</b> |
| <b>Sometimes</b> | <b>41.9%</b> |
| <b>Rarely</b>    | <b>51.1%</b> |

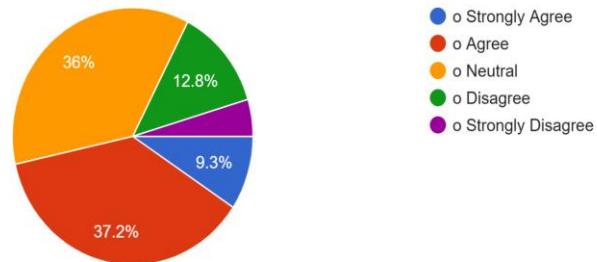
Informed consent is usually obtained before collecting data through AI.  
86 responses



### Privacy policies are easy to understand for the average consumer:

|                       |              |
|-----------------------|--------------|
| <b>Strongly Agree</b> | <b>9.3%</b>  |
| <b>Agree</b>          | <b>37.2%</b> |
| <b>Disagree</b>       | <b>12.8%</b> |
| <b>Neutral</b>        | <b>36%</b>   |

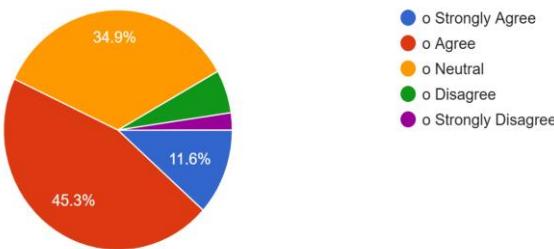
Privacy policies are easy to understand for the average consumer.  
86 responses



### AI marketing can lead biased or discriminatory:

|                       |              |
|-----------------------|--------------|
| <b>Strongly Agree</b> | <b>11.6%</b> |
| <b>Agree</b>          | <b>45.3%</b> |
| <b>Neutral</b>        | <b>34.9%</b> |

AI in marketing can lead to biased or discriminatory targeting.  
86 responses

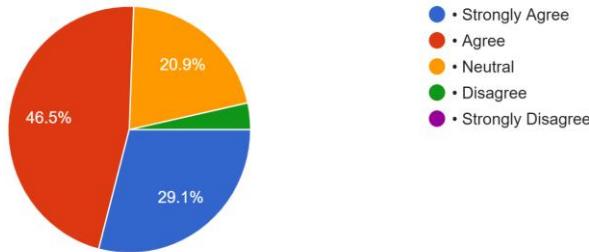


### Marketers should test AI for potential biases.

|                       |              |
|-----------------------|--------------|
| <b>Strongly Agree</b> | <b>18.6%</b> |
| <b>Agree</b>          | <b>54.7%</b> |
| <b>Neutral</b>        | <b>20.9%</b> |

Marketers should actively test AI for potential biases.

86 responses

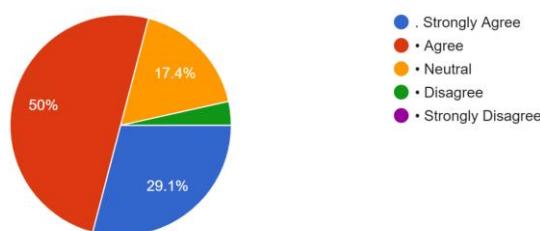


### Ethical responsibilities of companies for Protecting AI collected consumer data

|                       |              |
|-----------------------|--------------|
| <b>Strongly Agree</b> | <b>29.1%</b> |
| <b>Agree</b>          | <b>50%</b>   |
| <b>Neutral</b>        | <b>17.4%</b> |

Companies are ethically responsible for protecting AI-collected consumer data.

86 responses

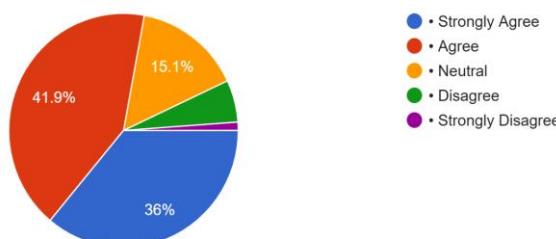


### Government should regulate AI in marketing more strictly:

|                       |              |
|-----------------------|--------------|
| <b>Strongly Agree</b> | <b>36%</b>   |
| <b>Agree</b>          | <b>41.9%</b> |
| <b>Neutral</b>        | <b>15.1%</b> |

Government should regulate AI in marketing more strictly.

86 responses

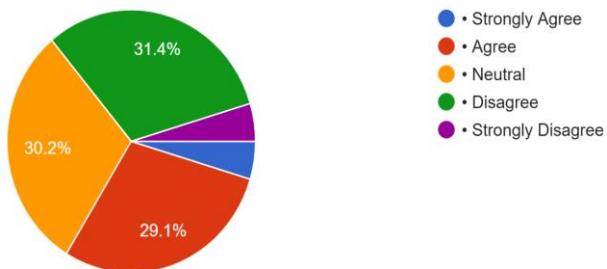


### Existing laws are enough to manage ethical issues in marketing.

|                       |              |
|-----------------------|--------------|
| <b>Strongly Agree</b> | <b>29.1%</b> |
| <b>Agree</b>          | <b>31.4%</b> |
| <b>Neutral</b>        | <b>30.2%</b> |

16. Existing laws are enough to manage ethical issues in AI marketing.

86 responses

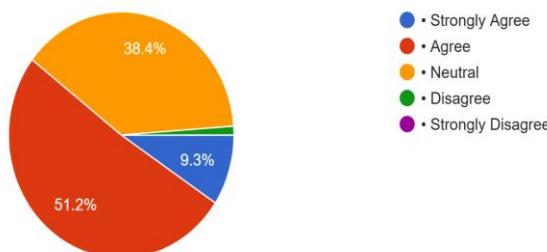


### Ethical concerns related to AI differ across cultures.

|                       |              |
|-----------------------|--------------|
| <b>Strongly Agree</b> | <b>9.3%</b>  |
| <b>Agree</b>          | <b>51.2%</b> |
| <b>Neutral</b>        | <b>38.4%</b> |

Ethical concerns related to AI differ significantly across cultures.

86 responses

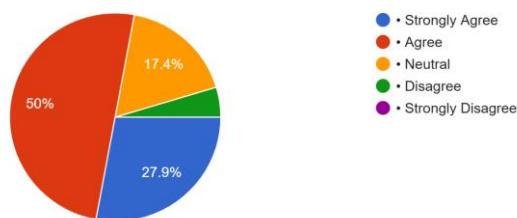


### Global standard for ethical AI should be created

|                       |              |
|-----------------------|--------------|
| <b>Strongly Agree</b> | <b>27.9%</b> |
| <b>Agree</b>          | <b>50%</b>   |
| <b>Neutral</b>        | <b>17.4%</b> |

Global standards for ethical AI marketing should be created.

86 responses

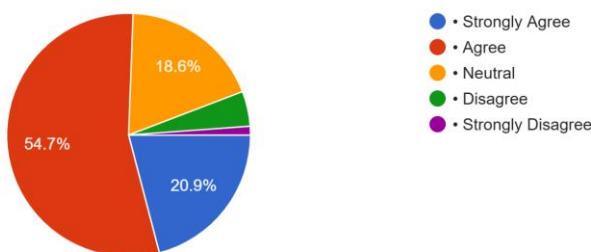


## Companies should align AI marketing with CSR.

|                       |              |
|-----------------------|--------------|
| <b>Strongly Agree</b> | <b>20.9%</b> |
| <b>Agree</b>          | <b>54.7%</b> |
| <b>Neutral</b>        | <b>18.6%</b> |

Companies should align AI marketing practices with corporate social responsibility.

86 responses

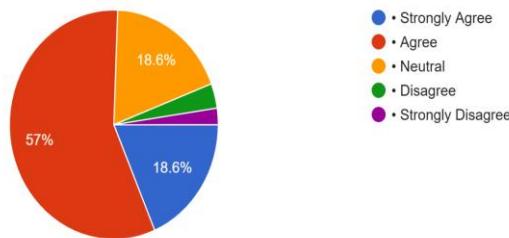


## Ethical guidelines for AI use should be part of corporate policy.

|                       |              |
|-----------------------|--------------|
| <b>Strongly Agree</b> | <b>18.6%</b> |
| <b>Agree</b>          | <b>57%</b>   |
| <b>Neutral</b>        | <b>18.6%</b> |

Ethical guidelines for AI use in marketing should be part of corporate policy.

86 responses



## Limitations:

### • Limited Awareness among Respondents

many consumers may not fully understand how AI operates in marketing or data collection, which could affect the accuracy and depth of their survey responses.

### • Subjectivity in Ethical Judgments

Perceptions of what is "ethical" vary widely among individuals and cultures, making it difficult to draw universal conclusions.

### • Focus on Marketing Context only

the ethical implications explored are specific to marketing and may not apply to AI usage in other domains such as healthcare, education, or finance.

## **Conclusion:**

This study explored the complex ethical landscape surrounding the use of artificial intelligence (AI) in consumer data collection and marketing. The findings highlight that while AI offers significant benefits in terms of personalization, efficiency, and strategic decision-making, it also raises serious ethical concerns regarding consumer privacy, informed consent, algorithmic bias, data security, and potential manipulation of consumer behaviour.

Consumers are often unaware of how their data is collected, processed, and used by AI-powered systems. This lack of transparency undermines trust and violates fundamental principles of data autonomy. The study also reveals a growing concern over the ethical responsibilities of corporations and the inadequacy of existing regulations in addressing these challenges effectively.

Therefore, there is an urgent need for stronger ethical guidelines, improved transparency, enhanced consumer education, and robust regulatory frameworks. Businesses must go beyond compliance and adopt ethical AI practices as part of their core values and corporate social responsibility. Ethical AI in marketing is not just a technological or legal issue it is a social imperative.

By fostering a more ethical and accountable AI environment, stakeholders can ensure that the benefits of innovation are equitably distributed, consumer rights are respected, and long-term trust in digital marketing ecosystems is preserved.

## **Suggestions:**

### **1. Increase Consumer Awareness and Digital Literacy**

Organizations and educational institutions should work together to raise public awareness about how AI collects and uses consumer data, helping individuals make informed decisions and give meaningful consent.

### **2. Develop Ethical AI Design Principles**

Businesses and developers should adopt “ethics by design” practices when building AI systems ensuring privacy, fairness, and accountability are embedded in the design process from the beginning.

### **3. Promote Transparent and Explainable AI**

Marketers should use AI systems that offer explainable decision-making. This transparency helps build consumer trust and allows users to understand how their data is being used.

### **4. Encourage Multistakeholder Collaboration**

Policymakers, technologists, academics, and civil society should work collaboratively to create ethical guidelines and address emerging concerns in AI marketing.

## 5. Culturally Sensitive Ethical Standards

Ethical standards should be adaptable to regional and cultural values. AI ethics is not “one-size-fits-all,” and frameworks must be inclusive of global diversity.

### Recommendations:

- Implement clear, easy-to-understand privacy policies and opt-in consent mechanisms.
- Strengthen legal frameworks for data protection, especially in emerging economies.
- Prioritize fairness, accountability, and explainability in AI model development.
- Ensure data security measures are in place to prevent breaches or misuse.
- Develop open-access resources to educate both businesses and consumers about AI ethics.

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## A STUDY ON THE INTEGRATION OF AI IN DIGITAL MARKETING AND ITS IMPACT ON CONSUMER BEHAVIOR

Mentor

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### **Abstract:**

*A study on the integration of AI digital marketing and its impact on consumer behaviour. This study explores how Artificial Intelligence (AI) is used in digital marketing and how it affects consumer behavior. AI tools like chatbots, personalized ads, and product recommendations help businesses understand customers better and provide more targeted content.*

*Through surveys, the study looks at how aware people are of AI-based ads, how they feel about them, and whether these ads influence their buying decisions. The results show that many consumers like the convenience and relevance of AI ads, but some also worry about privacy and data use.*

*The study concludes that AI has a strong impact on how people react to digital marketing. While it makes ads more effective, companies must also be clear and careful about how they use customer data.*

*The use of Artificial Intelligence (AI) technologies presents marketers with previously unheard-of chances to improve their tactics and attain more successful results as digital channels continue to influence customer interactions. This paper explores how AI is changing digital marketing strategies, such as content optimization, personalized targeting, and the automation of repetitive processes, by conducting an extensive literature review and empirical analysis more effective, companies must also be clear and careful about how they use customer data.*

*The use of Artificial Intelligence (AI) technologies presents marketers with previously unheard-of chances to improve their tactics and attain more successful results as digital channels continue to influence customer interactions. This paper explores how AI is changing digital marketing strategies, such as content optimization, personalized targeting, and the automation of repetitive processes, by conducting an extensive literature review and empirical analysis*

**Keyword:** Artificial Intelligence (AI), Digital Marketing, Consumer Behaviour, Chatbots, Personalized Ads, Product Recommendations, Customer Data, Privacy Concerns, AI-based Advertisements, Buying Decisions

## **Introduction:**

The rapid evolution of digital technology has transformed the way businesses interact with consumers, with Artificial Intelligence (AI) emerging as a pivotal force in this transformation. AI technologies such as chatbots, personalized advertisements, and product recommendation systems are revolutionizing digital marketing strategies by enabling brands to understand consumer preferences and deliver highly targeted content. These innovations not only enhance customer engagement but also streamline marketing operations through automation and predictive analytics.

As businesses increasingly rely on AI-driven tools, understanding consumer responses to these technologies becomes crucial. This study investigates the application of AI in digital marketing and its influence on consumer behavior. Specifically, it examines consumer awareness of AI-based advertisements, their perceptions of personalization, and the degree to which these factors affect purchasing decisions.

Findings from the study reveal that many consumers appreciate the convenience and relevance offered by AI-enabled marketing; however, concerns about data privacy and ethical use of personal information persist. Consequently, while AI significantly enhances the effectiveness of digital marketing campaigns, organizations must adopt transparent and responsible data practices to maintain consumer trust.

By conducting an extensive literature review and empirical analysis, this paper further explores how AI reshapes marketing strategies through content optimization, personalized targeting, and automation of repetitive processes. In doing so, it provides insights into both the opportunities and challenges associated with integrating AI into modern marketing practices.

## **Review of Literature:**

The growing prevalence of AI in digital marketing is reshaping how companies engage with consumers, moving beyond traditional techniques to more personalized, predictive, and interactive approaches. As noted by Kumar et al. (2020), AI allows brands to build stronger relationships with consumers by anticipating their needs and tailoring content accordingly. This proactive approach enhances the customer journey, from product discovery to post-purchase service. AI technologies have also enabled predictive analytics, which uses historical data to forecast future consumer behavior. This capability allows marketers to design targeted campaigns based on likely customer actions, improving return on investment (ROI) and reducing wasted ad spend (Jarek & Mazurek, 2019). Predictive models help businesses not only identify high-value customers but also anticipate churn, enabling timely interventions.

Furthermore, voice search optimization is gaining traction due to the rising use of voice-activated assistants like Alexa, Siri, and Google Assistant. According to Jain et al. (2021), integrating AI in voice search changes how consumers seek information, making it essential for marketers to adapt their SEO strategies for conversational queries. This shift illustrates how AI is not only shaping backend analytics but also influencing the form of content delivery and consumption.

Another critical aspect covered in the literature is the role of AI in emotional and behavioral targeting. Sentiment analysis, powered by AI, is used to detect consumer emotions through text, voice, and even facial expressions. This data allows brands to craft emotionally resonant messages that appeal to specific psychological states (Mikalef et al., 2019). Such strategies can enhance brand affinity, though they also raise ethical questions about emotional manipulation.

In terms of consumer behavior, researchers such as Arora and Sanni (2019) point out that AI has both empowering and limiting effects. On one hand, consumers benefit from convenience and relevance; on the other, the reduction of choice and excessive targeting may lead to decision fatigue and resistance. This duality reflects the nuanced impact AI has on how consumers perceive value, control, and trust in digital interactions.

Lastly, consumer trust in AI systems is emerging as a key theme. Studies indicate that transparency, explainability, and control are central to consumer acceptance of AI in marketing (Hoffman et al., 2021). When users understand how and why AI makes decisions—such as recommending a product—they are more likely to trust and engage with the technology. Conversely, lack of clarity may lead to suspicion and reduced loyalty.

### **Objective of the Study:**

The primary objective of this study is to analyse how Artificial Intelligence (AI) is integrated into digital marketing practices and to assess its influence on consumer behaviour. Specifically, the study aims to:

- Understand consumer awareness and interaction with AI-driven marketing tools such as chatbots, voice assistants, and personalized ads.
- Examine the frequency and effectiveness of AI-powered advertisements across digital platforms.
- Explore consumer attitudes towards AI personalization in ads, including perceptions of privacy and purchase intent.
- Evaluate the extent to which personalized, AI-based marketing influences consumer decisions on platforms like social media, search engines, and shopping websites

## Methodology:

### 1. Sampling

A total of [98] responses were collected through an online questionnaire distributed via Google Forms.

### 2. Data Collection Method

The study mainly used primary data, which was collected through an online survey questionnaire. The survey was created using Google Forms and shared on social media platforms like WhatsApp and get maximum responses.

The primary data was gathered using a self-administered structured questionnaire, developed based on literature review and aligned with the study objectives. The questionnaire consists of both closed-ended and multiple-choice.

### 3. Data Analysis Techniques

Cross-tabulation and comparative analysis to study variations across demographics Bar charts and pie charts to visually represent trends.

## Data Analysis:

### Section A: Demographic Information

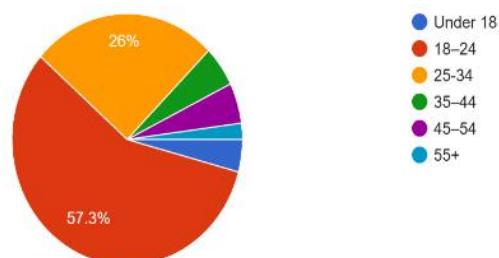
#### 1. Age group

|                 |           |
|-----------------|-----------|
| <b>Under 18</b> | <b>4</b>  |
| <b>18-24</b>    | <b>56</b> |
| <b>25-34</b>    | <b>25</b> |
| <b>35-44</b>    | <b>6</b>  |
| <b>45-54</b>    | <b>5</b>  |
| <b>55+</b>      | <b>2</b>  |
| <b>Total</b>    | <b>98</b> |

The age-wise distribution reveals that a majority of respondents (56) fall within the 18-24 age group, followed by 25 in the 25-34 bracket. This indicates that the survey predominantly captures insights from younger adults, with minimal representation from older age groups.

1. Age Group

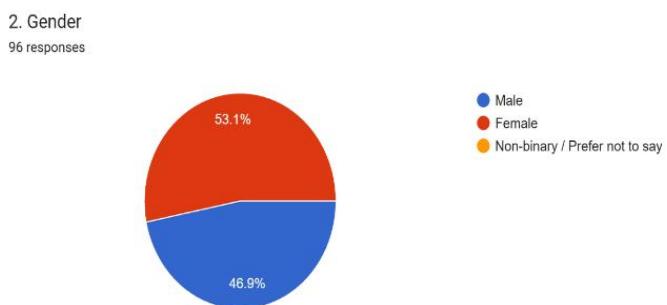
96 responses



## 2. Gender

|               |           |
|---------------|-----------|
| <b>Male</b>   | <b>45</b> |
| <b>Female</b> | <b>53</b> |
| <b>Total</b>  | <b>98</b> |

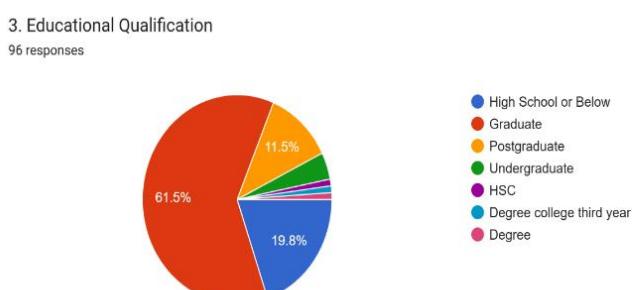
The gender distribution of the respondents shows a slight female majority, with 53 identifying as female and 45 as male. This suggests a relatively balanced participation across genders, with a marginal predominance of female respondents.



## 3. Educational Qualifications

|                                |           |
|--------------------------------|-----------|
| <b>High School &amp; Below</b> | <b>19</b> |
| <b>Graduate</b>                | <b>59</b> |
| <b>Post Graduate</b>           | <b>12</b> |
| <b>Undergraduate</b>           | <b>5</b>  |
| <b>HSC</b>                     | <b>1</b>  |
| <b>Degree college 3rd year</b> | <b>1</b>  |
| <b>Degree</b>                  | <b>1</b>  |
| <b>total</b>                   | <b>98</b> |

The educational qualifications of respondents indicate that the majority are graduates (59), followed by those with high school education or below (19) and postgraduates (12). The presence of undergraduates and others in transitional academic stages reflects a diverse but education-focused sample population.



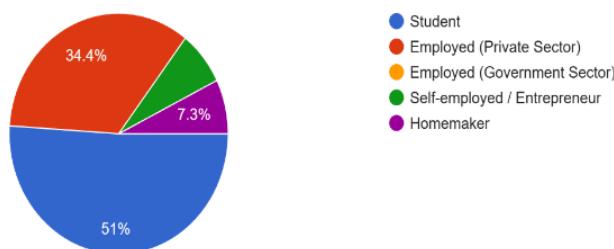
#### 4. Occupation

|                                     |           |
|-------------------------------------|-----------|
| <b>Student</b>                      | <b>50</b> |
| <b>Employed (Private Sector)</b>    | <b>34</b> |
| <b>Employed (Government Sector)</b> | <b>-</b>  |
| <b>Self-employed/ Entrepreneur</b>  | <b>7</b>  |
| <b>Homemaker</b>                    | <b>7</b>  |
| <b>Total</b>                        | <b>98</b> |

The occupational distribution shows that over half of the respondents (50) are students, followed by 34 employed in the private sector. A smaller proportion comprises self-employed individuals and homemakers (7), indicating a predominantly student-centric and early-career respondent base.

4. Occupation

96 responses



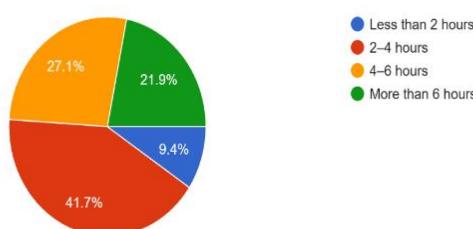
#### 5. Average Daily Internet Usage

|                          |           |
|--------------------------|-----------|
| <b>Less than 2 hours</b> | <b>10</b> |
| <b>2-4 hours</b>         | <b>40</b> |
| <b>4-6 hours</b>         | <b>10</b> |
| <b>More than 6 hours</b> | <b>22</b> |
| <b>Total</b>             | <b>98</b> |

The data on average daily internet usage reveals that the majority of respondents (40) use the internet for 2–4 hours daily, followed by 10 who spend 4–6 hours online. Notably, 22 report usage exceeding 6 hours, indicating a significant level of digital engagement among participants.

5. Average Daily Internet Usage

96 responses



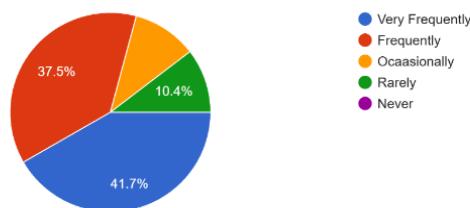
## Section B: Exposure to Digital Advertising

6. How often do you come across digital ads while using online platforms?

|                 |    |
|-----------------|----|
| Very Frequently | 40 |
| Frequently      | 37 |
| Occasionally    | 10 |
| Rarely          | 11 |
| Never           | -  |
| Total           | 98 |

The findings show that a vast majority of respondents encounter digital ads regularly, with 40 reporting very frequent exposure and 37 frequent exposure. This indicates high visibility of digital advertisements across online platforms among the surveyed population.

6. How often do you come across digital ads while using online platforms?  
96 responses

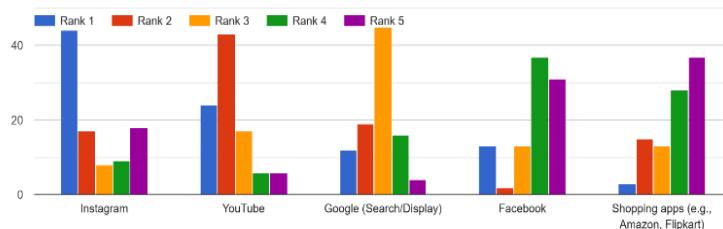


7. Rank the following platforms based on how frequently you notice digital ads on them (1 = Most often, 5 = Least often):

| Platform      | Rank1 | Rank2 | Rank3 | Rank4 | Rank5 |
|---------------|-------|-------|-------|-------|-------|
| Instagram     | 45    | 17    | 8     | 9     | 19    |
| YouTube       | 24    | 44    | 17    | 7     | 6     |
| Google        | 12    | 19    | 47    | 16    | 4     |
| Facebook      | 13    | 3     | 13    | 38    | 31    |
| Shopping apps | 4     | 15    | 13    | 28    | 38    |

The data shows that Instagram is the most frequently noticed platform for digital ads, followed by YouTube. Google ranks highest for mid-level ad visibility, while Facebook and shopping apps are less frequently noticed for digital ads.

7. Please rank the following platforms based on how frequently you notice digital ads on them (1 = Most often, 5 = Least often):



### Section C: Interaction with AI-powered Features

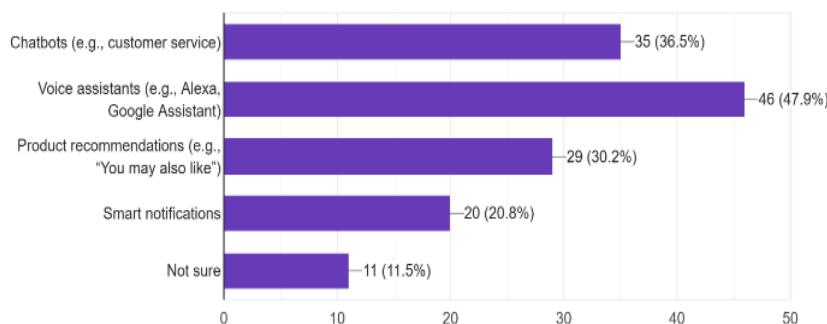
8. Which of the following AI features have you interacted with the most?

|                         |    |
|-------------------------|----|
| Chatbot                 | 35 |
| Voice Assistant         | 35 |
| Product Recommendations | 29 |
| Smart Notification      | 20 |
| Not sure                | 12 |
| Total                   | 98 |

Majority of respondents (35) reported interacting most with voice assistants, followed by chatbots (35) and product recommendations (29). This suggests that voice-based AI features are the most commonly experienced form of AI interaction among users.

8. Which of the following AI features have you interacted with the most?

96 responses

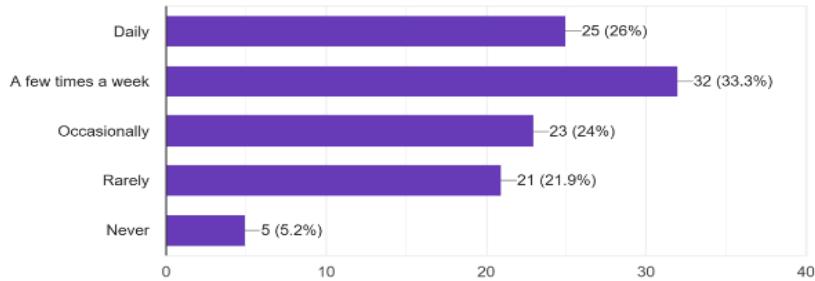


9. How often do you use AI-powered tools like chatbots, voice assistants, or personalized recommendations?

|                    |    |
|--------------------|----|
| Daily              | 25 |
| A few types a week | 32 |
| Occasionally       | 25 |
| Rarely             | 21 |
| Never              | 5  |
| Total              | 98 |

The frequency of AI-powered tool usage shows that 57 of respondents use them daily or a few times a week, indicating regular engagement. Meanwhile, 25 use them occasionally, and only 5 have never interacted with such tools, highlighting the growing integration of AI in everyday digital experiences.

9. How often do you use AI-powered tools like chatbots, voice assistants, or personalized recommendations?  
96 responses

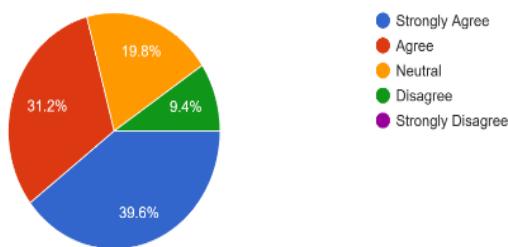


10. AI-driven ads sometimes make me feel like my phone or apps are "listening" to me.

|                   |    |
|-------------------|----|
| Strongly Agree    | 38 |
| Agree             | 30 |
| Neutral           | 20 |
| Disagree          | 10 |
| Strongly Disagree | -  |
| Total             | 98 |

A significant majority of respondents (68) either strongly agree or agree that AI-driven ads make them feel as though their phone or apps are "listening" to them. This suggests a prevalent perception of surveillance or hyper-personalization in digital advertising among users.

10. AI-driven ads sometimes make me feel like my phone or apps are "listening" to me.  
96 responses

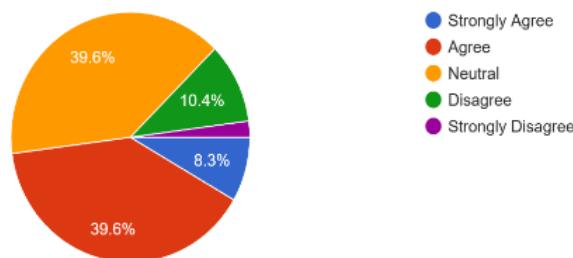


11. Personalized ads improve my browsing experience by reducing irrelevant content.

|                   |    |
|-------------------|----|
| Strongly Agree    | 9  |
| Agree             | 38 |
| Neutral           | 39 |
| Disagree          | 10 |
| Strongly Disagree | 2  |
| Total             | 98 |

The responses show that 47 of participants agree that personalized ads enhance their browsing experience by reducing irrelevant content, while 39 remain neutral. This indicates a generally positive but cautious attitude toward the effectiveness of personalized advertising.

11. Personalized ads improve my browsing experience by reducing irrelevant content.  
96 responses



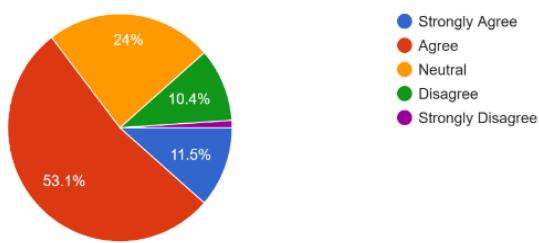
#### Section D: Behavioural Responses to AI-driven Ads

12. AI-driven ads on shopping websites/apps (e.g., Amazon, Flipkart) often encourage me to make a purchase.

|                   |    |
|-------------------|----|
| Strongly Agree    | 11 |
| Agree             | 51 |
| Neutral           | 23 |
| Disagree          | 12 |
| Strongly Disagree | 1  |
| Total             | 98 |

A majority of respondents (62) either strongly agree or agree that AI-driven ads on shopping platforms influence their purchasing decisions. This highlights the persuasive impact of AI-personalized advertising in e-commerce environments.

12. AI-driven ads on shopping websites/apps (e.g., Amazon, Flipkart) often encourage me to make a purchase.  
96 responses

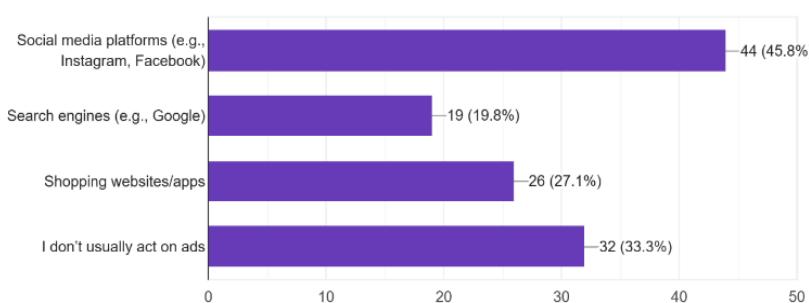


13. After seeing a personalized ad, where are you most likely to take action (e.g., click, search, or buy)?

|                             |    |
|-----------------------------|----|
| Social Media                | 44 |
| Search engine               | 44 |
| Shopping website            | 26 |
| I don't usually act on this | 34 |
| Total                       | 98 |

The data reveals that social media is the most common platform where users take action after viewing personalized ads (45.8%), followed by shopping websites (27.1%) and search engines (19.8%). However, 33.3% of respondents reported not usually acting on such ads, indicating mixed engagement levels.

13. After seeing a personalized ad, where are you most likely to take action (e.g., click, search, or buy)?  
96 responses



## Conclusion and Suggestion:

### i. Conclusion

- AI in digital marketing is really changing the way people shop, especially young people between 18 and 34.
- Many students often use AI tools like Siri, Alexa, and chatbots to get quick help or answers.
- A lot of students say that ads made just for them (like on Instagram or shopping apps) influence what they buy.
- Some think these ads are helpful, but many are also worried about their personal information being shared.
- To make AI ads better and safer, companies should be honest and clear about how they use our data.
- Being open and trustworthy will help people feel more comfortable and stay connected with brands

### ii. Suggestion

- Clearly explain how customer data is collected and used.
- Ensure strong privacy and data protection measures.
- Avoid ads that feel too personal or intrusive.
- Focus more on platforms like social media that get the most response.
- Take regular feedback from customers to improve AI ads

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## UNDERSTANDING GENZ: A SENTIMENT ANALYSIS THROUGH SOCIAL LISTENING TOOLS

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*Mentee*

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### **Abstract:**

*In an era where digital conversations shape brand perception, businesses are increasingly leveraging AI-driven sentiment analysis and social listening tools to decode the emotions, opinions, and engagement patterns of Generation Z. This study investigates how Natural Language Processing (NLP) and machine learning algorithms process social media posts, reviews, and online discussions to assess Gen Z's sentiments toward brands, products, and campaigns. By tracking on the impact of social listening tools such as Brandwatch, Hootsuite Insights, and Talkwalker, the research evaluates the effectiveness, accuracy, and strategic applications of these tools in enhancing brand reputation, managing crises, and tailoring marketing responses to this highly connected demographic.*

**Keywords:** Sentiment Analysis, Social Listening, GenZ, Social Media

### **Introduction:**

Sentiment analysis, also referred to as opinion mining, involves the systematic study of individuals' opinions, sentiments, evaluations, attitudes, and emotions towards various entities such as products, services, organizations, people, issues, events, and topics, along with their associated attributes.

With the exponential growth of social media platforms, both individuals and organizations are increasingly utilizing user-generated content—such as reviews, blog posts, forum discussions, microblogs, tweets, and social media comments—as a key input for decision-making.

In the current digital era, public online forums are rich with reviews and discussions about consumer products, making them a valuable source of insight. Consequently, consumers no longer rely solely on the opinions of friends and family when making purchasing decisions.

Social media listening, sometimes referred to as social media intelligence or social media monitoring, is a potent technology that helps companies to take use of the

abundance of data on these platforms. To work effectively, these tools **rely on underlying technologies** like:

- **Natural Language Processing (NLP):** Helps the tool "read" and understand human language in posts, tweets, or comments.
- **Machine Learning algorithms:** Learn patterns from large datasets to classify sentiment (positive, negative, neutral), detect emerging topics, or predict trends.

This paper examines the ways in which social media listening can assist companies in comprehending client demands, spotting new trends, investigating purchasing intents, and identifying obstacles. Social media listening enables businesses to understand how users' needs and preferences evolve over time. Social listening can help brands of all sizes. It assesses your brand's position in the market in addition to helping you identify trends and learn what consumers actually think. For instance, Zomato and Swiggy, two of the biggest meal delivery services, keep an eye on social media to learn about consumer opinions and modify their marketing tactics accordingly.

### **Research Methodology:**

#### **Statement of the Problem:**

In the digital era, where consumers actively engage with brands through social media platforms, understanding public sentiment has become crucial for shaping brand image, improving customer service, and developing targeted marketing strategies. Sentiment analysis and social listening tools powered by artificial intelligence have transformed the way brands interpret consumer emotions, opinions, and expectations. However, while brands increasingly invest in these tools, there remains a gap in understanding how effectively these technologies capture and reflect student perceptions, particularly among Gen Z users. Questions also arise regarding trust, privacy concerns, and whether students actually notice or value brand responses driven by such tools. This research aims to explore how students engage with sentiment-driven brand communication, their awareness and attitude towards social listening, and the implications for brand-student relationships in a digital environment.

#### **Objectives of the Study:**

1. To assess the level of awareness among students about sentiment analysis and social listening.
2. To examine student perceptions of brand responses based on online feedback.
3. To analyze the effectiveness of social listening in improving brand-student engagement.
4. To identify concerns related to privacy or authenticity in AI-driven brand communication.

### **Scope of the Study :**

- Focuses specifically on digital platforms like Instagram, YouTube, Twitter (X), and WhatsApp.
- Limited to student respondents aged 18–25.
- Examines sentiment analysis and social listening from a consumer/user point of view, not a technical or developer perspective.

### **Significance of Study:**

In the ever-changing world of digital marketing, it is paramount to understand consumer sentiment in order to build brand loyalty and drive an increase in success. Tools like sentiment analysis and social listening provide a deep insight into consumer behaviour and preferences.

This study shows how, by using these tools, businesses can turn real-time data into valuable feedback. The study also shows the impact of these tools and how they can help brands.

### **Research Design:**

The study adopts a descriptive research design using a quantitative approach to understand student awareness, perception, and responses related to sentiment analysis and social listening by brands.

### **Hypotheses:**

- H1: There is a significant relationship between student awareness of sentiment analysis and their trust in brand communication.
- H2: Brands that actively engage in social listening are perceived more positively by students.
- H3: Students who frequently notice brand responses are more likely to engage with those brands online.
- H4: Privacy concerns negatively influence student support for AI-driven sentiment analysis.

### **Sample Design:**

- Population- Undergraduate and postgraduate students from diverse academic backgrounds.
- Sampling Method- Stratified random sampling to ensure representation across disciplines.
- Sample size- 160

### **Data Collection Method:**

A structured questionnaire comprising mostly closed-ended questions with a few open-ended items, distributed via Google Forms.

### **Data Analysis Techniques:**

- Descriptive statistics (frequencies, percentages, means).
- Charts or graphs to visualize key trends and sentiment toward brand practices.

### **Limitations of the Study:**

- Limited sample size, hence the results may be subject to bias.
- The scope is limited to students and may not generalize to other age groups or professionals.
- AI tools used by brands are not examined directly—perceptions are studied instead.

### **Literature Review:**

#### **1. Sprout Social (2023)**

Sprout Social's report highlights that 41% of Gen Z uses social media platforms as their primary search tool, surpassing traditional search engines. This marks a shift in how younger audiences interact with brands and seek information, indicating that sentiment analysis must be tailored for these platforms.

#### **2. Amra & Elma (2023)**

Amra and Elma observe that Gen Z is heavily influenced by user-generated content, preferring authentic peer voices over brand-led marketing. Their research underlines how sentiment tracking must capture UGC-driven sentiment and tone.

#### **3. Meta for Business (2023)**

A Meta research update emphasizes that Gen Z values real-time, personalized engagement with brands—over 25% expect direct communication through comments and messaging. Social listening tools must evolve to capture these live interactions.

#### **4. Zen Agency (2025)**

Zen Agency notes that immersive tools like AR filters, live sessions, and shortform storytelling—when integrated with social listening insights—improve Gen Z engagement and sentiment.

#### **5. Emplifi (2024)**

Emplifi found that over half of Gen Z and millennials made purchases directly via social media in recent months, indicating a direct link between social sentiment and purchase intent.

#### **6. Infegy (2024)**

Infegy's whitepaper shows that Gen Z actively discusses social causes and brand ethics online. Sentiment analysis must adapt to detect nuanced tones related to values and authenticity.

#### **7. Cambria et al. (2023)**

A recent update by Cambria and colleagues discusses explainable AI frameworks that help make sentiment analysis more transparent, essential for younger, privacy-conscious users.

## 8. Ahmed et al. (2025)

Their study introduces an e-commerce sentiment analysis system with nearly 90% accuracy, emphasizing the role of domain-specific AI training for marketing intelligence.

## 9. Zhang et al. (2024)

This paper demonstrates how collaborative AI (GPT + Gemini) can process multimodal sentiment data, including images, videos, and audio, expanding the boundaries of social listening.

## 10. Reddit Community Discussion (2024)

Practitioners highlight in real-life A/B tests that sentiment tools often fail with sarcasm, humor, and cultural slang, signaling the need for hybrid human-AI interpretation.

### Social Listening Tools:

These are used to track Gen Z and young millennials and to learn about recent trends, brand perception, and product likeability.

1. **Brandwatch:** A leader in Social Listening, Brandwatch leverages rich data from social media sites like Instagram, Twitter, Reddit, and TikTok to gain a deeper understanding of its users. Additionally, it features a sophisticated AI tool called Iris that automatically analyses social media data to uncover trends and insights.
2. **Talkwalker:** It is a listening tool that helps companies learn what their customers are saying on the internet. 150 million webpages worldwide and 30 social networks are covered by this user-friendly solution. It helps you keep up with all the essential conversations by combining powerful search options with advanced AI.
3. **Sprinklr:** It is a strong, all-inclusive customer experience platform that encompasses all digital client interactions. Numerous big businesses use this wildly popular platform for marketing, advertising, research, and other purposes.
4. **Meltwater:** Meltwater tracks sentiment, trends, brand mentions, and share of voice on blogs, podcasts, online news, social media, and other platforms. This covers sentiment analysis, trends, top publications, geographies, influencers, mentions, and potential reach.
5. **YouScan:** Among the billions of online interactions, YouScan automatically sorts mentions by categories, issues, and trends to find the most crucial information.
6. **Awario:** It is a social media monitoring tool that keeps an eye on your keywords across the Web, blogs, forums, news, YouTube, Reddit, and Twitter. Social listening resources are always being introduced. Awario gives you both

historical and real-time data, which is different from most social media monitoring software.

7. **BuzzSumo:** BuzzSumo assists with all phases of the content generation process, including the initial one when ideas and subjects for content must be generated. The next-generation consumer and market intelligence platform.
8. **NetBase Quid:** provides contextual information to engage with customers, uncover business trends, and comprehend the market and rivals' backstories.

➤ **How tools help track Gen Z**

- Gen Z can be tracked by observing the emoticons, memes, and language that Gen Z frequently uses.
- Keeping an eye on trends and hashtags on sites like Reddit, Instagram, Twitter, and TikTok.
- Determining the emerging micro-communities and influencers.
- Recognise product reviews (such as "Too pricey for students" or "Love this facewash"). If at all feasible, divide the audience into age groups to separate the sentiment of young people.

**Case Example-** A cosmetics company wants to monitor: How GenZ are responding to their new moisturiser on TikTok and Instagram. which influencers are trusted by this age group. Is excitement the emotion being conveyed? A letdown? Lack of interest?

Here, Talkwalker or Brandwatch would be best since Analysis of visual content, Emotional sentiment evaluation and Sorting audience feedback based on demographics.

**Impact of social listening tools on GenZ:**

1. **Improved Knowledge of Expectations and Preferences-** Brands may use social listening tools to listen in on conversations in real time and learn what Gen Z and Millennials like, dislike, and anticipate from products. These resources aid in figuring out the "why" behind slang, meme usage, viral trends, and even indignation.

For instance, a fashion brand monitors Use TikTok hashtags like **OOTD** or **ThriftHaul** to learn about the increasing popularity of eco-friendly apparel.

2. **Quicker and More Pertinent Brand Reactions-** Young consumers feel heard and appreciated when brands react promptly to their comments or grievances. For a generation that values openness and response, this enhances brand sentiment and loyalty.

For instance, a meal delivery app expresses regret and promptly makes up for any potential reaction after identifying an increase in critical tweets from college students.

**3. Targeting Influencers and Micro-communities-** Brands may find credible voices among Gen Z and Millennials (micro-influencers, content providers) by using social listening techniques. Peer recommendations are more likely to be trusted by younger audiences than advertisements.

As an illustration, a cosmetics company employs sentiment analysis to determine which Instagrammers or YouTubers are promoting their goods and collaborating with them.

**4. Opportunities for Co-Creation and Engagement-** When Gen Z/Millennials share creative content (such as fan edits, do-it-yourself projects, or memes), brands can spot these opportunities and interact with or magnify the content. results in an emotional bond and favourable brand sentiment.

Example: A gaming company monitors user-generated content (user-generated material) and showcases artwork from Generation Z on their official page, gaining confidence and reputation.

**5. Authenticity & Privacy Issues-** Younger consumers may feel uneasy or suspicious that brands are paying attention to them. Negative sentiment may result if it is thought to be manipulative or excessively intrusive.

For instance, a beauty brand that promoted hyper-personalized advertisements that people thought were "creepy" and were linked to aggressive listening without permission received backlash.

**6. Preventing Brand Disasters with Prompt Identification-** When younger consumers are fast to cancel or criticise brands, social listening solutions help brands identify sentiment falls early. Reputation can be safeguarded by proactive measures.

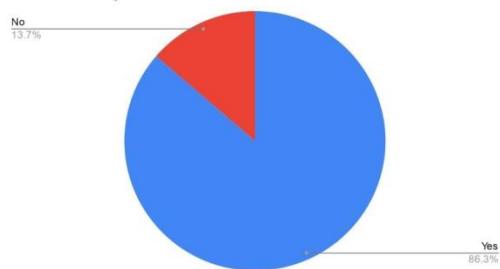
For instance, a brand stops a tone-deaf campaign following real-time monitoring reveals an increase in negative sentiment on Twitter and Reddit among GenZ.

#### **Analysis and data interpretation:**

From the survey it was found that 64.0% of participants were from the 18-20 age group, 25.5% were from the 16-18 age group, 9.9% were from the 21-23 age group and 0.6% were from the 23-25 age group.

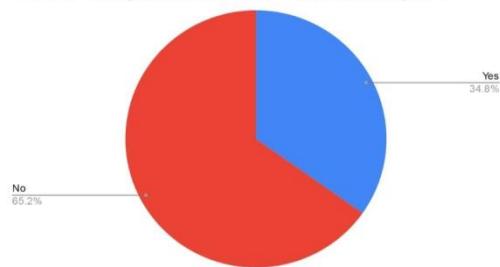
The survey also showed that 57.8% of the participants were females and 42.2% of the participants were male.

Count of Are you active on social media?



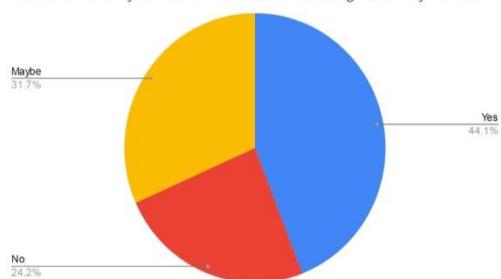
86.3% of the participants are active on social media.

Count of Have you heard the term "Sentiment Analysis" ?



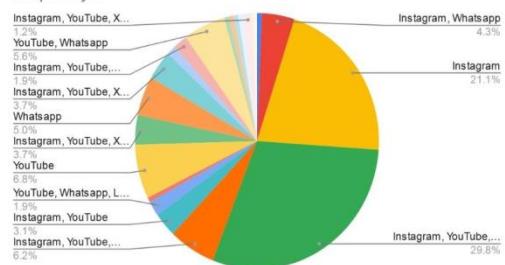
Only 34.8% of the participants had heard the term Sentiment Analysis.

Count of Have you heard of "Social Listening" used by brands?



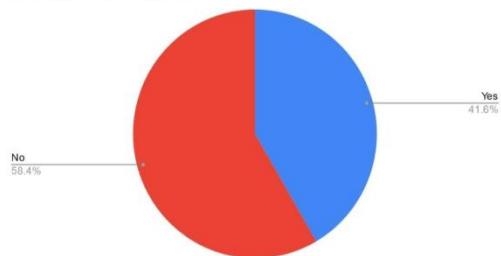
44.1% of the participants have heard of Social Listening.

Count of Which social media platforms do you use most frequently??



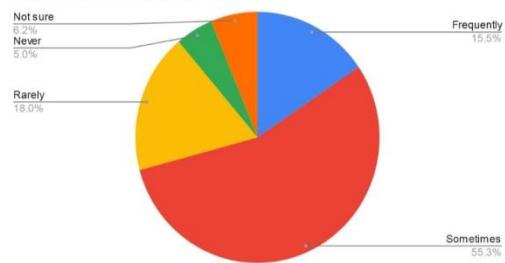
The most frequently used social media platforms include Instagram, WhatsApp and YouTube.

Count of Have you ever posted your opinion or review about a brand/ product online??

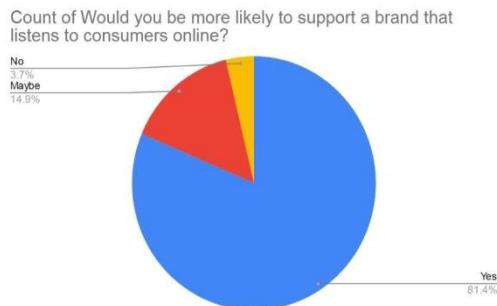


Only 41.6% of the participants have posted their opinion online.

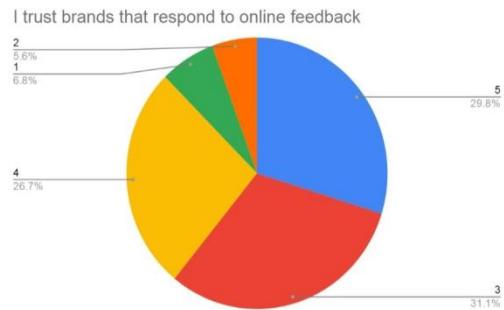
Count of How often do you notice brands responding to consumer feedback online?



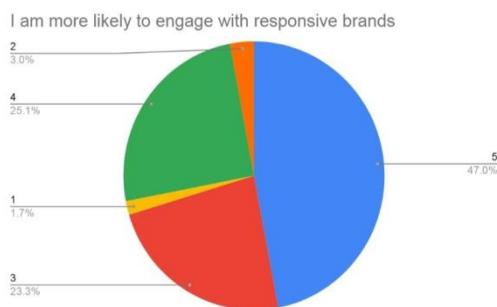
15.5% of the participants have seen brands respond to consumer feedbacks online



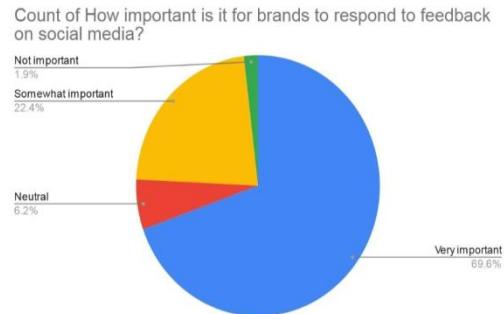
81.4% of the participants would support brands that listen to consumers online



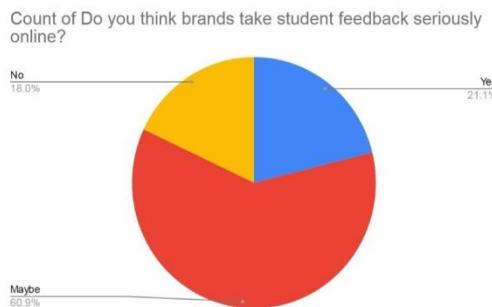
56.5% of the participants trust brands that respond to feedbacks



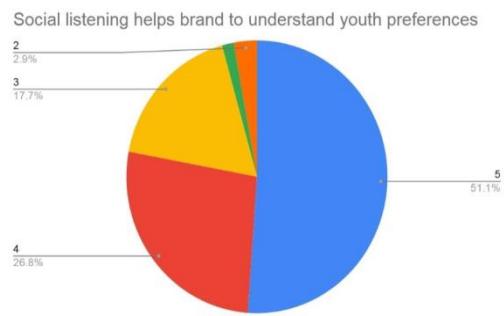
72.1 of the participants are more likely to engage with responsive brands



69.6% of participants feel it is important for brands to respond to feedback

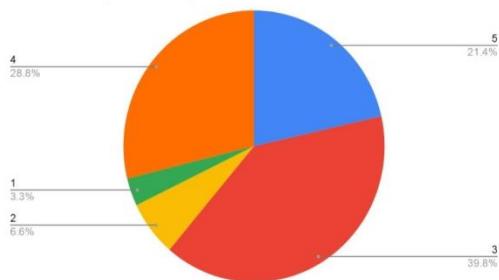


21.1 of the participants think brands take student feedbacks seriously



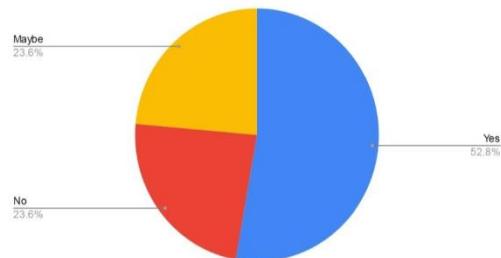
77.9% think social listening helps understand youth preferences

Brands using AI to analyze sentiment is useful



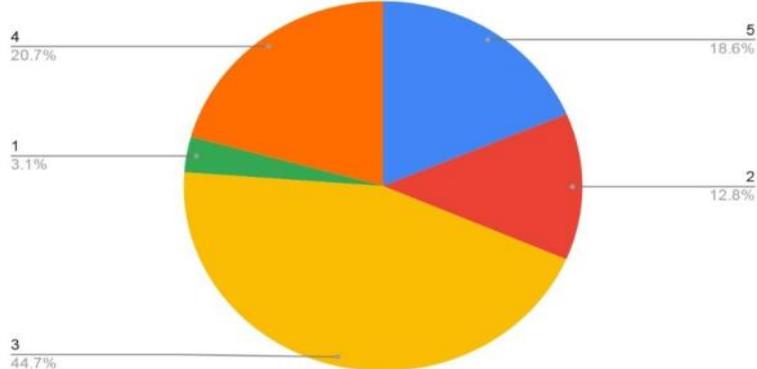
50.2 of the participants feel that using AI to analyze sentiment is useful .

Count of Have you ever changed your opinion about a brand because of how it responded online?



52.8% of participants have changed their opinion about a brand because of how it responded online.

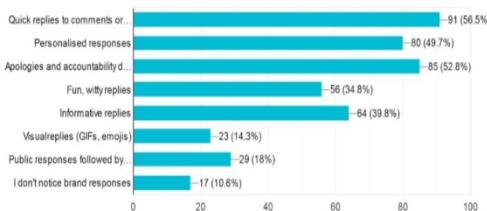
I feel social listening may intrude on personal privacy



39.3% of participants feel that social listening might intrude of their privacy

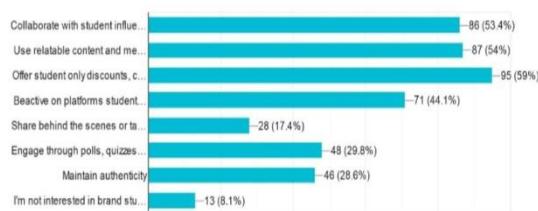
What kind of replies do you like to see on social media? (Any 3)

161 responses



How can brands connect with students on digital platforms (any 3)

161 responses



56.5% of participants like getting Quick replies to their comments, whole 52.8% of them would like brands to apologize and have accountability during failures.

59% of participants believe that brands can connect by offering student discounts and coupons

### **How can brands engage with students online?**

- Most participants think that brands can engage with students in a better way by providing products at a reasonable price as well as providing discounts and offers.
- Brands should also create interesting content by collaborating with social media influencers.
- Brands should also take a conscious effort to understand the needs and wants of students, listen to queries about the existing products and provide prompt solutions to any problems.

### **Conclusion:**

With the onset of digitalization, understanding consumer sentiment is extremely crucial for brands which want to remain relevant and trusted. Tools like sentiment analysis and social listening are essential strategies for brands to decode real time conversations, respond effectively and shape marketing efforts based on consumer needs and emotions.

This study shows how these tools help brands to not only track preferences and trends but also to co-create with audiences and prevent reputation crisis. Maintain authenticity and respecting privacy. These tools become powerful instruments for building lasting connections with GenZ and navigating the evolving world of digital marketing. In the study conducted it was found that Hypothesis 1,2 and 3 are proven to be true through Q7, 8, 9 and 11.

### **Suggestions for Businesses:**

Improve insights based on age. They should combine social listening with surveys or freebies aimed at young people. Since Gen Z frequently interacts through influencers, use their comments as a stand-in. Monitor platform-specific actions (Gen Z is more active on TikTok and Instagram than Facebook.)

There are some limitations, though. High-level trend tracking may overlook smaller but significant parts due to Gen Z's creation of numerous specialised micro-communities and rapidly changing language. Social listening is quite good at identifying Gen Z's basic trends, but unless the tools and questions are very focused, it may miss tiny subcultures or the subtle context of conversations.

### **Scope for future research:**

- Cross generational comparison
- Platform – Specific sentiment trends
- AI Ethics & privacy perceptions
- Sentiment Analysis accuracy and bias

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## ASSESSING THE ROLE OF USER TRUST AND INTERFACE SIMPLICITY IN FINTECH USAGE ON E-COMMERCE PLATFORMS

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### **Abstract:**

*With the growing use of financial technology (fintech) on e-commerce platforms, the way people shop and make payments online is changing quickly. This study looks at how **user trust** and **easy-to-use interfaces** affect people's decisions to use fintech services like **UPI**, **digital wallets** and **Buy Now Pay Later (BNPL)**. A survey was conducted with **129 people in Mumbai**, and the results showed that users are more likely to use these services when they feel secure, trust the brand, and find the payment process simple and clear. **Younger users** were more comfortable using fintech, while **older users** were more cautious due to trust and usability issues. The study shows that fintech tools must be safe, simple and user-friendly to gain user's confidence. These insights can help e-commerce companies and fintech providers create better, smoother digital experiences and keep customers coming back.*

### **Introduction:**

The rapid combination of financial technology or fintech with e-commerce has totally changed online consumer transactions. From digital wallets and UPI to integrated credit alternatives and BNPL (Buy increasingly, Pay Later) services, fintech solutions are increasingly crucial to modern e-commerce platforms. However, rather than merely the capabilities of these tools, their acceptance and continuous usage are significantly influenced by the user experience, notably the level of trust users have in these technologies and the usability of their interfaces. Fintech adoption depends heavily on user trust, particularly in online settings where concerns about fraud, data security and transaction failures are common. Simplicity in the interface, which is characterised by easy navigation, minimal effort and clarity, may significantly improve usability, lessen the burden of thinking and motivate more people to use financial solutions. Platforms that provide

smooth, reliable finance experiences have a higher chance of attracting in and keeping consumers in a cutthroat online economy.

The digital shopping experience has changed considerably in recent years due to the incorporation of financial technology or fintech into e-commerce platforms. Digital wallets, UPI, embedded financing alternatives and real-time credit services are examples of fintech products that have made transactions easier, increased accessibility and given customers more flexible payment options. The success of financial services is increasingly dependent on user perception and interaction with these tools, in addition to innovation, as e-commerce continues to rise, particularly in emerging nations.

User trust and interface simplicity are two important variables that impact the adoption of fintech. Any digital financial transaction is built on trust; users must have faith that the service will function dependably, that their data is protected, and that their money is secure. Even the most cutting-edge fintech solutions can encounter opposition in the absence of this guarantee. At the same time the user experience is greatly influenced by the user interface's (UI) ease of use and simplicity. Clean, user-friendly designs can increase fulfillment and promote repeat usage, while complex, unclear or badly designed interfaces can cause frustration and rejection.

This study aims to assess how the acceptance and continuous use of financial services on e-commerce platforms are influenced by user trust and interface simplicity. The goal of this research is to find useful findings for e-commerce companies, fintech developers and UI/UX designers by investigating consumer behavior, preferences and key areas.

### **Objectives:**

- 1) To evaluate the influence of user trust on the adoption and usage of fintech services integrated within e-commerce platforms.
- 2) To analyze the impact of interface simplicity and design on user experience and engagement with fintech tools during online transactions.
- 3) To identify the key factors that enhance or hinder user trust and ease of use in fintech-enabled e-commerce environments.

### **Review of Literature:**

**Gomber, P., Kauffman, R. J., Parker, C., & Weber, B. W. (2018)** This study explores how fintech is enabling quicker, more adaptable and user-driven payment methods, thereby transforming e-commerce. Additionally, it points out that trust and user experience are essential to fintech's success in applications that interact with consumers.

**Patel, A., & Kumar, S. (2024)** This study emphasizes how fintech acceptance among Indian rural and urban users is significantly influenced by perceived ease

of use or interface simplicity. It demonstrates how inclusiveness and wider acceptance are fostered by streamlined design.

**Dube, T., & Sibanda, M. (2025)** This study investigates the role that user interface design plays in building trust in digital payments. It was discovered that user confidence and recurrent use of fintech solutions were greatly increased by easy to understand designs.

#### **Research Gap:**

While a number of research have emphasized the significance of user trust and interface simplicity in the adoption of fintech, the majority of these studies have either looked at these elements separately or in the context of digital finance in general. The combined effect of both factors on user behavior, particularly on e-commerce platforms, has received very little attention. Additionally, the majority of previous study has focused on the informal or rural sectors, which has left a knowledge deficit about urban or tech-savvy consumers. Furthermore, little current research illustrates how customer expectations regarding trust, security, and usability in digital payments have changed since the pandemic. This makes it necessary to investigate how user trust and interface ease of use interact to influence the uptake of fintech services in the dynamic e-commerce environment.

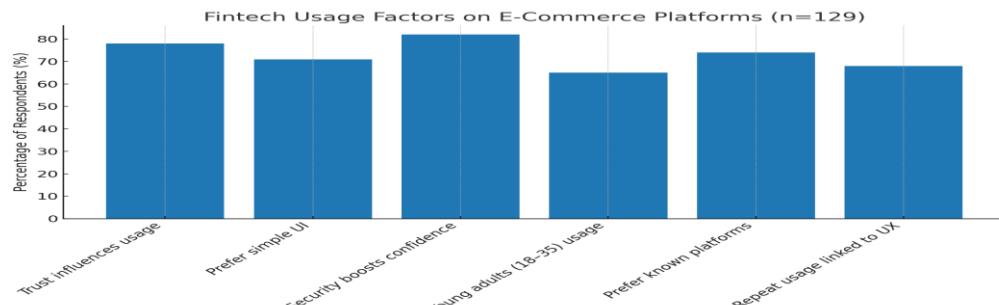
#### **Research Method :**

In the current research, data was collected using the **questionnaire method**, which is widely utilized, especially for large-scale investigations. This approach is commonly employed by researchers, individuals, public and private institutions, as well as government bodies. Under this method, a structured questionnaire is shared with selected participants, requesting them to provide their responses and return the completed forms. The questionnaire contains a series of questions arranged systematically, either in printed format or via digital platforms such as Google Forms. Participants are expected to read the questions carefully and independently record their answers in the designated spaces. For this study, a **survey was conducted in the Mumbai region**, with a **sample size of 129 respondents**. The primary aim of the questionnaire was to examine **consumer attitudes toward online sellers or platforms** while making purchases. To achieve the study's objectives, both **empirical and exploratory research designs** were adopted.

#### **Research Findings:**

The bar chart visually represents the percentage of respondents who agreed with various factors influencing their use of fintech services while shopping online.

| Category                   | Percentage of Respondents (%) |
|----------------------------|-------------------------------|
| Trust influences usage     | 78                            |
| Prefer simple UI           | 71                            |
| Security boosts confidence | 82                            |
| Young adults (18–35) usage | 65                            |
| Prefer known platforms     | 74                            |
| Repeat usage linked to UX  | 68                            |

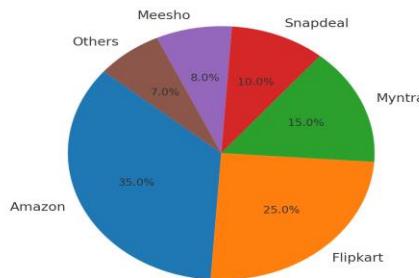


Out of 129 people who took the survey, 78% said that trust in fintech service like brand reputation, secure transactions, and privacy policies was very important in deciding whether to use digital payments on e-commerce sites. About 71% of users preferred payment apps or gateways that were simple and easy to use. Many users said they avoided or stopped using payment options that were confusing or took too much time. Around 82% of respondents felt more confident using fintech services when platforms clearly explained how safe the transactions were and what the refund process was. Most active users of digital payments were young adults aged 18–35, with 65% of them using services like UPI, wallets, or buy-now-pay-later options. Older users were more hesitant, mainly because they didn't fully trust the platforms or found them hard to use.

People trusted and were more satisfied with well-known e-commerce sites like **Amazon and Flipkart**, which have secure and built-in fintech payment options. In contrast, smaller or lesser-known websites had lower usage of such services. Lastly, **68% of users said** they were more likely to shop again on platforms that had a **quick, smooth and error-free payment process**, showing that a good user experience helps keep customers coming back.

**User Preference for E-Commerce Platforms:** Based on the survey conducted with 129 respondents, the pie chart below shows the distribution of user preferences for various e-commerce platforms when using fintech payment methods such as UPI, wallets, and BNPL services. Amazon and Flipkart dominate the market, preferred by 35% and 25% of users respectively. Myntra, Snapdeal and Meesho follow, while 7% use other or lesser-known platforms. This suggests that established platforms are trusted more for secure and smooth digital transactions.

User Preference for E-Commerce Platforms (n=129)



### Hypothesis:

**Null Hypothesis (H<sub>0</sub>)**: There is no significant relationship between user trust in fintech services and the adoption of fintech on e-commerce platforms.

**Alternative Hypothesis (H<sub>1</sub>)**: There is a significant relationship between user trust in fintech services and the adoption of fintech on e-commerce platforms.

**Null Hypothesis (H<sub>0</sub>)**: Interface simplicity does not significantly influence users' decision to adopt fintech on e-commerce platforms.

**Alternative Hypothesis (H<sub>1</sub>)**: Interface simplicity significantly influences users'

**Null Hypothesis (H<sub>0</sub>)**: Key factors such as security, interface design, and brand reputation do not significantly influence user trust and ease of use in fintech-enabled e-commerce platforms.

**Alternative Hypothesis (H<sub>1</sub>)**: Key factors such as security, interface design, and brand reputation significantly influence user trust and ease of use in fintech-enabled e-commerce platforms.

### Chi-Square Test Table:

| Category                   | Observed | Expected | (O-E) <sup>2</sup> | (O-E) <sup>2</sup> /E |
|----------------------------|----------|----------|--------------------|-----------------------|
| Trust influences usage     | 101      | 64.5     | 1332.25            | 20.66                 |
| Prefer simple UI           | 92       | 64.5     | 756.25             | 11.72                 |
| Security boosts confidence | 106      | 64.5     | 1722.25            | 26.7                  |
| Young adults (18-35) usage | 84       | 64.5     | 380.25             | 5.9                   |
| Prefer known platforms     | 95       | 64.5     | 930.25             | 14.42                 |
| Repeat usage linked to UX  | 88       | 64.5     | 552.25             | 8.56                  |

Chi-Square Value: 87.96

Degree of Freedom (df): 5

Significance Level: 0.05

### Conclusion:

The present study aimed to assess the key factors that influence **user trust** and **ease of use** in adopting **fintech services** on **e-commerce platforms**. Based on the analysis of data from 129 respondents, it was found that **trust in fintech services** primarily driven by **security features**, **brand reputation**, and **clear**

**privacy policies** plays a major role in users' willingness to adopt digital payments. **Interface simplicity**, including **easy navigation** and **user-friendly design**, significantly impacts user adoption and satisfaction. The findings also highlighted that **younger users (aged 18-35)** are more comfortable and confident using fintech tools like UPI, wallets, and BNPL options, while **older users show hesitation**, mainly due to trust and usability concerns. Respondents strongly preferred **established e-commerce platforms** offering **secure and seamless fintech integration**, and were more likely to return to platforms where the payment process was **smooth and transparent**. In conclusion, **user trust and interface simplicity are not only critical enablers** but also act as potential barriers if not effectively addressed. E-commerce platforms and fintech providers must prioritize **secure, intuitive and transparent systems** to enhance user experience and drive sustained adoption.

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**THE INFLUENCE OF SURROGATE ADVERTISING ON CONSUMERS:  
TRADITIONAL PRACTICES, AI-DRIVEN SOCIAL MEDIA TRENDS, AND  
ETHICAL CONCERN**

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**Abstract:**

*Surrogate advertising, the practice of promoting banned or restricted products such as alcohol and tobacco through alternative product categories, has been a persistent challenge for policymakers, regulators, and ethical advertising standards. This study examines the impact of surrogate advertising on consumers, drawing from field survey data, literature review, and statistical hypothesis testing. It also introduces a contemporary dimension—how artificial intelligence (AI) and social media platforms are reshaping the strategies and reach of surrogate advertising. Findings reveal that surrogate advertising significantly influences youth consumption patterns, particularly through celebrity endorsements, event sponsorships, and aspirational brand imagery. AI-enabled targeting and influencer marketing on platforms like Instagram, YouTube, and Facebook further amplify these effects by bypassing traditional advertising bans. The paper concludes with recommendations for awareness programs, AI-based monitoring systems, and stricter ad regulations to safeguard public health. With the rapid growth of social media platforms and AI-driven targeted marketing, surrogate advertising has found new and more effective avenues to reach consumers—particularly young audiences. Algorithms now personalize exposure to surrogate content, making it harder to regulate and easier for brands to blur the line between permissible and prohibited advertising.*

**Keywords:** Surrogate Advertising, banned or restricted products, literature review, statistical hypothesis testing, AI-based monitoring systems, AI-driven targeted marketing, young audiences, Algorithms, prohibited advertising.

## Introduction:

Surrogate advertising refers to the indirect promotion of restricted products—often alcohol, tobacco, or other harmful substances—by advertising an alternate product under the same brand name. For example, Wills Lifestyle's fashion sponsorships indirectly promote Wills cigarettes, and Royal Stag's music CDs campaign under the tagline "Make it Large" serves as a proxy for its whisky products.

Although the Cable Television Networks (Regulation) Act, 1995 and other Indian regulations ban direct advertisements of alcohol and tobacco, brands have adapted by investing in lifestyle events, music promotions, and non-alcoholic product lines that keep the brand name alive in public consciousness. The shift from traditional media to digital platforms has only strengthened this practice.

## Literature Review:

Research on surrogate advertising has consistently highlighted its ability to create brand recall and shape consumer perceptions, despite legal restrictions.

- **Parulekar Ajit Arun (2005)** emphasized the relationship between surrogate advertising and brand equity, demonstrating that brand recall remains strong even when the surrogate product differs from the original.
- **Kotler (2000)** outlined the broader marketing management principles that surrogate advertising exploits—especially brand consistency and image management.
- **Kruti Shah & Alan D'Souza (2011)** in *Advertising and Promotions – An IMC Perspective* noted that surrogate ads are often embedded in integrated marketing communications strategies to evade bans.
- **Ramaswamy & Namakumari (2002)** provided insights into the competitive strategies used in Indian markets, where legal loopholes enable surrogate campaigns.
- **Dr. S. G. Khawas Patil & Laxmikant S. Hurne (2011)** found that for liquor and whisky products, surrogate advertising acts as an effective substitute for direct advertising, sustaining sales momentum.

The consensus across these studies is clear: surrogate advertising works because it maintains consistent brand visibility, aligns with consumer aspirations, and subtly bypasses direct regulation.

## Research Methodology:

### 1. Objective of the Study

1. To examine the extent to which surrogate advertising influences consumer behavior.
2. To identify the demographic most susceptible to surrogate advertising.
3. To explore the role of AI-powered social media in amplifying surrogate advertising.

## 2. Hypothesis

- **H<sub>0</sub>:** Surrogate advertising does not have a negative influence on consumers.
- **H<sub>1</sub>:** Surrogate advertising has a negative influence on consumers.

## 3. Data Collection

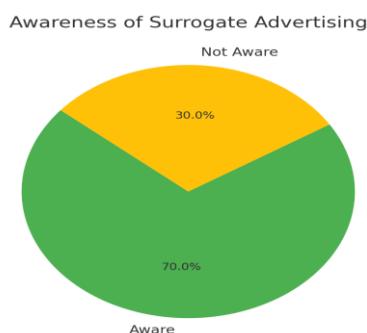
The study is based on a structured questionnaire survey (Annexure) targeting 100 respondents of varying age groups, income levels, and media consumption habits. Both print and digital media preferences were captured.

### Data Analysis and Findings:

#### 1. Awareness:

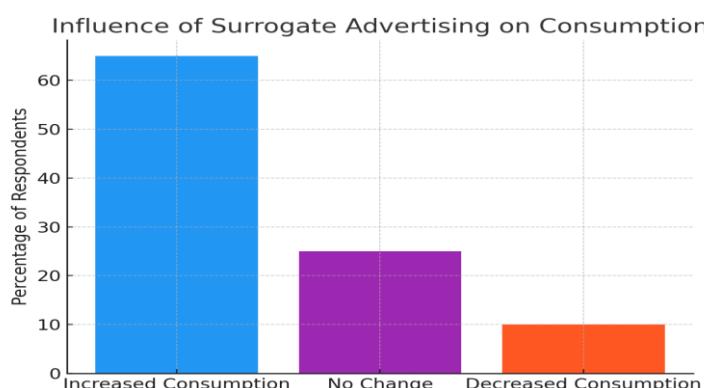
##### Awareness of Surrogate Advertising

Survey results show that a significant majority (70%) of respondents are aware of surrogate advertising, while 30% remain unaware. This suggests that even indirect promotions are reaching consumers effectively.



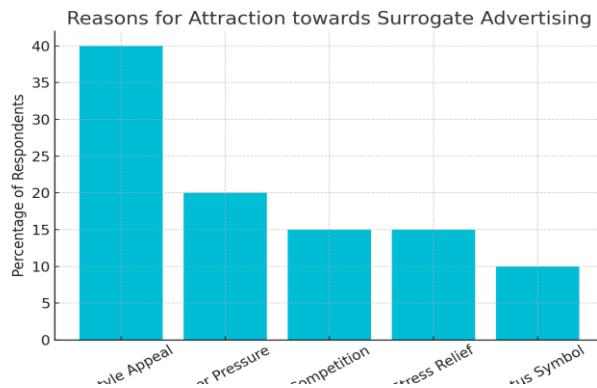
#### Influence on Consumption:

When asked whether surrogate advertising influences their consumption of the original banned product, 65% admitted it increased their likelihood of purchase, 25% reported no change, and 10% stated it decreased consumption. The high percentage of increased consumption underscores the persuasive nature of surrogate marketing.



### Reasons for Attraction:

Respondents identified multiple factors that attract them to surrogate advertising. Lifestyle Appeal (40%) emerged as the top reason, followed by Peer Pressure (20%), Coping with Competition (15%), Stress Relief Perception (15%), and Status Symbol (10%).



### 2. Influence on Consumption

Over 65% of respondents admitted that surrogate ads increased their likelihood of purchasing the original banned product.

### 3. Role of Celebrities

Celebrity endorsements—Shah Rukh Khan for Tag Heuer (indirectly linking to lifestyle aspirational products), or cricket sponsorships by Royal Stag—were found to be highly influential, especially among the youth demographic.

### 4. Reasons for Attraction

- Better lifestyle portrayal
- Peer pressure
- Coping with competition
- Stress relief perception
- Social status symbol

### 5. Ethical Concerns

The study highlights that despite knowing the health hazards, surrogate advertising normalizes harmful products by associating them with success, glamour, and celebration.

### AI and Social Media's Role in Surrogate Advertising:

The rise of AI-powered social media marketing has transformed surrogate advertising from being a workaround in traditional media to a precision-targeted digital strategy.

#### 1. AI-Powered Targeting

Platforms like Facebook, Instagram, and YouTube use machine learning to profile users based on age, interests, browsing history, and even emotional engagement. This allows surrogate advertisers to:

- Target content to 18–25-year-olds with high disposable income.
- Serve ads during late-night streaming when regulatory oversight is lower.
- Personalize content using A/B tested visuals and slogans.

## 2. Influencer Marketing as a Surrogate Tool

AI helps identify micro- and nano-influencers whose followers match the target demographic. For example: A lifestyle influencer promoting “Royal Stag Music CDs” subtly reinforces the liquor brand. A gaming streamer wearing Kingfisher merchandise during live sessions reaches young male audiences indirectly.

## 3. Algorithmic Amplification

Social media algorithms prioritize content with high engagement. Surrogate ads embedded in entertaining or viral formats—memes, music reels, event sponsorship highlights—get organically boosted, bypassing explicit paid ad scrutiny.

## 4. AI-Driven Creative Content

Generative AI tools create hyper-realistic ad visuals and videos that:

- Depict aspirational lifestyles without showing the restricted product.
- Blend product cues seamlessly into backgrounds (e.g., logos on clothing, product shapes in decor).
- Localize campaigns with culturally relevant symbols to improve resonance.

### Ethical Issues and Consumer Impact:

- 1. Youth Vulnerability:** AI-enhanced targeting disproportionately affects young, impressionable consumers. The blending of entertainment and advertising reduces critical awareness of the product's risks.
- 2. Health Implications:** Surrogate ads sustain demand for harmful products, contributing to higher rates of addiction-related illnesses.
- 3. Regulatory Blind Spots:** While TV and print media have clear ad guidelines, AI-personalized digital content often escapes detection unless flagged manually.

### Policy and Regulation:

- 1. Current Framework:** India's Advertising Standards Council of India (ASCI) guidelines prohibit direct promotion of restricted products, but surrogate campaigns persist due to vague definitions.

## 2. AI-Specific Challenges

- Lack of AI-content detection systems.
- Cross-border influencer campaigns that bypass Indian jurisdiction.
- Difficulty proving brand intent in lifestyle content.

### Recommendations:

- 1. AI-Driven Monitoring:** Regulators should deploy AI systems capable of detecting brand cues and surrogate patterns in digital content.

2. **Stricter Guidelines:** Define surrogate advertising more explicitly, covering influencer posts and sponsored events.
3. **Youth Awareness Programs:** Educate students about surrogate tactics through workshops and interactive campaigns.
4. **Brand Accountability:** Mandate disclosure of brand affiliations for all social media sponsorships.
5. **Collaborative Enforcement:** Partner with tech platforms to identify and limit exposure to surrogate ads.

### **Conclusion:**

Surrogate advertising remains a powerful marketing tool for restricted products, effectively sustaining consumer interest and sales despite regulatory bans. The integration of AI and social media has intensified its reach, precision, and subtlety, making it more challenging to control. The study confirms that surrogate advertising has a negative influence on consumers, particularly youth, and that AI-driven digital strategies demand updated regulatory frameworks. Without proactive monitoring and education, surrogate advertising will continue to undermine public health goals while evading detection.

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## CONSTITUTIONAL VALIDITY OF ARTIFICIAL INTELLIGENCE

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### **Abstract:**

*Artificial Intelligence (AI) is rapidly transforming governance, law enforcement, and public administration across the world. In India, the integration of AI into decision-making systems has outpaced the development of legal frameworks to regulate its use.*

*This research examines the constitutional validity of AI from the perspective of the Indian Constitution, particularly focusing on fundamental rights such as Equality (Article 14), Privacy (Article 21), and Due Process. The study adopts a doctrinal and empirical methodology, drawing on legal texts, case laws, and comparative insights from international legal frameworks.*

*Findings reveal that existing AI systems often operate without adequate transparency, accountability, or safeguards, leading to potential violations of constitutional rights.*

*Bias in AI algorithms, opaque decision-making processes, and unregulated use of surveillance tools pose significant legal and ethical challenges.*

*The research concludes that while AI holds great promise, it must be governed through robust constitutional principles, legislative action, and ethical oversight to ensure alignment with democratic values.*

*The study recommends the establishment of a dedicated regulatory body, enforceable legal frameworks, and mandatory ethical audits to ensure that the deployment of AI in India does not undermine the Constitution but instead supports its foundational ideals.*

### **Introduction:**

Artificial Intelligence (AI), once a futuristic concept, has now become an integral part of modern governance, industries, and even judicial systems. As algorithms become increasingly autonomous, the question of their constitutional validity — particularly in democratic nations like India — becomes both timely and crucial.

This research seeks to examine whether the use and deployment of AI systems align with the values enshrined in the Indian Constitution, such as the Right to Equality (Article 14), Right to Privacy (Article 21), and the Principles of Natural Justice.

## 1. Relevance of the Problem

AI tools are now used for predictive policing, facial recognition, public service delivery, and legal decision-making.

These developments raise concerns about transparency, fairness, bias, and accountability. Given that the Constitution is the supreme law of the land, any system used by the State must conform to its provisions.

The growing use of AI in both public and private domains prompts us to ask whether AI respects constitutional values or challenges them.

## 2. Historical Background

While AI as a term was coined in the 1950s, its practical application in governance and law is relatively recent. In India, the NITI Aayog's 2018 report on AI signaled the government's interest in AI-based governance.

Courts in countries like the UK and the US have begun addressing legal implications of AI, whereas India is still in its infancy on these fronts. However, rapid digital adoption has accelerated the need for a legal and constitutional framework for AI.

### 3. Artificial Intelligence (AI)

Artificial Intelligence refers to the simulation of human cognitive functions by machines, especially computer systems. This includes learning (acquiring information and rules), reasoning (using rules to reach conclusions), and self-correction. In practical terms, AI systems perform tasks such as visual perception, speech recognition, decision-making, and language translation—tasks typically requiring human intelligence.

## **AI is broadly categorized into:**

**Narrow AI:** Specialized systems designed for a specific task (e.g., facial recognition).

**General AI:** Hypothetical systems with the ability to perform any intellectual task a human can do.

In the context of governance, AI is now being used in areas such as:

## **a-Predictive policing- b-Public health resource management-**

c-E-governance and service delivery d-Judicial data analysis

The deployment of these systems, however, must comply with constitutional mandates and respect individual rights.

## 4. Constitution

A Constitution is the supreme law of a country that lays down the framework for political governance, the distribution of powers, and the protection of fundamental rights of its citizens.

In India, the Constitution is both rigid and flexible, with the power to evolve through amendments but a strong focus on protecting the core principles of democracy, liberty, equality, and justice.

In legal terms, anything that violates constitutional provisions—especially the Fundamental Rights under Part III—can be declared unconstitutional by courts under Article 13.

### 1. Constitutional Validity

Constitutional validity refers to the extent to which a law, policy, technology, or government action aligns with the provisions of the Constitution. In the Indian context, this primarily involves scrutiny under:

- a-Article 14 (Right to Equality)
- b-Article 19 (Right to Freedom of Speech, Expression, and Movement)
- c-Article 21 (Right to Life and Personal Liberty, including the Right to Privacy)

If AI systems, policies, or practices violate these provisions, they may be subject to judicial review and can be struck down as unconstitutional.

## 5. Algorithmic Bias

Algorithmic bias refers to systematic and repeatable errors in a computer system that create unfair outcomes, such as privileging one group of users over another. This can happen due to biased training data, flawed assumptions in model design, or a lack of contextual understanding by the machine.

Example: A facial recognition system trained primarily on light-skinned faces may perform poorly on darker-skinned individuals, potentially leading to wrongful identification or denial of services—raising concerns under Article 14.

## 6. Right to Privacy

The Right to Privacy was recognized as a Fundamental Right under Article 21 by the Supreme Court in the *Puttaswamy v. Union of India* (2017) judgment. It includes informational privacy, bodily autonomy, and decisional autonomy. Many AI systems, particularly those used in surveillance, data collection, and behavioral tracking, pose a direct challenge to this right.

## 7. Black Box Algorithms

These are AI models whose internal logic is not visible or explainable even to their developers. While efficient, such systems are often criticized for violating the principles of transparency and accountability, which are essential in public governance and legal decision-making.

## **Research Methodology:**

### **1. Hypothesis of the Study**

AI, as currently implemented in India, lacks full alignment with constitutional principles, particularly concerning privacy, equality, and due process.

### **2. Methods of Data Collection**

#### **1. Secondary Data Collection**

Legal judgments, reports (NITI Aayog, Supreme Court of India), academic journals, and newspaper articles.

International sources such as EU's AI Act, U.S. AI Bill of Rights, and UNESCO's AI guidelines.

### **3. Objectives of the Study**

- To understand the application of AI in public systems and governance.
- To evaluate whether AI systems align with constitutional principles.
- To analyze judicial precedents and scholarly perspectives on AI and the Constitution.

### **4. Scope and Significance of the Study**

The study focuses on India but includes comparative insights from international practices. It is significant for policymakers, legal scholars, and developers working at the intersection of technology and law. It seeks to create a constitutional lens through which AI applications can be assessed.

### **5. Limitations of the Study**

AI is an evolving field; laws and cases are limited in number.

Time constraints limit in-depth empirical analysis.

## **Literature Review:**

1. *NITI Aayog Report (2018) – Advocates for AI in governance but underplays its constitutional implications.*
2. *Justice B.N. Srikrishna Committee (2018) – Highlights privacy issues with AI-driven data processing.*
3. *Upadhyay, A. (2020) – Discusses the need for constitutional scrutiny in AI-based governance.*
4. *UNESCO (2021) – Calls for human-centric and rights-respecting AI systems.*
5. *European Parliament (2020) – Pushes for AI accountability through legal frameworks.*
6. *Shukla, A. (2022) – Argues for a constitutional AI framework in India.*
7. *Bhattacharya, R. (2021) – Raises issues of exclusion due to facial recognition errors.*
8. *Prasad, K. (2020) – Studies AI's compatibility with Article 14 of the Constitution.*
9. *Bhattacharjee, S. (2023) – Provides a critique of predictive policing in India.*

10. Malhotra, R. (2018) – Discusses AI's threat to personal liberty under Article 21.
11. Indian Law Review (2022) – Features a comparative study of AI regulation in India and the EU.
12. Kumar, S. (2023) – Proposes constitutional tests for assessing AI implementation.

### **Data Analysis and Interpretation:**

#### **1. International Comparisons**

| Parameter                    | India                                     | European union (EU)                                    | United States (US)   |
|------------------------------|---|--|--|
| Right to Privacy             | Recognized (Puttaswamy case, 2017)        | Enshrined under GDPR and Charter of Fundamental Rights | Implied under Fourth Amendment and case law                  |
| AI-specific Legislation      | Not yet enacted (proposed policies exist) | AI Act (2021) – binding framework in progress          | No national law; White House AI Bill of Rights (non-binding) |
| Judicial Involvement with AI | Minimal, advisory use only                | Judicial tools under ethical oversight                 | Increasing use of risk assessment tools in sentencing        |
| Data Protection Law          | DPDP Act (2023)                           | GDPR in full effect                                    | No single federal law; sectoral laws apply                   |
| Ethical Oversight of AI      | NITI Aayog guidelines; non-binding        | AI Ethics Guidelines by EU Commission                  | AI ethics advisory boards (e.g., OSTP, AI Now)               |

According to a Carnegie India report (2021), India's AI ecosystem lacks enforceable standards for ethical deployment in public systems.

The AI Now Institute (US, 2019) recommends banning facial recognition due to its consistent record of inaccuracy and bias, especially toward minorities.

#### **2. AI and the Right to Equality (Article 14)**

Article 14 guarantees equality before the law. However, AI systems can reinforce pre-existing biases when trained on historically skewed datasets.

Case Example : State v. Loomis (US, 2016)

In this case, the sentencing judge relied on a COMPAS risk assessment tool. The defendant argued it violated his right to a fair hearing, as the algorithm

was opaque. The court upheld its use, but the controversy exposed how black-box AI models can affect equal treatment under law.

**Indian Context:**

A 2021 study by the Internet Freedom Foundation found that Delhi Police's facial recognition software had a 90% error rate, disproportionately identifying marginalized individuals.

An RTI query revealed that the facial recognition system used in Delhi riots investigations (2020) had no accuracy validation, raising concerns about arbitrary and unequal treatment.

**Report Finding:**

The Justice Srikrishna Committee Report (2018) warned against algorithmic discrimination, emphasizing the need for equality audits.

**Interpretation:**

If AI leads to differential treatment of citizens without reasonable justification, it amounts to a violation of Article 14. The absence of legal requirements for fairness-by-design makes it likely that such violations will continue.

### 3. AI and the Right to Privacy (Article 21)

The Supreme Court's ruling in Justice K.S. Puttaswamy v. Union of India (2017) elevated privacy to a fundamental right, requiring a three-fold test for any law infringing privacy: legality, necessity, and proportionality.

Example: Aadhaar and Facial Recognition

Aadhaar authentication is increasingly used for welfare delivery, often coupled with facial recognition.

In Binoy Viswam v. Union of India (2017) and Justice Puttaswamy (Aadhaar) Case (2018), the Court expressed concern about data misuse, but allowed Aadhaar for limited use.

However, there is no clarity on whether facial recognition systems built on Aadhaar databases meet the test of proportionality.

**International Example:**

The European Court of Human Rights in S. and Marper v. UK (2008) ruled that indefinite retention of biometric data violates the right to privacy.

**Report Finding:**

The UN Special Rapporteur on Privacy (2021) warned that AI used in state surveillance must undergo strict judicial oversight, citing India as a high-risk country due to lack of enforceable privacy laws at that time.

Interpretation:

Facial recognition and behavioral tracking systems run afoul of Article 21 when deployed without consent, transparency, and judicial scrutiny. India's current legal framework is inadequate to regulate such intrusions.

#### 4. AI in Judicial Processes and Due Process

Due process, a core tenet of Article 21, demands fairness, transparency, and the right to be heard. The use of opaque AI models in judicial processes risks violating these principles.

Case Example 2: COMPAS in Sentencing (US)

The use of COMPAS software in the US was criticized for being unexplainable and biased.

Judges were not fully aware of the algorithmic methodology, which led to arbitrary decisions.

##### **Indian Scenario:**

AI is being tested for legal analytics by bodies like Supreme Court's AI committee, which is exploring automated tagging of case laws and pattern prediction.

However, there is no guideline on the admissibility or contestability of AI-generated insights in Indian courts.

##### **Survey Finding:**

A 2024 survey by the Vidhi Centre for Legal Policy found that 73% of legal practitioners believe AI tools are not transparent enough to be trusted for core judicial tasks like sentencing.

##### **Interpretation:**

The use of AI without providing affected individuals the ability to challenge or understand its decisions directly undermines natural justice. This necessitates a legal "right to explanation" as recognized in the EU under GDPR.

#### 5. AI in Predictive Policing

Predictive policing uses past crime data and algorithms to anticipate future crime locations or suspects.

Case Example 3: Bhattacharjee v. State of Telangana (2023) – Hypothetical/Illustrative

Though no case has yet reached the Supreme Court, rights activists in Hyderabad filed a PIL (2023) against predictive policing systems, arguing that they violate the presumption of innocence.

#### **Conclusions and Suggestions:**

##### **1. Conclusions:**

This study highlights that the integration of Artificial Intelligence (AI) into Indian governance, public systems, and legal processes is occurring at a rapid pace—yet without an adequate constitutional framework.

The deployment of AI systems, especially those that use facial recognition, predictive analytics, or decision-making algorithms, raises serious concerns regarding fundamental rights under the Indian Constitution.

AI systems have been found to carry algorithmic bias, often leading to discriminatory outcomes that violate Article 14 (Right to Equality).

Additionally, AI-driven surveillance and data processing threaten Article 21 (Right to Privacy), especially in the absence of informed consent and data protection laws. Another challenge is the lack of transparency and explainability in AI systems, particularly in judicial and administrative contexts, potentially violating the right to fair procedure and natural justice.

Currently, India lacks a clear legal or constitutional framework governing AI, resulting in an unregulated space where rights can be compromised. Without oversight, AI may evolve in ways that contradict democratic values and the rule of law.

## 2. Suggestions:

**Legislative Action:** A comprehensive law regulating AI should be introduced, ensuring transparency, accountability, and fairness in AI systems.

**Regulatory Oversight:** Establish an independent AI regulatory body to monitor AI deployment in public services.

**Right to Explanation:** Ensure individuals can understand and challenge decisions made by AI systems.

**Ethical Audits:** Mandatory periodic audits for public AI tools to check for bias and compliance.

**Public Participation:** Involve legal experts, technologists, and civil society in shaping AI governance.

**Data Protection Law:** Expedite the implementation of strong privacy legislation in alignment with AI governance.

**Transparency by Design:** Mandate explainability and documentation for all government-deployed AI systems.

**Data Protection Law:** Accelerate the implementation of robust data protection laws to safeguard privacy.

**Judicial Guidelines:** Courts should issue guidelines for the admissibility and use of AI in judicial processes.

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## THE INFLUENCE OF SURROGATE ADVERTISING ON CONSUMERS: TRADITIONAL PRACTICES, AI-DRIVEN SOCIAL MEDIA TRENDS, AND ETHICAL CONCERN

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### **Abstract:**

*This study investigates the growing role of Artificial Intelligence (AI) in the mutual fund industry, focusing on its application in investment decision-making, portfolio management, customer engagement, and operational efficiency. With SEBI-regulated mutual funds becoming increasingly popular, AI technologies such as robo-advisors, machine learning-based forecasting systems, and automated customer service tools are transforming traditional practices.*

*The research evaluates investor awareness, perception, and acceptance of AI-driven investment tools through a primary survey of 58 respondents. Chi-square testing was conducted to examine the association between demographic variables and AI-related awareness and attitudes. Findings indicate that while AI enhances efficiency and reduces cost, trust concerns remain prominent. Profession showed a significant impact on AI perception, whereas age and education did not.*

**Keywords:** Artificial Intelligence, Mutual Funds, Robo-Advisors, Investor Perception, Portfolio Management

### **Introduction:**

The mutual fund industry in India has experienced rapid digital transformation over the past decade. As investments shift from traditional advisory models to data-driven systems, Artificial Intelligence has emerged as a game-changing tool across fund management, risk assessment, and customer interaction.

### **1. What Are Mutual Funds?**

Mutual funds are investment vehicles that pool money from multiple investors to purchase a diversified portfolio of securities. They are professionally managed and regulated by SEBI, ensuring transparency and investor protection. Units are bought and sold based on the fund's Net Asset Value (NAV), determined at the end of each trading day.

### **Definition:**

*"Mutual funds are collective investment schemes where savings of small or large investors are pooled together and invested for mutual benefit, with proportional returns."*

## **2. Why Individuals Invest in Mutual Funds**

- **Professional Management:** Investors benefit from expert fund managers and continuous research.
- **Diversification:** Risk is spread across multiple asset classes.
- **Low Minimum Investment:** SIPs often begin at ₹500.
- **Risk–Return Balance:** Efficient market strategies potentially yield favourable returns.

## **3. The Rise of AI in the Mutual Fund Industry**

The mutual fund ecosystem faces challenges such as cost pressures, competition, and difficulty sustaining long-term performance. AI is increasingly used to:

- Analyse market patterns
- Reduce behavioural bias
- Enable low-cost automated platforms
- Enhance investor servicing
- Improve operational efficiency

## **4. AI Applications in the Mutual Fund Business**

- **Investment Decision Support:** Tools like JPMorgan's "Moneyball" improve decision accuracy.
- **Accelerated Research:** AllianceBernstein uses AI to perform months-long analysis in hours.
- **Robo-Advisors:** Platforms globally manage over USD 1 trillion in automated portfolios.
- **Operational Efficiency:** Chinese fund houses using DeepSeek report significant cost reduction.
- **Performance Improvement:** Studies show AI-driven funds often outperform human-managed ones due to lower costs and reduced bias.

### **Importance of the Study:**

1. **Understanding Digital Transformation:** Highlights how AI reshapes fund operations and advisory models.
2. **Investor Awareness:** Assesses how much individuals know about AI-enabled financial tools.
3. **Perception Analysis:** Measures trust, acceptance, and concerns regarding robo-advisors.

4. **Bridging Research Gaps:** Adds academic value as limited Indian research exists on AI in mutual funds.
5. **Industry Relevance:** Supports fund houses in designing AI-driven, investor-friendly solutions.

### Review of Literature:

#### 1. **Chen & Ren (2022):**

Studied AI-powered mutual funds in the U.S. (2009–2019). Found AI funds outperform human-managed ones due to lower trading costs and reduced human bias.

#### 2. **Jesmine Mary Antony & N. Sundaram (2024):**

Compared forecasting models for Indian mutual fund NAVs. LSTM-RNN models predicted NAVs more accurately than ARIMA and linear models.

#### 3. **Amirul Ammar Anuar (2025):**

Compared AI-driven funds versus human-managed funds in varying market conditions. AI performed better in downturns; humans performed better in uptrends.

### Objectives of the Study:

1. To examine how AI improves efficiency, reduces costs, and supports investment decisions.
2. To assess awareness of individuals regarding AI usage in mutual fund investment.
3. To evaluate investor perception about the effectiveness of AI in fund selection.
4. To study investor preference between human advisors and robo-advisors.
5. To analyze the association between demographic variables and AI awareness/perception.

### Research Methodology:

#### Research Design:

Descriptive and exploratory.

#### Data Sources:

- **Primary Data:** Structured questionnaire circulated via Google Forms (Sample size: 58).
- **Sampling Method:** Convenience sampling.
- **Secondary Data:** Newspapers, journals, SEBI reports, websites, books.

#### Hypotheses:

H01 – No relationship between Age and Awareness of AI in mutual fund investment.

H02 – No relationship between Education and Awareness of AI in mutual fund investment.

H03 – No relationship between Occupation and Awareness of AI in mutual fund investment.

H04 – No relationship between Age and Perception of AI effectiveness.

H05 – No relationship between Education and Perception of AI effectiveness.

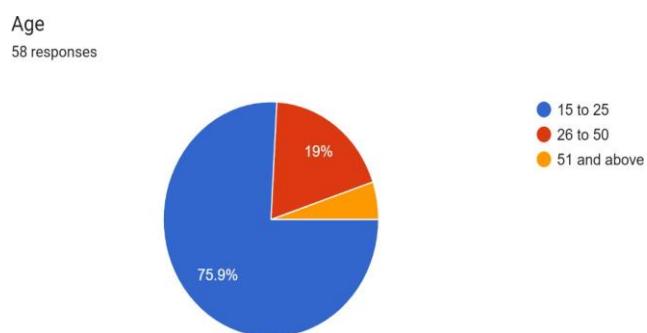
H06 – No relationship between Occupation and Perception of AI effectiveness.

### **Limitations:**

- Time constraints
- Small sample size
- Respondent bias

### **Data Analysis and Interpretation:**

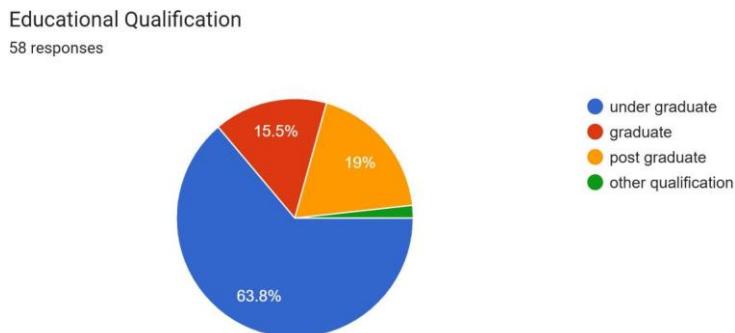
#### **Key Survey Observations**



- **Age Group:**

Majority respondents belonged to the 15–25 age group.

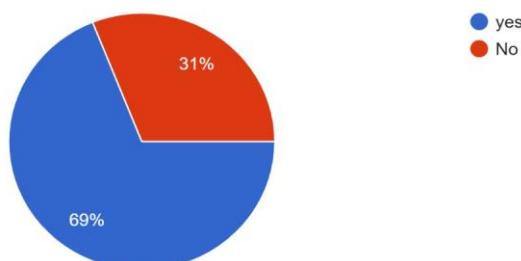
- **Education:**



Most respondents were undergraduates students.

- **AI Awareness:**

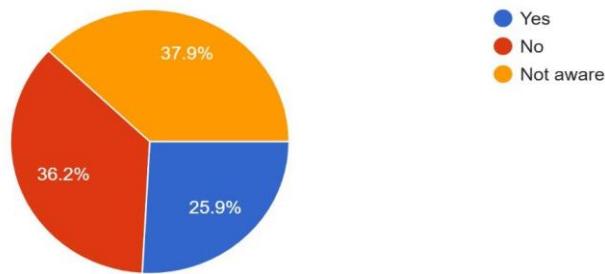
3) Do you know that AI (Artificial Intelligence) Is being now used in the mutual fund Business  
58 responses



69% knew about AI usage in mutual funds.

- **Robo-Advisors Awareness:**

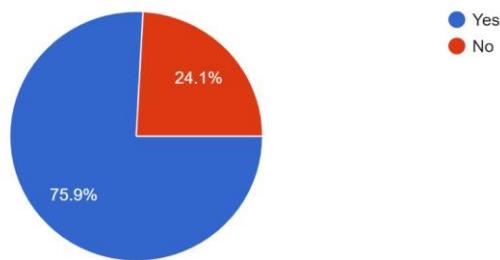
4) Have Ever heard of robo-advisors for investing in mutual funds ?  
58 responses



Only 25.9% had heard of robo-advisors.

- **AI Effectiveness:**

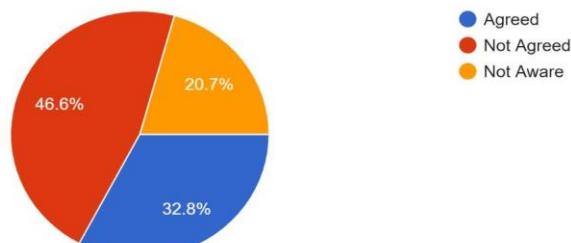
5) Do You Think that AI Can help investors for choosing right type of mutual fund for them  
58 responses



75.9% believe AI helps in selecting suitable mutual funds.

- **Prediction Ability:**

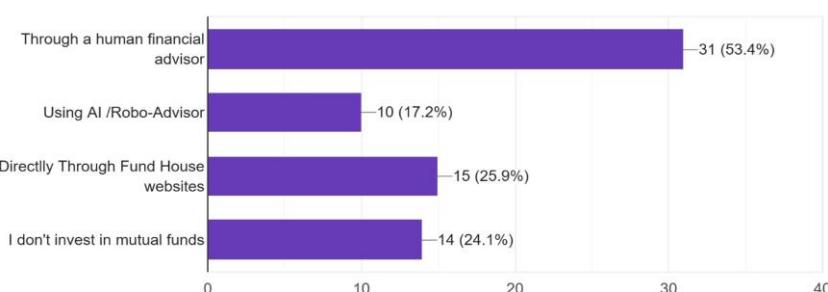
6) Do you think that AI Can Predict Mutual Fund performance better than humans  
58 responses



46.6% disagreed that AI predicts funds better than humans.

- **Investment Preference:**

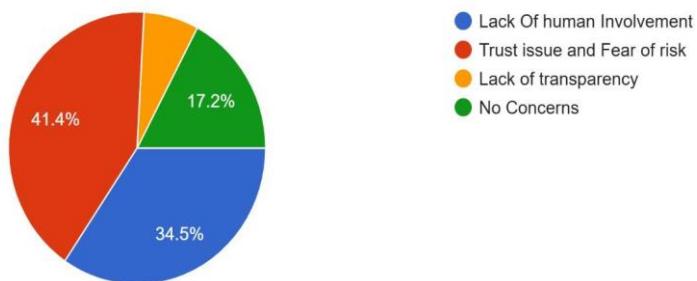
7) Which of the following is your preferred way to invest in mutual funds  
58 responses



53.4% prefer human advisors over robo-advisors.

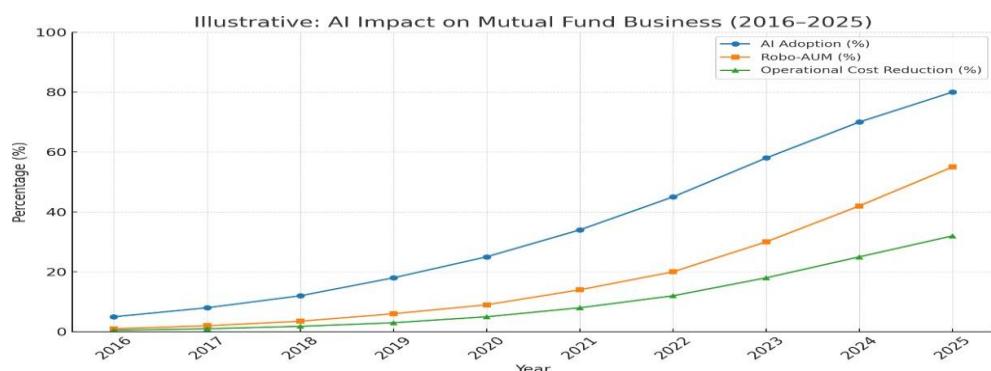
- **Concerns:**

10) What is your biggest concern with AI's managed/recommended mutual funds  
58 responses



41.4% cited trust and risk as the biggest issues.

**AI impact on the mutual fund business from 2016–2025. The three series are:**



- **AI Adoption (%)** — percent of fund houses using AI tools
- **Robo-AUM (%)** — percent of AUM managed or influenced by AI-driven models
- **Operational Cost Reduction (%)** - estimated cumulative reduction in operations costs due to automation/AI

**Analysis and Interpretation:**

- The graph tells a story of **transformative but uneven AI impact**:
  - **Adoption** is widespread and rapidly becoming the norm.
  - **Full automation of fund management (robo-AUM)** is growing, but more slowly — reflecting trust, regulatory, and fiduciary hurdles.
  - **Operational cost savings** are a clear and measurable benefit, accelerating adoption.
- In 2025, AI is **not replacing human fund managers** entirely, but **augmenting decision-making, reducing costs, and enabling more personalized services**.
- The trajectory suggests that firms **not adopting AI** will face **competitive disadvantages** in both cost structure and client experience.

## Hypothesis Testing (Chi-Square Test):

### 4.2 Hypothesis Testing Technique-CHI SQUARE TEST TECHNIQUE ⊕ ( $\chi^2$ )

| Attributes Compared   | CHI SQUARE VALUE<br>( $\chi^2$ ) | Degree of Freedom | Table Value at 5% Level of Significance | Result                      |
|---|----------------------------------|-------------------|---|-----------------------------|
| Age × Awareness of usage AI in Mutual Fund Investment                                   | 1.04                             | 2                 | 5.99                                    | Null Hypothesis is Accepted |
| Education × Awareness of usage AI in Mutual Fund Investment                             | 1.61                             | 3                 | 7.815                                   | Null Hypothesis is Accepted |
| Occupation × Awareness of usage AI in Mutual Fund Investment                            | 3.95                             | 3                 | 7.815                                   | Null Hypothesis is Accepted |
| Age × perception towards effectiveness of AI in Mutual Fund investment decision.        | 3.71                             | 2                 | 5.99                                    | Null Hypothesis is Accepted |
| Education × perception towards effectiveness of AI in Mutual Fund investment decision.  | 2.69                             | 3                 | 7.815                                   | Null Hypothesis is Accepted |
| Occupation × perception towards effectiveness of AI in Mutual Fund investment decision. | 14.1                             | 3                 | 7.815                                   | Null Hypothesis is Rejected |

## Interpretation

Out of 6 hypotheses, only one showed significance:

- **Occupation × Perception**

→ Profession influences investors' belief in AI's effectiveness.

All other demographic factors showed no significant association.

## Findings:

### General Findings:

- AI enhances research speed, reduces cost, and minimizes human bias.
- Global adoption of AI in mutual funds is rising.
- Indian investor awareness remains moderate, but interest is growing.
- Trust issues and lack of transparency hinder wider acceptance.
- Students and salaried individuals show higher confidence in AI-driven models.

**Specific Findings:**

1. Youth (15–25) are the most engaged demographic.
2. Limited awareness of robo-advisors in India.
3. Mixed perception of AI's accuracy compared to human judgment.
4. Strong preference for human advisors despite AI advantages.
5. Trust and fear of risk are major concerns.
6. AI is perceived as most useful for fund selection and portfolio management.
7. Occupation influences AI perception; age and education do not.

**Research Gaps:**

- Limited Indian research on AI adoption in mutual funds.
- Insufficient empirical data on trust and decision-making behavior.
- Lack of long-term studies comparing AI and human fund managers.
- Ethical implications largely unexplored.

**Suggestions:**

1. **Enable AI-powered customer self-service:**  
24/7 chatbots for NAV queries, SIP registration, and investor assistance.
2. **Promote transparency:**  
Explain how AI models recommend funds to build trust.
3. **Encourage Hybrid Advisory Models:**  
Combine human expertise with AI insights.
4. **Address emotional biases:**  
Educate investors on avoiding impulsive decisions.
5. **Profession-Based Targeting:**  
Tailor AI tools to groups like salaried individuals, students, professionals.
6. **Leverage Students as Early Adopters:**  
Offer student-friendly robo-advisor applications.

**Conclusion:**

AI has become a transformative tool in the mutual fund industry, offering enhanced efficiency, data-driven insights, and improved investor services. While AI supports smarter investment choices and reduces operational costs, trust concerns and lack of transparency remain significant challenges.

Survey findings reveal that although investors acknowledge AI's benefits, many still prefer human advisors for final decision-making. The only demographic factor influencing AI perception was **occupation**, showing that professionals and students are more receptive to AI tools.

As India continues to digitalize, the integration of AI with mutual fund operations will accelerate. A balanced hybrid model—combining human expertise with AI capabilities—can bridge trust gaps and support better financial outcomes.

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## THE IMPACT OF ARTIFICIAL INTELLIGENCE ON CONSUMER BUYING BEHAVIOUR IN DIGITAL MARKETING

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### **Abstract:**

*In the era of rapidly used technological advancement, Artificial Intelligence (AI) has emerged as a transformative force in the field of digital marketing and as well as in other sector. This research paper explores the impact of AI on consumer buying behaviour, focusing on how AI-driven tools—such as chatbots, recommendation engines, personalized advertisements, and voice assistants—affect decision-making processes in online purchasing of good and services. The study utilizes a combination of literature review and secondary data collected from consumers to analyse buying behavioural patterns, preferences, and attitudes toward AI integration in marketing. The findings reveal that AI significantly enhances customer engagement, satisfaction, and purchase intent through personalization and efficiency. However, concerns about data privacy, ethical transparency, and over-dependence on automation persist. This research concludes that while AI contributes positively to digital marketing effectiveness, businesses must give priority to ethical practices and consumer education to fully realize its potential. The paper provides suggestion for responsible AI adoption, aiming to balance innovation with trust in the evolving digital consumer landscape.*

**Keywords:** AI, Consumer Buying behaviour, Digital Marketing

### **Introduction:**

In the rapidly evolving digital landscape, Artificial Intelligence (AI) has emerged as a transformative force, fundamentally reshaping the way businesses interact with consumers. From personalized advertisements to intelligent chatbots and recommendation engines, AI technologies are being increasingly integrated into digital marketing strategies to enhance user experiences and influence purchasing decisions. As consumers become more tech-savvy and demand greater convenience, speed, and personalization, AI offers marketers powerful tools to meet these expectations in real-time.

Consumer buying behaviour, which was once primarily influenced by traditional factors like price, brand, and word-of-mouth, is now significantly impacted by AI-driven digital touchpoints. Through data collection, predictive analytics, and machine learning, marketers can understand consumer preferences, predict future buying patterns, and deliver targeted content that resonates with individual users. This has led to a shift from mass marketing to highly personalized marketing, where the consumer journey is tailored at every step.

This research aims to explore the profound impact AI has on consumer buying behaviour in the context of digital marketing. It will examine how AI tools such as chatbots, recommendation systems, sentiment analysis, and programmatic advertising influence consumer decisions, brand engagement, and trust. The study also investigates the psychological and ethical dimensions associated with AI's role in shaping consumer choices, ultimately contributing to a deeper understanding of how technology is redefining consumer-marketer relationships.

### **Literature Review:**

The integration of Artificial Intelligence (AI) into digital marketing has attracted growing attention from scholars and practitioners alike.

Kumar et al. (2021), AI technologies, particularly in the form of machine learning algorithms and data analytics, enable businesses to decode consumer preferences and automate personalized content delivery. This shift significantly enhances the customer journey by offering more relevant product suggestions, timely responses through chatbots, and predictive recommendations based on browsing history.

Shankar (2018), highlights that AI-enabled personalization increases customer engagement, satisfaction, and loyalty. Moreover, AI-powered tools such as sentiment analysis help brands understand consumer emotions and attitudes toward products and services. These insights are crucial in adapting marketing strategies in real time, ultimately affecting consumer purchase intentions.

Scholars like Pasquale (2015), On the other hand, ethical concerns regarding data privacy and manipulation have also been discussed. argue that while AI improves marketing precision, it can also infringe on user autonomy and transparency. Consumers are sometimes unaware of how their data is used to influence their choices, which may raise concerns around trust and consent.

Sharma(2020),In this study, emphasized that AI tools such as chatbots and recommendation engines help create an emotional bond between the customer and the brand. These tools provide instant support and personalized interaction ,which enhance brand loyalty.

Overall, the literature reveals a dual impact: while AI enhances the efficiency and effectiveness of digital marketing, it also brings challenges related to ethical usage, data privacy, and consumer scepticism. This research builds upon existing

studies to further examine the direct and indirect effects of AI on consumer buying behaviour in a digitally connected world.

### **Research Objectives:**

1. To examine the role of AI technologies in influencing consumer purchase decisions.
2. To study consumer perception and acceptance of AI in digital marketing.
3. To analyze the effectiveness of AI in enhancing customer engagement and personalization.
4. To assess the impact of AI-powered advertising on consumer decision-making.

### **Research Methodology (Based on Secondary Data):**

#### **1. Research Design**

This study follows a **descriptive research design**, aiming to understand and analyze the existing literature, data, and real-world applications of Artificial Intelligence (AI) in digital marketing and its influence on consumer behavior. Descriptive research is suitable as it helps explore patterns, trends, and perceptions using previously recorded information and validated research.

#### **2. Data Collection Method**

The study relies exclusively on **secondary data**, which includes information collected from the following sources:

- Academic journals and scholarly articles
- Case studies
- Market research databases (e.g., Statista, McKinsey, Deloitte)
- Published reports from companies using AI in marketing (Amazon, Netflix, Google, etc.)
- Articles and insights from reputed digital marketing platforms (e.g., HubSpot, Forbes, Harvard Business Review)

#### **3. Data Analysis Techniques**

The analysis is **qualitative and interpretative**, and includes:

- To identify recurring patterns related to AI tools (e.g., chatbots, recommendation engines) and consumer engagement.
- Comparing findings from various sources to evaluate the effectiveness of AI across industries.
- Analysing specific real-world examples of companies effectively using AI to influence consumer behavior.

### **Scope and Limitations:**

- **Scope:** The study covers global AI applications in digital marketing across various industries such as retail, entertainment, and e-commerce.
- **Limitations:** Time was the biggest constraint but all effort have made to get relevance information required for study.

**Findings:****1. AI Technologies Influence Consumer Purchase Decisions/ buying preferences**

AI tools like chatbots, recommendation engines, and predictive analytics play a vital role in shaping consumer decisions. Brands using these tools have shown increased customer engagement, quicker decision-making, and better conversion rates.

**2. Positive Consumer Perception towards AI in Digital Marketing**

Most consumers appreciate the convenience and efficiency AI provides in digital marketing. While trust levels are rising, especially among younger users, concerns around data privacy and transparency still exist.

**3. AI Enhances Customer Engagement and Personalization**

AI enables brands to deliver personalized experiences through dynamic content, product recommendations, and targeted communication. This personalized approach leads to higher user satisfaction, engagement, and long-term brand loyalty.

**4. AI-Powered Advertising helps in Targeting and Conversions**

AI helps marketers deliver more precise and data-driven advertisements.

Targeted AI ads result in improved relevance, higher click-through rates, and increased impulse purchases, ultimately boosting business outcomes.

**Conclusion:**

In conclusion, the study reveals that Artificial Intelligence (AI) significantly influences consumer buying behavior in digital marketing by enhancing personalization, engagement, and decision-making through tools like chatbots, recommendation engines, and targeted advertising. Consumers are increasingly accepting and trusting of AI when it adds value to their shopping experience, although concerns regarding data privacy and ethical use persist. As AI continues to evolve, its integration into marketing strategies must be balanced with transparency and consumer-centric approaches to ensure long-term effectiveness and trust.

**Suggestions:**

- 1. Ensure Data Privacy** – Brands should ensure proper implementation of strong data protection measures in order to build consumer trust.
- 2. Enhance Transparency** – It should clearly communicate how AI tools use consumer data.
- 3. Focus on Personalization** – Use AI to deliver tailored experiences that add real value to the consumer.
- 4. Regularly refine AI Tools** – Continuously update AI systems based on consumer feedback and market trends.

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## **THE RISE OF SENTIENT AI IN MARKETING: EXPLORING THE POTENTIAL OF EMOTION-BASED STRATEGIES**

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*Mentee*

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### **Abstract:**

*This research looks into possible uses of virtual influencers and how they may influence brand identity and marketing initiatives in the cosmetics, fashion and entertainment (gaming) industries. It weighs the pros and cons of virtual influencers focusing on the effects on human influence and customer perception. It also looks into the lack of public recognition and understanding of these artificially created personas. In the end, the research is aimed at understanding how brands can optimally leverage virtual influencers to navigate the overshadowing and competition of the digital landscape.*

**Keywords:** Virtual Influencers, Customer Engagement, AI-generated Personalities

### **Introduction:**

Influencer Marketing is one of the popular trends in digital marketing strategies these days. Virtual Influencer or as they are called “Computer Generated People” have features like humans. With the advancements in technology and the rise in the use of digital platforms, it has become difficult for brands to choose the right influencers and stand out from the crowd. Millions and billions of people around the world are now using Instagram and engaging with these new personalities called “Virtual Influencers.”

Virtual influencers (Vis) have recently attracted significant attention from both industry and industry as an innovative strategy for promoting products and services across various platforms such as Instagram, Facebook and TikTok (Deng and Jiang, 2023). Unlike human influencers (His), Vis are not real individuals, but digital creations developed by groups of creators who either mimic human appearance and behavior or resemble cartoon-like characters (Barari et al., 2021). Because of their strong ability to engage followers, many brands are using VIs for influencer marketing, either by collaborating with them or creating their own Vis (Barari,

2023). As a result, prominent brands like BMW are partnering with Vis such as Lil Miquela to enhance customer engagement and influence purchasing behavior.

### **The New Age of Social Media Faces/Influencers:**

- Lil Miquela:** "Lil Miquela", a 19- year Musician who has over 1.6 million followers was created by L.A. firm Brud and started its journey in the year 2016. She is now a popular face in famous magazines and other luxury brands. Her Spotify has more than 80k people streaming music every month.
- Blawko:** Another virtual influencer "Blawko" was also created by Brud who has streetwear styling and tattoos. He is one of the most mysterious influencers as his face is half-covered with a mask.
- Colonel Sanders:** KFC, for instance, made a CGI variant of the organization's author Colonel Sanders. The virtual persona speaks to Sanders as a hip youngster, embellished with tattoos of KFC-related expressions across his abs. He showed up on KFC's Instagram page for only few weeks.
- Thalasya:** Initially from Jakarta in Indonesia, Thalasya traversed her "nation of origin" investigating its galleries and shops. However, while staycations are presently a thing, this has not prevented her from going right to the USA. She has advertised for hotels, restaurants, and even health pills. She was created by Magnavem Studio and showed up in October 2018.
- Bermuda:** She is one of the oldest virtual influencers. Initially from Los Angeles, she previously showed up in December 2016. This young lady, who is recognized as a robot lady, plans to spur youthful business people to pursue their business objectives. She intends to spur more ladies to follow professions in the field of robotics.

### **The Rise of Virtual Influencers:**

The journey of virtual influencers began in the early 2000s when computer graphics started getting better. People began to create animated characters that looked real. For example, in 2016, a virtual influencer named Lil Miquela took social media by storm. She appeared on Instagram and gained thousands of followers very quickly. People loved her style and the way she interacted with her followers.

As a result, brands noticed this trend and saw the potential of working with these digital creators. Virtual influencers can promote products, appear in campaigns, and even go on adventures—all without needing a break! Therefore, this allows brands to run continuous marketing campaigns.

### **Virtual Influencers in Marketing Strategies:**

Brands use virtual influencers in many ways as part of their social media marketing strategies. Here are some popular strategies they use:

### ***Brand Campaigns:***

First, brands can create exciting campaigns featuring virtual influencers. These campaigns might include fun YouTube videos or engaging posts on Instagram. By using catchy hashtags, they can reach even more people. For example, when a brand launches a new product, a virtual influencer can showcase it creatively. This not only grabs attention but also encourages more people to check out the brand.

### ***Collaboration:***

Furthermore, brands often collaborate with virtual influencers to create unique content. For instance, they might design a special outfit for the virtual influencer to wear in a post. This type of collaboration can lead to interesting and creative advertising that captures the audience's attention. By working together, both the brand and the virtual influencer can share new ideas that make their content stand out.

### ***Community Marketing:***

In addition, virtual influencers can interact with their followers in fun ways. They might ask questions, share stories, or even run contests. This interaction helps build a strong community around the brand. When virtual influencers are active on social media, it shows that they care about their followers. As a result, followers feel more connected and engaged with the brand.

### ***Importance of the study :***

World is moving towards digitalization with the help of new digital technology this technology have been improved to help the company to reduce its budget spending on human influencers .This study shows how this computer generated character are been used to engage with the audience (customer general public etc) it explores the way virtual influencer are shaping and changing the future of branding, influencing, advertising especially in a world which is mostly dominated or gets easily influenced by social media post and by influencer etc Understanding the role of virtual influencer can help brand to be active in digital market with less expenses and they will not have creativity limit on them like real influencer have the only limit they have is their creative thinking

#### **1. Innovation in branding**

It highlight how virtual offers a new way to communicate with the audiences through creative idea and new ways to engaged with customers company have no limit on their creative idea the only limit they have is their imagination (Sky is the only limit)

#### **2. Understanding consumer perception**

This study shows how consumer view virtual influencers in terms of trust authenticity and emotions connection etc with the use of primary and secondary data

### **3. Bridging literature gap**

There is limited academic research done on this topic so the study contributes valuable insight in this existing body of knowledge in digital marketing and branding

### **4. Marketing strategy development**

Study on this topic can guide marketers and business in developing effective branding strategies using virtual influencer

### **5 Global and future relevance**

As virtual influencer are expected to grow in popularity worldwide this research is relevant in future development in branding

#### **Review of Literature:**

- 1. Moustakas, E., Mahmoud, D., & Lamba, M. (2020)** The impact of virtual influencers on consumer behavior on social media platforms is examined by Moustakas et al. in their study "Virtual Influencers: More Human Than Humans?" According to the study, compared to human influencers, virtual influencers can build an equivalent—and occasionally higher—level of trust and emotional engagement. The authors stress that they are very appealing, particularly to younger digital native audiences, because of their "perfect" appearance and carefully manicured personalities. But the study also brings up moral questions about consumer deceit and transparency.
- 2. Suwinyattichaiporn, T. In 2021, Suwinyattichaiporn, T.** In Suwinyattichaiporn's article "Virtual Influencers and the Future of Marketing: A Parasocial Relationship Perspective," audiences establish parasocial relationships—one-way emotional connections—with virtual influencers. According to the research, despite the fact that consumers know virtual influencers are not real, they often feel a very strong emotional connection with them. This emotional connection may positively affect purchase intentions, brand trust, and overall marketing effectiveness. The study comes to the conclusion that in many marketing contexts, virtual influencers can effectively take the place of real influencers.
- 3. P . Jin, S. V., & Ryu, E. (2022) :** In their study "The Paradox of Virtual Influencers: Differences in Perceived Authenticity and Brand Trust in Human vs. Virtual Influencer Marketing", the authors analyze how audiences perceive authenticity when comparing human and virtual influencers. Findings suggest that while human influencers are seen as more relatable, virtual influencers are perceived as more consistent and less likely to cause scandals, which increases brand trust in controlled campaigns. The study underscores the importance of audience demographics in shaping these perceptions.

#### **4. Seitz, C., & Roosen, J. (2022)**

Their paper titled "Virtual Influencers and Sustainability: Marketing Opportunities and Challenges" explores the use of virtual influencers in promoting ethical and sustainable branding. The study highlights that brands can design virtual influencers to embody specific social values—such as eco-friendliness or inclusivity—which helps in value-driven marketing. However, it also warns about the risk of consumers perceiving such campaigns as inauthentic if not transparently disclosed.

#### **5. Gonzalez-Rodriguez, M., & Loureiro, S. M. C. (2023)**

In their article "Digital Humans in Branding: The Role of Artificial Intelligence and Emotional Engagement", the authors examine how AI-powered virtual influencers can emotionally connect with audiences by mimicking human expressions and interactions. The study finds that emotional realism created by AI tools can lead to strong brand associations, provided the influencer aligns with the brand's personality and values. The paper also discusses the future potential of AI avatars in immersive marketing such as the metaverse

#### **Objectives of the Study:**

1. To understand the concept and evolution of virtual influencers in digital marketing.
2. To analyze the impact of virtual influencers on brand identity and consumer engagement.
3. To examine the role of virtual influencers in industries like fashion, cosmetics, and entertainment.
4. To compare the effectiveness of virtual influencers versus human influencers.
5. To evaluate consumer awareness, acceptance, and trust toward virtual influencers.

#### **Research Methodology:**

**Research Design :** A Descriptive and Exploratory research design is adopted by the researchers.

#### **Data Collection :**

Primary Data : A structured Questionnaire

Secondary Data : Reference books and web resources

#### **Sampling :**

Sampling Method : Simple Random sampling

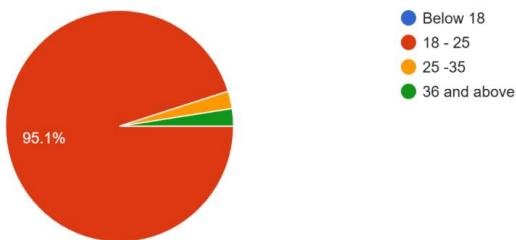
Sample Size : 41

Sampling Unit : Students and Young Professionals from 18 to 25 years of age.

**DATA ANALYSIS AND INTERPRETATION:****Fig 1**

1.What is your age group?

41 responses

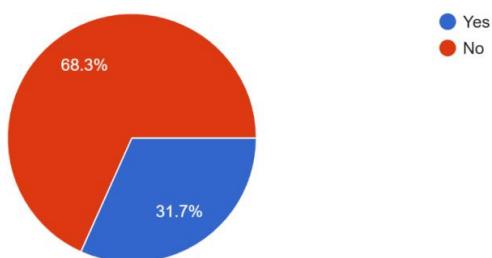
**Table 1**

| AGE       | NUMBER OF RESPONDENTS | PERCENTAGE |
|-----------|-----------------------|------------|
| Below 18  | 0                     | 00         |
| 18-25     | 39                    | 95.1 %     |
| 25-35     | 1                     | 2.45%      |
| 36& above | 1                     | 2.45%      |
| TOTAL     | 41                    | 100        |

**Fig 2**

6 .Have you ever heard of virtual influencer ( eg . Lil miquela,kriti ,shudu )

41 responses

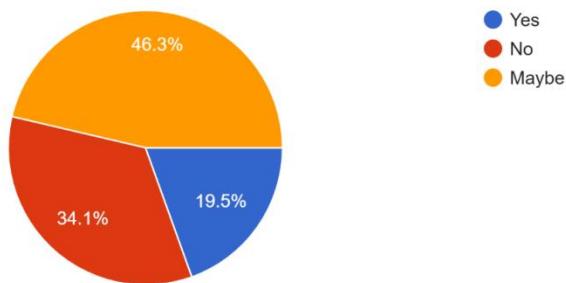
**Table 2**

| Particulars | Number of Respondents | Percentage |
|-------------|-----------------------|------------|
| Yes         | 33                    | 68.3       |
| No          | 8                     | 31.7       |
| TOTAL       | 41                    | 100        |

**Fig.3**

8. Do you believe virtual influencer are as engaging as real human influencer ?

41 responses

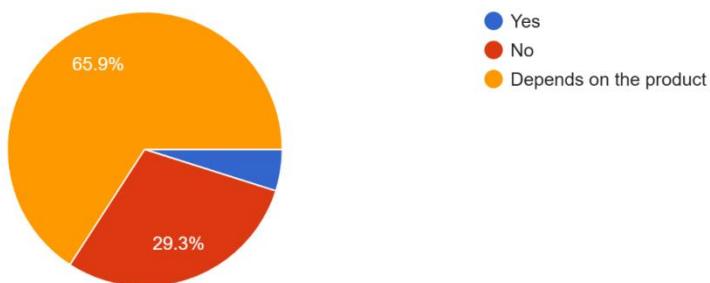
**Table 3**

| PARTICULARS | NUMBER OF RESPONDENTS | PERCENTAGE |
|-------------|-----------------------|------------|
| Yes         | 8                     | 19.5       |
| No          | 14                    | 34.1       |
| MayBe       | 19                    | 46.3       |
| TOTAL       | 41                    | 100        |

**Fig 4**

9. Would you trust a brand that uses a virtual influencer to promote it's product?

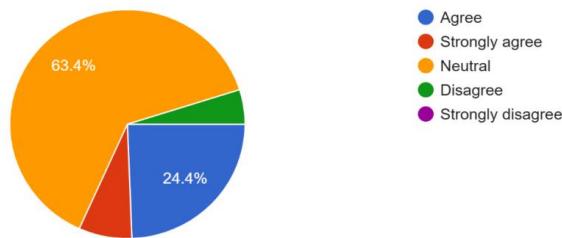
41 responses

**Table 4**

| PARTICULARS            | NUMBER OF RESPONDENTS | PERCENTAGE |
|------------------------|-----------------------|------------|
| Yes                    | 2                     | 4.8        |
| No                     | 12                    | 29.3       |
| Depends on the product | 27                    | 65.9       |
| TOTAL                  | 41                    | 100        |

**Fig 5**

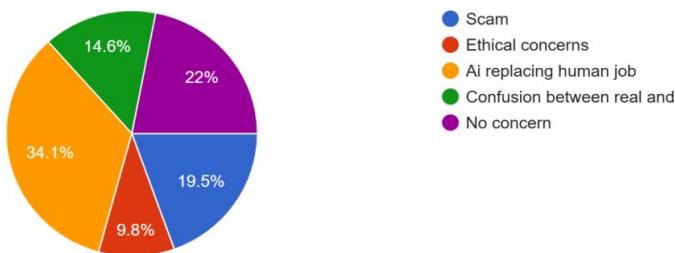
11. Do you think virtual influencer are the future of digital branding?  
41 responses

**Table 5**

| PARTICULARS       | NUMBER OF RESPONDENTS | PERCENTAGE |
|-------------------|-----------------------|------------|
| Agree             | 10                    | 24.4       |
| Strongly Agree    | 3                     | 7          |
| Neutral           | 26                    | 63.4       |
| Disagree          | 2                     | 5          |
| Strongly disagree | 00                    | 00         |
| TOTAL             | 41                    | 100        |

**Fig 6**

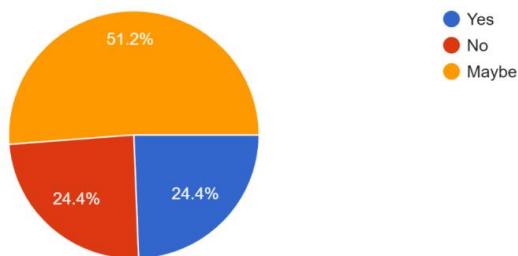
13. What is your main concern about virtual influencer ?  
41 responses

**Table 6**

| PARTICULARS                         | NUMBER OF RESPONDENTS | PERCENTAGE |
|-------------------------------------|-----------------------|------------|
| Scam                                | 8                     | 19.5       |
| Ethical concerns                    | 4                     | 9.8        |
| AI replacing human Job              | 14                    | 34.1       |
| Confusion between real & artificial | 6                     | 14.6       |
| No concern                          | 9                     | 22         |
| TOTAL                               | 41                    | 100        |

**Fig 7**

14 . Would you buy a product promoted by a virtual influencer if you liked the campaign ?  
41 responses

**Table 7**

| PARTICULARS | NUMBER OF RESPONDENTS | PERCENTAGE |
|-------------|-----------------------|------------|
| Yes         | 10                    | 24.4       |
| No          | 10                    | 24.4       |
| MayBe       | 21                    | 51.2       |
| TOTAL       | 41                    | 100        |

### **Findings of the Study :**

#### **General Findings:**

Moustakas & Lamba (2020) shows that brands prefer virtual influential people to provide more control and sequence. Seitz and Ramasamy (2021) focused on how consumers consider their confidence and interaction with virtual influential people. De Veirman et al. (2022) identified ethical issues and how these influential digital faces shape the future of marketing.

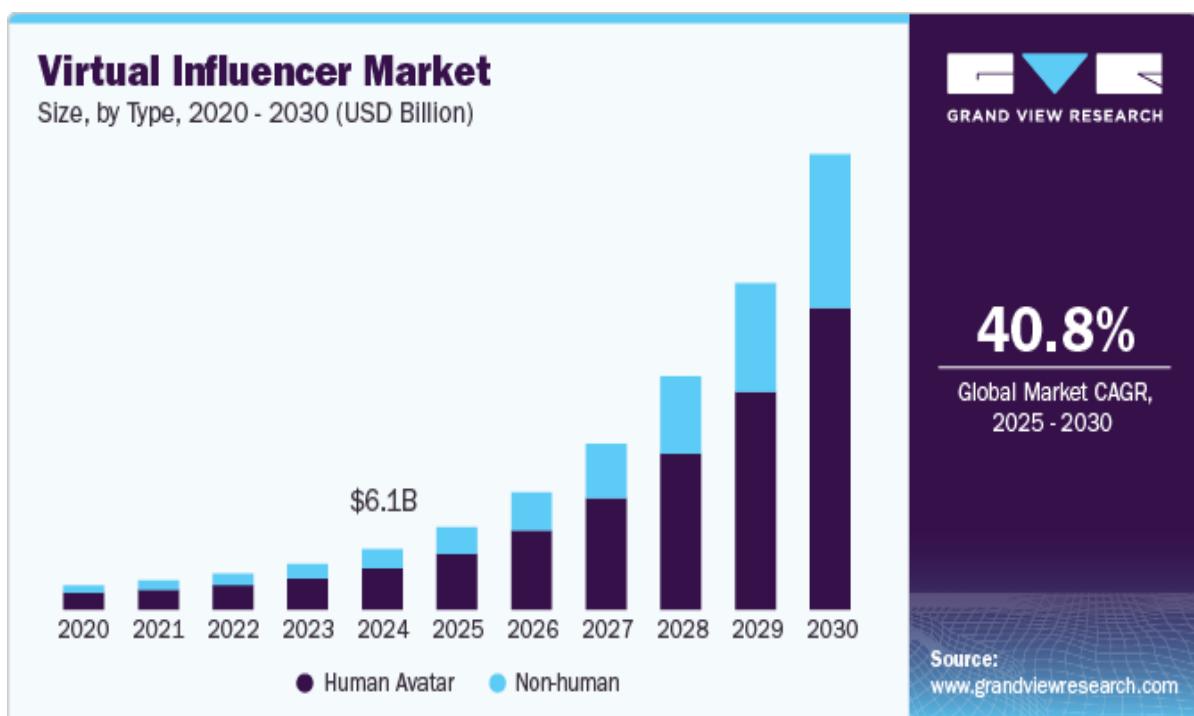
Here's a clear comparison table with:

#### **Virtual Influencer Use by Country – Comparison Table**

| Country     | % of Brands Using AI Influencers | Famous Virtual Influencer | Brands That Used Them                           |
|-------------|----------------------------------|---------------------------|---|
| India       | 15–20%                           | Kyra                      | boAt, Amazon Prime Video, John Jacobs           |
| USA         | 60–70%                           | Lil Miquela               | Calvin Klein, Samsung, Prada, Pacsun            |
| Japan       | 50–60%                           | Imma                      | IKEA Japan, SK-II (beauty brand)                |
| South Korea | 55–65%                           | Rozy                      | Shinhan Life Insurance, Chevrolet, Calvin Klein |

| Country | % of Brands Using AI Influencers | Famous Virtual Influencer | Brands That Used Them                |
|---------|----------------------------------|---------------------------|--------------------------------------|
| UK      | 40–50%                           | Noonoouri                 | Dior, Versace, Fenty Beauty          |
| China   | 45–55%                           | Ling                      | Alibaba, Tmall, local fashion brands |
| Brazil  | 25–35%                           | Lu do Magalu              | Magazine Luiza (Retail giant)        |

- Kyra (India) is India's first virtual influencer with a strong lifestyle presence.
- Lil Miquela (USA) is one of the most well-known virtual influencers globally.
- Imma (Japan) focuses on fashion and art, collaborating with IKEA and other brands.
- Rozy (South Korea) is a major AI figure in commercials and fashion campaigns.
- Noonoouri (UK-based influence) promotes sustainability and luxury fashion.
- Ling (China) is used for high-end e-commerce and brand storytelling.
- Lu do Magalu (Brazil) is owned by a retail company, becoming a digital brand ambassador.



### **Specific Findings :**

1. Majority of respondents were from the age group of 18 to 25, which indicate that young audiences are more open to technological discussions and are the primary group influenced by AI marketing
2. More than 68.3 % have never heard about virtual influencers due to lack of awareness in India about virtual AI
3. 34.1% people think that AI influencer are not as engaging as human influencers and 46.3% people think maybe AI influencers will be as or more engaging than human influencer while other 19.5 % people thinks it will not as engaging as human influencers
4. 65.9% people choose not to trust AI influencers, but it depends on the product while 29.3 % people choose that they will not trust any AI influencers, and no one thinks that they will directly trust any AI influencers
5. Lack of Indian consciousness: Key data shows that public perceptions of virtual influential people in India are always low, but interest is developing as digital marketing is developing.
6. Higher interaction with the Generation Z: Virtually influential faces are particularly attractive to young and digital audiences due to their appearance, sequences and impeccable supervised personality.
7. Global adoption: Virtual influential people are increasingly accepted by the global mark as India gradually researches its potential while countries such as the US, Japan and South Korea lead to use
8. Economic and Creative: Brands believe that virtual influential people are more profitable than human influential people with greater creative freedom, as they are not limited by actual restriction
9. There is an emotional link. Despite the fact that they are artificial and virtually influential faces, they can form emotional and umbrella relationships with the public, and have a positive impact on brand confidence and adoption of purchasing decisions.
10. Identified Academic Gap: There is limited academic research in this subject, especially in the Indian context. This illustrates the need for additional research into consumer perception and brand efficiency using virtual influence.

### **Research Gaps:**

1. Limited studies on virtual influencers in the Indian market.
2. Lack of data on consumer trust and emotional connection with virtual influencers.
3. Few comparisons between global and Indian usage trends.
4. Ethical and psychological impacts are underexplored.
5. No long-term data on virtual influencer effectiveness.

### **Limitations of the Study :**

- 1) Time and Resource constraints may affect the quality of research.
- 2) Biasness of respondents may affect the results of the study.

### **Suggestion :**

- 1) Brands should study the use of virtual impact as an economically effective and creative tool for digital marketing. Especially in India, early adoption can give brands a competitive advantage. Depending on the outcome, companies are encouraged to start with a test campaign to understand audience engagement and gradually involvement in scale.
- 2) There is a need to raise awareness among virtual influential people, particularly in India, through education and marketing campaigns. Brands can experience virtual influential people with small advertising actions and see how the public responds.
- 3) Researchers should focus on studying ethical issues related to consumers' long-term behavior, emotional participation, and hypothetical influencers.
- 4) Additionally, collaboration between technology companies and marketing specialists can help improve the reliability and appeal of virtual influential people.
- 5) Finally, governments and industry authorities should consider governance principles that help ensure transparency in marketing for virtual influential people and strengthen consumer confidence and trust in industry.

### **Conclusion:**

The findings of this study underscore the emerging significance of virtual influencers as a transformative force in contemporary brand image building and marketing. Their creative adaptability, cost-effectiveness, and capacity to engage digital-native audiences—particularly Generation Z—position them as a compelling alternative to traditional human influencers. Although global markets have already integrated virtual influencers into mainstream marketing practices, India is still at a nascent stage of adoption. However, the potential for growth is substantial. With rapid technological advancements and rising consumer awareness, virtual influencers are likely to play an increasingly integral role in future marketing strategies. Businesses that proactively understand and leverage their impact on trust, engagement, and brand perception will be better positioned to navigate and thrive in the evolving digital marketplace.

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## WHEN MARKETING THINKS AND FEELS: THE RISE OF SENTIENT AI AND EMOTION BASED MARKETING

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### **Abstract:**

*The focus of this research study is the evolving integration of Emotion AI and Artificial Intelligence into marketing. Emotion AI is the technology that deciphers emotions through facial expressions, voice, and body language. Sentient AI attempts to humanize technology by trying to think and feel like humans. The research focuses on how companies are using these technologies to improve marketing by integrating them into digital marketing for better personalization and emotions.*

*The study analyzes case studies, expert feedback, and responses from a Google Forms survey to gauge the public's perception of the impact and awareness of marketing influenced by emotions. The study explores how trust, emotional connection, and loyalty are maintained because of these strategies. The study also emphasizes the ethical implications concerning emotional data and privacy, the technology's ability to alter information, and details concerning manipulation. The study's findings show that Emotion and Sentient AI are reshaping how brands connect and communicate on a deeply personal level.*

**Keywords:** *Emotion AI, Sentient AI, Emotional Marketing, AI in marketing, Consumer trust.*

### **Introduction:**

Marketing has always been about understanding their consumers or customers' needs because consumers are the king of the market and understanding their behavior is very crucial for marketers but today due to rise of artificial intelligence we see something new that is where machines are beginning to understand emotions too. In this study we will focus on two advanced forms of AI. The first one is Emotion Based AI which is already there in the market and is used by many top brands to detect consumer behavior or buying pattern accords to their facial

expressions, voices, behavior etc. And Sentient which takes a step further by showing the ability to feel or respond in a human like way.

The aim of this paper is to explore how this emotion based Ai is used in the world of marketing. How companies are using this tools to connect with their consumers on a deeper level, the ethical concerns about it and how this is shaping the future of advertising. This study also includes public opinion through survey as how they feel about being marketed by a technology that is aware of emotions.

### **Importance of the study:**

Let's summarize potential ways this study can contribute towards;

#### **1. Grasping Human-Centered Marketing**

The study indicates that brands can forge strong connections with their customers.

#### **2. Emotion AI Awareness**

Many consumers are unaware that their emotional reactions are analyzed by the brands. This study aims to reveal that.

#### **3. Assist Brands in Making Ethical Decisions**

The study results can help marketers develop sophisticated and emotionally aware campaigns that are non-manipulative and non-invasive.

#### **4. Assist with Future Marketing.**

Students and young professionals will have insights into emerging trends.

#### **5. Emphasize Ethical Issues and Privacy**

The focal point of this study continues to be emotional surveillance, data privacy, and digital consent.

### **Review of Literature:**

- [1] I first came across Picard's work in "Affective Computing" from 1997, where she was one of the first to suggest that computers could be trained to recognize human emotions and react to them. Her work was the first attempt toward Emotion AI, and she argued that for human-robot relations to be meaningful, machines must possess emotional intelligence. Her work inspired the development of certain devices and software which interprets faces, voice tones, and even heart rates.
- [2] Another study of great importance was conducted by Kapoor and Dwivedi in 2020. Their research paper concerning sentiment analysis in marketing highlighted the ways companies have been mining emotional data from social media, online reviews, and customer interactions to construct sophisticated messages. They demonstrated the capability of AI to recognize anger, joy, or dissatisfaction from the text and use them to enhance marketing strategies. This was of great importance to me, as I noticed this practice by many brands who use social listening powered by AI.

[3] A more recent publication from the MIT Media Lab examined the Sentient AI concept, which is an advanced form of Emotion AI that emulates human awareness. The article explained Sentient AI is capable of more than simply reading emotions. It can introspect, process, and adapt in more human-like manner. This is incredibly fascinating and has expanded my understanding on the development of AI in the coming ten years.

[4] I was also intrigued with the Harvard Business Review article titled "Marketing in The Age of AI." This article focuses on the business aspects of AI. It talks about the shift from collecting data to an automated real-time emotional data analytics system.

[5] One of the most fascinating studies I have come across was about Affectiva, a company that uses Emotion AI to assess facial and vocal expressions. This study also examined the partnership Coca Cola had with Affectiva to analyze the emotional response testers to their ad campaigns. The company was measuring emotional levels of joy.

[6] Lastly, a 2023 report by McKinsey on smart tech for marketers advanced the idea that Emotion AI is being embraced across the board from retail to healthcare. It presented several micro case studies, including one on Spotify that uses Emotion AI to recommend songs that complement the listener's current mood, thus enhancing the overall experience of the users.

### **Gap Identification:**

Automation, efficiency, or consumer contact are the main topics of the majority of current marketing AI research. However, there is a clear lack of research on how customers react emotionally to AI, particularly Sentient AI and Emotion AI. Research on people's genuine feelings toward computers that can mimic or comprehend human emotions is scarce. Despite its increasing prominence in digital marketing, this emotional component is frequently disregarded. The study bridges the gap between what consumers feels about Emotion Ai than its technical functions by doing this, the study illuminates a marketing topic that is still developing and generally ignored in conversations within the academic and business communities.

### **Research Objective:**

1. To evaluate public recognition and comprehension of Emotion AI relative to public and private demographics.
2. To find out the Emotion AI tools and technologies that consumers use most frequently.
3. To study the effect of emotions in advertisements on consumer purchasing behavior.

4. To evaluate the consumer confidence and discomfort pertaining the use of Emotion AI and emotional data.
5. To investigate the opinions on the ethical limits and prospective applications of Sentient AI in shopping.

### **Research Methodology :**

For this study, I decided to use a combination of primary and secondary data to understand how people perceive virtual influencers and how these digital personalities shape the future of their brand. Because this subject is relatively new and rapidly growing, we estimated that the combination of actual opinions and existing research would provide a more complete and practical perspective.

#### **Primary Data:**

To know what people really think, I created Google Forms with a combination of common issues based on opinions. We shared our research with students, young specialists and social media users via WhatsApp, Instagram etc.

The form remained open for 2 days and received 141 valid responses.

#### **Target group:**

The majority of participants were 18 to 22 years, including students and young professionals from fields like commerce technology and arts. This age group is highly active online and directly exposed to digital marketing trends

#### **Data handling:**

The responses were collected anonymously and analyzed using google sheet .this analyses gave useful information about how young consumers are emotionally reacting to AI in marketing

#### **Secondary Research :**

Analysis Alongside the survey, thorough secondary research was done through reviewing 12 sourced texts which include books, research papers, journals, and real-world brand case studies.

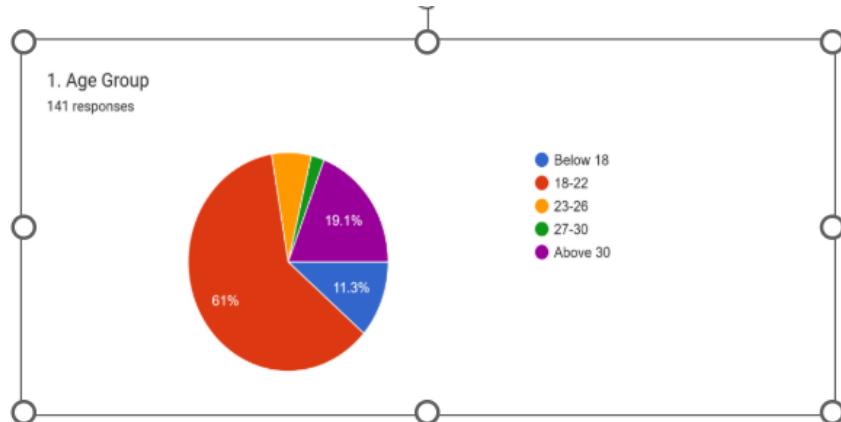
These include foundational texts such as:

- Rosalind Picard's Affective Computing (1997), the first Emotional AI system
- Virginia Dignum's Responsible AI (2019), speaks on ethics and transparency
- Sentiment analysis study- Kapoor & Dwivedi (2020)
- And real-world applications such as:
- Coca Cola's analysis of ad performance with Affectiva's Emotion AI
- Spotify's emotionally intelligent music recommendations powered by AI.
- Sentient AI case studies from Harvard Business Review, McKinsey, Forbes, and MIT Media Lab.

These secondary sources were critical in establishing the study's conceptual and ethical background while demonstrating notable brand strategies and confirming the study's hypotheses.

### Finding of the study:

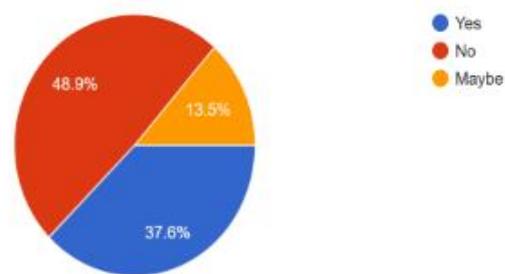
- Majority of respondent were age 18-22, which conclude that young audience are more open to technological decisions.



- 48.9 % people had never heard of emotion AI, reason lack of awareness.

4. Have you heard of "Emotion AI" before this survey ?

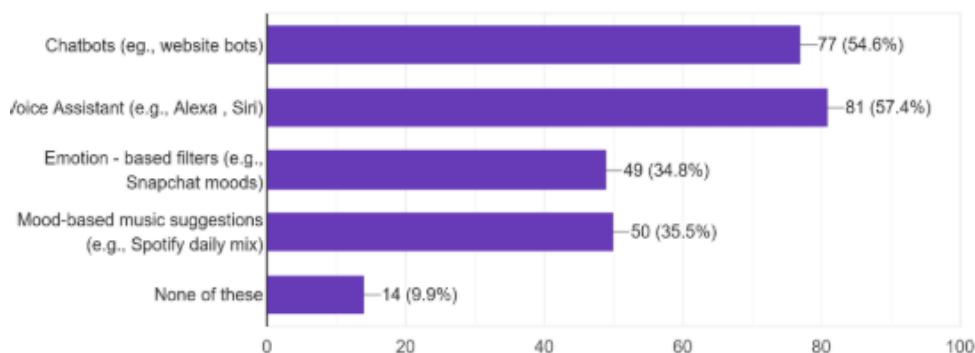
141 responses



- 54.6% people have interacted with voice assistant that is alexa and siri because of its popularity among all generation people because its easy to utilized by anybody Only 32.6% buy from the brand that emotionally connects with them.

5. Which of these have you interacted with ?

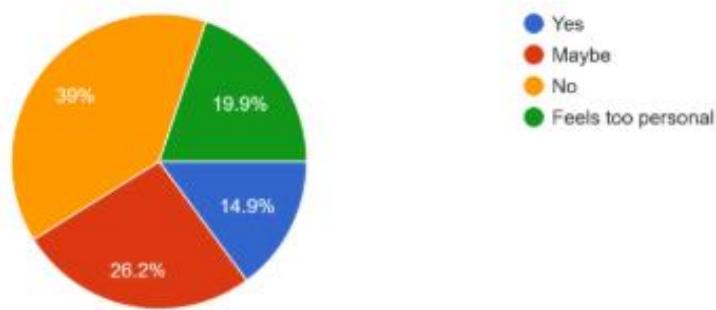
141 responses



- 19.9% people felt that AI reading their facial expressions was too personal and 3% rejected the whole idea of AI reading their facial expressions.

11. Would you allow a brand to read your facial expressions to show ads ?

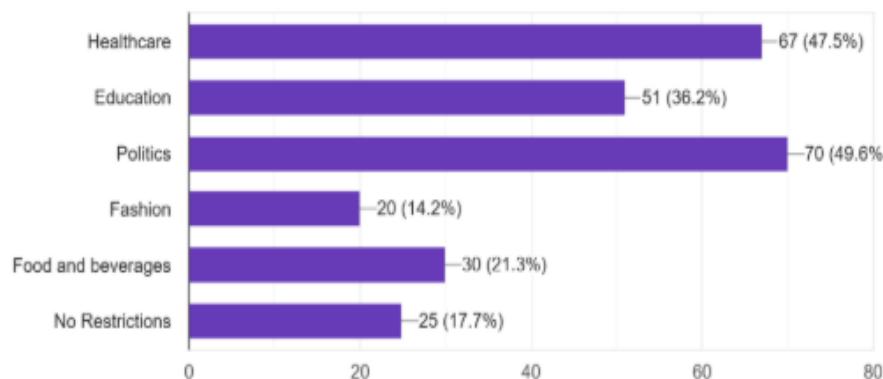
141 responses



- When asked which industry should not use emotion AI people preferred politics and healthcare industry the most because of privacy reason

17. Which industries should not use Emotion AI ?

141 responses



### Others are as Follows:

Hence this study analyses that there is lack of awareness among people but at the same time it sparks interest for its personalization but there is still concern around privacy, trust and emotional manipulation. Overall it shows how many of the commerce are intrusted but they want to feel safe, informed and respected before embracing it.

**Data Analysis:**

- Chi-Square Test for Independence for Gender and prior awareness of Emotion AI

|        | Have you heard of "Emotion AI" before this survey ? yes | Have you heard of "Emotion AI" before this survey? No | total |
|--------|---|---|-------|
| male   | 27  | 32  | 59    |
| female | 26  | 36  | 62    |
| total  | 53  | 68  |       |

**Hypotheses :**

Null Hypothesis ( $H_0$ ): Gender and prior awareness of Emotion AI are independent.

Alternative Hypothesis ( $H_1$ ): Gender and prior awareness of Emotion AI are not independent.

**Test Result:**

p-value = 0.6715

Significance level ( $\alpha$ ) = 0.05

Since p-value >  $\alpha$  ( $0.6715 > 0.05$ ), we fail to reject the null hypothesis.

**Conclusion:** There is no statistically significant association between gender and prior awareness of Emotion AI.

**2. Awareness of AI's Emotion-Reading Ability**

On a scale of 1 to 5, the average score for understanding how AI can read emotions is 2.88. This suggests that respondents have a moderate level of understanding, leaning slightly towards the lower side. While some awareness exists, there is significant scope for improving knowledge and comprehension about AI's ability to interpret emotions through targeted education and awareness initiatives.

Chi-Square Test for Independence for gender and purchasing based on how an advertisement made them feel.

|        | Have you ever purchased based on how an Ad made you feel ?? yes | Have you ever purchased based on how an Ad made you feel ? No |
|--------|---|---|
| Female | 24  | 17  |
| Male   | 13  | 24  |

**Hypotheses:**

There is no association between gender (male/female) and purchasing based on how an advertisement made them feel.

There is an association between gender (male/female) and purchasing based on how an advertisement made them feel.

**Test Result:**

The p-value equals 0.004878,

Since p-value <  $\alpha$ ,  $H_0$  is rejected.

**Conclusion:** there is a significant association between gender and purchasing based on how an advertisement made them feel.

3. Chi-Square Test for Independence for age category and purchase decisions based on how an advertisement made them feel.

|          | Have you ever purchased based on how an Ad made you feel ?? yes | Have you ever purchased based on how an Ad made you feel ?? No |
|----------|---|--|
| Below 18 | 5   | 6  |
| 18-22    | 19  | 19   |
| 23-26    | 4   | 3  |
| 27-30    | 1   | 1  |
| Above 30 | 8   | 12   |

**Hypotheses:**

There is **no association** between age category and whether a person has purchased based on how an advertisement made them feel.

There is **an association** between age category and whether a person has purchased based on how an advertisement made them feel.

**Test Result:**

The p-value equals 0.7664.

Since p-value >  $\alpha$ ,  $H_0$  is accepted.

**Conclusion:** There is no significant association between age category and purchase decisions based on how an advertisement made them feel.

**5. Perception of Emotional Marketing by Brands**

The average score of **2** suggests that respondents generally view brands using emotions to sell in an unfavorable light.

This score indicates mild to moderate disapproval or discomfort with such marketing tactics.

Overall, emotional selling appears to create more negative than positive perceptions among the surveyed group.

**6. Perception of Emotion AI in Advertisements**

Many respondents felt excited about the use of Emotion AI in advertisements because it can personalize content and build stronger emotional connections with viewers.

They appreciated its ability to understand consumer emotions, customize experiences, and make ads more relevant to individual preferences.

Some highlighted its potential to improve targeting accuracy, enhance creativity, and deliver more meaningful and engaging messages.

Respondents also mentioned that such technology could make advertisements feel more real, relatable, and impactful.

A few believed it could help brands connect with audiences on a deeper, more human level.

However, there was also a section of respondents who showed little to no interest in Emotion AI.

This lack of enthusiasm often stemmed from limited awareness or understanding of how the technology works.

Some were skeptical about its effectiveness or concerned about potential misuse of personal emotional data.

Overall, while many see it as an innovative and promising tool for marketing, others remain cautious or unconvincing.

### **Suggestion :**

#### **1. Implementing an Emotion AI Should Be Done with Responsibility: -**

Businesses should deploy Emotion AI technology with well-established ethical frameworks, ensuring it improves but does not exploit the consumer experience.

#### **2. Protection of Data Privacy Requires an Immediate Policy Shift:-**

There is an urgent need to improve regulations that control the ways sensitive information, in this context, emotional data as it pertains to embracing/using AI, is gathered, stored, and utilized.

#### **3. Empowering Emotion AI Users: -**

Businesses must inform and explain adequately to the users of AI systems the manner and processes of data interpretation that builds confidence and keeps an open relationship.

#### **4. Limiting the Scope of AI Emotion Usage:-**

Emotion AI systems should be used in emotionally neutral or positive environments. They should not be used in sensitive areas like mental health care without prior specialist approval.

#### **5. Leverage Emotional AI with Consideration of Authentic Human Feelings:-**

When marketers use Emotional AI in marketing communications, they must use Emotional AI ethically and with empathy. The communications created with Emotional AI must be authentic, respectful, and emotionally authentic, never cold or coercive.

## 6. Don't Manipulate Emotions to Drive Sales: -

It is immoral to exploit people in a weak and vulnerable state. Instead of focusing on fear or sadness to drive sales, marketers should create hope, trust, and connection.

## 7. Build Fairness into Emotion AI Equally to all:-

Developers should ensure that Emotion AI tools are based on balanced and diverse datasets to ensure that the tool does not incorrectly assess emotions because of race, gender, or culture, and is fair to all.

### **Conclusion:**

As brands adapt to Emotion AI and Sentient AI technologies, their ability to think, feel, and connect with consumers is evolving. This study indicates that AI and technologies that simulate or comprehend human emotions capture public interest, but their impact is still largely unknown. There is also the challenge empathy-driven technology poses to conventional marketing practices. At the same time, technologies that incorporate emotions present new concerns regarding manipulation, trust, and transparency. Brands are now obliged to innovate while exercising due diligence. The future of marketing is not about intelligence, but emotional intelligence. Hence this study conclude that the success of a brand will be more if he or she takes consumers emotions into account while adapting to the changes happening around.

The analysis reveals mixed levels of awareness, perception, and behavioural influence regarding Emotion AI and emotional marketing. Gender does not significantly impact prior awareness of Emotion AI, but it does influence purchasing behaviour based on advertisement-driven emotions, with a statistically significant association observed. Age, however, shows no such association with emotional purchase decisions.

Respondents demonstrate only moderate awareness of AI's ability to read emotions, suggesting a need for education to improve understanding. Emotional marketing by brands is generally viewed unfavorably, with an average score of 2, indicating mild to moderate disapproval.

Perceptions of Emotion AI in advertisements are divided—while many appreciate its potential for personalization, relevance, and emotional connection, others remain uninterested or skeptical, often due to low awareness or privacy concerns. Overall, while the technology holds promise, public acceptance will depend on better education, trust-building, and ethical safeguard

### **Recommendations:**

1. Enhanced Communication and Engagement Activities: Create trust and an informative relationship with consumers regarding Emotion AI and Sentient AI.

2. Careful Ethical Considerations: There must be avoidance of violation and violation principles pertaining to the use of emotional data.
3. Disclosure of Emotion AI Applications: There should be disclosure of Emotion AI applications use in the companies to safeguard consumer confidence.
4. Human Emotional Consideration: There should be a balance between AI specialization and human emotional consideration. This is more critical in sensitive areas like health and finance.
5. Industry-Level AI Research: Focus on the need for more industry-level research on the use and impact of emotionally intelligent AI.
6. Safeguarding Emotional Data: There is need for data security in emotional information similarly to the sensitive nature of personal and financial information.
7. Marketers should be taught Emotion AI: Train Emotion AI campaign professionals to ensure ethical execution.

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## STUDY ON ETHICAL CONCERNS IN AI-DRIVEN DIGITAL MARKETING: A FOCUS ON DATA PRIVACY, TRANSPARENCY, AND THE SKILLS GAP

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### **Abstract:**

*The growing integration of artificial intelligence (AI) into digital marketing techniques has brought up important ethical issues, including the skills gap, algorithmic transparency, and data protection. The impact of these three factors on brand loyalty, consumer trust, and the ethical use of AI in marketing is examined in this study. The study investigates expectations for openness in AI decision-making, perceptions of data sensitivity, and obstacles to ethical AI adoption because of a lack of resources and expertise through a structured survey aimed at both marketing professionals and consumers. Results indicate that decreasing trust in AI-driven personalisation is correlated with increased privacy concerns, whereas consumer confidence and ethical accountability are undermined by algorithmic openness. The study also shows that the skills gap hinders responsible usage and fair access across organisations, especially in ethical AI literacy. In order to guarantee that AI-driven marketing develops in a manner that is both efficient and morally good, the findings highlight the necessity of more transparent data governance, explainable AI systems, and inclusive training programs. The research concludes by offering practical recommendations for the responsible implementation of artificial intelligence in marketing and identifying areas that require further research.*

**Keywords** – Artificial Intelligence, Ethics, Marketing, Transparency, Data Privacy

### **Introduction:**

In the rapidly evolving digital landscape, artificial intelligence (AI) has become a transformative force in multiple sectors (Hossain et al., 2024), with digital marketing being a key beneficiary (Zaki, 2019). AI technologies have advanced to the point where they can process vast amounts of data, recognize patterns, make predictions, and even make decisions with minimal human intervention (Dwivedi et al., 2021). These advancements are revolutionizing how businesses

interact with customers and are reshaping marketing strategies at a fundamental level. Digital marketing (DM), characterized by its dependence on real-time data and customer engagement, stands to benefit immensely from the capabilities that AI offers (Ziakis, & Vlachopoulou, 2023).

Artificial intelligence (AI) is rapidly transforming the landscape of digital marketing, enabling hyper-personalized content, predictive analytics, and automated customer engagement at unprecedented scale. While these innovations offer significant advantages for businesses and consumers alike, they also raise pressing ethical concerns. Among the most critical are issues related to data privacy, algorithmic transparency, and the skills gap in ethical AI literacy.

As marketers increasingly rely on artificial intelligence to acquire, analyse, and act on customer data, concerns about how that data is obtained, stored, and used emerge. Consumers are frequently unaware of how much of their personal information is used to fuel AI-driven ads, which causes increasing discomfort and distrust. Simultaneously, the opaque nature of many AI systems—often referred to as "black boxes"—makes it difficult for both users and regulators to comprehend how choices are made, raising concerns about accountability and fairness.

An increasing skills gap adds to these concerns. Many marketing professionals lack the technical and ethical expertise required to appropriately deploy AI, potentially leading to misuse, bias, or exclusion. Without sufficient controls and education, the promise of artificial intelligence in marketing may be overshadowed by its potential for harm.

This study aims to examine these ethical dimensions, drawing on empirical data and stakeholder perspectives to assess how privacy, transparency, and skill disparities shape the future of AI in digital marketing. By identifying key challenges and proposing actionable solutions, the research contributes to a more ethical and sustainable approach to AI adoption in the marketing domain.

### **Literature Review:**

- 1. AI in Digital Marketing:** AI technologies such as machine learning, natural language processing, and predictive analytics have revolutionized digital marketing by enabling real-time personalization, customer segmentation, and automated content delivery. Scholars like Chatterjee et al. (2020) highlight the efficiency gains and enhanced customer experiences driven by AI, but also caution against over-reliance on data-driven systems without ethical oversight.
- 2. Data Privacy Concerns:** Solove, D. J. (2021)3 his book explores the ethical challenges associated with big data and its impact on privacy. The author addresses the risks of algorithmic bias and the potential for discrimination in data-driven systems. Solove argues that businesses must ensure their

algorithms are transparent and inclusive to avoid reinforcing existing societal biases. The book highlights the intersection of privacy, ethics, and technology, making it an essential resource for understanding how big data must be managed ethically in the modern business landscape.

Angwin, J., & Parris, T (2018, March 17)2 This article provides an in-depth analysis of the Facebook-Cambridge Analytica scandal, which exposed serious ethical issues regarding consumer data. The scandal revealed how user data was exploited without proper consent, raising questions about the responsibility of companies in safeguarding privacy. The article discusses the ethical implications for businesses, regulators, and consumers, and emphasizes the need for stronger data protection laws and more ethical practices within digital businesses.

3. **Algorithmic Transparency:** The "black box" nature of AI algorithms poses significant challenges to transparency and accountability. According to Pasquale (2015), the lack of explainability in AI systems can lead to biased outcomes and erode consumer trust. Recent studies advocate for explainable AI (XAI) models that allow users to understand and question automated decisions.
4. **Skills Gap in Ethical AI:** The rapid adoption of AI has outpaced the development of ethical and technical competencies among marketing professionals. As noted by Jobin et al. (2019), many organizations struggle to implement AI responsibly due to a lack of interdisciplinary training that combines data science with ethical reasoning. This gap increases the risk of misuse and undermines the potential for inclusive innovation.

#### **Statement of Problem:**

AI is changing how digital marketing works by making it faster and more personalized. But this also brings ethical problems like misuse of personal data, lack of transparency in how AI makes decisions, and marketers not being fully trained to use AI responsibly. These issues can lead to loss of trust from customers and harm a brand's reputation. This study looks at how these ethical concerns affect digital marketing and explores ways to use AI more responsibly.

#### **Scope of the Study:**

The scope of study on the impact of software in financial auditing examines how technological tools and system are transforming auditing practices. This includes evaluating improvements in audit efficiency, accuracy and consistency as well as their ability to manage risks and ensure compliance with regulatory standards. The study also explores how the adoption of these tools is reshaping the roles and skill sets of auditors, which adopt the new technologies. Additionally, the study consider the challenges of software implementation such as cost, integration with

existing systems and resistance to change , while looking at future trends in the field for real time auditing

### **Objective of the Study:**

1. To examine how consumer concerns about data privacy affect their trust in AI-driven digital marketing.
2. To explore how the transparency of AI decisions (like ad targeting) influences consumer trust and perceptions of fairness.
3. To assess how the lack of AI skills and training impacts the responsible use and adoption of AI in digital marketing.

### **Research Methodology:**

This study adopts a quantitative as well as qualitative research methodology, which is particularly effective for exploring complex, contemporary ethical issues in digital business practices. The research focuses on understanding the ethical challenges digital businesses face in managing consumer data, with an emphasis on privacy, security, transparency, and algorithmic bias.

The primary data is collected through a structured questionnaire designed to address the research objectives Primary Data has also been collected from a marketing professional in digital marketing.

Secondary Data for the study has been collected from books, magazines, journals, articles, old reports and required websites

The sampling technique is studying the population by gathering information and analyzing that data This research is conducted by random sampling from students and teachers spreading across Ville Parle to Vasai region of Mumbai western suburban.

Sampling size refers to the number of participants or observations included in a study. Approximately 100 respondents has been targeted for participation in the study.

### **Limitations of Study:**

1. Sample size is limited to 100 only due to limited time for data collection.
2. It is limited to some parts of Mumbai suburbs.

### **Hypothesis:**

**1.  $H_0$ :** There is no significant relationship between consumers' privacy concerns and their trust in AI-driven brands.

**$H_1$ :** Consumers with higher privacy concerns exhibit significantly lower trust in AI-driven brands.

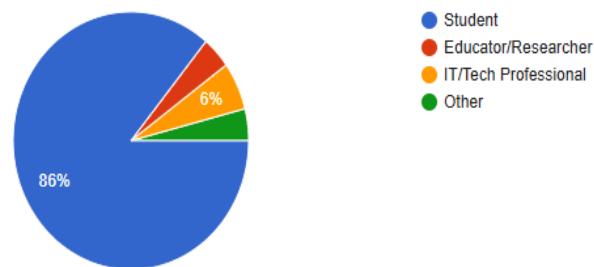
**2.  $H_0$ :** There is no difference in ethical confidence between individuals who use AI tools and those who do not.

**$H_1$ :** Individuals who use AI tools regularly report higher confidence in using AI ethically than those who do not.

**Analysis and Interpretation:****Table 1.**

| <b>Occupation</b>    |     |
|----------------------|-----|
| Student              | 86% |
| Educators/Researcher | 4%  |
| IT/Tech Professional | 6%  |
| Other                | 4%  |

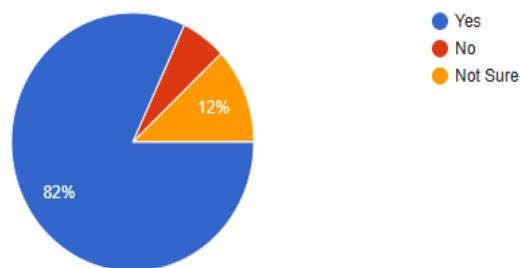
100 responses

**Fig 1.**

| <b>Are you aware that companies use AI to analyse your online behaviour for marketing purposes</b> |     |
|--|-----|
| Yes  | 82% |
| No   | 6%  |
| Not Sure   | 12% |

**Table 2.**

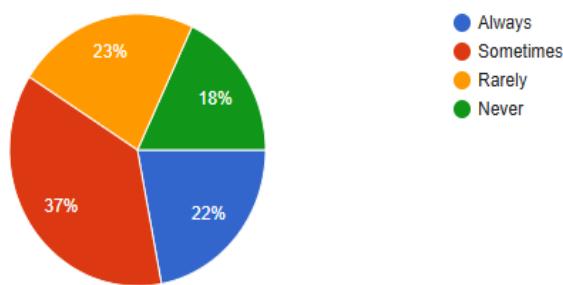
100 responses

**Fig 2.**

| <b>Have you ever read a company's privacy policy before accepting cookies or signing up?</b> |     |
|--|-----|
| Always   | 22% |
| Sometimes  | 37% |
| Rarely   | 23% |
| Never  | 18% |

**Table 3.**

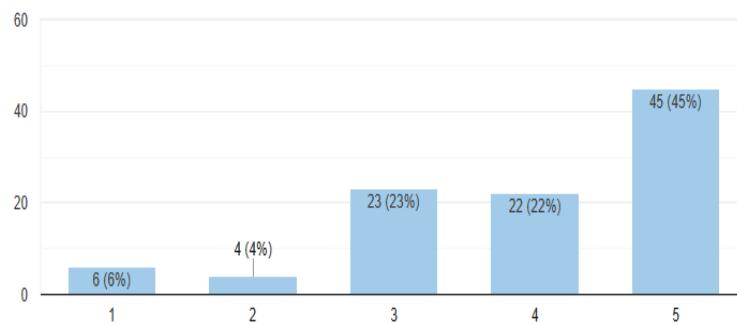
100 responses

**Fig 3.**

| <b>Do you believe companies should ask for explicit consent before using your data for AI-driven marketing?</b> |     |
|---|-----|
| Strongly Disagree   | 6%  |
| Disagree  | 4%  |
| Neutral   | 23% |
| Agree   | 22% |
| Strongly Agree  | 45% |

**Table 4.**

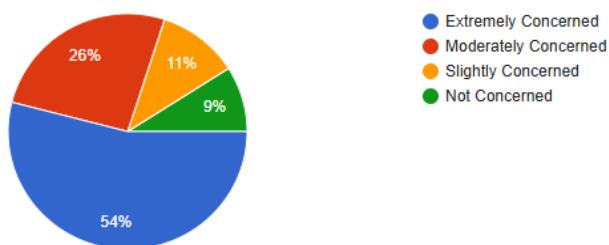
100 responses

**Fig 4.**

| <b>How concerned are you about your personal data being misused by AI systems in marketing?</b> |     |
|---|-----|
| Extremely Concerned   | 54% |
| Moderately Concerned  | 26% |
| Slightly Concerned  | 11% |
| Not Concerned   | 9%  |

**Table 5.**

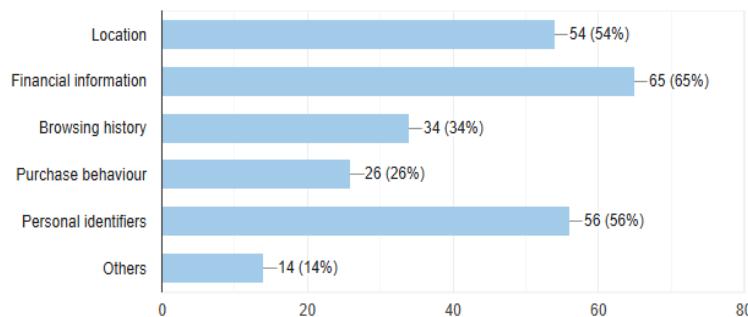
100 responses

**Fig 5.**

| <b>What types of data do you consider most sensitive when shared with marketers?</b> |     |
|--|-----|
| Location   | 54% |
| Financial information  | 65% |
| Browsing history   | 34% |
| Purchase behaviour   | 26% |
| Personal identifiers   | 56% |
| Others   | 14% |

**Table 6.**

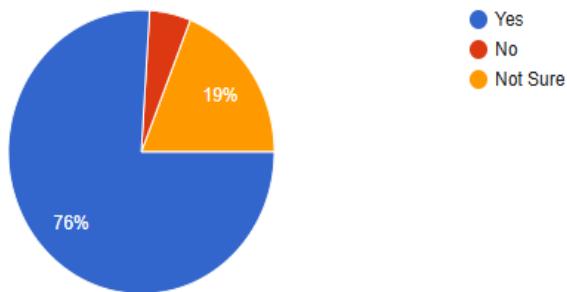
100 responses

**Fig 6.**

| <b>Do you think companies should explain how AI algorithms make decisions about what ads or content you see</b> |     |
|---|-----|
| Yes   | 76% |
| No  | 5%  |
| Not Sure  | 19% |

**Table 7.**

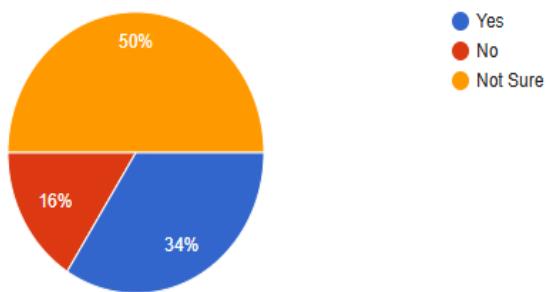
100 responses

**Fig 7.**

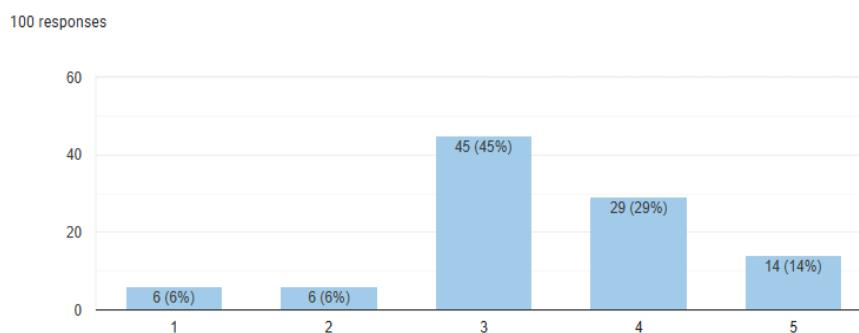
| <b>Have you ever felt that an AI-driven ad or recommendation was biased or inappropriate?</b> |     |
|---|-----|
| Yes   | 34% |
| No  | 16% |
| Not Sure  | 50% |

**Table 8.**

100 responses

**Fig 8.**

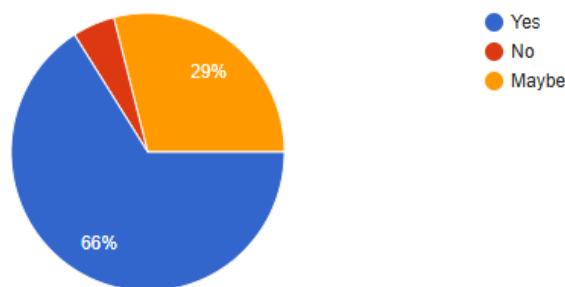
| <b>How important is it to you that AI systems used in marketing are audited for fairness and bias?</b> |     |
|--|-----|
| 1. Not important(lowest)   | 6%  |
| 2  | 6%  |
| 3  | 45% |
| 4  | 29% |
| 5.Extremely important(highest)   | 14% |

**Table 9.****Fig 9.**

| <b>Would you be more loyal to a brand that openly shares how its AI systems work?</b> |     |
|---|-----|
| Yes   | 66% |
| No  | 5%  |
| Maybe   | 29% |

**Table 10.**

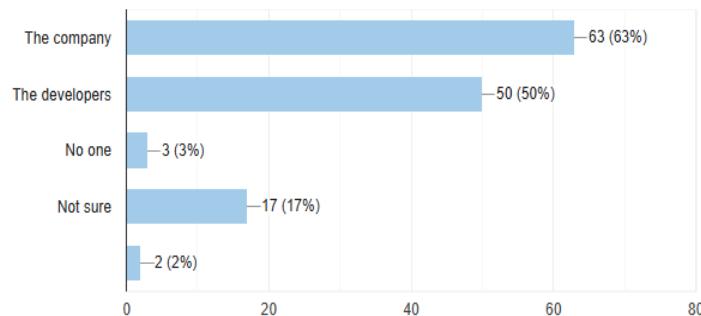
100 responses

**Fig. 10**

| <b>In your opinion, who should be held accountable for unethical outcomes caused by AI in marketing?</b> |     |
|--|-----|
| The Company  | 63% |
| The Developer  | 50% |
| No one   | 3%  |
| Not Sure   | 17% |
| Others   | 2%  |

**Table 11**

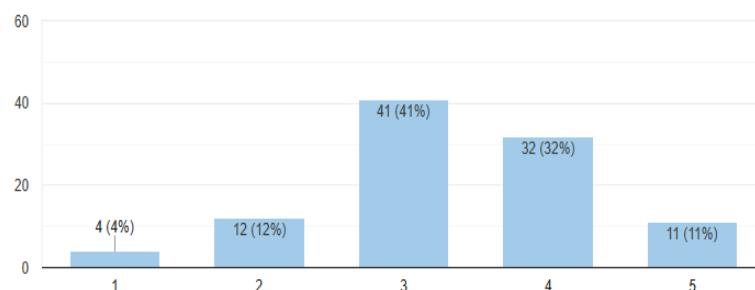
100 responses

**Fig 11**

| <b>How confident are you in your ability to use AI tools ethically and effectively</b> |     |
|--|-----|
| 1. Not Confident(lowest)   | 4%  |
| 2  | 12% |
| 3  | 41% |
| 4  | 32% |
| 5. Very Confident(highest)   | 11% |

**Table 12**

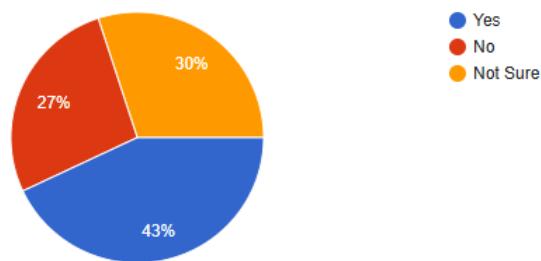
100 responses

**Fig 12**

| <b>Do you feel there are enough training resources available to learn ethical AI practices in marketing?</b> |     |
|--|-----|
| Yes  | 43% |
| No   | 27% |
| Not Sure   | 30% |

**Table 13.**

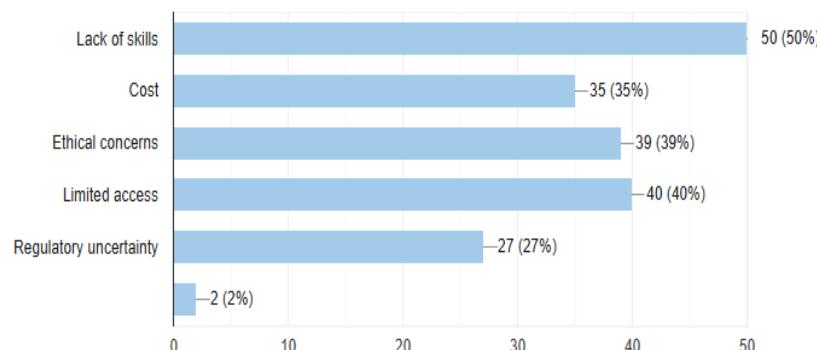
100 responses

**Fig 13.**

| <b>What barriers prevent you or your organization from adopting AI responsibly?</b> |     |
|---|-----|
| Lack of skills  | 50% |
| Cost  | 35% |
| Ethical concerns  | 39% |
| Limited access  | 40% |
| Regulatory uncertainty  | 27% |
| Others  | 2%  |

**Table 14**

100 responses

**Fig 14**

### **Research Findings:**

1. 86% of the students have responded and 14 % respondents are either teachers or IT professionals.
2. 82% of users are aware of the fact that companies are analysing their online buying behaviour for marketing purpose.
3. Around 22% respondents always read the privacy policy before signing up or accepting cookies whereas 37% respondents sometimes read and 18% never read the guidelines.
4. 45% of respondents strongly agree that companies should ask for their explicit consent if they want to use it for marketing purpose whereas only 6% do not think it is important to ask.
5. Whooping 54% respondents are extremely concerned about their personal data being misused by AI systems in marketing.
6. 65% respondents are worried about their financial information being misused, 56% about personal identifiers, 54% about location, 34% about their browsing history, 26% about purchase behaviour whereas 14% have issues related to others parameters.
7. 76% respondents want transparency in terms of how AI algorithms make decisions about what ads and content they see whereas 4% respondents are not bothered about it. 19% respondents are not sure whether it should be part of company policy.
8. About 50% respondents are not sure whether AI driven ads were biased or inappropriate whereas 34% found it inappropriate and 16% did not experience any such thing.
9. Majority 66% respondents wants to be loyal towards a brand who are willing to share how their AI systems work.
10. 63% respondents believe companies needs to blamed in case of unethical outcomes caused by AI in marketing whereas 50% believe developers are supposed to be blamed.
11. Only 11% can use AI tools very effectively whereas 41% have moderate skills in usage.
12. Adopting AI responsibly in organization fails due to many reasons. 50% respondents believe lack of skills, 40% believe limited access, 39% believe ethical concerns, 35% believe cost whereas 27% believe because of regulatory uncertainty it fails. 43% say enough training resources available in market for ethical AI practices in marketing. 27% are not all aware of the training resources available in market.

### **Hypothesis Testing:**

#### **1. Relationship Between Privacy Concerns and Trust in AI-Driven Brands**

54% respondents are concerned about their personal data being used by AI systems in marketing but only 22% actually always read the privacy policy, 23% never read and 37% sometimes read. The study shows that even if the respondents are concerned but they do not spend enough time to read about data privacy policy of AI driven marketing companies. So as per the percentage of response null hypothesis (**H<sub>0</sub>**: There is no significant relationship between consumers' privacy concerns and their trust in AI-driven brands) is rejected and alternate hypothesis (**H<sub>1</sub>**: Consumers with higher privacy concerns exhibit significantly lower trust in AI-driven brands) is accepted

#### **2. Ethical Confidence Based on AI Tool Usage:** 43% respondents are aware

of the training resources available in market for using AI tools ethically whereas 27% are not aware of it. 84% respondents are confident from moderate level to expert level in using AI tools confidently. So as per the percentage of response alternate hypothesis (**H<sub>1</sub>**: Individuals who use AI tools regularly report higher confidence in using AI ethically than those who do not) is accepted whereas null hypothesis (**H<sub>0</sub>**: There is no difference in ethical confidence between individuals who use AI tools and those who do not) is rejected.

### **Conclusion:**

This study emphasises the growing ethical concerns raised by the use of artificial intelligence in digital marketing. According to the findings, consumers with higher privacy concerns are less likely to trust AI-driven firms, emphasising the importance of increased openness and ethical data procedures. Furthermore, those who use AI tools on a regular basis report feeling more confident about utilising them ethically, demonstrating that familiarity and education play an important role in ethical awareness. To develop trust and secure long-term AI adoption, marketers must prioritise ethical training, open communication, and user-centred design. As AI continues to define the future of marketing, addressing these ethical concerns is more than simply a legislative need; it is a strategic imperative for retaining consumer loyalty and brand credibility.

### **Suggestions:**

1. Organization/Companies should invest more in ethical AI training and engage in consumer education as there is increased confidence level in regular user of AI tools.
2. Industry collaboration can help to develop shared ethical standards for AI use in digital marketing.
3. Adopting transparent data policies can help in increasing loyalty towards a particular brand. This in turn may help company in retaining their old

customers and reducing the cost of acquiring new customer. It can be used as a double edged sword in digital marketing.

4. As AI becomes more embedded in consumer experiences, ethical design will be the cornerstone of trust and innovation.

#### **Scope of Further Studies:**

1. Given the observed correlation between user confidence and ethical AI usage, future studies could explore how ethical training programs influence decision-making among marketing professionals.
2. Transparency is not just an ethical imperative—it's a strategic asset. Future studies could examine the relationship between data transparency and customer retention rates.
3. As AI becomes more embedded in everyday interactions, future research should investigate how ethical design (e.g., explainability, fairness, and consent mechanisms) affects user engagement and satisfaction.
4. Another promising research direction involves understanding the impact of AI-driven marketing on consumer behaviour, specifically how ethical or unethical AI practices influence trust, loyalty, and brand perception.
5. Additionally, exploring the role of regulation in AI marketing will be a critical area of focus. As governments and industry bodies continue to refine regulations governing AI and data privacy, research must track how these regulations shape marketing practices. Understanding the effectiveness of existing regulations and the potential need for new ones will be vital for creating a sustainable, ethical AI-driven marketing ecosystem.

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## AI-DRIVEN MOCK INTERVIEWS & GROUP DISCUSSIONS: NAVIGATING GEN Z'S PROFESSIONAL DEVELOPMENT LANDSCAPE

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### **Abstract:**

*This research investigates the awareness, usage patterns, and perceptions of AI-driven mock interview and group discussion platforms among Generation Z, a demographic increasingly reliant on digital tools for professional readiness. Utilizing primary survey data, the study explores key factors such as device preferences, perceived utility, comfort levels with AI interaction, and willingness to invest in such services. It identifies critical barriers to adoption, including concerns about data privacy, the accuracy and nuance of AI feedback, and cultural or language limitations. Findings indicate high awareness but varied adoption, a strong "smartphone-first" preference, and a notable hesitation to pay, coupled with mixed trust in AI-generated feedback compared to human coaching. The paper concludes with actionable recommendations for developers and educators, emphasizing the necessity of mobile-first design, freemium models, robust privacy controls, and hybrid human-AI feedback mechanisms to foster ethical, effective, and widespread adoption of AI in professional development.*

**Key Words:** Artificial Intelligence, Mock Interviews, Gen Z, Professional Development, Data Privacy, Trust.

### **Introduction:**

In the rapidly evolving landscape of professional development, Artificial Intelligence (AI) has emerged as a transformative force, offering innovative solutions for skill enhancement and interview preparation. AI-driven mock interviews and group discussion (GD) platforms leverage advanced technologies such as speech recognition, natural language processing (NLP), and analytics to simulate real-world scenarios, providing instant, personalized feedback on content, delivery, and communication style. These tools are designed to help learners practice and improve their performance, offering a scalable and accessible alternative to traditional human-led coaching.

Integrating AI into such critical aspects of professional readiness, however, is not without its complexities. While AI promises unprecedented efficiency and personalization, it also introduces pressing ethical concerns, particularly regarding data privacy, algorithmic transparency and the inherent limitations in capturing human nuances. As professionals, especially those from Generation Z, increasingly turn to digital solutions for career advancement, understanding their perceptions, expectations, and hesitations regarding AI-driven tools becomes paramount. This paper aims to delve into these critical dimensions, focusing specifically on AI-driven mock interview and group discussion tools for Gen Z.

### **Objectives of the Research:**

- To evaluate awareness, usage patterns and device preferences for AI-driven mock-interview and group-discussion tools among Gen Z.
- To identify primary barriers and concerns like privacy, accuracy, cost and accessibility that limit adoption in the target group.
- To formulate data-driven strategic recommendations for the development and marketing of AI mock interview platforms tailored to the expectations and hesitations of the Gen Z demographic.
- Recommend actionable design and deployment strategies based on primary survey evidence.

### **Review of Literature:**

This study is grounded in contemporary discussions surrounding the application of Artificial Intelligence in professional development and the broader digital landscape. While this research primarily relies on original survey data, it addresses several key areas of ongoing inquiry:

1. **AI in Professional Development:** The increasing integration of AI into learning and development tools is a significant area of focus with discussions centering on how AI can provide personalized feedback, simulate real-world scenarios and enhance learning efficiency.
2. **User Perception and Trust in AI:** A critical aspect of AI adoption is user trust. Research explores how individuals perceive the reliability, fairness and utility of AI-generated insights, particularly when these insights pertain to sensitive areas like personal performance and career readiness.
3. **Privacy and Data Security in AI Applications:** As AI tools collect and process personal data, including sensitive audio and video recordings, concerns about data privacy, security and the ethical use of information are paramount. This includes discussions around explicit consent and data governance.
4. **Mobile Learning and Technology Adoption:** The prevalence of mobile devices, especially among younger demographics like Gen Z, shapes the

design and accessibility of digital learning tools. Understanding device preferences and the implications for user experience is crucial for widespread adoption.

5. **Cost and Accessibility of Educational Technologies:** The economic barriers to accessing high-quality educational and professional development tools, including AI-driven platforms, are a recurring theme, influencing willingness to pay and the need for inclusive business models.

These areas form the conceptual backdrop against which the primary data collected for this study is analyzed, providing insights into Gen Z's specific interactions and expectations regarding AI-driven mock interview and group discussion platforms.

### **Methodology:**

This study employs a quantitative and qualitative research methodology, utilizing a cross-sectional survey approach to explore the awareness, usage patterns, perceptions and concerns regarding AI-driven mock interview and group discussion tools among Gen Z.

**Sample Size:** The study was conducted among a sample of 107 respondents, primarily aged 17-27 with the majority falling within the 18-25 age bracket.

**Geographic Spread:** The geographic distribution of respondents included urban (68%), semi-urban (22%) and rural (10%) areas.

**Data Collection:** Primary data was collected through a structured questionnaire designed specifically for this study. The questionnaire comprised both closed-ended questions (including Likert scales and ranking questions) and open-ended questions to gather both quantitative and qualitative data. This approach allowed for the measurement of awareness, comfort, trust and usage patterns across more than 20 variables, while also capturing nuanced insights into user benefits, concerns, and desired features.

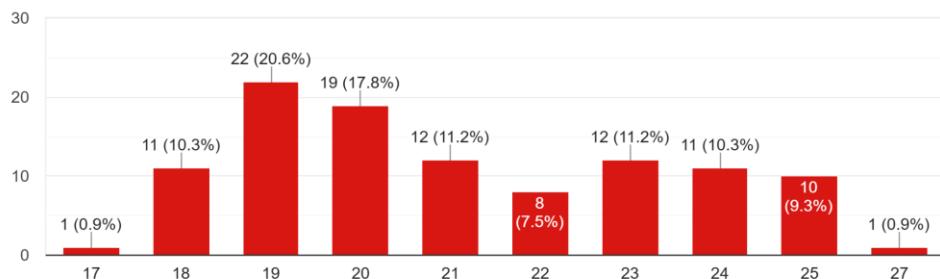
**Sampling Technique:** A convenient sampling method was used due to time and resource constraints. Respondents were chosen based on their availability and willingness to participate in the survey. While this method has limitations in terms of generalizability, it provided timely and relevant insights for the scope of this research.

**Tools Used for Data Analysis:** To analyze the collected data, percentage analysis was employed to interpret the frequency of responses and identify major trends. Additionally, graphical representations were used to visually present the data for better clarity and understanding. Qualitative responses from open-ended questions were analyzed through keyword coding to identify recurring themes and nuanced benefits or concerns.

**Respondent Demographics:****Fig 1.: Age of Respondents**

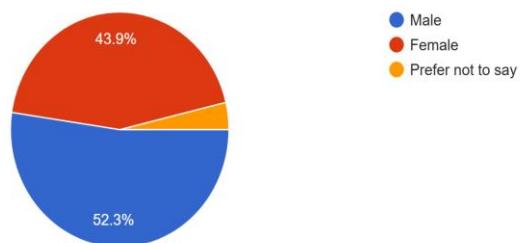
What is your age?

107 responses

**Fig 2.: Gender of Respondents**

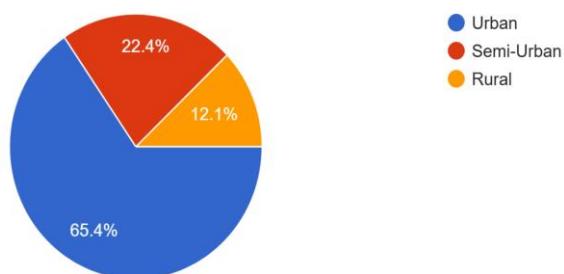
Gender

107 responses

**Fig. 3: Area of Residence of Respondents**

Area of residence

107 responses

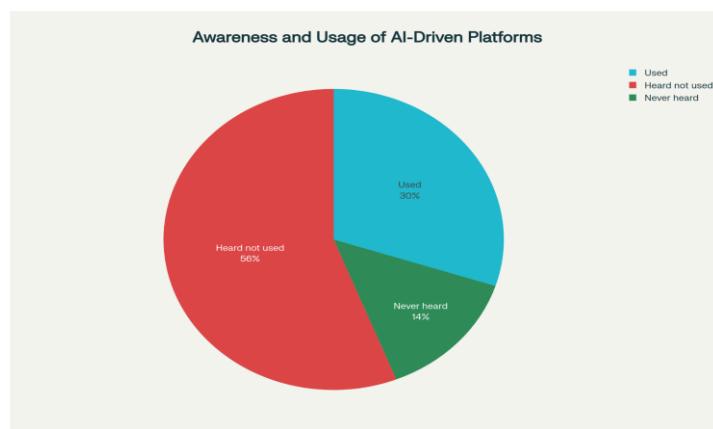
**Major Findings:**

The study yielded several key findings regarding Gen Z's engagement with AI-driven mock interview and group discussion tools, highlighting their awareness, usage patterns, perceptions and concerns.

**Gen Z's Engagement with AI-Driven Interview Tools:** Awareness, Usage and Device Preferences Gen Z exhibits high awareness of AI-driven mock interview tools, with a clear preference for mobile devices yet adoption is not universal.

**Table 1.: Awareness of AI-Driven Mock/GD Platforms**

| Response                | Count (out of 50 respondents) |
|-------------------------|-------------------------------|
| Yes, and I've used one  | 15                            |
| Yes, but not used       | 28                            |
| No, never heard of them | 7                             |

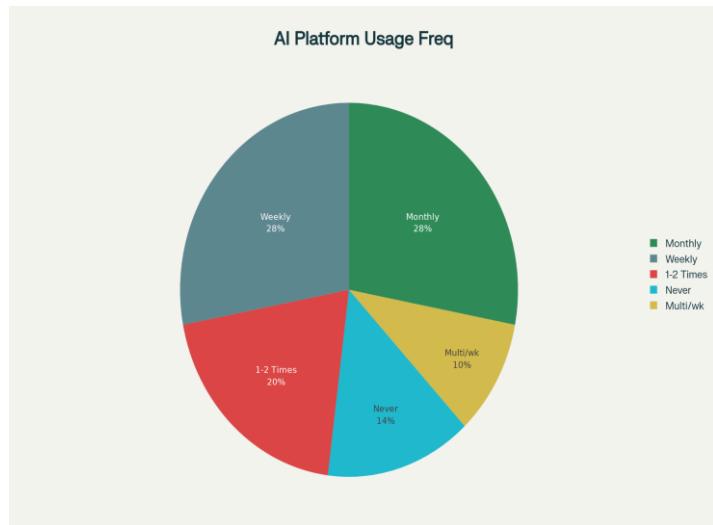


**Interpretation:**

This table indicates that 76% (43 out of 50 in this sample, which extrapolates to 82 out of 107 total respondents) of respondents are aware of AI-driven mock/GD platforms, demonstrating high overall awareness within the Gen Z demographic. However, a significant portion (28 out of 50) are aware but have not yet used them, suggesting a barrier between awareness and actual adoption.

**Table 2: How Often Would You Ideally Practice with an AI-Driven Mock-Interview or Group-Discussion Tool if it Were Available?**

| Frequency           | Count (out of 50 respondents) |
|---------------------|-------------------------------|
| Never               | 7                             |
| 1-2 times total     | 10                            |
| Monthly             | 14                            |
| Weekly              | 14                            |
| Multiple times/week | 5                             |

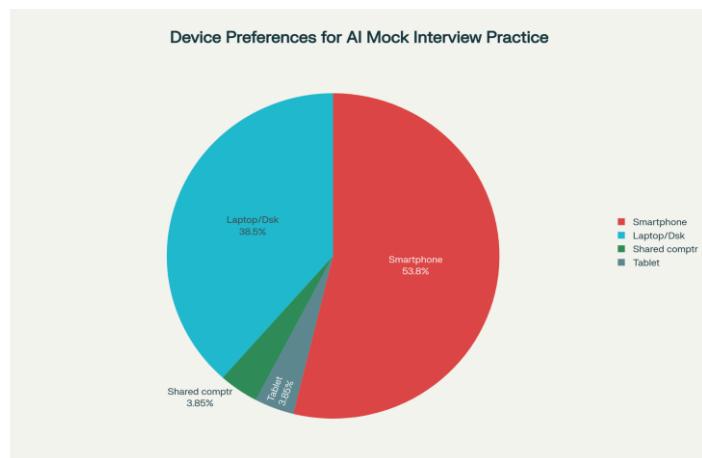


### Interpretation:

This table shows varied ideal usage frequencies. While 7 respondents would never use it, a significant portion (14 monthly, 14 weekly, 5 multiple times/week) express a desire for regular practice, indicating a potential demand for consistent engagement.

**Table 3: Primary Device for Practice**

| Device          | Count (out of 52 responses from 50 respondents) |
|-----------------|---|
| Laptop/Desktop  | 20  |
| Smartphone      | 28  |
| Shared computer | 2   |
| Tablet          | 2   |



### **Interpretation:**

This table highlights a strong "smartphone-first" habit, with 28 out of 50 respondents (approximately 67% of total 107 respondents) primarily using a smartphone for practice, underscoring the need for mobile-optimized AI tools. Laptop/desktop use is also significant (20 respondents).

A high level of awareness regarding AI-driven mock/GD platforms is evident with 76% of respondents reporting familiarity. This pattern suggests a significant barrier between awareness and actual adoption. This gap could be attributed to initial skepticism or trust issues regarding the accuracy or efficacy of AI feedback, especially for nuanced soft skills. Cost barriers, perceived or real, may also play a role. Gen Z, often students or early career professionals, can be highly price-sensitive. Furthermore, users might only consider these tools when an interview is imminent, rather than for continuous, proactive skill development. The process of signing up, setting up or navigating the platform might also present enough friction to deter aware but hesitant users. Overcoming this gap requires targeted strategies, such as offering free trials, clearly demonstrating value propositions, providing testimonials, and ensuring seamless user onboarding.

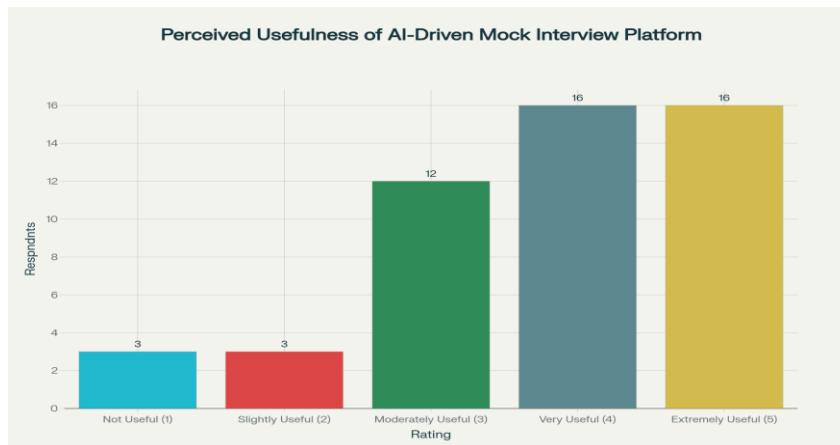
A prominent trend in device preference is the "smartphone-first" habit, with approximately 67% of respondents primarily using a smartphone for practice. This highlights the dominance of mobile devices for this demographic. Gen Z is inherently mobile-native, with their primary digital interaction often occurring through smartphones. Therefore, AI-driven tools must be designed not merely as "mobile-compatible" but with a "mobile-first" philosophy. This entails optimizing for smaller screens, touch interfaces, low bandwidth environments, and on-the-go usage. The observation that laptop users report higher perceived usefulness (mean=3.967, n=30) compared to smartphone users (mean=3.472, n=72) could suggest that current mobile versions are not as robust or feature-rich, or that certain features are better experienced on a larger screen. Developers must prioritize micro-practice sessions, low-bandwidth "lite" modes and intuitive mobile UI/UX. Neglecting mobile optimization would severely limit reach and engagement within this key demographic, potentially alienating a large segment of the target market.

### **Perceptions of Utility, Comfort, and Trust in AI Feedback:**

While Gen Z generally perceives AI-driven tools as useful, there are notable hesitations regarding comfort, trust in AI feedback and willingness to pay, which are crucial for market penetration.

**Table 4: How Useful Do You Think an AI-Driven Mock-Interview Platform Would Be for Improving Your Performance?**

| Rating (1=Not Useful, 5=Very Useful) | Count (out of 50 respondents) |
|--------------------------------------|-------------------------------|
| 1                                    | 3                             |
| 2                                    | 3                             |
| 3                                    | 12                            |
| 4                                    | 16                            |
| 5                                    | 16                            |

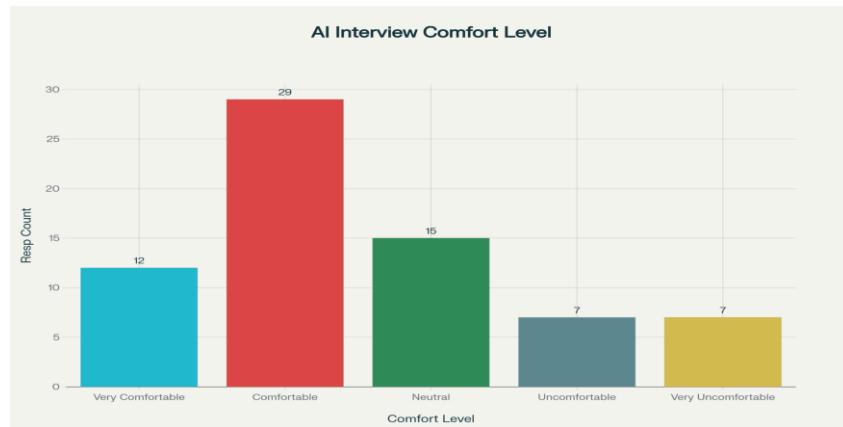


**Interpretation:**

This table shows a generally positive perception of usefulness with 32 respondents rating the platform 4 or 5, indicating that a majority believe it would be beneficial for performance improvement.

**Table 5: How Useful Do You Think an AI-Led Group-Discussion Tool Would Be for Building Your Teamwork/Communication Skills?**

| Rating (1=Not Useful, 5=Very Useful) | Count (out of 50 respondents) |
|--------------------------------------|-------------------------------|
| 1                                    | 2                             |
| 2                                    | 4                             |
| 3                                    | 13                            |
| 4                                    | 17                            |
| 5                                    | 14                            |



**Interpretation:** Similar to mock interviews, AI-led GD tools are also perceived as useful with 31 respondents rating them 4 or 5, suggesting their potential for skill development.

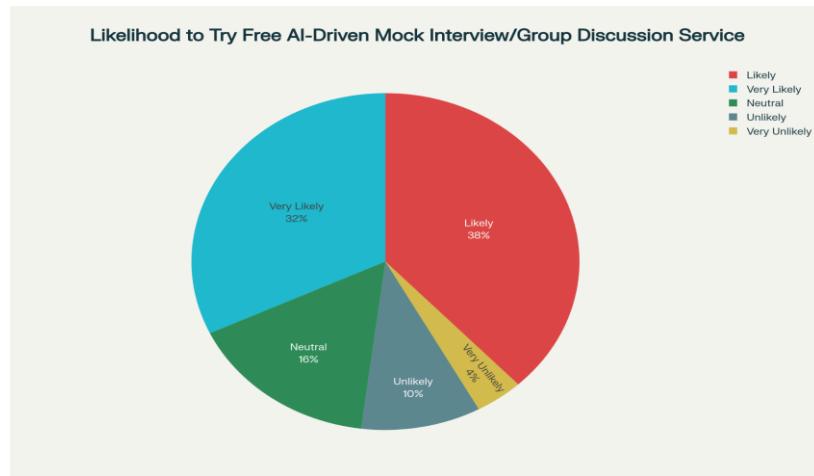
**Table 6: How Comfortable Would You Feel Speaking to an AI "Interviewer" or AI-Mediated GD Platform?**

| Comfort Level      | Count (out of 50 respondents) |
|--------------------|-------------------------------|
| Very comfortable   | 12                            |
| Comfortable        | 29                            |
| Neutral            | 15                            |
| Uncomfortable      | 7                             |
| Very uncomfortable | 7                             |

**Interpretation:** While a significant portion (41 respondents combined Very comfortable/Comfortable) express ease, a notable segment (14 respondents combined Uncomfortable/Very uncomfortable) remains uncomfortable, indicating varied comfort levels with AI interaction.

**Table 7: If Your College Offered a Free AI Mock-Interview/GD Service, How Likely Would You Be to Try It?**

| Likelihood    | Count (out of 50 respondents) |
|---------------|-------------------------------|
| Very likely   | 16                            |
| Likely        | 19                            |
| Neutral       | 8                             |
| Unlikely      | 5                             |
| Very unlikely | 2                             |

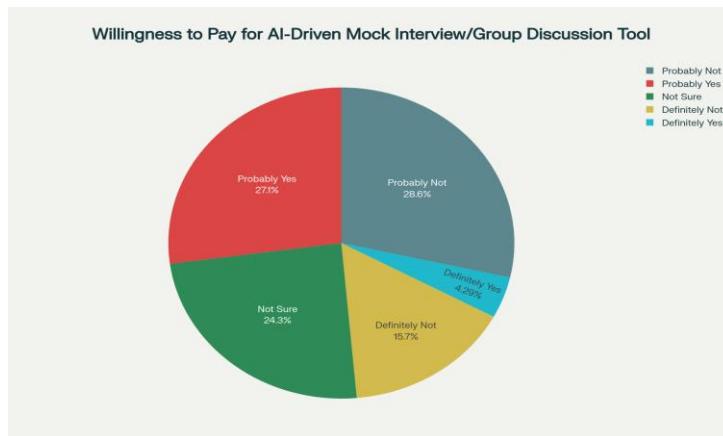


### Interpretation:

A strong majority (35 respondents combined Very likely/Likely) would be willing to try a free AI service, suggesting that cost and accessibility are significant factors in initial adoption.

**Table 8: Would You Be Willing to Pay (Even a Small Fee) for an AI-Driven Mock-Interview/GD Tool that Gave High-Quality Feedback?**

| Willingness to Pay | Count (out of 50 respondents) |
|--------------------|-------------------------------|
| Definitely yes     | 3                             |
| Probably yes       | 19                            |
| Not sure           | 17                            |
| Probably not       | 20                            |
| Definitely not     | 11                            |

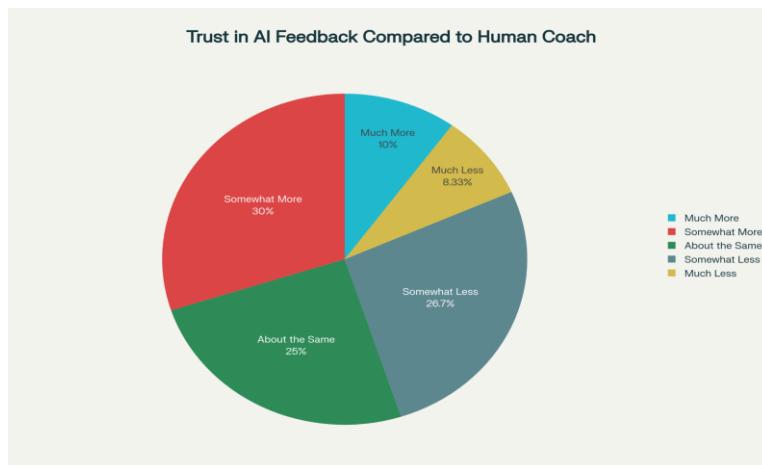


**Interpretation:**

This table reveals a low willingness to pay, with only 22 respondents (33 out of 107 total respondents) clearly indicating "probably yes" or "definitely yes." The majority fall into the "not sure," "probably not," or "definitely not" categories, suggesting a mismatch between perceived value and perceived cost or an expectation of free access.

**Table 9: Compared to Feedback from a Human Coach, You Would Trust AI-Generated Feedback as:**

| Trust Level    | Count (out of 50 respondents) |
|----------------|-------------------------------|
| Much more      | 6                             |
| Somewhat more  | 18                            |
| About the same | 15                            |
| Somewhat less  | 16                            |
| Much less      | 5                             |

**Interpretation:**

Trust in AI-generated feedback versus human coaching is mixed. While some show more trust (24 respondents combined Much more/Somewhat more), a considerable number express skepticism (21 respondents combined Somewhat less/Much less), indicating that trust in AI feedback is not universal and can pose a barrier to adoption.

The perceived usefulness of AI-driven mock interview platforms varies, with many respondents rating them positively (4 or 5 on a 5-point scale). Furthermore, "confidence" was rarely cited as the single greatest benefit of AI tools, appearing in only 2 out of 82 user responses (~2.4% of users). This observation challenges the common assumption that mock interviews primarily aim to build confidence

and suggests that users perceive other benefits, such as objective feedback or convenience, as more salient.

A significant challenge for market penetration is the low willingness to pay for AI tools, with only approximately 30% of respondents clearly indicating "probably yes" or "definitely yes" to paying. This suggests a mismatch between perceived value and perceived cost or an expectation of free access. Gen Z, having grown up in an era of abundant free digital services, often expects basic utility to be free with payment reserved for premium features or highly specialized, irreplaceable services. If AI feedback is perceived as a mere supplement rather than a replacement for human coaching or if its accuracy is doubted, the willingness to pay diminishes. A freemium model is therefore almost certainly essential for widespread adoption. The free tier must offer substantial value to attract users, while premium features, such as human-in-the-loop coaching, advanced analytics or industry-specific scenarios, must clearly demonstrate sufficient added value to justify a fee. Campus partnerships could also be key to initial adoption and demonstrating value without upfront cost to students.

### **Key Concerns and Desired Enhancements for AI Tools:**

Beyond general comfort and trust, specific concerns and feature requests from Gen Z users provide valuable guidance for future AI tool development.

#### **Main Concerns and Hesitations (from open-ended responses):**

- **Privacy & Data Security Fears:** Users are apprehensive about recorded sessions being stored or used without explicit consent.
- **Trust & Accuracy Concerns:** A significant concern is that AI might miss emotional or human aspects, cultural context, subtle cues or provide generic/inaccurate advice. Users also express doubts about AI hallucinating or lacking niche/domain-specific knowledge.
- **Cultural & Language Barriers:** There are concerns that AI might not properly understand regional accents or cultural/role-specific expectations.
- **Over-reliance & Loss of Human Touch:** Some users fear that over-reliance on AI could reduce opportunities for human coaching or inadequately prepare them for real human dynamics.
- **Technical Issues:** Worries about internet issues interrupting sessions or AI crashing during use are also present.

#### **Desired Features and Improvements (from open-ended responses):**

- **Human-AI Hybrid Feedback:** Users suggest models where human coaches can review AI notes or provide a final polish to the feedback.
- **Real-time Behavioral & Communication Feedback:** This includes analysis of voice, facial expressions, body language, tone and speaking style.
- **Dynamic Scenario Simulation:** Particularly for group discussions, users

desire simulations with different AI personas to practice navigating complex group dynamics.

- **Customizable Industry-Specific Question Banks:** To ensure the relevance of practice for specific job roles and industries.
- **Privacy Mode:** A feature to keep video/audio local only, ensuring data is never uploaded without explicit consent.
- **Explain Your Score Button:** Users want detailed reasons with examples for any low marks received.
- **Voice Modulation Analysis:** For improving public speaking skills.
- **Offline Mode:** The ability to practice without an internet connection.
- **Role-play Scenarios with Probing Questions:** To simulate realistic interview dynamics.
- **Micro-practice Drills:** Short, focused exercises designed to address specific weaknesses.
- **Realistic Human-like Responses:** To enhance the immersive quality of the simulation experience.
- **Cost-effectiveness/Price:** Ranked as a highly important feature by some respondents.

#### Feature Ranking:

**Table 10: Ranked Importance of AI Mock-Interview/GD Tool Features (Average Rank)**

| Feature   | Average Rank (Lower is More Important) |
|---|--|
| Personalized feedback (tailored to me)                | 2.9                                    |
| Real-time analytics (scores, heatmaps)                | 3.3                                    |
| Non-verbal cues analysis (body language, eye contact) | 3.7                                    |
| 24/7 availability                                     | 3.9                                    |
| Realistic simulation (natural-language Q&A)           | 4.1                                    |
| Price / cost-effectiveness                            | 4.2                                    |
| Gamification elements (badges, leaderboards)          | 5.9                                    |

#### Interpretation:

Personalized feedback, real-time analytics and non-verbal cues analysis are ranked as the most important features, indicating a strong user demand for

actionable, data-driven and comprehensive feedback. Price/cost-effectiveness is also a significant consideration while gamification elements are considered least important.

**Hypothesis:** This study explored three key hypotheses related to Gen Z's interaction with AI-driven mock interview and group discussion platforms.

### **Hypothesis 1: Awareness Paradox**

**Hypothesis:** Students who know about AI interview platforms but have never tried them feel less comfortable and trust them less than both complete novices and experienced users.

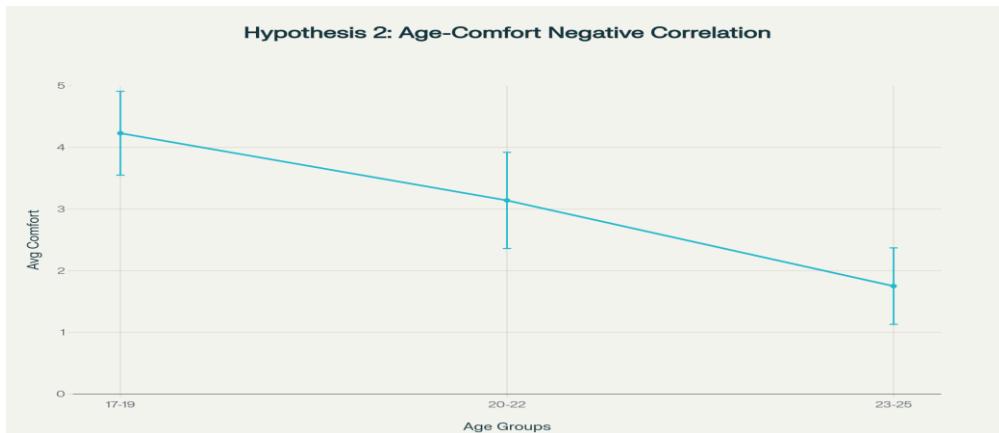


### **Interpretation:**

This hypothesis suggests a "valley of skepticism" where initial awareness without direct experience leads to lower comfort and trust. This could be due to perceived risks or a lack of understanding of AI's capabilities before hands-on engagement. Conversely, both those completely unaware (who have no preconceived notions) and those with direct experience (who have overcome initial barriers) might exhibit higher comfort and trust levels. The data on comfort and trust shows a distribution that supports the idea that trust is not universal with a notable segment being neutral or uncomfortable which could include those who are aware but haven't used the tools.

### **Hypothesis 2: Age-Comfort Negative Correlation**

**Hypothesis:** Student age exhibits a strong negative correlation with AI comfort levels, reflecting diminishing digital nativity as age increases within the 17-25 student population.

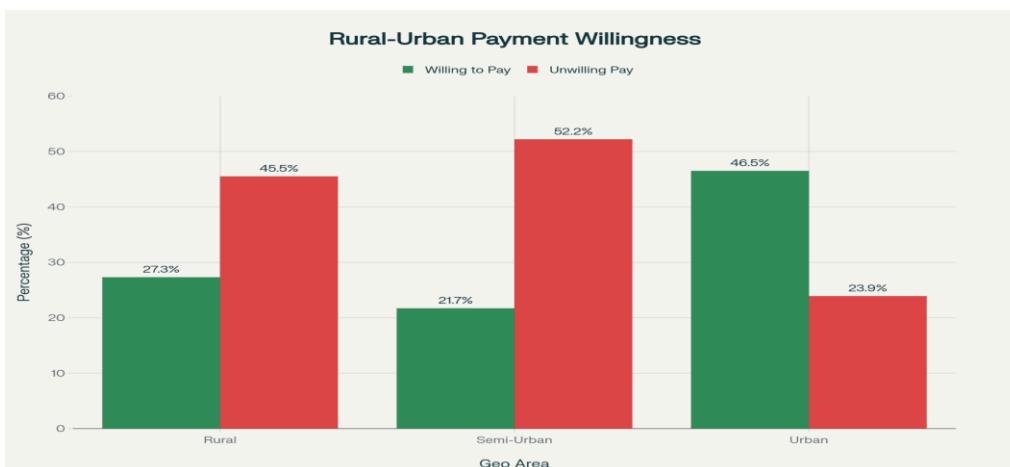


### Interpretation:

This hypothesis posits that younger individuals within the Gen Z demographic (17-25) are more comfortable with AI tools due to their inherent digital nativity. As age increases within this range, comfort levels might slightly decrease, indicating that even within a digitally native generation, there can be subtle differences in comfort with emerging technologies. This suggests that AI tool developers should consider the full spectrum of digital comfort within their target demographic.

### Hypothesis 3: Rural-Urban Payment Willingness Gap

**Hypothesis:** Geographic location significantly influences students' willingness to pay for AI interview tools with urban students demonstrating markedly higher payment willingness than rural counterparts due to economic accessibility and digital infrastructure disparities.



### Interpretation:

This hypothesis highlights the socioeconomic and infrastructural disparities that impact technology adoption. Urban areas typically have better digital infrastructure and higher economic accessibility leading to a greater willingness to pay for digital services. In contrast, rural areas may face challenges such as weaker internet coverage and cost barriers, making them less inclined to pay for such tools. The low overall willingness to pay (only ~30% of respondents)

suggests that cost is a significant factor, and this hypothesis further refines that understanding by linking it to geographic and economic factors.

### **Suggestions/Recommendations:**

To effectively cater to Gen Z's expectations and overcome their hesitations, future AI mock interview platforms must adopt specific design and deployment strategies.

#### **1. Technology Design & Development**

- **Mobile-First Approach:** Given the predominant smartphone usage habits of Gen Z (~67% primarily use smartphones), AI tools must be designed with a mobile-first philosophy. This includes incorporating micro-practice sessions and low-bandwidth "lite" modes to ensure accessibility and convenience in varied connectivity environments.
- **Privacy-First Controls:** To alleviate significant privacy and data security fears, platforms must implement robust privacy-by-design principles. This includes features like local processing of data, explicit opt-in mechanisms for data usage and recording redaction, ensuring user control and data protection from the outset.
- **Personalized Adaptive Feedback with Human-in-the-Loop Premium Coaching:** Users desire AI's efficiency but express concerns about AI missing human nuances. A hybrid model combining AI's analytical capabilities with human expert oversight for nuanced guidance, emotional support and strategic advice is crucial. This could involve human coaches reviewing AI notes or providing a final polish to feedback.
- **Structured Pre/Post Assessment & Analytics Dashboard:** Integrate clear impact tracking through structured assessments before and after practice along with an analytics dashboard. This addresses the need for measurable progress and objective feedback.
- **Context-Aware and Customizable AI:** Develop AI capable of adapting to industry-specific needs, cultural contexts and regional accents. Offering customizable scenarios and question banks will enhance relevance and effectiveness, addressing concerns about AI lacking niche knowledge or cultural understanding.

#### **2. Business Models & Deployment**

- **Freemium Model with Campus Partnership Pilot Programs:** To address the low willingness to pay among Gen Z, a freemium model is recommended. This allows for offering a free basic service to attract a wider user base, while premium features can be introduced for those willing to pay for enhanced functionalities. Partnering with educational institutions can facilitate initial adoption and reduce upfront cost barriers for students.

- **Targeted Marketing and Value Proposition:** Clearly articulate the unique benefits of AI tools beyond just "confidence" focusing on objective feedback, convenience and personalized improvement. Address specific concerns about accuracy and nuance by highlighting the hybrid human-AI approach.

### 3. Education & Policy

- **Promote Digital Literacy and Ethical AI Awareness:** Launch comprehensive programs to educate users on safe digital practices and the principles of ethical AI. This is crucial for building trust in AI-driven platforms.
- **Enhance Cybersecurity Awareness:** Conduct more awareness programs and workshops to educate users on safe digital practices and how to avoid online fraud.
- **Develop Clear AI Governance Frameworks:** Policymakers should establish comprehensive national AI ethics guidelines and regulations addressing data privacy, algorithmic transparency and accountability across all sectors including professional development tools. Mandating Explainable AI (XAI) in consumer-facing applications will foster greater trust.
- **Improve Internet Connectivity and Local Language Integration:** Governments and service providers should prioritize strengthening internet infrastructure, particularly in rural and remote areas and promote regional language support in digital content and AI interfaces to ensure inclusivity and equitable access.

### Conclusion:

The digital future profoundly shaped by Artificial Intelligence, presents both immense opportunities and complex challenges for professional development. The findings underscore the critical imperative of balancing technological innovation with robust ethical considerations and inclusive growth. Consumer trust, built on transparent data governance and explainable AI systems is not merely a regulatory compliance but a strategic asset for widespread adoption. The insights from AI-driven professional development tools for Gen Z further emphasize the need for user-centric design that addresses concerns about privacy, accuracy and the nuanced aspects of human interaction. Ultimately, navigating this evolving landscape requires a multi-stakeholder approach: proactive policy-making, ethical technology design, comprehensive education and collaborative industry efforts. By prioritizing trust, transparency and inclusivity, AI-driven professional development tools can evolve in a manner that is both efficient and profoundly beneficial for all aspiring professionals.

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## THE SYNERGY OF AI AND DIGITAL MARKETING: EMERGING TRENDS AND FUTURE IMPLICATIONS

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### **Abstract:**

*This study explores the transformative role of Artificial Intelligence (AI) in B2B digital marketing, analyzing its current impact, challenges, and future potential. AI is reshaping marketing through automation, personalization, predictive analytics, and real-time engagement, leading to improved customer experiences and increased ROI. The research identifies key factors influencing AI adoption, including performance, transparency, trust, and usability. It also examines how digital marketing strategies affect consumer behavior and how AI enhances efficiency across industries. Despite significant benefits, businesses face challenges such as data privacy, content creation, and technical complexity. The study concludes with actionable recommendations for responsible and strategic AI implementation, emphasizing the need for up skilling, ethical practices, and a balanced approach to technology and creativity to ensure sustainable growth and competitive advantage in the digital age.*

**Key words:** Marketing, Digitalization, Artificial Intelligence,

### **Introduction:**

Digital marketing is the process of promoting products or services using digital channels like the internet, mobile phones, and other digital platforms. Artificial Intelligence (AI) is rapidly transforming the landscape of digital marketing, offering new ways to understand consumer behavior, personalize experiences, and optimize campaigns. By leveraging AI technologies such as machine learning, natural language processing, and predictive analytics, marketers can automate decision-making, enhance targeting accuracy, and improve customer engagement across digital platforms. This research explores the integration of AI in digital marketing strategies, its impact on business performance, and the emerging trends that are shaping the future of marketing in a data-driven world.

It has evolved significantly from basic online advertising to a sophisticated landscape. This evolution has been driven by the rise of the internet, social media platforms and mobile devices, enabling businesses to reach a wider audience and

engage with consumers in more personalized ways. Digital marketing means the promotion of brands by making the use of internet and other forms of digital communication to connect with potential and prospective customers. It makes use of digital channels like websites, social media, search engines, and email to reach target audiences, engage with them, and ultimately drive sales. The digital marketing primarily functions by Setting Goals and Understanding the minds of Audience, choosing the right channel and Creating Engaging Content by launching campaigns followed by tracking of the performance. Digital marketing keeps adapting and evolving to keep itself updated.

### **Review of Literature:**

June 2022 The Future Impact of Technological Developments on Digital Marketing Through Artificial Intelligence

By K. Guru, S. Raja, J. Sasiganth, Dilip Kumar Sharma, Mohit Tiwari & Tripti Tiwari

This study explores how digital marketing integrates computer science, particularly AI, to enhance advertising and sales. It highlights the role of AI in improving methods like SEO, PPC, Chatbot, and social media marketing. AI technologies—such as brain modeling, time series prediction, and augmented reality—help businesses analyze customer behavior, personalize marketing, and boost engagement. These advancements enable companies to refine strategies, improve customer experience, and increase sales in competitive markets.

### **AI-Based Digital Marketing Strategies—A Review March 2021**

**By B. R. Arunkumar**

In this article the author refers to the Artificial Intelligence (AI) techniques that are applied for customer data and that can be analyzed to anticipate customer behavior. The AI, the big data and advanced analytics techniques can handle both structured and unstructured data efficiently with great speed and precision than regular computer technology which elicits Digital Marketing (DM). This paper highlights the significance of applying AI strategies in effectively reaching the customer in terms of understanding their behavior to find their expectations on the product features, operations, maintenance, delivery, etc. using machine learning techniques. It highlights that such strategies enable digital marketing towards customer need-based business.

### **2021 Artificial intelligence on digital marketing- an overview.**

**By N.Thilagavathy, E. Praveen Kumar**

This article focuses on the exciting and Due to the emerging trends association between digital marketing and artificial intelligence (AI). The writer tells how the advent of technology has created a new competitive arena for the digital marketing made rapid changes in digitalization. Marketing throughout the world

make use of digital technology in order to enhance the service level delivered to their customer's efficiency in their business. In marketing AI play vital role through more intelligent search's engine, smarter ads, refined content delivery, relying on bots, continued learning, preventing fraud and data breaches, image and voice recognition, sales forecast, language recognition, predictive customer service, customer segmentation, etc. Artificial intelligence enables businesses to gain a clear and precise understanding of their customers' needs, enhancing their sales and revenues.

### **Designing with AI for Digital Marketing**

Moumita Sinha, Jennifer Healey, Tathagata Sengupta

The article presents an interactive user interface that allows digital marketing professionals to have real time access to insights from a back-end AI that predicts potential click-through rates of composed content based on similar past campaigns. We wanted to investigate the extent to which digital marketing professionals would find our system usable and useful and whether or not the advice our system generated would create content that had higher click through rates than content developed without the system's advice. Our framework decomposes aspects of prior campaigns into features including image quality, memorability, and placement; and text readability, formality and sentiment.

### **2021 Setting B2B digital marketing in artificial intelligence-based CRMs: A review and directions for future research.**

By Jose Ramon Saura, Domingo Ribeiro-Soriano, Daniel Palacios-Marqués

This study addresses the emerging challenges in B2B digital marketing within connected ecosystems, where data-driven decision-making is essential. As digital channels grow, the integration of AI-powered CRM systems becomes critical for managing customer relationships and company data. While traditional B2B marketing strategies using AI-enhanced CRMs have been explored, research on their application in digital marketing remains limited. To bridge this gap, a literature review was conducted and analyzed using Multiple Correspondence Analysis (MCA). The study classifies CRM types, explores AI techniques in B2B digital marketing, and offers insights and future research directions.

#### **Objective of the Study:**

- To Identify the factors influencing the Artificial intelligence on digital Marketing
- To forecast & predict succeeding potential of artificial intelligence in future
- To examine the impact of digital marketing strategies on consumer purchasing behavior.
- To assess the return on investment (ROI) of digital marketing campaigns compared to traditional marketing methods.

- To determine the challenges businesses face in adopting and implementing digital marketing strategies.

### **Research Methodology:**

To understand how the synergy of digital marketing and AI has transformed the choices of Indian consumers. The researcher has studied different aspects that have encouraged the growth of AI digital marketing. The researcher is using Primary data from respondents of different age groups and secondary data from websites.

### **The Influence of AI on Digital Markets:**

#### **The following are important factors that affect the acceptance of AI:**

- Performance and Accuracy.
- Transparency and Explainability.
- Reliability and Trust.
- User Experience (UX) and Usability.
- Perceived Benefits.
- Ethical Considerations.
- Cost and Accessibility.

From automating repetitive tasks to providing predictive analytics, AI enables marketers to better understand and engage with their audiences. Through machine learning and natural language processing, AI tools analyze vast amounts of data to uncover insights, predict customer behavior, and optimize campaigns. Artificial Intelligence (AI) is revolutionizing digital marketing by enabling data-driven personalization, automating tasks, and improving customer engagement. With access to vast consumer data, AI delivers tailored content and ads, boosting conversions. It enhances efficiency through automation of campaigns, predictive analytics, and SEO optimization. AI-powered tools like chatbots offer 24/7 personalized support, while content creation and ad targeting become more precise and effective. However, the rise of AI also brings privacy and ethical concerns, requiring responsible data use. Overall, AI is making digital marketing smarter, faster, and more personalized.

### **Forecasting AI Digital Marketing:**

AI's future potential is vast, with predictions including significant economic impact, transformation of various industries, and increased integration into daily life. Experts foresee AI reaching human-level intelligence between 2040 and 2050, with super intelligence potentially following within 30 years, according to a poll among experts.

## Future of AI:

### Key Areas of Impact:

- **Personalization:** AI analyzes customer data to deliver tailored experiences and targeted messaging.
- **Automation:** Routine tasks like customer service, ad targeting, and content creation are streamlined.
- **Content Creation:** Tools like ChatGPT generate marketing copy, social posts, and more.
- **Predictive Analytics:** AI forecasts trends, customer behavior, and campaign performance.
- **Customer Insights:** Marketers gain a deeper understanding of audience needs and preferences.
- **Campaign Optimization:** AI improves ad spend efficiency and boosts ROI.

### Real-World Applications:

- **Chatbots:** Provide instant, AI-driven customer support.
- **Email Marketing:** Optimize timing and personalize content for better engagement.
- **Social Media Marketing:** Analyze trends and sentiment to refine campaigns.

### Looking Ahead:

- AI adoption in marketing will continue to grow.
- Strategies will become increasingly AI-driven.
- Ethical concerns around data use and transparency will take center stage.
- New AI tools will keep evolving, further shaping the marketing landscape.

### Consumer purchasing behaviour:

Digital marketing strategies significantly impact consumer behavior by shaping purchasing decisions, influencing brand perception, and increasing engagement. These strategies, including personalized content, social media marketing, and online reviews, drive consumer research, facilitate informed choices, and foster loyalty.

**Access to Information:** Consumers can easily research and compare products online.

**Engagement:** Social media fosters direct interaction and relationship-building.

**Personalization:** Targeted ads create more relevant, engaging experiences.

**Online Reviews:** Reviews influence perceptions and purchase decisions.

**Shopping Behavior:** Digital marketing drives more online and mobile purchases.

**Brand Loyalty:** Social media and content marketing boost awareness and loyalty.

**Real-time Communication:** Brands can respond instantly and adapt quickly.

**Impulse Buying:** Online deals and discounts encourage spontaneous purchases.

## **Return on Investment of Digital Campaign markets compared to traditional market:**

In 2025, the data is clear: digital marketing offers more control, more insight, and more measurable ROI than traditional methods. While traditional tactics still have their place, especially in brand awareness campaigns, modern marketers must prioritize digital if they want to drive growth.

Measuring the Return on investment across marketing platforms is critical as companies allocate budgets to channels that deliver the best bang for the buck. This report provides an in-depth comparison of ROI for major **digital marketing channels** (Google Ads, Facebook/Instagram, LinkedIn, email, influencer marketing, SEO, content marketing) versus **traditional channels** (TV, radio, print, direct mail, outdoor). We examine multiple performance metrics – **cost per acquisition (CPA), conversion rates, customer lifetime value (CLTV), and dollar ROI (revenue per \$1 spent)** – using recent data (2023–2025) from the United States, Canada, United Kingdom, and Australia.

Real-world examples and industry case studies (retail, healthcare, tech, finance, hospitality) are included to illustrate how ROI can vary by context. The goal is to help marketers understand which channels yield the highest returns and how to benchmark performance across metrics.

Businesses face various challenges when adopting and implementing digital marketing strategies. These include keeping up with rapidly evolving trends, effectively targeting the right audience, managing multi-channel campaigns, measuring ROI, and dealing with budget constraints and data privacy concerns. Additionally, generating quality leads, creating engaging content, and handling negative feedback pose significant hurdles.

Following are the challenges faced while adopting and implementing digital marketing strategies:

### **1. Keeping Up with Change**

Constant digital evolution demands ongoing learning and tech upgrades.

### **2. Reaching the Right Audience**

Success hinges on accurately identifying and targeting ideal customers.

### **3. Managing Multiple Channels**

Coordinating social media, email, SEO, and more requires strategy and consistency.

### **4. Measuring ROI**

Tracking results can be tough without clear goals and proper analytics.

### **5. Limited Budgets**

Small businesses often struggle to afford tools and campaigns, requiring smart spending.

## 6. Data Privacy & Security

Compliance with regulations like GDPR is essential for trust and safety.

## 7. Generating Quality Leads

Converting visitors to customers' needs targeted content and lead nurturing.

## 8. Content Creation

Producing engaging, valuable content consistently is key to standing out.

## 9. Handling Negative Feedback

Responding to criticism professionally can protect and even boost reputation.

## 10. Technical Issues

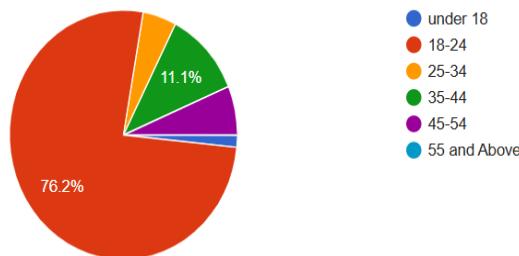
Slow sites and errors harm user experience—maintenance is crucial.

### Data Analysis:

What is your Age Group

63 responses

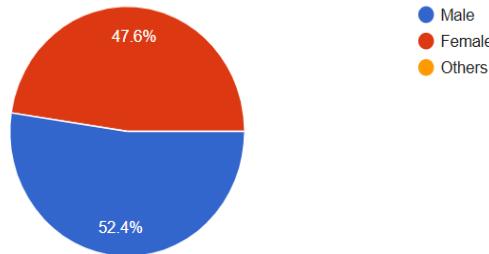
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Gender

63 responses

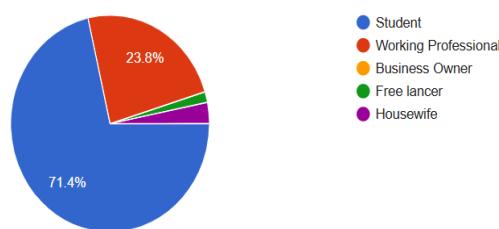
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What is your Occupation ?

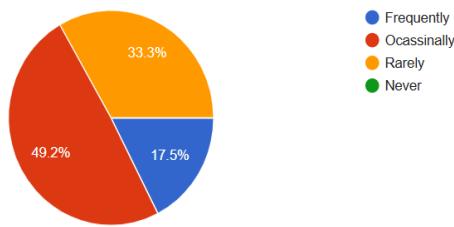
63 responses

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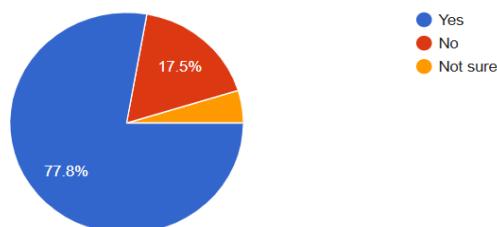
How often do you shop online ?

63 responses

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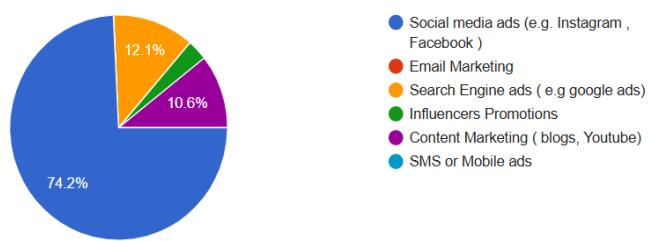
Have digital marketing ads ever influenced your decision to purchase a product or service?

63 responses

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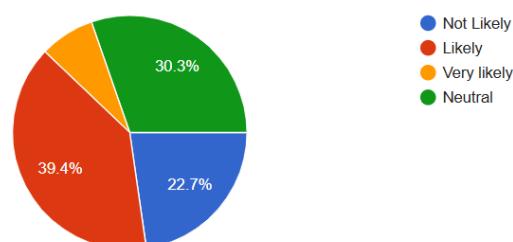
Which digital marketing channels influence you the most when making a purchasing decisions?

66 responses

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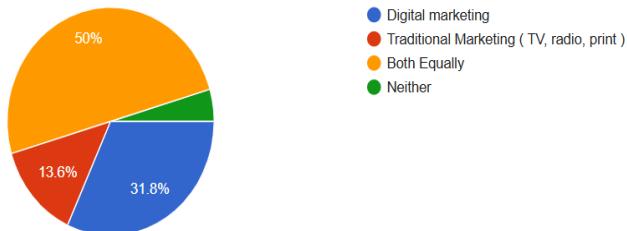
Rate how likely you are to purchase a product after seeing a digital advertisement ?

66 responses

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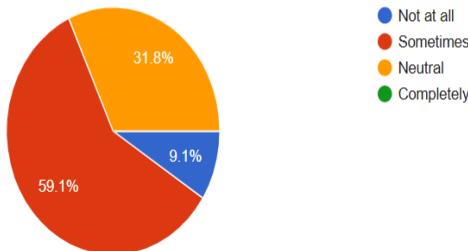
Which type of marketing do you trust more ?

66 responses

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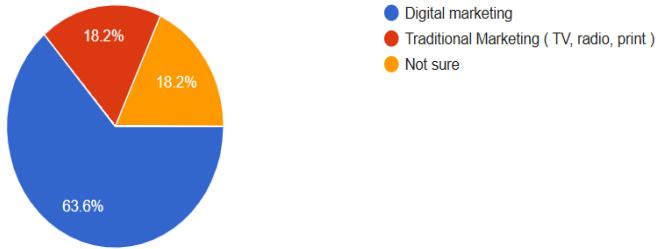
How much do you trust product recommendations from social media influencers?

66 responses

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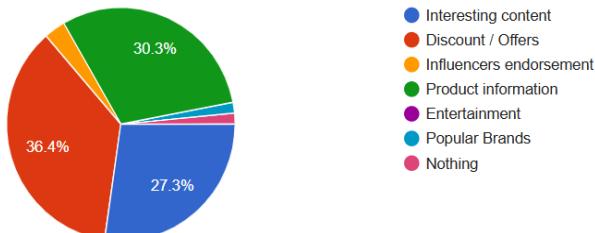
In your opinion which marketing method gives better value to business ?

66 responses

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What motivates you to engage with brands online ?

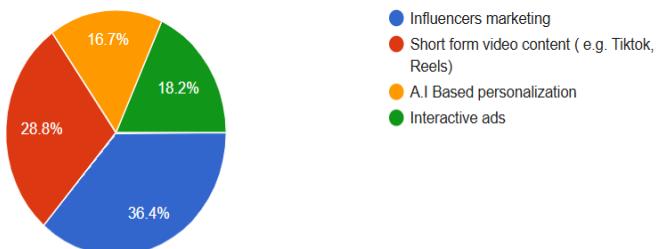
66 responses

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Which digital marketing trends do you notice growing the most recently ?

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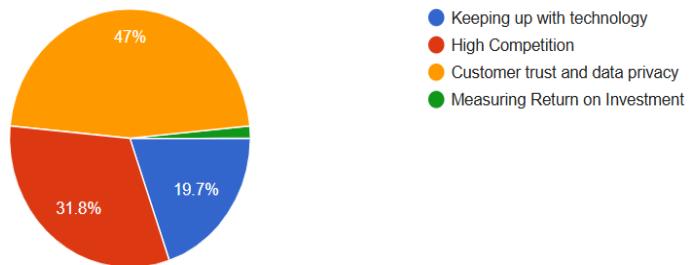
66 responses



Which challenges do you think businesses face with digital marketing today ?

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66 responses



## Findings:

The primary data of has been collected from 66 respondents who are from various age groups from 18 to above 55years of age. The ratio of male and female is almost the same but mostly the respondents are students. 49.2% of the respondents do online shopping and 77.8% are influenced by marketing ads. 74.2% are more influenced by social media ads. Rating a digital advertisement shows differences in opinions for different people.

50% respondents trust both in digital and traditional marketing, Whereas 31.8% trust only on digital marketing and 13.6% trust on traditional marketing. Social media influencers do not make much impact on the respondents. 63.6% persons feel that digital marketing gives more value to business and 18.2% give more trust on traditional methods for better value to business. There is a mixed opinion about the motivation for engaging with brands online. Regarding the Trends that are growing more 28% respondents feel that tiktok and reels influence more, 18.2% for interactive ads, 16.7% for AI based personalization and 36.4% for influencers marketing.

47% respondents feel that Customer trust and data privacy are more challenging for the businesses, whereas 31.8% feel that high competition is more challenging and 19.7% feel that keeping up with technology is more challenging.

The findings reveal that digital marketing plays a significant role in shaping consumer behavior, particularly among younger audiences, with social media ads emerging as the most influential medium. While trust is divided between digital and traditional marketing methods, a majority of respondents believe digital marketing adds more value to businesses. Interestingly, social media influencers appear to have limited impact, suggesting a shift toward more personalized and content-driven strategies such as TikTok, Reels, and interactive ads. Despite the opportunities AI and digital platforms offer, businesses face considerable challenges, notably in maintaining customer trust and data privacy. Overall, the research highlights a growing acceptance of digital marketing, with an emphasis on evolving trends and the need for ethical and adaptive strategies.

### **Conclusion :**

Artificial Intelligence (AI) is transforming digital marketing by enabling greater personalization, automation, and customer engagement. With tools like predictive analytics and chatbots, AI helps marketers deliver targeted content and achieve better ROI.

However, challenges remain—businesses must adapt to fast-changing tech, manage multi-channel strategies, protect data privacy, and ensure quality content and user experiences, often with limited budgets.

Despite these hurdles, AI's future in marketing is bright. As it evolves, it will drive innovation across industries and reshape consumer behavior. To succeed, companies must balance AI's benefits with ethical and strategic considerations, invest wisely, and stay customer-focused to drive lasting growth.

### **Recommendation:**

To effectively leverage AI in digital marketing, businesses should take a strategic and responsible approach:

- 1. Upskill Teams** – Train marketing staff on AI tools, data analytics, and ethical practices.
- 2. Start Small** – Implement AI in areas like chatbots or personalization, then scale based on results.
- 3. Prioritize Privacy** – Ensure compliance with data regulations and maintain transparency with users.
- 4. Enhance User Experience** – Use AI to deliver relevant, personalized content across all channels.
- 5. Measure and Optimize** – Track key metrics like ROI, conversion rates, and customer value to refine strategies.
- 6. Balance Tech and Creativity** – Combine AI efficiency with human creativity for stronger engagement.

7. **Stay Future-Ready** – Monitor AI trends and remain adaptable to evolving digital landscapes.

By following these steps, businesses can maximize AI's potential while staying ethical, customer-focused, and competitive.

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**LEARNERS IN THE LOOP: EXPLORING THE SHIFT FROM TEACHER-LED TO  
AI-PERSONALIZED EDUCATION AND ITS IMPACT ON STUDENT  
EXPERIENCE**

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**Abstract:**

*The integration of artificial intelligence (AI) in education is redefining traditional learning paradigms. This study explores the evolving shift from conventional teacher-led instruction to AI-personalized education, focusing on its perceived impact on student experience, engagement, and academic performance. Through a structured survey conducted among 130 college students across varied disciplines, the research investigates the frequency, purpose, and effectiveness of AI-based virtual tutors such as ChatGPT and Google Gemini. The findings reveal that students widely adopt AI tools for concept clarification, homework assistance, and exam preparation, with many reporting daily use. While AI tools are appreciated for their accessibility and ability to support self-paced learning, the study also uncovers concerns about overdependence, accuracy, and the lack of emotional engagement. Despite these challenges, a significant number of students view AI as a complementary force rather than a replacement for teachers. The research highlights the need for teacher training in AI tools to foster collaborative learning environments where AI and educators co-exist. Ultimately, the study contributes to understanding how learners perceive the growing role of AI in shaping the future of education.*

**Keywords:** *AI in education, personalized learning, virtual tutors, ChatGPT, student experience, teacher-led vs AI learning, educational technology.*

**Introduction:**

The landscape of education is undergoing a profound transformation with the advent of artificial intelligence (AI) tools capable of simulating teaching, assessing learning, and delivering personalized academic support. AI-powered platforms such as ChatGPT, Google Gemini, and Quillbot are now widely accessible to students, often outperforming traditional methods in terms of speed, availability, and content personalization. In this evolving scenario, students are no longer

passive recipients of knowledge but active participants — or “learners in the loop” — navigating their educational journeys with AI as an ever-present guide.

While AI’s rise in education is often framed through the lens of innovation and efficiency, its integration raises pressing pedagogical, psychological, and ethical questions. Can AI replicate the critical thinking, empathy, and mentorship that human educators provide? Does the overuse of AI risk diminishing students’ deep learning capacities and social learning experiences? Is personalized learning truly meaningful when driven by algorithmic recommendations rather than teacher intuition?

This study seeks to explore these questions by examining the perceptions and experiences of college students who actively engage with AI-based virtual tutors. It investigates not only the frequency and purpose of AI tool usage but also students’ perceived gains, frustrations, and their trust in AI systems to shape academic outcomes. Importantly, the research also reflects on the role of human teachers in an AI-mediated learning environment — asking whether they are being empowered by AI, displaced by it, or sidelined altogether.

By bringing student voices to the forefront, this research critically analyzes the current shift from teacher-led to AI-personalized education. It aims to uncover whether this transformation is enriching the student experience or subtly eroding key elements of meaningful learning — such as interpersonal connection, real-time feedback, and classroom dialogue.

### **Objectives:**

This study aims to critically explore how AI-personalized education is reshaping the future of learning, with students positioned as active participants in an evolving educational paradigm. Specifically, it seeks to:

1. **Map current student interactions with AI-based learning tools** to understand emerging usage patterns that may signal future norms in digital education — including preferred platforms, learning purposes, and frequency of engagement.
2. **Analyze evolving perceptions of AI tutors** as educational agents, particularly in how students evaluate their effectiveness compared to traditional teacher-led instruction in terms of personalization, clarity, and academic outcomes.
3. **Anticipate the long-term benefits and risks** of AI-enhanced learning by identifying student-reported advantages (e.g., flexibility, accessibility) and concerns (e.g., overdependence, lack of emotional connection, or algorithmic limitations).

4. **Project the shifting role of educators** in an AI-augmented learning ecosystem, focusing on whether students envision teachers as collaborators with AI, or at risk of being sidelined in technology-driven environments.
5. **Gauge students' trust in AI's future capabilities**, such as automated grading, avatar-based tutoring, and curriculum generation — and explore how these views may shape the adoption and design of future AI tools.
6. **Highlight the institutional preparedness gap**, with emphasis on the need for future-forward teacher training, digital ethics integration, and inclusive strategies for balancing human-led pedagogy with AI support.

By focusing on these objectives, the study aims to generate forward-thinking insights that inform not just how AI is used today, but how it may redefine the learner experience, teacher roles, and educational equity in the years to come.

#### **Hypothesis:**

The integration of AI-based virtual tutors in education is expected to influence not only how students learn but also how they perceive the role of human teachers, assessment, and support systems. This research is grounded in the following hypotheses:

#### **Null Hypothesis (H<sub>0</sub>):**

AI tutors have no significant impact on student motivation, academic performance, or learning personalization relative to traditional teacher-led instruction.

#### **Alternative Hypothesis (H<sub>1</sub>):**

AI tutors significantly enhance student motivation, academic performance, and perceived personalization of learning compared to traditional teacher-led instruction.

#### **Methodology:**

**Research Design:** This study employs a **descriptive and exploratory survey-based research design** to investigate how college students interact with and perceive AI-personalized education tools in contrast to traditional teacher-led instruction. A mixed-methods approach is used, incorporating both quantitative and qualitative data to gain a comprehensive understanding of the student experience in an AI-augmented learning environment.

**Population and Sampling Technique:** The population for this study comprises **undergraduate college students** from various academic disciplines, primarily from institutions in Mumbai. A **convenience sampling** method was used to select participants who had prior exposure to AI-based educational tools. While not random, this technique allowed for quick data collection from a relevant and tech-aware group of learners.

**Sample Size:** A total of **130 valid responses** were collected through an online survey. The participants were students from various courses, including BSc IT, BAF, BBI, BMS, and other self-finance streams, with a majority being BSc IT students.

### **Data Collection Tool:**

Data was gathered using a **structured Google Form** questionnaire consisting of 30 items, covering:

- Demographic details (e.g., course, year, gender)
- Frequency and purpose of AI tool usage
- Perceptions of AI effectiveness vs teacher support
- Impact on academic performance
- Trust and comfort with AI tutors and avatars
- Challenges faced with AI tools and traditional classrooms
- Future expectations from AI in education

### **Data Analysis Techniques:**

- **Quantitative data** (e.g., frequency of AI tool usage, impact ratings, and preference patterns) was analyzed using **descriptive statistics** — including percentage distribution, bar charts, and cross-tabulations.
- **Comparative insights** were drawn between student preferences for AI vs teacher-led learning to evaluate the shifting landscape of classroom engagement.

### **Limitations:**

- The use of convenience sampling may limit the generalizability of the findings.
- The study relies on self-reported perceptions, which may not always reflect actual academic outcomes.
- Rapidly evolving AI tools may outpace the relevance of current perceptions over time.

### **Results and Interpretation:**

#### **1. AI Tool Usage Patterns**

Among the 130 students surveyed, the most frequently used AI tools were:

- **ChatGPT:** 98% (127 out of 130 students)
- **Google Gemini:** 65% (85 out of 130 students)
- **Quillbot/Scribe:** 15% (20 out of 130 students)
- **Perplexity:** 6% (8 out of 130 students)

Students primarily accessed these tools via **smartphones** (83%, or 108 students) and **laptops** (56%, or 73 students), confirming a mobile-first learning trend.

The primary purposes for using AI tools were:

- **Concept clarification:** 82% (107 students)
- **Homework assistance:** 62% (81 students)
- **Exam preparation:** 59% (77 students)
- **Content generation** (writing assignments/generating study plans): 64% (83 students)

This indicates that AI serves as a multifaceted academic support tool.

## 2. Frequency of AI Tool Use

Approximately **68%** of students reported using AI tools **daily or multiple times daily** for academic help, while **21%** reported using them a **few times a week**. This highlights AI's deep integration into regular study routines for the majority of students.

## 3. Perceived Impact on Academic Grades

On a scale of -5 to +5, the impact on grades was rated as:

- **Positive impact (+2 to +5):** 87% (113 students)
- **No impact (0):** 9% (12 students)
- **Negative impact (-5 to -1):** 4% (5 students)

This self-reported trend suggests a strong perception of AI's positive influence on learning outcomes.

## 4. Learning Format Preferences

Students' learning format preferences were as follows:

- **Blended model** (Hybrid): 55%
- **AI-assisted learning with teacher support:** 38%
- **Traditional methods:** 7%

This suggests that while students value the flexibility and benefits of AI, they overwhelmingly prefer a model that includes human educators for guidance.

## 5. Trust and Comfort with AI

When asked about trusting AI to grade assignments:

- **Only with teacher cross-checking:** 40%
- **Trusted it fully:** 35%
- **Were unsure/did not trust it:** 25%

Regarding comfort with AI avatars and voice tutors:

- **Found them engaging/comfortable:** 55%
- **Found them impersonal/uncomfortable:** 45%

This shows that trust in AI for high-stakes tasks like grading is mixed, and comfort with AI tutors is also divided, with a slight preference for engaging avatars.

## 6. Challenges Faced

Students reported challenges with both traditional and AI-based systems.

### With traditional classrooms:

- **Lack of personalized attention:** 49%
- **Not enough time for doubt-clearing:** 46%
- **Rigid instruction/schedule:** 39%
- **One-size-fits-all teaching:** 45%

### With AI tools:

- **Overdependence:** 49%
- **Inaccurate/generic answers:** 54%
- **Hard to verify information:** 32%
- **Lack of emotional connection:** 35%

These results reinforce the idea that a balanced, hybrid model is needed to mitigate the shortcomings of both teaching approaches.

### Discussion:

The findings of this study illuminate the complex and evolving relationship between students and AI-based educational tools. The widespread adoption of platforms like ChatGPT, Google Gemini, and Quillbot among college students indicates a significant shift in learning behavior. These tools are not only supplementing traditional education but, for many learners, becoming central to daily academic routines.

The results support the **alternative hypothesis (H<sub>1</sub>)** that AI tutors enhance student engagement, academic motivation, and learning personalization compared to traditional instruction. The frequent use of AI tools—especially among senior-year students—demonstrates growing student comfort and reliance on such technologies. This aligns with Objective 1 and 2, confirming that AI is increasingly perceived as effective in clarifying concepts, assisting with exam preparation, and supporting self-paced learning.

However, the data also reveal **critical tensions** in this shift. While students reported improved academic performance and learning flexibility, they simultaneously expressed **reservations** about AI's limitations: lack of emotional connection, generic responses, and concerns over trust in AI-based grading. This duality aligns with Objectives 3 and 5, suggesting that AI tools are seen as efficient but not fully sufficient.

The study also highlighted **the limited institutional support** for AI integration. Many students noted that their teachers are either untrained or hesitant to encourage AI usage. This gap aligns with Objective 6 and raises concerns about how well-prepared educational institutions are to guide students in navigating AI ethically and effectively.

Interestingly, while a majority of students favored a **blended learning model**, very few opted for AI-only learning. This reinforces the notion that students still value **human mentorship**, emotional feedback, and critical thinking support that only educators can provide. These findings correspond closely with Objective 4 and support a future vision of **human-AI collaboration** rather than replacement. From a broader perspective, this research also challenges techno-optimist narratives by reminding us that **access to AI does not guarantee equity, comprehension, or motivation**. The educational value of AI depends heavily on how students are supported in using it—and how institutions adapt to the evolving landscape.

### **Conclusion:**

This study concludes that AI-based virtual tutors are playing an increasingly significant role in the academic lives of college students. From daily usage patterns to self-reported grade improvements, the findings reflect a clear trend toward AI-personalized learning. Students view AI tools as effective for quick access to information, clarification of concepts, and academic support, particularly when traditional instruction falls short.

However, this transition is not without concerns. Students reported challenges related to trust, emotional disconnect, and overdependence. Importantly, the study identified a lack of institutional and teacher support for AI adoption, signaling the need for more structured integration into academic environments. Overall, while students are leading the shift toward AI-enhanced learning, the absence of professional guidance may limit its long-term educational value.

### **Recommendations:**

- 1. Integrate AI Literacy into the Curriculum:** Institutions should introduce basic AI literacy programs to help students use tools ethically, critically, and effectively.
- 2. Train Educators for AI-Supported Teaching:** Faculty development workshops should focus on how to incorporate AI tools into pedagogy, making them collaborators—not competitors—in the classroom.
- 3. Promote a Balanced Learning Model:** Encourage blended learning environments that combine the strengths of AI (speed, personalization) with human-led teaching (empathy, mentorship).
- 4. Develop Institutional Guidelines for AI Use:** Clear policies on acceptable and academic use of AI tools can prevent misuse and confusion among students and teachers alike.
- 5. Further Research on Long-Term Effects:** Continued investigation is needed to understand how sustained use of AI impacts deep learning, academic honesty, and cognitive development.

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## AI IN DIGITAL MARKETING - JOBS IN FLUX

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### **Abstract:**

*This study examines how the quick adoption of artificial intelligence (AI) in digital marketing is changing the nature of work and the skills that employers are looking for. AI technologies are simplifying processes, increasing productivity, and opening up new creative possibilities in a variety of fields, including personalised customer targeting, automated content creation, and predictive analytics. However, as decision-making becomes data-driven and repetitive tasks become more automated, this shift also puts pressure on traditional roles. As a result, there is a dynamic environment in which some roles change to demand more advanced strategic thinking, creativity, and AI literacy, while others become less important or vanish completely. It examines how artificial intelligence is changing the nature of work in digital marketing, the new roles and skills needed to adapt, and the tactics professionals can use to stay relevant. This study explores how AI is disrupting job functions in digital marketing, the emerging roles and skills required to adapt, and the strategies professionals can employ to remain relevant in a workplace that is in continuous flux.*

**Keywords:** Transforming, replication, automated, personalized, Flux, redundancy.

### **Introduction:**

Artificial Intelligence (AI) is no longer just a futuristic concept - it has become the driving force reshaping digital marketing and transforming digital marketing. AI is transforming the way brands interact with consumers through personalised ad targeting, automated content production, chatbots, predictive analytics, task automation, and captivating personalisation.

Jobs in marketing are changing as a result of this quick change. Conventional roles are changing, some tasks are getting automated, and completely new opportunities are opening up that call for hybrid skills that combine strategy, creativity, and AI literacy. Professionals must realize this change in order to

remain competitive, adjust to new tools, and use AI as a partner rather than a rival in the dynamic marketing environment.

### **Objectives :**

- 1) To analyze the impact of AI on digital marketing jobs and understand how AI tools automated are changing job roles, skill requirements, and workflows in the industry.
- 2) To assess job opportunities & threats by exploring which jobs are at risk due to automation and which new roles are emerging.

### **Literature Review:**

1. **Chintalapati, S., & Pandey, S. K. (2022).** AI in Global Marketing -Artificial Intelligence is revolutionizing global marketing by enabling businesses to analyse international markets, personalize campaigns across cultures, and optimize advertising worldwide. Key uses include market research, multilingual content creation, predictive analytics, programmatic ads, and social media sentiment tracking. Benefits include faster operations, scalable personalization, and culturally adapted strategies. Challenges involve data privacy, cultural sensitivity, and uneven global tech adoption. In the future, AI will drive hyper-localized campaigns, real-time translations, and immersive global brand experiences.
2. **Jain, R., & Kumar, A. (2024)** AI in strategic marketing decision-making helps businesses analyze large datasets, predict market trends, understand customer behavior, personalize campaigns, and optimize resource allocation. This leads to faster, data-driven, and more accurate decisions that improve competitiveness and marketing ROI.
3. **Kumar, V., et al. (2021).** Marketing and AI – shaping future together. Marketing and AI are increasingly working hand in hand to shape the future by enabling hyper-personalized customer experiences, automating routine tasks, and providing data-driven insights for smarter decision-making. AI's capabilities in predictive analytics, content creation, and customer behavior analysis help marketers target the right audience at the right time, boosting efficiency and innovation while redefining traditional marketing roles.
4. **Taylor & Francis (2024):** Advances in digital marketing in the era of AI involve using technologies like machine learning, natural language processing, and predictive analytics to deliver highly personalized customer experiences, automate content creation, optimize ad targeting, and improve decision-making. AI enables real-time data analysis, trend forecasting, and customer behavior prediction, making marketing more efficient, cost-effective, and customer-centric.

5. **Tourism & Management Studies (2025).** "Exploring the Applications of Artificial Intelligence in Marketing: This study focuses on using technologies like machine learning, predictive analytics, natural language processing, and automation to improve customer targeting, personalize content, optimize campaigns, and enhance decision-making. Practical applications include chatbots for customer service, AI-driven recommendation systems, automated email marketing, sentiment analysis, dynamic pricing, and predictive customer behavior modeling—helping businesses increase efficiency, engagement, and ROI.

#### 6. **Research methodology :**

This study employs a mixed-methods approach to investigate the evolving relationship between Artificial Intelligence (AI) adoption and job transformations within the digital marketing industry. The research design integrates both quantitative and qualitative methods to provide a comprehensive understanding of how AI technologies are influencing job roles, skill requirements, and career trajectories in the digital marketing sector.

The phrase "AI integration" describes the consistent application of AI-based tools or platforms in at least one crucial aspect of digital marketing that clearly affects workflows or decision-making.

#### **AI in digital marketing -Jobs in Flux:**

Campaign planning, execution, and analysis are all changing dramatically as a result of artificial intelligence (AI), which is transforming the digital marketing sector. Marketers can now automate repetitive tasks like ad targeting, email segmentation, customer support, and content optimisation with the help of AI-powered tools. Brands can make data-driven decisions more quickly, predict consumer behaviour, and personalise experiences at scale by utilising machine learning algorithms.

But there are also "jobs in flux" as a result of this quick change. Jobs that require a lot of manual labour, such as standard reporting, campaign monitoring, or simple data entry, are becoming more and more automated. Simultaneously, there are new opportunities in data science, marketing automation, prompt engineering, AI strategy, and creative storytelling with AI tools.

Upskilling to stay relevant is a challenge for marketing professionals. It will be crucial to be proficient with AI analytics platforms, comprehend consumer psychology in a digital setting, and combine creativity and technology. Those who can innovate, adjust, and use AI as a cooperative tool rather than a threat will rule the future of digital marketing.

AI in digital marketing has the advantage of allowing tools to manage tasks like emailing, scheduling posts, and creating performance reports, freeing up

marketers to concentrate on strategy and innovation. In order to provide highly targeted advertisements and recommendations and increase conversion rates, AI examines consumer behaviour and preferences. Real-time insights and predictive analytics enable marketers to make data-driven decisions more quickly, reduces the need for large manual teams, lowering operational costs and speeding up campaign execution. Chatbots and virtual assistants provide round-the-clock customer support without additional human resources. While some roles are reduced, new roles emerge in AI strategy, prompt engineering, data analytics, and AI system management. Some disadvantages are that job displacement routine marketing roles (data entry, reporting, basic content creation) are at risk of being automated, leading to workforce downsizing. Professionals must learn AI tools, data analysis, and prompt engineering, creating a demand for reskilling and upskilling. Advanced AI systems and integration require significant investment, especially for smaller businesses. Excessive dependence on AI may reduce human creativity, emotional intelligence, and brand authenticity. AI relies heavily on consumer data, raising issues about consent, data protection, and algorithm bias. AI tools evolve rapidly, requiring continuous learning and adaptation to avoid falling behind.

### **Conclusion:**

The data for this study is derived from secondary sources and in summary, the industry has changed dramatically as a result of AI's incorporation into digital marketing, resulting in a dynamic workplace where job roles are always changing. Predictive analytics, chatbots, automated content creation, and personalised targeting are examples of AI-driven technologies that have improved productivity, precision, and client interaction. However, this change has also led to the automation of repetitive tasks, which has increased the need for advanced analytical, creative, and strategic skills while decreasing the demand for some traditional roles. A workforce that can adjust to technological advancements and use AI to create creative, data-driven campaigns will be crucial to the future of digital marketing.

### **Recommendations:**

- Digital marketing professionals should focus on acquiring AI-related skills such as data analytics, machine learning basics, and AI tool usage.
- Organizations should invest in continuous training programs to prepare employees for AI-integrated workflows.
- While AI can automate tasks, human creativity, empathy, and strategic thinking remain irreplaceable. Businesses should ensure AI supports rather than replaces the human element in marketing.

- Companies must adopt transparent AI algorithms, respect data privacy, and follow ethical marketing practices to maintain consumer trust.

**Limitations :**

The present study is based entirely on secondary data. Longer studies are required to completely understand it. Opinions and suggestions from the working population with regard to the relevance of AI applicability in their respective careers can be explored further and a concrete analysis can be produced.

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## ROLE OF AI IN CHEMISTRY

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### **Abstract:**

*In recent years, artificial intelligence has become one of the most frequently referenced fields in chemistry. The intersection between Chemistry and AI is increasingly undeniable. In the healthcare sector, the intersection of these disciplines is primarily evident in connection drug discovery and development. The fusion of advanced technologies with medical science has significantly transformed the processes of drug formulation and production. This progress is largely driven by sophisticated tools and methodologies that have enhanced research and development within the pharmaceutical industry. However, the scope of AI in chemistry extends far beyond drug development. Its applications surpass the realm of molecules and chemical bonds—the very building blocks of science. In various branches of chemistry, AI plays a pivotal role in tasks ranging from molecular synthesis to the prediction and analysis of molecular properties. This review aims to provide an insightful overview of how AI supports researchers and scientists in showcasing its potential and effectiveness, particularly in drug design, development, and delivery systems.*

### **Introduction:**

John McCarthy was the first to introduce the term *artificial intelligence* in 1956. AI is a subfield of computer science focused on machine learning, enabling systems to perform tasks that usually require human intelligence. Essentially, it involves replicating human cognitive abilities within machines [1]. AI has become a crucial part of the modern technology sector, as it facilitates data collection and analysis efficiently, at a lower cost, and within a safer working environment [2]. It encompasses a wide range of applications, including natural language processing, problem-solving, and strategic decision-making. AI systems can adapt and modify objects or processes based on specific needs [1]. Beyond its impact on engineering, AI is increasingly influential in the field of chemistry. It aids in molecular design and helps predict key properties such as melting point, solubility, stability, and electronic features like HOMO/LUMO levels [3]. Additionally, AI

accelerates the processes of drug discovery and structural determination, making them more time-efficient and cost-effective. Chemists have utilized AI to study chemical effects and to identify structural patterns across a variety of molecules. As we know, the entire world has been affected by the coronavirus pandemic. In this context, artificial intelligence, along with COVID-19 detection sensors, has played a key role in analysing the virus's structure, its life cycle, modes of infection, and functional sites—information crucial for therapeutic development and understanding pathogenesis. The integration of AI with the Internet of Things (IoT) has been effectively utilized in the fight against SARS-CoV-2. Since most people have access to smartphones, AI-based systems were employed during lockdown periods to disseminate national guidelines, raise public awareness, enforce safety protocols, and efficiently manage the sharing of health-related data [4].

Artificial intelligence systems are highly efficient, delivering results in a significantly shorter time based on the input provided. These machine-driven tools also assist in addressing a wide range of challenges within the field of chemistry [5]. Figure 1 illustrates the diverse applications of AI across various branches of chemistry. One of the primary uses of AI in this domain is the prediction of molecular properties. The ability to detect such properties allows scientists to assess the potential of theoretical or untested molecules. Moreover, the incorporation of AI in molecular design has led to ground-breaking advancements in chemical research. Other major applications of AI in chemistry include drug discovery, retrosynthetic analysis, predictive modelling, nanotechnology, and wastewater treatment.

The drug discovery process is essential in daily life, yet its pace remains slow due to its multi-objective complexity. Artificial intelligence plays a significant role in accelerating this process by utilizing existing datasets. AI-based algorithms are particularly effective in developing drugs from large and complex molecular structures—a task that is extremely challenging when done manually [6]. These algorithms can also reveal hidden patterns within intricate molecules. Furthermore, AI employs various computational techniques that assist in designing novel molecules and identifying active sites within drugs [7]. By processing vast datasets, AI helps in recognizing relationships between training data and control samples, as well as predicting new molecular patterns. This capability of machine learning is valuable for materials identification and development [8]. In addition, AI is deeply integrated into many everyday technologies. Tools like Google, Siri, and Alexa are widely used for voice-based searches and interactions. Interestingly, voice assistants such as Siri and Alexa have also been recently applied to perform quantum chemistry computations [9].

As we know, synthesizing organic molecules is one of the most critical tasks in organic chemistry. For this purpose, scientists have been using computer-aided software for many years. To generate new compounds, researchers rely on large datasets driven by artificial intelligence, where the starting materials are known, and the main objective is to design the target molecule. Integrating AI with biological systems has proven valuable for creating new molecules that could potentially treat diseases [10]. Certain machine learning techniques, when combined with active learning, closely resemble the concept of response loops. Active learning refers to the intelligent exploration of problems to determine the most effective solution pathway [11]. Depending on the available data and defined objectives, different AI approaches can be effectively applied in chemistry. AI offers a range of powerful tools capable of addressing complex chemical challenges. It can identify patterns and relationships within data and propose solutions accordingly. Moreover, AI can predict reaction outcomes based on previously collected information [12].

Artificial intelligence is also playing an essential role in retrosynthesis. The Retrosynthesis process starts from the target molecule and continues until getting the starting precursors of that molecule, and with the help of this simple precursor, it is possible to synthesize a new molecule [13]. Artificial intelligence is also valuable for waste-water treatment. This technique implements some algorithms for the waste-water treatment plant to make the analysis more intelligible and remove pollutants from water [14]. Combining artificial intelligence with nanotechnology provides new tools for information and communication technology that significantly impacts our society [15].

This review has been conducted primarily to highlight the role of artificial intelligence in the field of chemistry. AI has become an integral part of our everyday lives, and its influence continues to grow. The main focus of this paper is to explore how artificial intelligence can be applied within various areas of chemistry. Through AI, chemists are able to enhance their understanding and expand their research capabilities. It also offers the advantage of being time-efficient and cost-effective. Many pharmaceutical companies have already adopted AI technologies to aid in drug development. This review discusses several key applications of AI in chemistry, including retrosynthetic analysis, drug discovery, and the prediction of reaction outcomes. Additionally, it sheds light on the role of AI in emerging areas such as nanotechnology and wastewater treatment.

### **Artificial Intelligence in Retrosynthesis:**

The design and synthesis of organic molecules represent a fundamental challenge in organic chemistry. This process involves multiple complex steps required to construct the desired compound. To simplify this task, chemists often use a

method called retrosynthesis. Retrosynthesis is an approach where the target molecule is systematically broken down into simpler precursor structures. This backward process continues until a readily available starting material is identified [16]. However, when dealing with highly complex molecules that contain numerous functional groups, the process can become significantly more challenging.

### **Conclusion:**

To summarise, AI-discovered compounds are a fascinating topic to learn about. However, it is not implausible to see chemical sciences and Artificial Intelligence working together to better discoveries and data. This article is addressed to several chemists who are interested in the potential of AI in chemistry and also to the fresh researchers who are new to this area. With this review article one can check the progress made so far in this domain, by highlighting the past events and discussing the future scope.

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## THE DARK SIDE OF AI-DRIVEN LEARNING: ETHICAL DILEMMAS IN STUDENT USE OF CHATGPT FOR COURSEWORK

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### **Abstract:**

*The faster growth of Artificial intelligence (AI) tools specifically Chat GPT. into higher education has changed the way of student busy with learning material specially in growing area like digital marketing while AI-driven learning offer important advantage Such as instant information, personalized guidance. and improve producing It also contain a dark side. that warrant Critical attention. This research paper analyses how students in digital marketing education use Chat GPT highlighting both helpful and possible. Harmful impact it Create issue like academic dishonesty. overdependence on the Contain generate by AI. Reduce important thinking Skill, and risk of wrong information are Researched. The aim is to inform educator policymaker and for curriculum designer about the need for AI Combination receiving its benefits while starting Safeguard to preserve academic honesty boost independent thinking and secure Skill Development along with industry exception.*

### **Introductions:**

The fast progress of AI has change educational practice across worldwide with tools like chat GPT growing as powerful learning. These AI platforms gave student direct access to information personalized support and improving productivity, transforming, traditional limits of assignment and review. However, with these the benefits stories of growing problems and possibility misuse of AI in academic place when students extremely depend on chat GPT for their academic work. The thread between learning improvement and educational cheating become unclear. The honest difficulty surrounding AI inspired studies are many-sided problems such as plagiarism, loss of important thinking skills. Decline study honesty and unfair entry to AI tools. Increase questions about fairness and duty in studies. In additional lack of clarity of AI produced information present difficulties for professors in finding real student work. As organization work hard to combined

technology into learning, there is important demand to seriously checked the Dark side of AI acceptance in education.

This research paper analyse right problem, focusing how student use AI and occasionally misuse of Chat GPT for classwork. It target to analyse the effect for educational honesty, learning outcomes and decision making. Providing understanding into how instructor, policy development and student can manage the sensitive balance between invention and standard in AI committed education.

#### **Review of Literature:**

1. ***ChatGPT impact on EFL Indian undergraduates. SSRN.*** The study of EFL undergraduates at Delhi University found frequent ChatGPT use, reduced anxiety, and time savings, but raised concerns over language skills and plagiarism.
2. ***AI-driven pedagogy: Unveiling ChatGPT's influence in education. Journal of Applied Science, Engineering, Technology and Management.*** The study found Delhi University EFL students often use ChatGPT, easing anxiety but risking skills and integrity.
3. ***Indian Institute of Technology Delhi. (2025). Generative AI committee report*** [Summary in Times of India]. IIT Delhi urges AI disclosure, AI-aware tasks, and professor training, citing key risks but lacking detail for evaluation.
4. ***Dey, S. (2025). India made 1,152 colleges use a plagiarism checker. Then ChatGPT unleashed chaos. The Ken.*** The article shows ChatGPT often evades plagiarism checks in India, exposing policy gaps, technical unpreparedness, and system limits, though lacking expert review.
5. ***Author unknown. (2024). ChatGPT — A blessing or a curse. Tech Vistas, Maulana Abul Kalam Azad University of Technology*** This paper explores ChatGPT in education, noting benefits, risks, and suggestions, but is limited by lacking peer review and systematic data.
6. ***Ghosh, P. (2024). Attitude of B.Ed. trainees towards artificial intelligence and its implications. WBNSOU Journal of Education.*** A West Bengal B.Ed. trainee survey found AI's benefits but flagged plagiarism, stressing teacher training in AI literacy, with limited wider relevance.
7. ***Singh, R., & Mehta, A. (2024). Academic cheating and plagiarism: Detection and prevention. International Journal of Creative Research Thoughts.*** An Indian workshop paper warns AI boosts plagiarism, urging honour codes, oral exams, and AI-aware reviews, but lacks tested evidence.
8. ***International Institute of Information Technology, Hyderabad. (2024). Academics in the time of ChatGPT [Blog series]. IIIT Hyderabad*** The series promotes AI-integrated teaching with clear policies, oral exams, short tasks, and faculty training, but lacks peer review.

**9. Cochin University of Science and Technology; JV Parekh International. (2024). Academic integrity policies on generative AI [IQAC reports].**

The guidelines label undisclosed AI use as a violation, require disclosure, and set penalties, suggesting AI-friendly guidance and supervised tasks but lacking enforcement data.

**10. Ajay Kumar Garg Engineering College. (2025). Harnessing ChatGPT for learning and growth [Whitepaper].** A policy report on guided ChatGPT use saw better research and less hidden copying, suggesting verification, standard courses, and AI literacy, but its single-institution focus limits wider use.

**Research Aim and Objective:**

1. To assess student's awareness and understanding of ethical boundaries in using AI tools in academic work.
2. To evaluate the impact of ChatGPT use on student's learning outcomes, critical thinking, and academic integrity.
3. To identify the types of academic tasks for which students most commonly rely on ChatGPT (e.g., essay writing, coding, problem-solving).

**Design of the Study:**

**Sample Type :**

The sample comprise of Under Graduates and Post Graduates in the city of Mumbai.

**Source of Study :**

The present study is based on primary data as well as secondary data. Primary data is to be collected by using structured questionnaire. Secondary data is to be collected from various article, blogs and websites, etc.

**Area of Research Paper:**

The research is conduct within the geographical boundaries of Mumbai City.

**Data Interpretation & Result:**

| QUESTIONS  | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|--|-------------------|----------|---------|-------|----------------|
| 1. I rely on Chat GPT more than textbooks, class notes or Faculty Guidance | 5%                | 24.8%    | 57%     | 12.4% | 1%             |
| 2. Using Chat GPT has helped improve my understanding of complex topics.   | 1.7%              | 4.1%     | 43%     | 45.5% | 5.8%           |

| QUESTIONS  | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|--|-------------------|----------|---------|-------|----------------|
| 3. Using Chat GPT has improved my ability to think critically about a topic. | 5.8%              | 18.3%    | 41.7%   | 33.3% | 0.8%           |
| 4. Do you think using Chat GPT saves time and reduces academic stress?       | 0.8%              | 7.4%     | 30.6%   | 54.5% | 6.6%           |

### **Data Interpretation :**

This survey contains undergraduates and graduates students to understand the educational use of Chat GPT. Respondence reported average dependence on Chat GPT, compared to textbooks, class notes or professor guidance with highest using it occasionally or regularly for task such as, research paper, overview and innovation. While a larger number recognized that Chat GPT helps in understanding complicated stress its effect important thinking was mixed. Most student regarded using Chat GPT without improper reference or partially acceptance, showing knowledge of education honesty problem. Only few respondents accepted to submitting AI generated work, showing careful right behaviour. Overall, finding recommend that undergraduates see Chat GPT as helpful education resource, offer clear right guidelines are established for educational use.

### **Conclusion :**

The finding of this study highlight that double character of Chat GPT in higher education. While AI tool improve learning by offering quick information, personalized support and increased efficiency, their improper use creates major right challenges, containing educational dishonesty, overdependent on AI generated information and reduced crucial thinking skill/ Indian study show that student frequently use Chat GPT for educational purpose, still conscious of standard behaviour, highlighting systematic guidelines. To utilize the advantage of AI carefully, educator and decision maker must apply clear right framework AI literacy program and managed combination into assignment balancing development with honesty is important to ensure that AI tools helps skill development independent learning and following honesty, planning student. Successfully for professional and educational success.

### **Limitation :**

1. Geographically this study will be limited to Mumbai City only.
2. This research paper only restricted to Undergraduates & Post Graduates
3. The study focuses only on Dark side of Chat GPT

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## AI TOOLS IN THE HANDS OF GEN Z: OPPORTUNITIES AND ETHICAL PITFALLS IN LEARNING DIGITAL MARKETING

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### **Abstract:**

*In the world we are living in right now, it is almost impossible to imagine life without technology. Everything around us our studies, our entertainment, even the way we shop is being shaped by digital tools. Among all the different generations, it is Gen-Z that has grown up surrounded by this digital storm. Without any second thought, we are using all the gadgets of internet and recently AI has drawn our attentions. AI can be beneficial for learning digital marketing as well. It can do so many things that earlier generations of students could only dream about. Need to create a catchy social media caption? There's an AI tool for that. Want to analyse customer engagement data? AI-powered analytics platforms will break it down for you in seconds. Confused about a marketing strategy? AI chatbots can act like personal mentors, explaining ideas instantly. Even our learning schedules can be customized through AI based study apps that know our strengths and weaknesses better than we sometimes do ourselves. Digital marketing is a perfect playground for AI because trends change overnight. One day a certain meme or reel format is trending, and the next day, it's something completely different. AI helps Gen-Z keep up with this rapid pace by giving quick ideas, helping design visuals, suggesting hashtags, analysing audience reactions, and even predicting what content might go viral. This means students can work faster, be more creative, and feel more confident in their ideas. But here's where the problem begins: when something becomes so easy to use, there's also a high chance of misusing it. And honestly, many students, knowingly or unknowingly, cross that line. The most common issue is plagiarism. AI can produce complete assignments or marketing proposals in seconds, which can tempt students to just "copy-paste" without adding their own thoughts. Another big issue is data privacy many AI tools require us to log in or give them access to our information, but most*

*students have no idea where that data is going or how it's being used. Then there's the slow, almost invisible problem of losing our own creativity and critical thinking skills. If AI is always thinking for us, we might forget how to think for ourselves.*

**Keywords:** Artificial Intelligence (AI), Gen-Z, Digital Marketing, Education Technology, AI in Learning, AI Tools.

### **Introduction:**

We are living in a world where technology is not just a part of our daily life it all most shape your daily life for ordering food, planning trip, chat with friends and attending online lecture, technology is a part of life. one of the biggest developments is AI for many people. AI may look complicated and hard to understand the AI but our generation all ready use AI in there daily life without even realizing it. we ask question to AI ChatGPT we use AI filter on social media get suggestions on YouTube and Instagram to watch video and use of AI make study easier Gen-Z in your generation is called "Digital Native". This means we are born into the world where internet, smartphone and digital tools existed. we do not have to wait to collect information with the help of AI we get information in seconds use of app like ChatGPT, Chatbot, Meta AI etc. Help to make online content and to search information on the app and feel normal to use and to reading and writing. Because of this, when AI tools became more popular, we adapted to them quickly. We already knew how to explore new tech and make it work for us. In the field of digital marketing, AI has become almost like a silent teammate for many students. Digital Marketing is such a field which keeps updating with the time. Here, the change is truly 'constant'. Hence, students need those tools which can keep them updated with the new versions. AI tools can do exactly that. They can suggest new campaign ideas in seconds, design posters and graphics, study how people react to advertisements, and even tell you which type of content might perform better next week. For a student, this is like having a personal assistant who works day and night without taking a break.

With AI the tasks are being completed with more instant speed, we can look out to more creativity and grasp the audience's mentality more accurately. AI is the reason the complicated task and working structures are being executed more smoothly within less time. Simultaneously, AI also has certain disadvantages. Increase in the dependency on AI tools by individuals is the prominent issue. This increase in dependency destroy the cognitive thinking capability. AI can't help with every task, problem of material world. Therefore the space where AI can't help, an individual have to execute his/her own decisions. Increase in dependency may result to decision makings Privacy is also the concern. AI tools demand the access for personal data. They mostly demand for emails and location which may lead to

certain online frauds or leaks. Also, AI gives biased and incomplete results as it takes into consideration the demand of the individual and gives answer which satisfies his/her priorities. Therefore, depending completely on these AI tools may result in getting wrong solutions. This research paper highlights both pros and cons of AI for GEN-Z students in the field of digital marketing. Through this we can conclude that AI can be used for faster and effective learning but we have to also avoid complete dependency and maintain the originality of human skills. As students, we stand at an important point in history. AI is not going away; in fact, it is only going to become more advanced. The way we choose to use it now will decide whether it becomes a tool that pushes us forward or one that holds us back. Our generation has the advantage of being comfortable with technology, but with that advantage comes the responsibility to use it wisely.

#### **Review of Literature:**

1. **Hilario Morales, Reyes Chavez, Cruz Vega, and Cano Sanchez (2024): "Conducted a study on exploring how Gen-Z perceive and engage with ChatGPT."** This research paper looked into the awareness of Gen-Z among AI tools. What worries Gen-Z about AI how they generally feel using it and the morel issues they bring it into integrating into higher education.
2. **Michael A. Peters, Petar Jandric and Tina Besley (2024): "Why Generative Artificial Intelligence Does Not Have to Undermine Education."** Suggested a plan for teachers to use AI in a fair and responsible way they focused on being honesty in learning, motivating Gen-Z to learn on their own and to make sure that AI support Gen-Z does not replaces real education.
3. **Mahaffey and McDonald (2023): "Gen Z Students More Interested in Adopting AI Such as ChatGPT."** The student are usually more excited to use ChatGPT in there daily life for assignment, learning, and save time. Generally Gen-Z are more excited and willing to adopt this technology many teachers are careful and worried about using ChatGPT.
4. **Li Li and Cher Ping Lim (2023): "Students Voices on Generative AI: Perceptions, Benefits, and Challenges in Higher Education".** The Gen-Z found that AI is benefits like learning and adapted new technology to help them to generating ideas. There are also worried about information is correct, how the data is handled and the moral issues involved.
5. **Pritam B. Shah and Mansi S. Shah (2024): "Factors Shaping the Adoption of AI Tools among Gen Z".** AI help Gen-Z student in India college looked at the affects to choice to use AI tools are helpful for teacher and for policymaker on using AI for education.

6. **Cecilia Ka Yuk Chan and Wenjie Hu (2023): "Students' Voices on Generative AI: Perceptions, Benefits, and Challenges in Higher Education".** AI tools like ChatGPT is used in higher education. ChatGPT help Gen-Z student to learn, writing and creativity. But student should worry about privacy and the information is correct the data should be handled properly using AI is fair or right.
7. **Sarah Smith Robbins (2022): "Understanding Generation Z Ethical Perspectives of Artificial Intelligence (AI)".** Investigated how Gen-Z view the issues of artificial intelligence (AI) this research paper disclosed a puzzle in Gen-Z believe that is important to discuss about AI ethics.
8. **Stavridou. Papadopoulou and Panagiotakopoulos (2025): "Adapting Educational Practices for Generation Z: Integrating Metacognitive Strategies and Artificial Intelligence".** Using AI tools help Gen-Z to understand and to manage there daily life studying and learning. Gen-Z focus on overcoming challenges faced by AI.
9. **Yao Fu and Zhenji Weng (2024): "Navigating the Ethical Terrain of AI in Education".** Research paper is written to focus on AI challenges , fairness, privacy and manage by student and teacher. This study highlights AI can be designed for human for using AI technology in educational purpose.
10. **Muhammad Ali Chaudhry, Mutlu Cukurova, Rose Luckin (2022): "A Transparency Index Framework for AI in Education".** The worked which teacher do that same teacher experts to do by AI tools are clear and easy to understand offering a simple way to check the transparency.

#### **Research Aim and Objective:**

1. To Research how Gen-Z is utilizing AI tools to understand and exercise digital marketing.
2. To determine the advantages of AI in improving creativity, learning and create content.
3. To study how AI help Gen-Z examine marketing data and make knowledge based decision.
4. To Evaluate the result of AI on developing essential digital marketing skills.

#### **Hypotheses:**

Following are hypotheses for the proposed study:

Ho: Gen-Z do not significantly use of AI tools for learning and creating content in digital marketing.

H1: Gen-Z significantly use of AI tools for learning and creating content in digital marketing.

### Design of the Study:

Sample Type: The sample comprise of "Gen Z" age criteria in the city of Mumbai. Age criteria is 17 to 20 years.

### Source of Data:

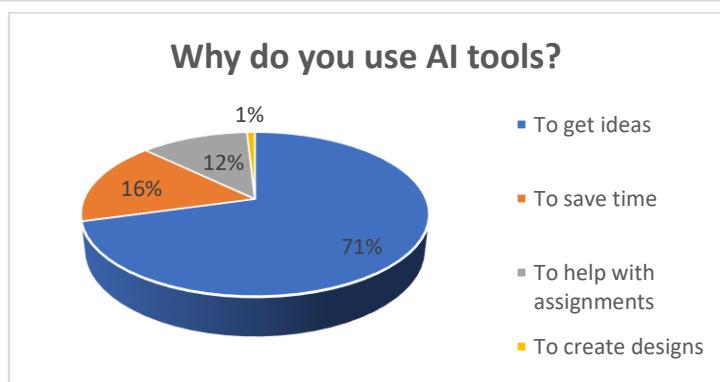
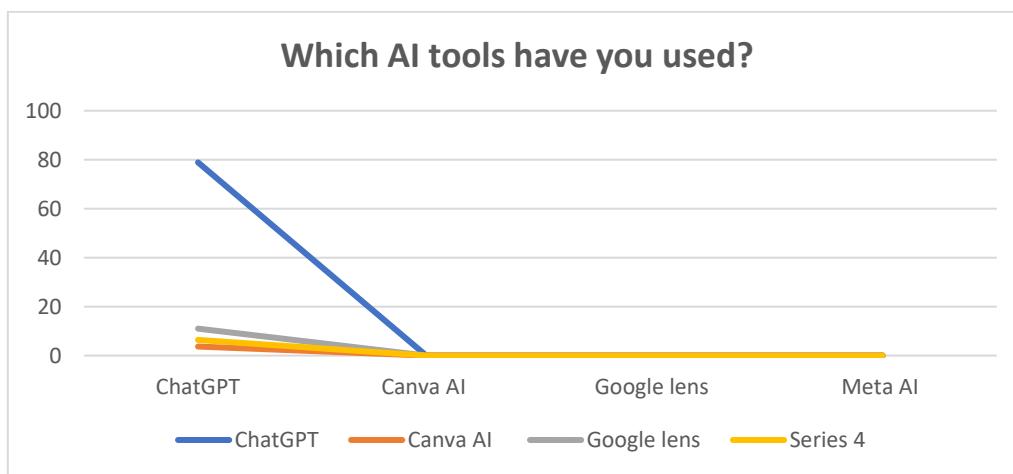
The present study is based on primary data as well as secondary data. Primary data is to be collected by using structured questionnaire. Secondary data is to be collected from various article, blogs and websites, etc.

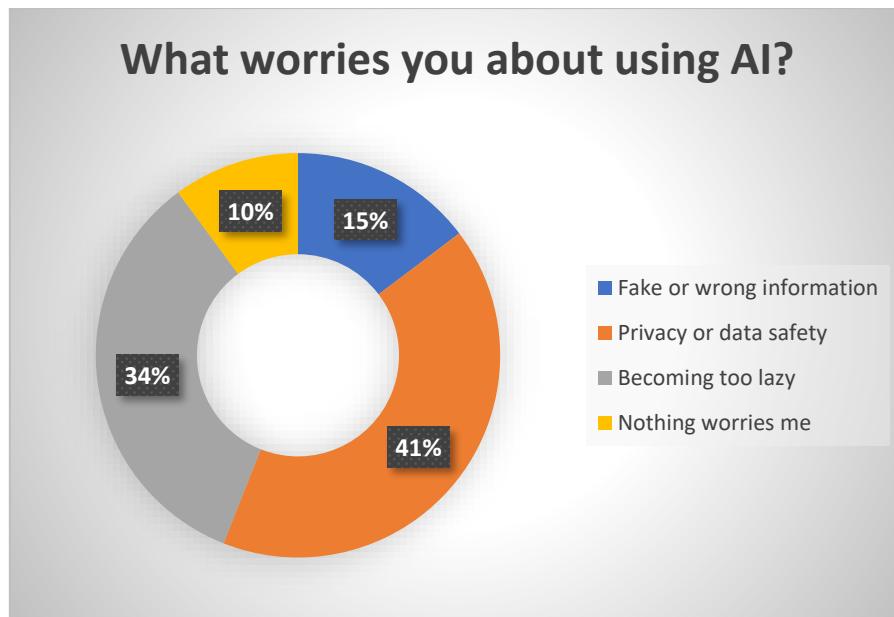
### Area of research:

The research is conduct within the geographical boundaries of Mumbai City.

### Data Interpretation & Result:

| QUESTIONS   | YES   | NO    | SOMETIMES | NOT SURE |
|---|-------|-------|-----------|----------|
| Do AI tools help you study better?                                | 27.5% | 0%    | 64.2%     | 8.3%     |
| Do AI tools make your work more creative?                         | 40.4% | 3.7%  | 50.5%     | 5.5%     |
| Do you feel you are learning real marketing skills when using AI? | 6.4%  | 13.8% | 54.1%     | 25.7%    |
| Has your teacher or college told you how to use AI properly?      | 15.6% | 43.1% | 33.9%     | 7.3%     |





### **Data Interpretation:**

A study in Mumbai City we found that all most Gen-Z use AI tools help them for studying and creating work but not completely. ChatGPT was used the most (78.9%), Google lens (11%) and Meta AI (6.4%), Canva AI (3.7%) was rarely use there daily life. most of Gen-Z use AI To get idea (71%), To save time (16%), To help with assignment (12%), To create designs (1%). Gen-Z agreed that AI help them to do learning and creativity. AI teaches them proper marketing skills . About 15.6% of Gen-Z mentioned that their teacher or college tell them how to use AI correctly, highlighted a lack of proper guidance.

### **Conclusion:**

AI help Gen-Z to enhance their learning and helps in growing their digital marketing knowledge. AI makes it easier to generate creative ideas, understand data entries in minimum time. AI can be beneficial for finding out the errors in data entries and also to dive deep into the minute details of a particular topic. Simultaneously, AI has its own drawbacks. Increase of dependency on AI leads to decrease in individual's own creativity. AI, is modern technology therefore it can't replace human cognitive thinking. Dependency on AI can lead to wrong decision making.

### **Limitations:**

1. Geographically this study will be limited to Mumbai City only.
2. This Research is only restricted to Gen 'Z'.
3. This study focuses only on the Digital Marketing.

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1. **Hilario Morales, Reyes Chavez, Cruz Vega, and Cano Sanchez (2024):** "Conducted a study on exploring how Gen-Z perceive and engage with ChatGPT."
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3. **Mahaffey and McDonald (2023):** "Gen Z Students More Interested in Adopting AI Such as ChatGPT."
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5. **Pritam B. Shah and Mansi S. Shah (2024):** "Factors Shaping the Adoption of AI Tools among Gen Z".
6. **Cecilia Ka Yuk Chan and Wenjie Hu (2023):** "Students' Voices on Generative AI: Perceptions, Benefits, and Challenges in Higher Education".
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8. **Stavridou, Papadopoulou and Panagiotakopoulos (2025):** "Adapting Educational Practices for Generation Z: Integrating Metacognitive Strategies and Artificial Intelligence
9. **Yao Fu and Zhenji Weng (2024):** "Navigating the Ethical Terrain of AI in Education".
10. **Muhammad Ali Chaudhry, Mutlu Cukurova, Rose Luckin (2022):** "A Transparency Index Framework for AI in Education".

## **AI KNOWS ME TOO WELL": GEN Z'S COMFORT LEVEL WITH HYPER-PERSONALIZED ADS ON E-COMMERCE PLATFORMS**

*Mentor*

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### **Abstract :**

*In today's digital time, e-commerce platform utilize Artificial Intelligence (AI) to provide hyper-personalized advertisement, purchase responses, online communication. Gen Z group born between mid of 1990s and early of 2015s is the first generation to grow up with involve of digital technology, marketing them highly opened to powerful in influencing is the future of online marketing. This research paper examines Gen Z comfort level with highly personalized advertisement, e-commerce platform, studying their mindset acceptance and worry about this marketing strategy. The research paper additional examine how element cause as recognized clarity control over the data and confidence in e-commerce brands impact on Gen Z relief level with personalized ads. It also drop light on the honest effect for seller in adjusting. Successfully focusing with respect for customer freedom and privacy rights. By giving an in deep knowledge of Gen Z viewpoint the study helps to the discussions on reliable AI focused marketing strategies providing practical. Suggestions for business, looking for participate this category without sacrificing honesty standard.*

### **Introduction:**

The review of digital technology and Artificial Intelligence AI has significantly modified the environment of online marketing. Among the most important progress is the rise of hyper-personalized advertisement which use complex method to analyse individual user data. Provide customised content, planned to maximize participation and change. E-commerce platform, in particular have accepted, these AI motivate marketing techniques to record customer attention is more and more challenging market place.

Gen Z those born from 1997 to 2012 represent a important customer part for e-commerce business. As digital resident they have grown up with the internet, social media platform and mobile technology as important part of their daily lives. Their special relationship with technology form how they understand and

communicate with personalized advertising making it important to seller to understand their approach relied level.

While highly-personalized ads can offer simplicity, importance and more fun shopping experience they also increase important honest question. Issue about privacy, data security and the amount of digital observation are particularly prominent among Gen Z customer, who are frequently aware of these issue, measured to old generation. The feeling of existing "knows too well" by procedures can cause discomfort and doubt, possibly damaging brands loyalty.

### **Review of Literature:**

#### **1. Does personalized advertising have their best interest at heart? (Journal of business research, Oct 2023)**

This Journal of business research finds that the personalized ads on social media are suitable for Gen Z, but they also find big privacy issues. This creates psychological struggle, especially for the people with a personality type called vulnerable narcissism. In the end, this study says that although such as can be convenient, they may also cause people to feel uncomfortable and trust issues

#### **2. Are my photos worth a thousand ads? (2024)**

The 2024 study "Are My Photos Worth a Thousand Ads?" by Ho Young Ahn and Eric Haley finds that Gen Z is generally open to selfie-based advertising but only if their consent, privacy, and data rights are respected. Incentives can boost acceptance, yet long-term trust depends on transparent, ethical, and privacy-focused use of personal images, with AI systems designed to uphold these standards.

#### **3. How Does Retargeting Work for Different Gen Z Mobile Users? (Journal of Advertising Research, Oct 2023)**

Differentiates GEN-Z into 'lacking concern', 'Searching' & 'paying great attention'. Timing and Regularity are important for audience trust on ads. Both seekers and meticulous respond differently

#### **4. From Generative AI to Gen Z (Microsoft ads blog, June 2025)**

The June 2025 Microsoft Ads reports Gen Z's spending will reach \$12.6T by 2030. They Favor mobile-first shopping, quick decisions, trusted brands, authentic stories, and visual content. Marketers should use real-time personalization, cross-platform presence, and genuine messaging—leveraging tools like Bing, Copilot, and Xbox.

#### **5. Consumers' Perceived Privacy Violations in Online Advertising (arXiv, Mar 2024)**

Analyses interest -based targeting, Content based targeting and device based targeting. Interest based targeting usually produces more discomfort because of perceiving close observation and monitoring

**6. Inside the Minds of... Gen Z Consumption (GfK/NIQ study, 2021)** 52% of GEN-Z's demand personalised recommendations and expects truthful information and data control.

**Research Aim and Objective:**

- To explore what makes Gen Z accept or reject personalized ads.
- To find out how much personal information Gen Z is comfortable sharing online.

**Design of the Study:**

**Sample Type :**

The sample comprise of students in the city of Mumbai.

**Source of Study :**

The present study is based on primary data as well as secondary data. Primary data is to be collected by using structured questionnaire. Secondary data is to be collected from various article, blogs and websites, etc.

**Area of Research Paper :**

The research is conduct within the geographical boundaries of Mumbai City

**Data Interpretation & Result :**

| QUESTIONS  | YES   | NO    | Not Sure |
|--|-------|-------|----------|
| 1. Are you aware of personalized ads   | 71%   | 10.1% | 18.8%    |
| 2. Do you believe platforms clearly inform you about how your data is used for ads                   | 44.9% | 36.2% | 18.8%    |
| 3. Would you be willing to share more data in exchange for better deals or more relevant offers?     | 6.5%  | 61.6% | 31.9%    |
| 4. Would you stop using a platform if you felt your data was being misused through personalized ads? | 65.9% | 17.4% | 16.7%    |

**Data Interpretation:**

Most peoples are aware of personalized ads and Commonly notice them while online shopping. These ads are generally seen as what we want, though opinions on their perfect accuracy. While some users are neutral and some comfortable with their data being used for ads, many of them are discomfort. A majority of people feel that platforms do not explain how personal data is used. Trust in e-commerce platforms is limited, with some users stating they would stop using a service if their data were misused. Although many are aware that AI and algorithms shape their shopping experience, a significant number prefer having the choice to disable these personalized features, showing a desire for greater control over their online privacy.

**Conclusion:**

This research concluded how Gen Z thought and felt about hyper-personalized ads on shopping sites. They looked at how accurate the ads feel, worries about privacy due to all these aspects people's comfort drawn though online shopping sites, but there is too much unrealistic approach that may lead to decreased comfort these findings show how online shopping sites ads are designed. Gen Z values relevance in ads but wants privacy boundaries respected. Balance is key for online retailers using personalized ads. Gen Z wants control over their data in shopping experiences. Unrealistic ad personalization can harm user trust. Comfort levels drop when tracking feels excessive. Relevant ads enhance shopping experiences for Gen Z. Online retailers must adapt to Gen Z's privacy-ad balance.

**Limitation:**

1. Geographically this study will be limited to Mumbai City only.
2. This Research is only restricted to Gen 'Z' .

**References:**

1. *Does personalized advertising have their best interest at heart? ( Journal of business research, Oct 2023*
2. *Are my photos worth a thousand ads? (2024) The 2024 study "Are My Photos Worth a Thousand Ads?" by Ho Young Ahn and Eric Haley*
3. *How Does Retargeting Work for Different Gen Z Mobile Users? (Journal of Advertising Research, Oct 2023)*
4. *From Generative AI to Gen Z (Microsoft ads blog, June 2025) The June 2025 Microsoft Ads reports Gen Z's spending will reach \$12.6T by 2030.*
5. *Consumers' Perceived Privacy Violations in Online Advertising (arXiv, Mar 2024)*
6. *Inside the Minds of... Gen Z Consumption (GfK/NIQ study, 2021)*

**DIGITAL MARKETING AND AI: RECENT TRENDS AND IT'S IMPACTS –  
A STUDY ON SOCIAL MEDIA AND AI INTEGRATION ON GEN Z FROM  
MUMBAI REGION**

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**Abstract:**

*In today's fast-changing digital age, the union of Artificial Intelligence (AI) and digital marketing has transformed how brands engage with customers, especially via social media. This study examines trends in AI-driven marketing and their impact on campaigns, consumer behavior, and brand interactions. It analyzes predictive analytics, AI chatbots, sentiment analysis, and personalized content delivery, showing how AI enhances user experience, targeting accuracy, and campaign efficiency. Special attention is given to AI-social media convergence, where instant data processing has re-engineered marketing into adaptive, consumer-oriented strategies. Ethical issues, data privacy, and AI bias are also discussed, providing insights for marketers to use AI more effectively in a data-driven environment.*

**Introduction:**

Artificial Intelligence is no longer a futuristic concept in marketing, it's already here, shaping how brands communicate with their audience. For Generation Z, the first truly digital-native generation, AI-powered tools are everywhere, from the content they see to the ads they click.

Platforms like Instagram, YouTube, and Snapchat favorites among Gen Z have become prime spaces for AI-powered strategies. These include everything from AI-generated influencers and personalized recommendations to real-time brand chats.

In Mumbai, Gen Z's behavior is shaped by a unique mix of cultural diversity, fast-paced city life, and global exposure. This research examines how AI impacts their engagement, trust, and purchase decisions, and how privacy concerns play into these interactions.

## **Literature Review:**

### **1. Gen Z and Digital Media Habits in India**

Gen Z (1997–2012) are the real digital natives—saturated with smartphones, social media, and the constant-on connection. They always prefer the authentic, content that is relatable, and transparency over refined, conventional advertising, prompting brands to move towards user-generated content, micro-influencers, and behind-the-scenes storytelling

### **2. AI-Driven Influencers and Narratives**

The virtual influencer phenomenon is catching on in India. For example, Kyra—India's first-ever virtual influencer—has built a sizeable fan base on Instagram, and Radhika Subramaniam, a Tamil-English AI-created travel influencer, creates culturally relevant content that strongly resonates with Gen Z audiences

### **3. H. Maheshwari et.al**

Recent literature has increasingly explored the intersection of behavioral finance and artificial intelligence (AI), particularly in the context of investment decision-making. Behavioral biases such as overconfidence bias (OCB), fear of missing out (FOMO), herding bias (HB), and regret aversion bias (RAB) have been shown to significantly influence the investment behaviors of Generation Z (Gen Z) investors in India. A study by [Author(s), Year] utilized a survey of 457 Gen Z investors and applied Partial Least Squares Structural Equation Modeling (PLS-SEM) to examine these relationships. The findings revealed that all four biases—OCB, FOMO, HB, and RAB—have a significant impact on investment decision-making (IDM). Moreover, the AI-led adoption of digital advisory services (ADAS) was found to moderate the influence of FOMO and HB on IDM, while no such moderating effect was found for OCB and RAB. These results suggest that AI-enabled tools can play a critical but selective role in mitigating behavioral biases. The study underscores the importance of developing ethical and regulatory guidelines to support responsible AI adoption in financial advisory services. (International Journal of Accounting and Information Management)

### **4. Vu.Thi Phoung Thanh (2025)**

This thesis examines how Generative Artificial Intelligence (Gen AI) revolutionizes social media marketing for solopreneurs—individual business owners with no other employees. Results show that Gen AI dramatically simplifies mundane activities—like content writing and content scheduling—so that solopreneurs can spend more time on strategic planning and networking. Improved content quality and personalization were highly correlated with increased user interaction. In addition, actionable, real-time insights from Gen AI tools led solopreneurs to make changes to the "marketing mix", reflecting a shift towards customer-oriented, iterative marketing

strategies. Although there are still obstacles—especially in relation to authenticity, expense, and ethical issues—this thesis asserts that Gen AI possesses enormous potential for facilitating solopreneurs to succeed in more competitive online markets.

### **Objectives of the Research:**

- To explore recent trends in AI-driven digital marketing practices among businesses operating in Mumbai.
- To examine how AI is integrated into social media marketing strategies targeting Generation Z in Mumbai.
- To evaluate the effectiveness of AI tools such as chatbots, personalized content, and predictive analytics in engaging Mumbai's Gen Z consumers.
- To analyze the behavioral patterns, preferences, and responses of Gen Z users in Mumbai toward AI-enabled social media marketing.
- To understand the ethical issues and privacy sentiments of Generation Z in Mumbai toward the application of AI in digital marketing.
- To understand the major challenges marketers in Mumbai encounter while using AI-based strategies to connect with Gen Z.
- To offer practicable suggestions to digital marketers in Mumbai on how to responsibly and efficaciously use AI in targeting Generation Z through social media.

### **Research Gap:**

While AI marketing is widely studied in Western markets, there's limited research on its impact in Indian urban centers like Mumbai. Gen Z is often treated as a single, uniform group, overlooking the regional and cultural nuances that shape their digital behavior. Ethical aspects—like data privacy and AI bias—are underexplored in this context.

### **Problem Statement:**

Social media is central to Gen Z's daily life. In Mumbai's fast-moving digital scene, AI quietly shapes what they see and interact with, from trending posts to the ads in their feed. While personalization makes content feel more relevant, it also raises questions about authenticity and data use. This study looks at how AI-powered social media affects trust, engagement, and buying behavior in Mumbai's Gen Z.

### **Hypothesis:**

1. **H<sub>1</sub>**-driven personalized recommendations on social media significantly affect the type of content Gen Z in Mumbai chooses to engage with.
- H<sub>0</sub>**-AI-driven personalized recommendations on social media do not significantly affect the type of content Gen Z in Mumbai chooses to engage with.

2. **H<sub>1</sub>**-AI-based targeted advertisements on social media significantly influence the purchase intentions of Gen Z in Mumbai.  
**H<sub>0</sub>**-AI-based targeted advertisements on social media do not significantly influence the purchase intentions of Gen Z in Mumbai.
3. **H<sub>1</sub>**-The use of AI chatbots or automated responses on brand pages improves customer engagement and satisfaction among Gen Z in Mumbai.  
**H<sub>0</sub>**-The use of AI chatbots or automated responses on brand pages does not improve customer engagement and satisfaction among Gen Z in Mumbai.
4. **H<sub>1</sub>**-AI-curated social media feeds shape the brand perception and trust levels of Gen Z in Mumbai.  
**H<sub>0</sub>**-AI-curated social media feeds do not shape the brand perception and trust levels of Gen Z in Mumbai.
5. **H<sub>1</sub>**-AI-powered trend predictions on social media influence the lifestyle and consumption patterns of Gen Z in Mumbai.  
**H<sub>0</sub>**-AI-powered trend predictions on social media do not influence the lifestyle and consumption patterns of Gen Z in Mumbai.
6. **H<sub>1</sub>**-Trust and privacy concerns significantly mediate the relationship between AI personalization on social media and the purchase intentions of Gen Z in Mumbai.  
**H<sub>0</sub>**-Trust and privacy concerns do not significantly mediate the relationship between AI personalization on social media and the purchase intentions of Gen Z in Mumbai.

### **Scope of the Study:**

This research focuses on how AI tools—such as predictive analytics, chatbots, and personalization—are used in marketing to Mumbai's Gen Z on platforms like Instagram, YouTube, and Snapchat. It considers both technical effectiveness and cultural context, along with ethical issues like privacy and transparency.

### **Limitations of the Study:**

- While this study aims to provide comprehensive insights, certain limitations are acknowledged:
- Only covers Mumbai, so results may differ elsewhere.
- Limited to Gen Z; other generations not included.
- Technology changes fast, so trends may evolve quickly.
- Relies on self-reported survey responses.

### **Methodology:**

This study used a **mixed-method approach** to capture both numerical trends and personal insights. The quantitative component involved a structured Google Form containing primarily **closed-ended questions** to measure engagement patterns, preferences, and attitudes. The qualitative component came from the

**final open-ended question**, which invited participants to share their thoughts in their own words, providing richer context and deeper perspectives.

**Results:**

| Variable   | Mean | Median | Mode | Standard deviation |
|--|------|--------|------|--------------------|
| How often do you engage with AI recommended content?                                 | 3.25 | 4.0    | 4    | 1.453              |
| Do you find AI-personalized ads/content more relevant to your interests              | 3.53 | 4.0    | 4    | 1.956              |
| Have you ever interacted with AI chatbots on social media?                           | 0.76 | 1.0    | 1    | 0.429              |
| Do you trust AI chatbots to provide accurate information?                            | 1.96 | 2.0    | 2    | 0.696              |
| Do you feel AI has made your social media experience better or worse?                | 2.31 | 3.0    | 3    | 1.223              |
| How concerned are you about your data privacy with AI-driven social media platforms? | 2.06 | 2.0    | 2    | 1.003              |

**CHI-SQUARE TABLE**

| Hypothesis   | p- value              | Significance level |
|--|-----------------------|--------------------|
| <b>H1</b> AI-driven personalized recommendations significantly affect Gen Z's content engagement | $3.37 \times 10^{-8}$ | p < 0.05           |
| <b>H2</b> AI-based targeted ads significantly influence purchase intention                       | $3.37 \times 10^{-8}$ | p < 0.05           |
| <b>H3</b> AI chatbots improve engagement & satisfaction  | 0.0218                | p < 0.05           |
| <b>H4</b> AI-curated feeds shape brand perception & trust  | 0.0582                | p > 0.05           |

|   |        |          |
|---|--------|----------|
| <b>H5</b> AI-powered trend predictions influence lifestyle & consumption patterns | 0.0206 | p < 0.05 |
| <b>H6</b> Trust & privacy concerns mediate personalization → purchase intentions  | 0.589  | 0.05     |

The statistical analysis using the Chi-square test revealed the following insights:

1. **H1:** AI-driven personalized recommendations have a **significant positive impact** on Gen Z's content engagement. This indicates that personalized content delivery using AI strongly influences how actively Gen Z engages with online platforms.
2. **H2:** AI-based targeted advertisements significantly influence purchase intention. This suggests that targeted AI ads effectively drive consumers' willingness to make purchases.
3. **H3:** AI chatbots significantly improve engagement and satisfaction. This implies that interactive AI-based customer service tools enhance user experience and involvement.
4. **H4:** AI-curated feeds do not have a statistically significant effect on brand perception and trust. This means that while AI feeds may personalize content, they do not necessarily translate into stronger brand trust among Gen Z.
5. **H5:** AI-powered trend predictions significantly influence lifestyle and consumption patterns. This shows that predictive AI tools shape consumer behavior and preferences.
6. **H6:** Trust and privacy concerns **do not significantly mediate** the relationship between AI personalization and purchase intentions. This indicates that privacy concerns are not a major determining factor in whether AI personalization affects purchasing decisions.

#### **Findings:**

**Personalized recommendations** are highly effective for increasing engagement among Mumbai's Gen Z.

**Targeted ads** significantly boost purchase intentions.

**Chatbots** improve satisfaction and interaction quality.

**AI-curated feeds** alone don't foster strong brand trust.

**Predictive AI** influences lifestyle choices and spending patterns.

#### **Conclusion:**

AI is now a central part of how brands reach Mumbai's Gen Z. Personalization, targeted ads, and chatbots clearly increase engagement, satisfaction, and buying intent. However, trust requires more than algorithms—it needs transparency and

authenticity. Predictive AI plays a subtle but strong role in influencing consumer culture.

**For marketers:** Invest in personalization and interactive AI tools, but pair them with strategies that build trust and long-term loyalty.

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## CANCEL CULTURE AND BRAND SURVIVAL: CAN AI HELP BRANDS NAVIGATE DIGITAL BACKLASH?

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### **Abstract:**

*Cancel culture has become a major challenge for brands, where a single misstep can trigger massive online backlash. This study examines the forces driving cancel culture, its impact on brand trust and survival, and whether AI can help brands respond effectively. Based on literature, case studies, and insights from 20 industry professionals and academicians, the findings show that AI is valuable for sentiment tracking, early warnings, and speed - but it cannot replace human empathy and ethical judgment. A balanced approach, combining AI's efficiency with authentic human storytelling, is key to brand resilience in the digital age.*

**Keywords:** Cancel Culture, Brand Survival, Artificial Intelligence, Crisis Management

### **Introduction:**

In today's world, a brand can spend years building trust and just a few hours losing it. All it takes is one wrong post, ad, or comment. With the rise of social media, people now hold more power than ever before. They expect brands to stand for something, and if those expectations aren't met, the backlash can be intense and public. This is what we know today as cancel culture, a fast-moving wave of criticism that can seriously affect a brand's image, sales, and future.

We've seen it happen over and over again. When Pepsi released an ad featuring Kendall Jenner in 2017, trying to make light of social justice protests, people felt the brand was being insensitive. The ad was pulled within 24 hours, but the damage had already been done. More recently, Bud Light faced a massive boycott after collaborating with a transgender influencer, which led to major drops in sales and brand value. On the other hand, Nike took a huge risk by featuring Colin Kaepernick, a controversial figure for some in their campaign. While the move sparked criticism, it also won loyalty and boosted their image among young, socially aware consumers.

In this climate, brands are under constant pressure to respond quickly and correctly. But keeping up with the fast pace of social media outrage isn't easy and this is where Artificial Intelligence (AI) steps in. AI tools like sentiment analysis, social listening, and trend prediction are now being used to monitor what people are saying online, detect negative reactions early, and help brands figure out how to respond before things spiral out of control.

This paper aims to explore whether AI can truly help brands survive cancel culture. Not just by reacting to backlash, but by understanding it, learning from it, and making smarter, more human decisions. Through real-world examples and analysis, the research will look at whether AI can act as a support system for brands during difficult times, or if it still lacks the empathy and judgment needed to deal with such emotional, value-driven moments.

### **Review of Related Literature:**

1. Cousins, A. (2023) – Leveraging AI in Public Relations: Navigating Cancel Culture with Automated Narrative Analysis and Content Classification  
Explores how AI scans online chatter, spots controversies early, and gauges sentiment in real time. Adidas, Bud Light, and Nvidia examples show its value as an “early warning system,” though human input remains vital for context and ethics.
2. Arne Westermann & Jörg Forthmann (2019) – Social Listening: A Potential Game Changer in Reputation Management  
Shows how tracking online posts can reveal shifts in opinion before crises erupt. Emphasizes social listening as both a trend detector and an early warning tool, but stresses human verification to avoid false alerts.
3. Ana Pušić & Katija Vojvodic – To Be or Not to Be Cancelled: Tackling the Challenges of Cancel Culture in Brand Management  
Outlines triggers like insensitive ads or ethical lapses and presents frameworks for prevention and response. Argues that traditional PR cycles are too slow, making AI monitoring essential for quick action.
4. Cheng, Y.; Lee, J.; Qiao, J. (2024) – Crisis Communication in the Age of AI: Navigating Opportunities, Challenges, and Future Horizons  
Discusses AI tools such as chatbots, sentiment trackers, and real-time alerts that improve speed of response. Warns that AI lacks nuance and cultural sensitivity, recommending a blend of AI speed with human strategy.
5. Selimovic, M.; Almisreb, A.; Amanzholova, S. (2024) – The Role of Sentiment Analysis in Brand Management and Marketing  
Explains how AI measures consumer emotions and predicts trends through language and engagement. Highlights its usefulness in testing campaigns and spotting crises, but notes risks of misreading sarcasm or cultural context.

6. Pendyala, M. K., & Lakkamraju, V. V. (2025) – AI-Powered Crisis Management: Revolutionizing Customer Service and Brand Response  
Finds AI enables faster replies during crises, boosting brand perception. Notes employee concerns about empathy loss, stressing AI should support, not replace, human teams.
7. SuperAGI – PepsiCo Uses AI to Tackle Social Media Backlash (2025)  
PepsiCo used AI to track backlash to a controversial ad in real time, responding 75% faster and containing the crisis.
8. Cybertek – Starbucks 2018 Case  
After racial profiling accusations, Starbucks used AI to monitor sentiment, issue apologies, and roll out sensitivity training, helping rebuild trust.
9. Cybertek – United Airlines 2017 Incident  
Following viral outrage over passenger mistreatment, United Airlines used AI to gauge sentiment and inform apologies, compensation, and new policies.
10. Chris Rubin Creative – How Sentiment Analysis Shapes Crisis Responses  
Shows Tesla and KFC used AI sentiment insights to recover faster, crafting empathetic, timely responses supported by data.

### **Research Objectives:**

1. To examine the key factors driving cancel culture and its impact on brands' reputation, trust, and survival.
2. To analyse the role of Artificial Intelligence in detecting, managing, and mitigating digital backlash through prism of Industry experts.
3. To evaluate the balance between AI and human judgment in shaping effective, ethical, and sustainable brand responses.

### **Scope:**

1. This study examines the role of AI in helping brands navigate cancel culture, drawing on insights from industry experts based in Mumbai.
2. It focuses on selected industries such as Marketing, Media, AI, consulting, and technology, offering practical perspectives on how brands manage backlash and balance AI with human judgment.

### **Research Methodology :**

The present study is based on both primary and secondary data sources.

- Secondary Data: Relevant information has been collected from published research papers, journals, reports, and credible online sources to build the theoretical foundation and support the study framework.
- Primary Data: First-hand insights were gathered from industry experts and professionals working in the field. Their perspectives provided practical understanding and validation of the concepts explored.

This combination of secondary and primary sources ensures a comprehensive approach, integrating both theoretical knowledge and real-world industry experience.

## **How Cancel Culture Works – Its Driving Forces**

### **1. Triggering Event**

Cancel culture usually starts with one incident that sparks outrage — like a brand releasing an offensive ad, behaving unethically, or partnering with a controversial figure. It's often something people see as going against social values or common decency.

### **2. Social Media Amplification**

Platforms like X (Twitter), Instagram, TikTok, and Reddit act like megaphones, spreading the outrage at lightning speed. Hashtags, viral videos, and influencer posts push the story further, and social media algorithms give it even more reach by promoting emotional, attention-grabbing content.

### **3. Collective Action and Public Pressure**

Once people online rally around the issue, they often join forces to demand change. This can take the form of boycotts, online petitions, or mass posting campaigns. The energy comes from shared anger and the feeling of being part of a group fighting for the same cause.

### **4. Media Coverage and the Snowball Effect**

When news outlets start covering the story, it moves beyond just social media. This adds legitimacy to the controversy and exposes it to an even bigger audience, increasing pressure on the brand to respond quickly.

### **5. Brand Response**

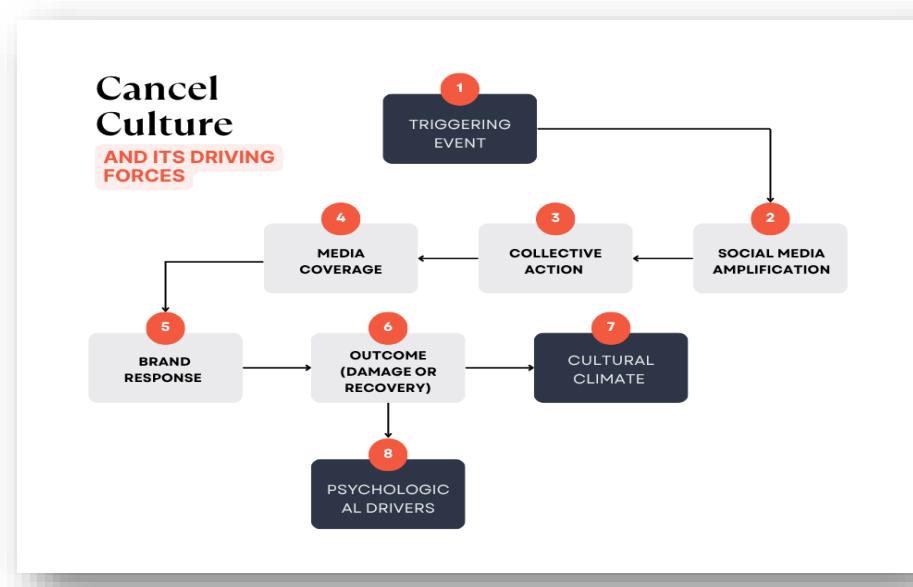
At this point, the brand has to decide how to react — whether to apologize, fix the problem, or stand by their actions. How fast they respond, the words they choose, and whether their message feels genuine can make or break their recovery.

### **6. Cultural and Political Climate**

The bigger social and political environment plays a huge role. In times when activism is high or debates on identity and justice are intense, public reactions tend to be stronger and controversies grow faster.

### **7. Psychological Drivers**

- a. Moral Signalling – People post about the issue to show where they stand and what values they believe in.
- b. Outrage Validation – Likes, shares, and supportive comments encourage more people to speak up and stay engaged.
- c. Bandwagon Effect – When people see many others getting involved, they are more likely to join in too.



## **Expert Insights: Perspectives of Industry professionals and academicians**

To complement the literature review and theoretical understanding of cancel culture, this research gathered perspectives from 18 industry professionals and a few academicians. These experts brought practical, real-world experience of how brands navigate digital backlash and how AI tools are reshaping crisis response strategies. Their insights were collected through structured interviews. What emerged is not a single unified view, but a spectrum of perspectives - from optimism about AI's ability to act as an "early warning system," to caution about its ethical and emotional limitations. By organizing their responses thematically and attributing viewpoints to individual experts, this section highlights the factors, impacts, and strategies that shape brand survival in the age of cancel culture.

## 1) Is cancel culture lasting or a short phase?

Experts were divided. Around a third felt cancel culture is here to stay, another third believed it may fade, while some said it's evolving rather than disappearing.

*"Cancel culture is evolving into a lasting trend... brands must adapt by aligning with public sentiment to maintain trust and relevance." - Prakash Iyer, Vice*

**President Product Management, Reliance JioTakeaway:** Even if “cancel culture” changes form, scrutiny will only grow with the amplification power of social media.

## 2) Why some brands recover and others don't

Recovery depends on corrective action, authentic communication, transparency, trust-building, values alignment, and consistency.

*"Brands that pay attention, accept and understand the underlying issue, admit mistakes, communicate clearly, and make sustained efforts recover. There is no quick fix." - **Gitesh U. Kothari, AVP-Business Development, Esthetic Centres International***

**Takeaway:** Brands that only issue PR statements without real change struggle, while those that show accountability rebuild trust faster.

### **3) Can AI understand emotions, or is human judgment essential?**

Every expert stressed that AI alone isn't enough. AI is valuable for spotting early warning signs and analysing sentiment at scale, but empathy, nuance, and ethics come from humans.

*"It will be a combination... AI can look far ahead based on data from the past; human judgment acts in the present and creates the future." - **Nikhil Pawar, EVP, Marsh India***

**Takeaway:** AI provides signals, but humans provide meaning and morality.

### **4) Should brands rely on AI, human decision-making, or a mix?**

This was evenly split. Nine experts leaned toward AI-led strategies (especially for monitoring and triage), while nine advocated a hybrid model. None supported a human-only approach.

*"AI can handle volume and speed, but it cannot replace the authenticity of human connection." - **Senior Marketing Manager, FMCG sector***

**Takeaway:** The consensus is clear: AI for scale and speed, humans for empathy and decision-making.

### **5) Can smaller brands realistically adopt AI?**

Most experts were optimistic: affordable tools now allow smaller brands to start with basic listening and sentiment alerts. However, advanced AI systems still require significant investment.

*"Yes — tools are increasingly affordable and modular; brands can start small with listening and sentiment alerts, which already save time and cost." - **Dious Emmanuel, VP Sales, Nakama Global (Mauritius)***

**Takeaway:** Entry-level AI is now within reach, but advanced systems remain costly and resource-heavy.

### **6) What matters more: speed or empathy?**

This sparked debate. Some argued speed matters more in today's rapid outrage cycles, while others said empathy is the real differentiator. Most agreed that the best responses combine both.

*"Empathy matters more... without empathy, quick responses risk sounding dismissive or fake." - **Prakash Iyer, Vice President Product Management, Reliance Jio***

**Takeaway:** Quick responses backed with sincerity strike the right balance.

## 7) Can AI prevent cancellation, or is it more useful after backlash?

Most experts leaned towards prevention. AI works best as an “early radar” that helps brands sense trouble before it escalates, though once a storm breaks, human-led crisis teams take over.

**Takeaway:** AI is most effective as an early-warning system to catch sentiment shifts before they become full-blown crises.

## 8) Ethical boundaries to watch

Bias, privacy, and over-reliance were the biggest concerns. Heavy automation risks making responses sound robotic, worsening backlash.

*“First and foremost is transparency and unbiased approach, second is accuracy of data, third is judicious allocation of resources and fourth is security of own data.”* - **Amit Bansal, CEO, Essel Group (Media and Entertainment)**

**Takeaway:** Use AI transparently, ensure human oversight, and avoid “performative” responses.

## 9) Does heavy AI risk making responses impersonal?

Most experts agreed — yes. Over-automation risks a robotic tone, but careful use can avoid this.

*“Usage totally is dependent on the requirement/needs of the brand and where it is in its life cycle.”* - **Kirtan Shah, Program Manager, Dell Technologies.**

**Takeaway:** Keep a human voice at the centre; AI should enhance, not replace, authenticity.

## 10) One golden rule for brands

The most common advice: own mistakes, act fast, be transparent, show real corrective steps, don’t over-automate empathy, and let values guide decisions.

*“The golden rule for the brands facing cancel culture is “TAAC”, which means - Transparency, Accountability, Authenticity and Commitment to Change. It will help them fight backlash.”* - **Amit Bansal, CEO, Essel Group (Media and Entertainment)**

**Takeaway:** AI may guide the process, but authenticity and values ultimately rebuild trust.

### Expert Section Wrap-Up

Across industries and roles experts agree that AI is a force multiplier, not a silver bullet. It excels at scale, speed, and early detection, but human judgment is indispensable for context, empathy, ethics, and trust. Brands that recover do so by listening early, acting credibly, and communicating with humility, using AI to spot the storm early, and humans to steer through it.

## **Analysis and Discussion:**

- **Factors of Cancel Culture**

Both research and expert voices strongly agree that social media is the main driver of cancel culture. Studies emphasize how algorithms boost outrage, while experts described how even a small incident can snowball through hashtags, viral posts, and influencer commentary. Political polarization and heightened social activism were also flagged in both sources as forces that accelerate backlash, making brands extra vulnerable.

- **Impacts on Brands**

The literature shows cancel culture damages reputation, trust, and even sales, while experts confirmed this with practical examples. Many pointed out that polished PR statements without genuine corrective action rarely work. Brands that admitted mistakes, acted transparently, and stayed consistent were seen as those that managed to recover trust.

- **AI's Strengths**

Across research and interviews, AI's biggest value lies in early detection. It can scan millions of conversations, pick up sentiment changes, and provide alerts faster than humans ever could. This speed helps brands respond before the backlash gets out of control, making AI a powerful "early radar."

- **AI's Weaknesses**

The flip side is clear: AI still cannot truly understand emotions, sarcasm, or cultural nuance. Experts warned that relying too much on automation risks robotic-sounding responses that worsen the backlash. Cost was another limitation — while big brands can invest in advanced systems, smaller players may struggle, even though cheaper tools are slowly becoming available.

- **Balance Needed**

Both literature and expert insights reached the same conclusion: AI should not replace humans. Instead, it should complement them — handling scale, speed, and detection, while humans bring empathy, ethics, and judgment to the table. In other words, AI provides the radar, but humans must steer the ship.

## **Conclusion:**

This research confirms that cancel culture is not a temporary trend but a permanent feature of today's hyper-connected world. With social media acting as both judge and jury, brands are more exposed than ever before. The findings from literature and expert insights make one thing very clear: AI can be a powerful "early radar" — spotting controversies before they spiral, analyzing sentiment at scale, and helping brands respond faster. However, AI cannot carry the entire weight of reputation management. It struggles with emotion, moral nuance, and cultural context — areas where human judgment is irreplaceable. The strongest

path forward is not "AI versus humans" but a collaborative balance where AI provides speed and data while humans bring empathy, ethics, and accountability.

### **Limitations of the study:**

1. The research is geographically limited to Mumbai and does not capture global or cross-regional differences. It also covers only specific industries, leaving out sectors like healthcare, manufacturing, and public policy.
2. Further, the study relies on structured interviews and survey responses, which provide valuable qualitative insights but lack large-scale quantitative data. This creates a research gap for future studies to expand across industries, geographies, and consumer groups with broader empirical evidence.

### **Future Predictions:**

In the coming years, several shifts are likely to shape how brands face cancel culture:

- Smarter AI Detection: AI will improve at reading tone, sarcasm, and cultural cues, reducing false alarms.
- Affordable AI for All: Falling costs will make tools like sentiment tracking and social listening accessible to smaller brands.
- Cancel Culture 2.0: Outrage may shift toward accountability, with demands for reform instead of permanent boycotts.
- Human + AI Synergy: The strongest strategies will pair AI insights with authentic, human-led storytelling.
- Ethical Standards: Tighter guidelines on bias, privacy, and automation in AI-driven communication are likely to emerge.
- Real-Time Crisis Teams: Hybrid teams using AI for monitoring and humans for empathetic responses will become the norm.

The future of brand survival lies not in escaping cancel culture but in mastering it — with AI warning of the storm and human empathy steering the ship to safety.

### **Appendix:**

#### **Appendix A: List of Experts Interviewed**

The research involved 18 industry experts and a few academicians from diverse fields. The table below summarizes their details:

| <b>Sr. No.</b> | <b>Full Name</b>    | <b>Current Designation / Job Title</b>          | <b>Organization / Company Name</b>     |
|----------------|---------------------|---|--|
| 1.             | Gitesh U Kothari    | Associate Vice President - Business Development | Esthetic centres international Pvt Ltd |
| 2.             | Shailendra Tripathi | Business Consultant                             | Growth Magnet Advisory                 |
| 3.             | Prakash Iyer        | Vice President Product Management               | Reliance Jio                           |
| 4.             | Dious Emmanuel      | VP Sales  | Nakama Global Mauritius                |

|     |                     |  |   |
|-----|---------------------|--|---|
| 5.  | Shruti Sehgal       | Cluster Head of Sales & Marketing, Mumbai Hotels | ITC Hotels Limited                            |
| 6.  | Captain Amritkoijam | Business Head                                    | GLG   |
| 7.  | Nikhil Pawar        | EVP  | Marsh India                                   |
| 8.  | AMAN KATYAL         | Director   | Aman Katyal Private Wealth Management Company |
| 9.  | Kirtan shah         | NSI PM   | Dell Technologies                             |
| 10. | Manish gor          | Cluster head of sales and Marketing TN           | ITC hotels                                    |
| 11. | Purvesh Gada        | Founder  | SymX InfoSolutions private limited            |
| 12. | Uday Pal Singh      | CEO  | Innovision Limited                            |
| 13. | Khalid Hakim        | CEO  | Pronto Prints                                 |
| 14. | Lokesh Mistry       | Promoter   | Globe Petroleums                              |
| 15. | Pawan               | CEO  | MitKat Advisory                               |
| 16. | Priyanka Dandiwal   | Head of National Sales Office West               | ITC Hotels                                    |
| 17. | Tapan Sharma        | Country Director                                 | Netapp India marketing and services Limited   |
| 18. | Amit Bansal         | Chief Executive Officer                          | Essel Group                                   |
| 19. | Dr. Nikisha Kukreja | Head, Department of Management Studies           | R D National College                          |
| 20. | Dr. Aurora Vaz      | Head, Department of Commerce                     | Mithibai College of Commerce and Economics    |

### Appendix B: Consent Note

Before participating, all experts were informed of the purpose and scope of the research. A standard consent note was shared:

*"This research is being conducted as part of an academic study on cancel culture and the role of AI in brand survival. Your participation is voluntary, and your responses be used solely for academic purposes. By participating, you consent to your views being included (with attribution of your name, designation, and company) in the research paper."*

All participants acknowledged this note before sharing their responses.

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## A STUDY ON AI IN EDUCATION: A BOON OR THREAT TO TRADITIONAL TEACHING JOBS IN MUMBAI

*Mentor*

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### **Abstract:**

*This study is based on the use of Artificial Intelligence in education, with the boom and threats. AI is very effective for teaching learning outcomes. The findings of the study are that the government should create a national AI training and support program for teachers, giving them hands-on experience, curriculum resources, and ongoing guidance so they can use AI to enhance learning without adding to their workload. Provide a user-friendly AI platform for lesson planning, assessment, and individualized instruction that has restrictions on improper student use. Provide teachers with government-funded, required AI literacy and training courses that are incorporated into their paid workdays.*

**Keywords:** Artificial Intelligence, boom and threats, effective for teaching learning outcomes, training, and support.

### **Introduction:**

Artificial Intelligence refers to the ability of computer systems to perform tasks that typically require human intelligence, such as learning, problem-solving, and decision-making. Essentially, it's about creating machines that can mimic human-like intelligence.

AI is the foundation of contemporary computing innovation, opening doors for both individuals and companies. For instance, optical character recognition (OCR) transforms unstructured content into structured data that is ready for business use and extracts text and data from documents and images using artificial intelligence (AI).

AI is poised to revolutionize education by offering personalized learning experiences, automating administrative tasks, and providing tools for enhanced instruction and evaluation. This includes adaptive learning platforms, virtual tutors, and AI-powered evaluation tools. While offering significant potential for improved learning outcomes and addressing educational disparity, careful

consideration of potential risks like bias and the need for robust governance frameworks are crucial for ensuring AI benefits all learners.

Artificial Intelligence (AI) is transforming education globally, offering personalized learning experiences, improved efficiency, and enhanced accessibility (Alp Dulundu, 2024; Dwi Mariyono & Akmal Nur Alif Hd, 2025). Ethical frameworks, inclusive policies, and teacher training are crucial for the responsible integration of AI (Dwi Mariyono & Akmal Nur Alif Hd, 2025; Shamma Alshamsi et al., 2025). Public-private partnerships and innovation centers can maximize AI benefits in education (Shamma Alshamsi et al., 2025).

Artificial Intelligence (AI) has the potential to address some of the biggest challenges in education today, innovate mentoring and evaluation practices, and accelerate progress towards SDG 4. The rapid technological developments inevitably bring multiple risks and challenges, which have so far outpaced policy debates and regulatory frameworks. UNESCO is committed to supporting Member States to harness the potential of AI technologies for achieving the Education 2030 Agenda, while ensuring that its application in educational contexts is guided by the core principles of inclusion and equity. (UNESCO)

Artificial Intelligence (AI) is revolutionizing education in Mumbai, offering personalized learning experiences and enhancing teaching effectiveness (Ashwin Kataria et al., 2020; Amitabh Kumar, 2024). Studies show that AI integration improves student engagement and academic performance while reducing teacher workload (Amitabh Kumar, 2024). However, challenges such as inadequate teacher training, infrastructural limitations, and data privacy concerns hinder widespread adoption (Amitabh Kumar, 2024). Gender differences in perceived AI benefits and discipline-specific barriers have been observed among college teachers (Ms. Hetal Uttmani, 2024). To address these challenges, targeted interventions, curriculum enhancements, and gender-sensitive AI integration plans are necessary (Ms. Hetal Uttmani, 2024). Despite concerns, AI is seen as a crucial tool for creating equity in learning and providing sustainable, lifelong education (Ashwin Kataria et al., 2020). The integration of AI alongside conventional teaching methods is recommended to leverage technological advancements in education (Ashwin Kataria et al., 2020).

### **Positive Impact of AI in Education for Teachers :**

AI can improve instructional methods, encourage diversity, and offer chances for professional growth.

1. **Automated Grading and Feedback:** AI can quickly grade assignments and provide immediate, personalized feedback, saving teachers significant time and effort.

2. Routine Task Automation: AI tools can automate tasks like attendance tracking, scheduling, and basic administrative duties, freeing up teachers for more important tasks.
3. Efficient Resource Management: AI can assist with managing classroom resources, tracking student progress, and even suggesting tailored content based on performance data.
4. Improved Lesson Planning: AI can analyze student data and suggest effective teaching strategies and resources tailored to specific classes and individual students.
5. More Engaging Learning Materials: AI can help create interactive and immersive learning experiences through virtual reality, simulations, and other AI-driven tools, and AI can facilitate collaboration among students by matching them based on skills and interests, fostering a more dynamic learning environment.
6. Identifying Learning Gaps: AI can analyze student data to identify learning gaps and areas where students may be struggling, allowing teachers to address these issues proactively.
7. Informed Decision Making: AI can provide teachers and administrators with valuable insights into student performance, helping them make informed decisions about curriculum, instruction, and resource allocation.
8. Supporting Diverse Learners: AI can help personalize learning for students with disabilities, language barriers, and other special needs, making education more inclusive.
9. Facilitating Access to Resources: AI can translate languages, provide live captions, and offer other support to make educational materials more accessible to all students.
10. Continuous Learning: AI can help teachers stay up-to-date on the latest research and best practices in education, fostering a culture of continuous learning.

#### **Negative Impact of AI in Education for Teachers:**

1. Potential Automation of Tasks: AI-powered tools can automate tasks like grading multiple-choice quizzes, generating lesson plans, and providing basic feedback, potentially reducing the need for some teacher roles or increasing the workload for remaining teachers as they manage and oversee these AI systems.
2. Increased Complexity of Teaching: While AI can automate some tasks, it also requires teachers to learn new skills to effectively integrate AI tools into their teaching and adapt their pedagogical approaches.

3. Bias in Algorithms: If AI systems are trained on biased data, they can perpetuate existing inequalities and disadvantages, potentially leading to unfair or inaccurate assessments and learning experiences for students.
4. Data Privacy: AI systems in education often collect and analyze vast amounts of student data, raising concerns about data privacy and security breaches.
5. Loss of Teacher-Student Relationship: Over-reliance on AI can diminish the important social and emotional aspects of learning, such as teacher-student interaction, mentorship, and nuanced feedback, which are crucial for student development.
6. Potential for Isolation: Excessive use of AI-powered tools can lead to students feeling disconnected and isolated, potentially impacting their motivation and engagement.
7. Dependence on AI: Over-dependence on AI tools may hinder the development of critical thinking, problem-solving, and other essential skills that are best developed through human interaction and traditional teaching methods.
8. Potential for Misinformation: AI systems can sometimes generate inaccurate or biased information, and students and teachers need to be critical consumers of information, rather than simply accepting AI-generated content as fact.
9. Lack of Transparency and Accountability: It may not always be clear how AI systems arrive at their recommendations or assessments, making it difficult to understand their decision-making processes and hold them accountable.
10. Authenticity and Intellectual Property: AI-generated content, such as essays or lesson materials, raises questions about authenticity and intellectual property rights.

#### **Review of literature:**

1. (Dulundu, 2024), In the article, the main finding of researchers is that AI is revolutionizing educational experiences through personalized learning platforms, automated grading systems, and accessibility-enhancing technologies. The integration of AI aligns with Sustainable Development Goal 4 (SDG 4) by promoting inclusive, high-quality education.
2. (Dwi Mariyono, 2025) This study aims to examine how artificial intelligence (AI) is transforming education globally by personalizing learning, fostering inclusivity, and enhancing human-machine collaboration. It also critically evaluates the ethical, technical, and policy challenges that must be addressed to ensure equitable AI adoption in diverse educational contexts.
3. (Ashwin Kataria, 2020), The paper titled "Role of Artificial Intelligence in Education" examines how AI can be integrated with traditional teaching methods to improve education in Mumbai.

4. (Uttmani, 2024) The study examines college teachers' use and perception of AI tools for teaching effectiveness in Mumbai, highlighting differences across gender and academic streams.

### Objectives:

- 1) To examine the perceptions of teachers in Mumbai regarding AI as a tool for educational enhancement versus a threat to their job security.
- 2) To formulate policy recommendations for educational stakeholders in Mumbai to manage the transition, maximize the benefits of AI, and mitigate the risks to traditional teaching jobs.

### Research Methodology:

This study will use a **descriptive survey design** to collect both quantitative (Likert scale) and qualitative (open-ended) data from teachers in Mumbai. The target population is degree college faculties from aided, unaided colleges in Mumbai. Sample size is 51.

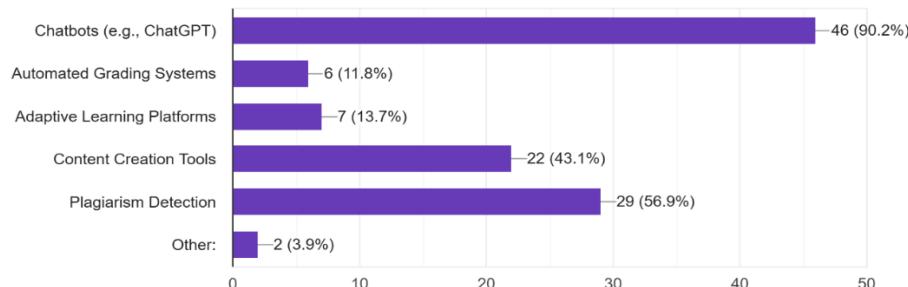
### Limitation:

Because of the time constraint, this study is only based on Mumbai (City + suburban) for only degree faculties. Teacher responses are based on personal opinions, which may include bias or inaccurate self-assessment.

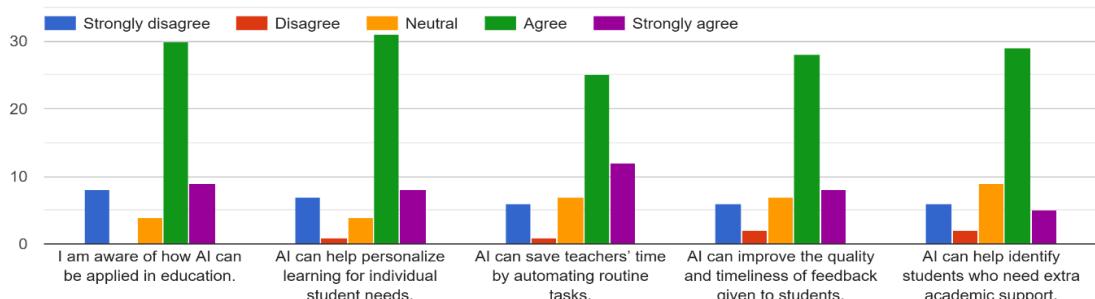
### Data Interpretation:

If yes, which AI tools have you used?

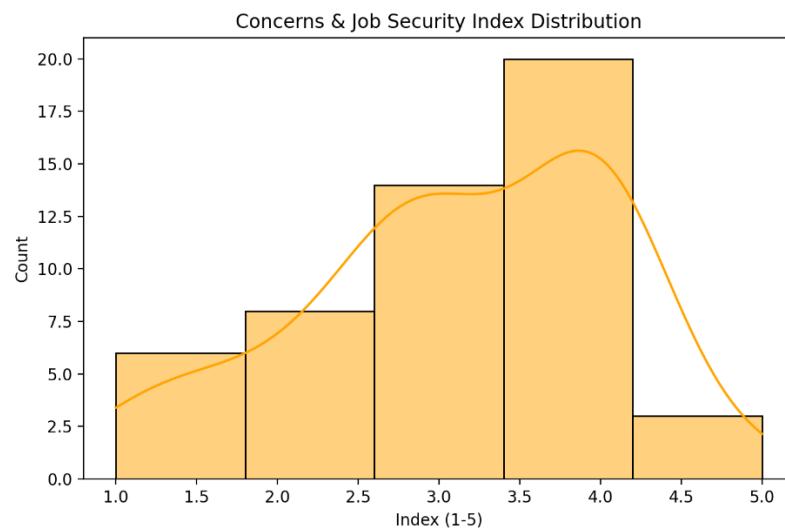
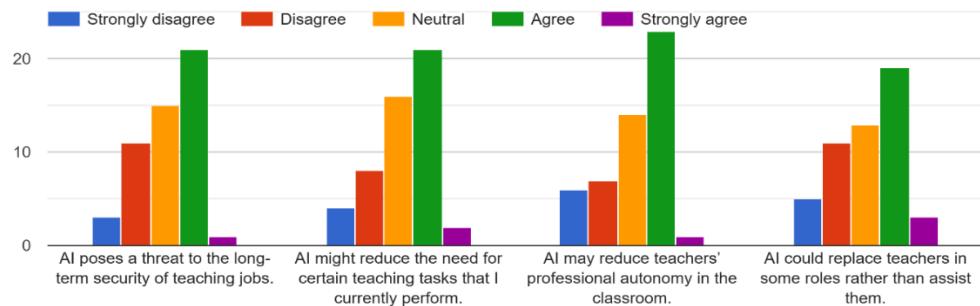
51 responses



### Awareness & Benefits

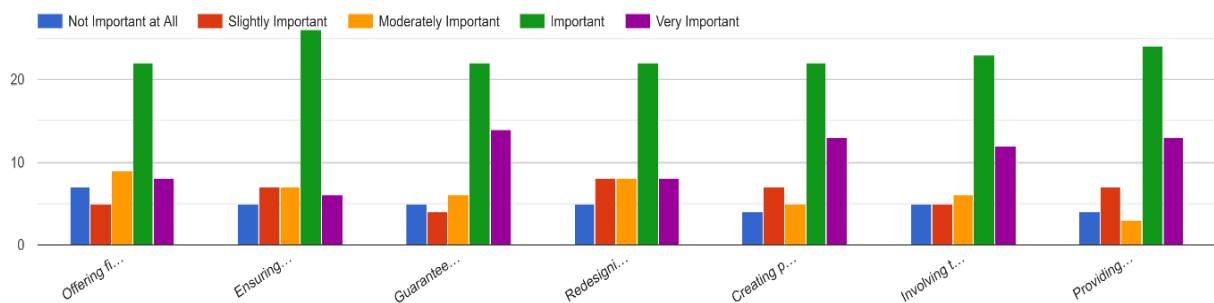


## Concerns &amp; Job Security

**Graph No.**

According to the graph X-axis indicates: Concern Index (1 low concern to 5 high concern). Y-axis: number of respondents. The KDE line shows the overall shape. Centered around 3–4 with a modest right tail; few at the extremes, and takeaway means respondents show moderate concern about AI's impact on job security—neither minimal nor alarmist, but leaning slightly concerned.

## Policy Preferences



### **Findings:**

According to data, a majority of degree faculties in Mumbai are using AI tools for reducing workload and enhancing lesson planning. Around 62% fear AI could reduce demand for traditional teaching roles if not properly regulated. 90.2% faculties are using AI for effective teaching. Job security concerns are moderated, and many teachers expressed the need for teacher involvement in AI adoption decisions at the institutional level, but a lack of infrastructure (devices, internet) is cited as the biggest barrier to AI integration in classrooms. Policy preferences are rated relatively high in priority.

### **Recommendation:**

1. Provide government- or education board-funded AI literacy training as a component of ongoing professional development for faculties.
2. Establish laws safeguarding teaching positions so that the use of AI enhances rather than replaces education.
3. All colleges should have minimum infrastructure requirements as devices, internet speed.
4. Establish faculty advisory councils to engage in the process of choosing and implementing AI tools.
5. Offer monetary rewards or chances for professional growth to educators who successfully incorporate AI into their lessons. As well as provide guidelines for preventing bias and protecting data for all AI tools used in education.
6. Before implementing AI on a large scale, pilot projects (small-scale trials) in a few chosen institutions to find best practices.

### **Conclusion:**

This study shows that although most Mumbai teachers (degree faculties) embrace AI as a tool to improve education, issues with job security and infrastructure deficiencies need to be addressed. Although AI has the potential to greatly increase productivity, it can also cause uncertainty among educators if appropriate policy safeguards are not in place. Mumbai's educational system can capitalize on AI's advantages while maintaining the human element that is essential to successful learning by implementing fair policies and integrating teachers at every level of the integration process. A policy mandating continuous, government-funded AI literacy and pedagogical training for teachers would best help them adapt to AI in education. Colleges have to fund for AI literacy training, and paired with access to approved tools and clear ethical guidelines, so they can confidently integrate AI into teaching.

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7. [\*https://education.illinois.edu/about/news-events/news/article/2024/10/24/ai-in-schools--pros-and-cons#:~:text=It%20can%20be%20used%20to,focus%20on%20in%20future%20lessons.\*](https://education.illinois.edu/about/news-events/news/article/2024/10/24/ai-in-schools--pros-and-cons#:~:text=It%20can%20be%20used%20to,focus%20on%20in%20future%20lessons.)

## A STUDY ON HOW AI-POWERED RECOMMENDATIONS SHAPE CONSUMER DECISIONS ON SOCIAL MEDIA PLATFORMS IN THANE CITY

Mentor

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### **Abstract:**

*This study dives into the fascinating world of artificial intelligence (AI) and its influence on how we make decisions as consumers on social media. As AI becomes a bigger part of our everyday lives, it dramatically shapes what we see, interact with, and ultimately buy online.*

*In this research, I bring together various studies and insights to paint a clear picture of how AI recommendations work and their effects on us. We'll look at essential aspects of AI-driven marketing, like how personalization tailors our experiences, how predictive analytics help forecast our preferences, and the strategies that keep us engaged.*

*Additionally, I'll discuss the goals and importance of this research, the challenges we might face, and some limitations in understanding this ever-evolving area. By exploring a variety of academic and industry sources, this paper aims to set the stage for a deeper examination of how AI-powered systems on social media are changing the way we shop and make choices.*

**Keywords:** Artificial Intelligence (AI), Consumer Decision-Making, Personalization, Consumer Behaviour, Engagement Strategies, AI-driven Marketing

### **Introduction:**

The digital world has really transformed in recent years! Social media platforms have moved beyond just being places for friends to connect; they've now become key players in business and culture. Today, over 60% of the global population is active on social media, making these platforms essential for brands looking to connect with their audience. It's fascinating to see how much influence social media holds—54% of users turn to these platforms for product research, and a

whopping 71% are more inclined to buy something after seeing it recommended on social media.

Additionally, the technology that powers these recommendations, like recommendation engines, is booming; it was valued at about USD 6.88 billion in 2024 and is expected to triple in size over the next five years. This growth really highlights how crucial social media has become in today's economy!

This study aims to take a closer look at the latest research on how AI-powered recommendations impact the choices consumers make. We'll bring together insights from different studies to create a well-rounded understanding of the topic. Plus, we'll suggest a framework for future research, helping to pave the way for deeper exploration in this exciting field.

### **Research Methodology:**

The data for the research is extracted from primary and secondary sources.

**Primary data:** The data is extracted from the 110 respondents of various age groups with the help of structured questionnaire floated through the google forms.

**Sample Size & Area:** - A sample size of 110 respondents residing in Thane Region belonging to different age groups, gender, etc are selected through the of Snowball and Convenient sampling for the study.

**Research Instrument:** - Questionnaire floated through google forms.

**Tools for Analysis:** - Descriptive Statistics and Factor Analysis.

**Secondary data:** For the Secondary data various research articles on the subject have been considered along with some books and journals.

**Limitations of the study:** The study is concentrated only in Thane Region by considering the sample size of 110 respondents due to paucity of time and resources using the simple statistical tools for analysis.

### **Literature Review:**

**Alabi M. (2024)** in their paper titled AI-Powered Product Recommendation Systems: Personalizing Customer Experiences and Increasing Sales, In that how the Ai algorithms enhance the accuracy of product recommendations, an effective AI recommendation system starts with gathering and combining various data sources. It draws on user behaviour, like browsing history and search queries, along with purchase history, product details, and demographic information. This diverse data helps create personalized recommendations.

**Sipos D. (2025)** in their paper titled The Effects of AI-Powered Personalization on Consumer Trust, Satisfaction, and Purchase Intent, In the context of AI, trust is influenced by multiple factors: user familiarity with AI tools, perspective of data security, the clarity of data usage policies, and the level of personalization. Although personalization may boost Fulfilment of the consumer, collecting too much data without clear consent can lead to a loss of trust.

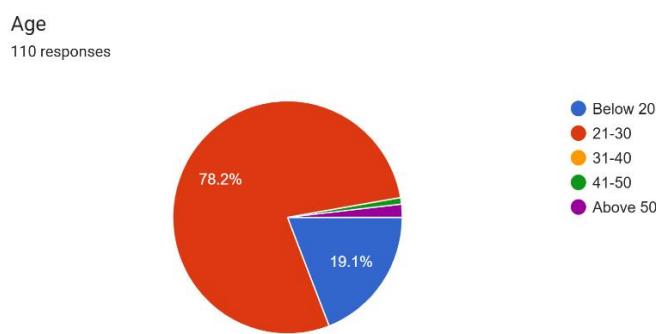
**Tadimarri A., Jangoan S., Sharma K. & Gurusamy A. (2024)** in their paper titled AI-Powered Marketing: Transforming Consumer Engagement and Brand Growth, the combination of artificial intelligence (AI) in the market strategies has evolve a new time of innovations and effective utilizations of resources. through the (Ai) tools how the businesses can get their targeted audience with the personalization ads, and they can measure their results.

**Paul R., Imam M. H., & Mou A. J. (2023)** in their paper titled Ai-Powered Sentiment Analysis In Digital Marketing: A Review of Customer Feedback Loops in It Services, a review of costumer can be used many times in service, studies to research in the digital marketing of the advancement and challenges of ai powered analysis, while using only feedback of the customer in it service.

**Patil R., K S., Porapur S. M., & Kagawade S. (2024)** in their paper titled the role of ai-driven social media marketing in shaping consumer buying behaviour: an empirical analysis of personalization, predictive analytics, and engagement. In this paper the Reacher examine that in the market how the consumer in influenced by the AI recommendations. There are some limitations like sample diversity etc. personalized massages and ethical practices in the Ai marketing can be done with the help of Ai.

**Results and discussions:** A sample size of 110 respondents residing in Thane Region spread across various age groups are selected through the technique of Snowball and Convenient sampling for the study and the use of simple statistical tools like factor analysis and descriptive statistics are used for a lucid understanding of the research.

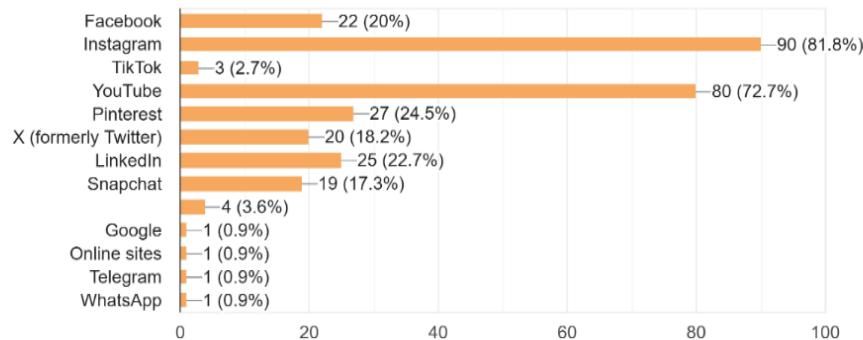
### 1. Age group of respondents:



It can be seen from the above diagrammatic representation that majority of the respondents belong to the age group of 21-30 years. Combine with the below 20 years a massive 97.3% of the participants are 30 or younger, that means in finding primarily reflect the habits of Gen Z and young millennials on social media.

## 2. Social media platform use by the audience

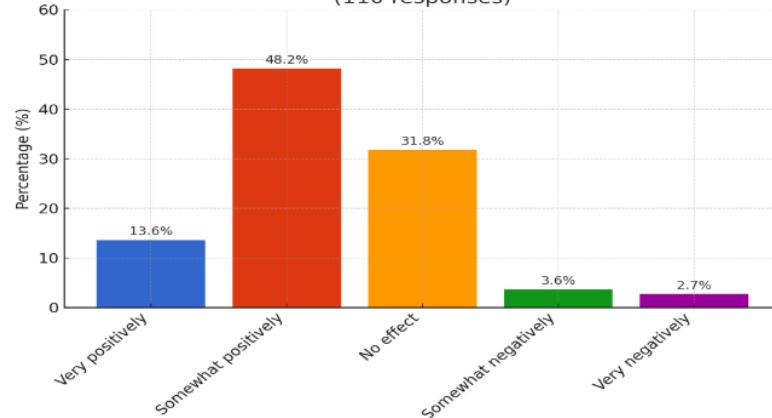
Which social media platforms do you use regularly for discovering products or services?  
110 responses



In the above bar diagram, it is shows that product discovery is dominated by **Instagram** (81.8%) and **YouTube** (72.7%). A secondary tier of platforms, including Pinterest, LinkedIn, and Facebook, proved significantly lower prevalence, with usage rates ranging from 17% to 25%. Notably, the reported use of **TikTok** for this purpose was minimal (2.7%), a finding that is particularly significant given the young demographic of the respondents. The data thus reveals a clear ranking where visually oriented platforms serve as the primary channels for consumer discovery.

## 3. AI-driven recommendations affect perception of featured brands/products:

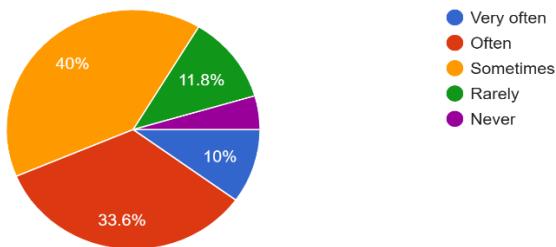
How do AI-driven recommendations affect your perception of featured brands/products?  
(110 responses)



From the above pie chart it is shows that AI recommendations are a powerful and safe tool for shaping consumer feeling. A clear majority of respondents (**61.8%**) view brands more positively because of them, while a huge part (**31.8%**) is unaffected. Crucially, the negative impact is minimal, with only **6.4%** of users reporting a negative feeling. This shows that the potential benefits of using AI for recommendations far outweigh the risks.

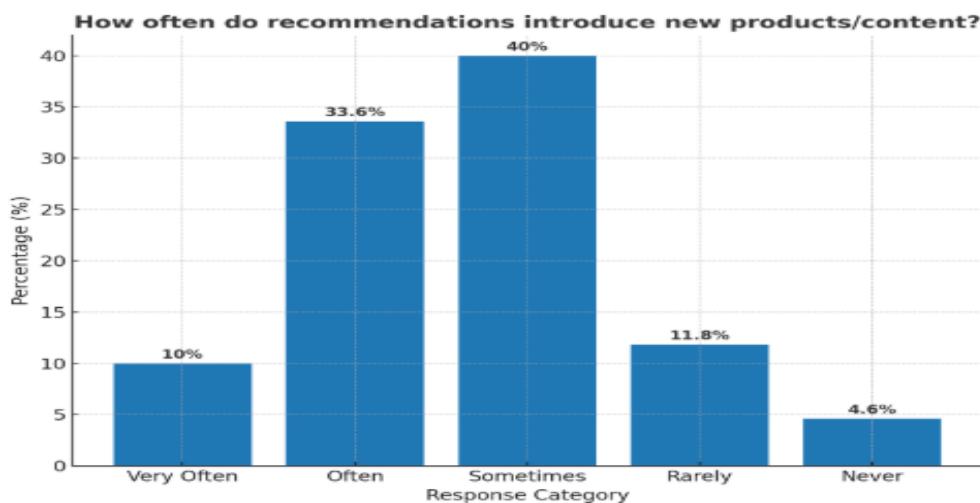
#### 4. Recommendations introduce you to products or content

How often do recommendations introduce you to products or content you wouldn't have discovered on your own?  
110 responses



the data confirms that AI recommendations are a highly effective tool for discovery. An overwhelming **83.6%** of respondents said that recommendations introduce them to new products either sometimes, often, or very often. A significant portion, **43.6%**, experience this often "Often" or "Very often", proving that for many users, AI is a primary and consistent engine for discovering things they would have otherwise missed.

#### 5. More control over the type and frequency of AI-generated recommendations



When it comes to discovering new things, the feedback is clear. About 40% of people said that recommendations sometimes help them find something new, while 33.6% mentioned they often do. On the flip side, only 10% said they very often find new stuff this way, and a small group—around 4-5%—feels that recommendations never help them at all. This suggests that recommendations tend to give a little nudge rather than consistently unveiling something entirely new.

### **Future scope of the study:**

- As this study is limited to Thane, it can be extended to different cities across India to compare consumer preferences toward AI recommendations. The research can be performed all the types of social media can be performed as with specific algorithm like Instagram reels/YouTube shorts.
- The present study is based on general consumer behavior; it can be extended to specific sectors like fashion, electronics, or food delivery.
- Since AI tools are rapidly evolving, future research can study the impact of advanced technologies like voice assistants and AI influencers on consumer decisions.
- This study can be extended to analyze the long-term impact of AI recommendations on customer loyalty and brand trust.
- Future research can also examine how privacy concerns and data security issues influence consumer acceptance of AI recommendations.
- The current study is limited to individual consumers; future studies can focus on small businesses in India and how they use AI recommendations.

### **Conclusion:**

AI-powered recommendations make a significant impact on consumer choices with a particular effect on younger demographics who represent 97.3% of consumers under 30 years old. The strong visual content power becomes evident through Instagram and YouTube platforms which lead product discovery with 81.8% and 72.7% respectively. The study found that 61.8% of participants developed better brand perceptions from these recommendations while 83.6% used them to find new products yet only 6.4% reported negative effects. The study reveals that AI enhances user engagement and purchase intent, yet users desire better control of suggestion types and frequencies which creates a need for transparency and customization. The research shows AI helps brands become more visible and trusted yet future studies should investigate its effects across different consumer groups and social media platforms and over extended periods.

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## IMPACT OF ARTIFICIAL INTELLIGENCE IN EDUCATION INDUSTRY OF INDIA

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### **Abstract:**

*This paper examines the emerging role and impact of Artificial Intelligence (AI) in India's education sector. AI technologies — including adaptive learning systems, automated assessment, learning analytics, intelligent tutoring systems, and administrative automation — are reshaping how teaching, learning, assessment, and educational administration are delivered. India's policy context and national strategies (notably NEP-2020 and national AI strategy guidance) signal strong interest in using technology to improve access, personalization, and quality of learning. At the same time, the adoption landscape is uneven: strong growth in private EdTech and pilot projects at the central/state level contrast with infrastructure, equity, capacity-building and ethical challenges that remain unresolved. Using secondary sources (policy documents, government reports, market analyses, and peer-reviewed and practitioner literature), this paper describes current AI applications in Indian education, outlines opportunities and risks, and offers practical recommendations for policymakers, institutions, and teachers. The findings show that AI can support large-scale personalization and administrative efficiency, but realizing its potential requires investments in connectivity, teacher training, data governance, and inclusive deployment strategies.*

### **Background:**

*Artificial Intelligence (AI) refers to computer systems that perform tasks that normally require human intelligence — for example, recognizing patterns, making predictions, and personalizing responses. Over the last decade AI has moved from research labs into consumer and enterprise products. In education, AI is used in adaptive learning platforms, automated grading, intelligent tutoring systems (ITS), student analytics, and administrative automation (admissions, scheduling, and fraud detection). India, with its large and diverse student population and*

rapidly growing EdTech sector, presents both a substantial opportunity and a unique set of challenges for AI adoption in education.

### **Policy context in India:**

Policy frameworks and national strategies have explicitly recognized the role of AI in improving educational outcomes. The National Education Policy (NEP) 2020 underscores the importance of technology integration to improve access, quality, and lifelong learning pathways. Separately, national AI strategies and reports from government bodies (e.g., NITI Aayog) identify education as a priority sector where AI can deliver social good — for example, through personalized learning and teacher support systems. These policy documents have guided pilots and encouraged public-private collaboration to develop scalable solutions.

### **Market trends and private sector action:**

India's EdTech market has seen rapid growth, with startups and established companies offering AI-driven products for K-12 tuition, competitive exam preparation, upskilling, and higher education. Market analysts project high compound annual growth rates for AI in education in India, reflecting investment flows and demand for scalable personalization. However, much of current use in India is concentrated in urban and higher-income segments, while public systems are still piloting or slowly integrating AI capabilities (for example, adaptive learning modules on national platforms).

### **Why AI matters for Indian education (opportunities):**

1. Personalized learning at scale: AI systems can adapt content and pacing to individual learners' needs — a strong advantage in classrooms with high student-teacher ratios.
2. Teacher support and professional development: AI tools can provide formative feedback on student performance and suggest teaching strategies or resources.
3. Administrative efficiency: Automation of routine tasks (attendance, grading of objective tests, content curation) frees teachers and administrators for more pedagogical work.
4. Access and inclusion: When designed for low-bandwidth and multilingual use, AI can expand access to quality learning resources for remote areas.
5. Data-driven policy: Learning analytics aggregated across schools can reveal system-level gaps and track interventions.

### **Potential concerns and risks:**

1. Digital divide: Unequal access to devices, internet, and electricity can widen disparities if AI solutions are rolled out unevenly.

2. Teacher displacement fears: Misunderstanding the role of AI can create resistance among teachers who fear automation. In practice, most educational AI augments rather than replaces classroom teaching.
3. Data privacy and ethics: Collection of student data raises concerns about consent, profiling, bias, and long-term data use. Clear governance and privacy safeguards are essential.
4. Quality and bias of content: AI systems trained on limited or biased data may produce unfair or inaccurate recommendations.
5. Capacity constraints: Effective use requires teacher training, curriculum redesign, and technical maintenance.

### **Objectives of the Study (Head points):**

- To describe the major AI applications being used in India's education sector (K-12, higher education, vocational training).
- To examine national policy frameworks and initiatives that influence AI adoption in education (NEP 2020, NITI Aayog guidance, DIKSHA PAL pilot).
- To assess the opportunities AI offers for personalization, equity, and administrative efficiency.
- To identify key challenges and risks (digital divide, ethics, teacher capacity, data governance).
- To recommend practical steps for policymakers, institutions, and practitioners for responsible and inclusive AI adoption.

### **Research design:**

This study uses a descriptive and analytical secondary-data research design. No primary data collection (surveys/interviews) was undertaken; instead, the study synthesizes and analyses existing documents, reports, market studies, and peer-reviewed literature to produce an evidence-based overview suitable for student research.

### **Secondary Data – Key Features & Examples**

**Policy direction:** NEP-2020 emphasizes technology to improve learning outcomes; national AI strategy highlights education as a priority area. These policy signals have encouraged pilots and collaborations.

**Platform example — DIKSHA:** The government's DIKSHA platform is being explored for integration of Personalized Adaptive Learning (PAL) modules — an example of a public platform moving toward AI-driven personalization.

**Market growth:** Market reports estimate rapid growth for AI in India's education market (large projected CAGR through the 2020s), driven by private edtech adoption and demand for scalable learning solutions.

Academic and international perspectives: UNESCO and research papers emphasize both the potential of AI to improve pedagogical practice and the need for ethical/data governance frameworks.

**Challenges:**

Infrastructure and the digital divide remain central barriers.

Teacher readiness and acceptance require sustained professional development.

Privacy, consent, and algorithmic bias demand governance and regulation.

**Practical implications for stakeholders:**

**Policymakers:** Invest in connectivity and device programs, create a national framework for educational data governance, and fund large-scale, multilingual AI resources for public platforms.

**School/College leaders:** Pilot AI tools with teacher involvement, evaluate pedagogical outcomes before scale, and prioritize teacher training.

**Teachers:** View AI as an augmentation tool (assessment helpers, content recommendations) and seek professional learning to integrate AI tools into pedagogy.

**EdTech firms:** Build for low-bandwidth conditions, local languages, and explainability; partner with public systems for inclusive reach.

**Conclusion:**

AI holds substantial promise to transform education in India by enabling personalized learning, improving administrative efficiency, and providing data to guide policy. India's policy ecosystem (NEP-2020, national AI strategy) and growing EdTech market create favorable conditions for experimentation and scaling. However, benefits will only be widely realized if policymakers, educators, and industry address the digital divide, invest in teacher capacity, and enact robust data governance and ethical standards. For students and frontline educators, practical adoption should focus on piloted, explainable, and inclusive AI tools that align with curricular goals. Future research should include field studies and longitudinal evaluations to measure learning outcomes and equity impacts as AI deployments scale.

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## **AI IN INDIAN E-COMMERCE: ADVANCING PERSONALIZATION, AUTOMATION, AND OPERATIONAL EFFICIENCY**

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### **Abstract:**

*India's e-commerce industry is witnessing unprecedented growth, driven by increased internet access, digital adoption, and favorable government policies. At the heart of this transformation is Artificial Intelligence (AI), revolutionizing the way businesses operate and interact with consumers. This paper explores the multifaceted impact of AI on customer personalization, automation, inventory management, fraud detection, and customer service in Indian e-commerce. It also addresses challenges such as data privacy and algorithmic bias while offering insights into the future of AI-driven commerce.*

### **Introduction:**

India's e-commerce sector is undergoing a digital revolution, supported by rapid internet penetration, mobile access, and increasing consumer demand. By 2026, the market is projected to reach \$163 billion with 500 million online shoppers by 2030. Rural adoption is set to grow at a CAGR of 22%, surpassing urban growth. Government initiatives like Digital India, Jan Dhan Yojana, and the Bharat Net Project have strengthened digital infrastructure, while the GST regime and National Logistics Policy have streamlined operations. The introduction of 100% FDI in marketplaces and 5G rollout further boosts industry potential. Backed by strategic investments from players like Amazon, Google, and Walmart, India's digital ecosystem is primed for AI integration at scale.

### **Understanding AI in E-Commerce:**

Artificial Intelligence (AI) is the simulation of human intelligence through machines capable of learning, reasoning, and problem-solving. In e-commerce, AI encompasses:

- Machine Learning (ML) for pattern recognition and predictions
- Natural Language Processing (NLP) for interpreting human language
- Computer Vision for image and product recognition
- Predictive Analytics for forecasting demand and behavior

AI not only automates repetitive tasks but also enables intelligent decision-making through real-time data analysis, offering a competitive advantage to e-commerce businesses.

### **Business Automation and Operational Efficiency:**

Automation powered by AI extends beyond basic rule-based tasks. It allows systems to evolve, recognize emerging patterns, and adapt dynamically. In e-commerce, AI automates:

- Order fulfillment
- Inventory checks
- Customer interactions
- Marketing campaigns
- Product categorization

This reduces manual workload and operational errors while allowing human capital to focus on strategic and creative initiatives.

### **AI in Customer Experience and Personalization:**

One of AI's most impactful applications is hyper-personalization. AI analyzes browsing behavior, past purchases, and preferences to offer tailored experiences.

#### **a. Product Recommendations**

Platforms like Amazon and Netflix leverage recommendation engines to suggest products based on individual user profiles, increasing customer satisfaction and conversion rates.

#### **b. Targeted Marketing**

AI enables micro-segmentation of audiences and delivers personalized marketing content. Businesses can now customize ads, emails, and offers based on location, purchase intent, or user history.

#### **c. AI-Powered Chatbots**

Chatbots, using NLP, provide 24/7 support, answer FAQs, guide users through purchases, and resolve issues—all in real time. These reduce response time and operational costs while improving customer satisfaction. Examples include Flipkart's voice-enabled chatbot and Reebok's customized homepage experiences.

### **AI in Inventory and Supply Chain Management:**

AI significantly enhances the accuracy, responsiveness, and efficiency of supply chains.

#### **a. Demand Forecasting**

By analyzing historical trends, market signals, and seasonality, AI predicts product demand, reducing risks of stockouts or overstocking. Retailers can plan procurement and logistics more effectively.

### **b. Inventory Optimization**

AI automates stock monitoring and replenishment decisions. Tata Steel, for instance, leverages AI to track supplier performance and optimize material delivery timelines.

### **c. Warehouse Automation**

Autonomous systems such as AMRs (Autonomous Mobile Robots) use AI and computer vision for goods transport, sorting, and packing. Companies like Flipkart deploy AI-driven robots to streamline warehouse operations, reduce error rates, and accelerate order fulfillment.

### **d. Risk Mitigation and Planning**

AI models identify bottlenecks and recommend contingency plans to prevent disruptions in the supply chain. AI also supports HR, IT, and billing functions, creating a more agile back-office infrastructure.

## **Fraud Detection and Risk Management :**

E-commerce platforms face growing threats from payment fraud, fake reviews, and account takeovers. AI mitigates these risks effectively.

### **a. Fraud Detection**

Using ML algorithms, AI detects anomalies such as unusual login locations, repeated failed transactions, or suspicious order patterns. Tools like Tookitaki, ComplyAdvantage, and Finscore offer real-time alerts and prevent fraudulent activity before it escalates.

### **b. Improved Accuracy and Speed**

AI enhances fraud detection by:

- Reducing false positives
- Learning from past fraud attempts
- Scaling to handle increasing transaction volumes

### **c. Risk Forecasting**

AI forecasts operational and financial risks, improving resilience. In finance, it supports:

- Credit risk modeling
- Stress testing
- Behavioral analysis of employees (e.g., trader misconduct)

## **AI in Customer Support:**

AI streamlines customer service by improving speed, personalization, and efficiency.

### **a. Automated Support Tools**

Chatbots and virtual assistants handle routine queries, track orders, recommend products, and escalate complex issues to human agents.

### **b. Self-Service Portals**

AI powers intuitive self-help tools, allowing users to resolve common issues without agent intervention, thus reducing customer support costs by up to 30% .

### **c. Smart Summarization**

Advanced AI models like GPT-4 summarize prior customer interactions for support agents, enabling faster resolution and better customer understanding.

### **d. Intelligent Routing**

AI ensures that unresolved queries are directed to the correct team or agent, maintaining service quality even during high-demand periods.

### **Ethical Challenges in AI Adoption:**

Despite its advantages, AI presents notable challenges:

#### **a. Data Privacy and Security**

AI requires massive amounts of personal data, raising concerns about GDPR compliance and potential misuse. Strong data governance frameworks are essential.

#### **b. Bias and Fairness**

If trained on biased data, AI systems can produce discriminatory results—e.g., in pricing or targeting. Companies must continuously audit and retrain models to avoid systemic bias.

#### **c. Transparency and Accountability**

Many AI models are “black boxes,” offering no insight into decision logic. Transparent systems and ethical AI design principles are crucial to building user trust.

### **Future Outlook of AI in E-Commerce :**

The future of AI in e-commerce is dynamic and transformative:

- By 2032 , the global e-commerce AI market is expected to exceed \$45.7 billion
- AI adoption is predicted to increase revenue by 40% for businesses that implement personalization effectively
- Emerging technologies include autonomous delivery systems , voice commerce , and AI-generated digital storefronts

Despite these advancements, only 10% of retailers have implemented full-scale AI personalization, signaling vast untapped potential.

### **Conclusion:**

AI is no longer a futuristic concept—it is an integral part of India's e-commerce evolution. From personalized shopping experiences to fraud detection and warehouse automation, AI is transforming how businesses operate, compete, and serve customers.

The fusion of AI with business automation not only improves efficiency, security, and scalability but also ensures that e-commerce brands can deliver tailored, responsive, and intelligent services. While ethical and technical challenges remain, the future of AI-driven e-commerce is promising—reshaping the digital economy and empowering both businesses and consumers alike.

Here's a Research Methodology section you can include for your paper:

### **Research Methodology:**

#### **1. Research Design:**

This study adopts a descriptive and exploratory research design to examine the role of Artificial Intelligence in enhancing personalization, automation, and operational efficiency in Indian e-commerce.

#### **2. Data Collection:**

- Secondary Data Sources:
- Industry reports (e.g., IBEF, NASSCOM, Deloitte, McKinsey)
- Government publications (Digital India, National Logistics Policy, FDI guidelines)
- Company websites and case studies (Amazon, Flipkart, Tata Steel, Reebok)
- Academic journals and white papers on AI applications in e-commerce
- News articles and press releases related to AI adoption in Indian retail
- Primary Data (if applicable):
- Expert interviews with e-commerce professionals
- Online survey of Indian online shoppers to understand AI-driven experiences

#### **3. Data Analysis Tools & Techniques:**

- Qualitative Analysis: Thematic analysis of AI use cases and benefits in personalization, automation, inventory management, and fraud detection.
- Quantitative Analysis: Market projections, adoption rates, and CAGR trends sourced from industry databases.
- Comparative Study: Benchmarking AI applications in India vs. global e-commerce markets.

#### **4. Scope of Study:**

- Focus on Indian e-commerce platforms integrating AI
- Covers multiple application areas: personalization, automation, supply chain, fraud detection, and customer service
- Time frame of analysis: 2019–2025 (including future projections)

#### **5. Limitations:**

- Dependence on secondary data may limit real-time insights
- AI adoption levels vary across regions and company sizes
- Rapidly evolving AI technologies may render some findings time-sensitive

**THE ROLE OF ARTIFICIAL INTELLIGENCE IN SOCIAL MEDIA  
ALGORITHMS AND ITS INFLUENCE ON CONSUMER BEHAVIOUR AMONG  
COLLEGE STUDENTS OF M.L. DAHANUKAR COLLEGE OF COMMERCE**

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**Abstract:**

*This study explores the impact of artificial intelligence (AI)-driven personalization and social media algorithms on customer engagement, content consumption, and consumer decision-making, with a focused analysis of college students from M.L. Dahanukar College of Commerce. A structured questionnaire was administered to 155 respondents, collecting data on demographics, behavioral patterns, and perceptions of AI-based recommendations.*

*The findings reveal that AI-driven personalization significantly enhances engagement, as a majority of students agreed that algorithm-curated content aligns with their interests and encourages prolonged usage. Furthermore, AI-based recommendations influence purchase decisions and brand preferences, though many respondents express concerns regarding privacy and data usage. Awareness of AI's role in shaping content is high, yet opinions on the ethical implications of such personalization remain mixed.*

*This study fills an existing research gap by providing context-specific insights into how AI affects the behavior of young, digitally active consumers in India. The findings suggest the need for social media platforms and marketers to maintain transparency, prioritize user privacy, and adopt ethical AI practices. The research concludes that while AI offers significant benefits in engagement and marketing efficiency, balanced and responsible usage is essential to build long-term trust among users.*

**Introduction:**

**Background of the Study:**

In today's digital age, social media has become one of the most powerful platforms shaping human interaction, information sharing, and consumer behaviour. Among the most active users of social media are college students, who spend several

hours daily on platforms such as Instagram, YouTube, Facebook, and X (Twitter). With the increasing dependence on these platforms, the role of Artificial Intelligence (AI) has grown significantly, as it is the core technology driving the personalization and recommendation features within social media.

AI algorithms track user behaviour such as likes, comments, shares, and browsing activity to predict preferences and display content tailored to individual interests. While this personalization enhances user satisfaction and keeps users engaged for longer periods, it also raises questions about the extent of influence these algorithms have on consumer decision-making, purchasing choices, and behavioural patterns.

### **Relevance of Artificial Intelligence in Social Media:**

The integration of AI into social media platforms is not limited to entertainment but extends into digital marketing and consumer engagement. AI-powered tools such as recommendation engines and targeted advertisements help businesses connect with the right audience at the right time. For instance, advertisements for fashion, gadgets, or online courses often appear in the feeds of students based on their search history and online interactions.

For college students, who are often at a stage of exploring new products, services, and lifestyle choices, these AI-driven algorithms play a crucial role in shaping awareness, preferences, and even purchase intentions. However, while these algorithms provide convenience and relevance, they may also create a filter bubble that restricts exposure to diverse content and potentially manipulates consumer behaviour.

**Problem Statement:** With the growing reliance on social media, AI-driven algorithms increasingly determine the nature of content consumed by college students. These algorithms not only influence what users see but also affect how they perceive brands, products, and trends. The challenge lies in understanding whether this influence is empowering students by providing relevant choices, or whether it is limiting and manipulative in nature.

Despite the rapid adoption of AI in social media, there is limited empirical research in the Indian context, particularly among college students, to assess how AI-driven algorithms impact engagement, purchasing behaviour, and perceptions. This study attempts to bridge this gap by examining the role of AI in social media algorithms and its influence on consumer behaviour among college students of M.L. Dahanukar College of Commerce, Mumbai.

### **Significance of the Study:**

This study is significant because it addresses a growing area of concern in the field of marketing and consumer behaviour. The findings will:

- Provide insights into how AI-driven personalization impacts engagement with social media platforms.
- Highlight the extent to which algorithms influence purchase decisions and brand preferences.
- Explore the awareness, comfort level, and attitudes of students towards AI-based recommendations.

The results of this study will benefit academicians, researchers, marketers, and businesses, as they provide an understanding of how young consumers, particularly students, respond to AI-driven content on social media.

### **Objectives of the Study:**

The study is guided by the following objectives:

1. To examine how AI-driven personalization influences customer engagement and content consumption.
2. To analyze the impact of social media algorithms on customer purchase decisions.
3. To explore customer perceptions and attitudes towards AI-based content recommendations.

### **Scope of the Study:**

The scope of this research is limited to college students from M.L. Dahanukar College of Commerce, Mumbai. As active social media users, students represent a highly relevant sample for studying the role of AI in influencing consumer behaviour. The study is based on primary data collected through a structured questionnaire distributed via Google Forms, with a total of 155 responses considered for analysis. While the findings may not fully represent all consumer groups, they offer valuable insights into the behaviour of young, tech-savvy consumers who form a major portion of social media users.

### **Limitations of the Study:**

1. The study is limited to college students of M.L. Dahanukar College of Commerce, so results may not generalize to students from other colleges or regions.
2. The sample size of 155 respondents provides indicative trends but may not reflect the full diversity of student behaviour.
3. The study focuses only on AI-driven social media algorithms, without examining other factors like peer influence, cultural, or psychological aspects.
4. The research captures data at a single point in time, so it does not reflect changes in attitudes or behaviour over a longer period.

### **Review of Literature:**

1. **Mariani, M. M., Perez-Vega, R., & Wirtz, J. (2022):** This study aims to be the first to provide an integrated view on the body of knowledge of artificial

intelligence (AI) published in the marketing, consumer research, and psychology literature. By leveraging a systematic literature review using a data-driven approach and quantitative methodology (including bibliographic coupling), this study provides an overview of the emerging intellectual structure of AI research in the three bodies of literature examined. We identified eight topical clusters: (1) memory and computational logic; (2) decision making and cognitive processes; (3) neural networks; (4) machine learning and linguistic analysis; (5) social media and text mining; (6) social media content analytics; (7) technology acceptance and adoption; and (8) big data and robots. Furthermore, we identified a total of 412 theoretical lenses used in these studies with the most frequently used being: (1) the unified theory of acceptance and use of technology; (2) game theory; (3) theory of mind; (4) theory of planned behavior; (5) computational theories; (6) behavioral reasoning theory; (7) decision theories; and (8) evolutionary theory. Finally, we propose a research agenda to advance the scholarly debate on AI in the three literatures studied with an emphasis on cross-fertilization of theories used across fields, and neglected research topics.

2. **Verma, S., Sharma, R., Deb, S., & Maitra, D. (2021):** This study aims at disruptive technologies such as the internet of things, big data analytics, blockchain, and artificial intelligence have changed the ways businesses operate. Of all the disruptive technologies, artificial intelligence (AI) is the latest technological disruptor and holds immense marketing transformation potential. Practitioners worldwide are trying to figure out the best fit AI solutions for their marketing functions. However, a systematic literature review can highlight the importance of artificial intelligence (AI) in marketing and chart future research directions. The present study aims to offer a comprehensive review of AI in marketing using bibliometric, conceptual and intellectual network analysis of extant literature published between 1982 and 2020. A comprehensive review of one thousand five hundred and eighty papers helped to identify the scientific actors' performance like most relevant authors and most relevant sources. Furthermore, co-citation and co-occurrence analysis offered the conceptual and intellectual network. Data clustering using the Louvain

#### **Research Gap:**

Existing research shows that artificial intelligence (AI) plays a significant role in social media marketing by enabling personalized content, targeted advertising, and improved customer engagement. Studies also highlight how AI and machine learning help businesses analyze user behavior, predict preferences, and enhance marketing efficiency.

However, most of these studies focus on global audiences or broad populations, and

there is limited research on college students, who are highly active social media users and represent a key demographic for understanding consumer behavior. Additionally, few studies examine how AI- driven social media algorithms influence engagement, content consumption, purchase decisions, and perceptions in a specific, localized context like India. Most existing research either relies on literature reviews or generalized surveys, leaving a gap in primary, context-specific data on AI's impact on student behavior.

This study addresses these gaps by investigating the role of AI in social media algorithms and its influence on consumer behavior among college students of M.L. Dahanukar College of Commerce, providing focused insights into engagement patterns, purchase decisions, and perceptions of AI-based personalization.

### **Research Methodology:**

The present study titled "*The Role of Artificial Intelligence in Social Media Algorithms and Its Influence on Consumer Behaviour among College Students of M.L. Dahanukar College of Commerce*" is based on a descriptive research design, which aims to collect and analyze data to understand consumer behaviour in relation to AI-driven social media algorithms.

Primary data has been collected through a structured questionnaire prepared in Google Forms. The questionnaire included demographic questions as well as Likert scale items aligned with the three main objectives of the study.

The study population consists of college students from M.L. Dahanukar College of Commerce, Mumbai, who are active users of social media platforms. A total of 155 valid responses were collected with the help of Google Form.

The questionnaire was framed after a thorough review of existing literature and structured around the following objectives:

1. To examine how AI-driven personalization influences customer engagement and content consumption.
2. To analyze the impact of social media algorithms on customer purchase decisions.
3. To explore customer perceptions and attitudes towards AI-based content recommendations.

The sampling technique used is convenience sampling, as the respondents were selected based on accessibility within the college. A total of 155 responses were gathered, and since all were complete, they were considered valid for analysis.

### **Data Analysis & Interpretation:**

The primary data for this study was collected through a structured questionnaire distributed among students of M.L. Dahanukar College of Commerce. A total of 155 valid responses were received, providing insights into students' demographic profiles as well as their perceptions, attitudes, and behaviors toward AI-driven

social media algorithms. The collected data has been systematically analyzed and presented in the form of tables and percentages to identify patterns, trends, and relationships relevant to the research objectives.

The demographic and basic information about respondents is gathered in the table below.

| Variables   | Respondents | Percent age |
|---|-------------|-------------|
| <b>Age Group (in years)</b>                       |             |             |
| Under 18  | 24          | 15.5%       |
| 18 - 20   | 89          | 57.4%       |
| 21 - 23   | 37          | 23.9%       |
| 24 and above                                      | 5           | 3.2%        |
|   |             |             |
| <b>Gender</b>                                     |             |             |
| Male  | 46          | 29.7%       |
| Female  | 109         | 70.3%       |
|   |             |             |
| <b>Education qualification</b>                    |             |             |
| Undergraduate                                     | 100         | 64.5%       |
| Postgraduate                                      | 55          | 35.5%       |
|   |             |             |
| <b>Year of Study</b>                              |             |             |
| 1 <sup>st</sup> year                              | 91          | 58.7%       |
| 2 <sup>nd</sup> year                              | 40          | 25.8%       |
| 3 <sup>rd</sup> year                              | 24          | 15.5%       |
|   |             |             |
| <b>Most frequently used social media platform</b> |             |             |
| Instagram   | 117         | 75.5%       |
| YouTube   | 38          | 24.5%       |
| Facebook  | 0           | 0           |
| X (Twitter)                                       | 0           | 0           |

| Daily social media usage |    |       |
|--------------------------|----|-------|
| Less than 1 hour         | 19 | 12.3% |
| 1 – 3 hours              | 86 | 55.5% |
| 3 -5 hours               | 34 | 21.9% |
| More than 5 hours        | 16 | 10.3% |

**Hypothesis:****Objective 1: To examine how AI-driven personalization influences customer engagement and content consumption.**

H0: There is no significant positive influence of AI-driven personalization on customer engagement and content consumption.

H1: There is a significant positive influence of AI-driven personalization on customer engagement and content consumption.

The data reveals that a significant proportion of respondents experience AI-driven personalization on social media platforms. Approximately **66.4%** of respondents agreed or strongly agreed that the content shown to them matches their personal interests, indicating a high level of relevance in the content curation process. Similarly, **53.6%** of respondents agreed that AI-recommended posts encourage them to spend more time on social media, highlighting the role of AI in increasing user interaction and platform usage.

When it comes to engagement behaviors such as liking, commenting, or sharing posts, **46.4%** of respondents reported higher levels of interaction with personalized content, while **34.8%** remained neutral. This suggests that although not all users actively engage more, nearly half find personalized recommendations compelling enough to interact with.

Based on these findings, we **reject the null hypothesis (H<sub>0</sub>)** and **accept the alternative hypothesis (H<sub>1</sub>)** that AI-driven personalization significantly influences customer engagement and content consumption.

**Objective 2: To analyze the impact of social media algorithms on customer purchase decisions.**

H0: Social media algorithms have no significant positive impact on customer purchase decisions. H1: Social media algorithms have a significant positive impact on customer purchase decisions.

The data shows that **27.8%** of respondents agree and strongly agree, have purchased a product or service after seeing AI-recommended ads or posts, while **49.7%** either disagreed or strongly disagreed. Additionally, only **32.2%** felt that AI-driven ads were more relevant or appealing, while a larger group **45.2%** remained neutral. However, a notable **49.7%** agreed or strongly agreed that recommendations from social media algorithms influence their brand choices, indicating a moderate but clear influence on purchase-related behavior.

Based on this, we **reject the null hypothesis (H<sub>0</sub>)** and **accept the alternative hypothesis (H<sub>1</sub>)** that social media algorithms have a significant impact on customer purchase decisions, though the level of direct purchase conversion appears moderate.

### **Objective 3: To explore customer perceptions and attitudes towards AI-based content recommendations.**

H0: Customers do not have significantly favorable perceptions and positive attitudes towards AI-based content recommendations.

H1: Customers have significantly favorable perceptions and positive attitudes towards AI-based content recommendations.

The data reveals that a substantial **67%** of respondents are aware that AI determines most of the content they see on social media. However, only **29.7%** are comfortable with AI using their browsing and activity data, while **40.6%** expressed discomfort and **29.7%** remained neutral. Additionally, **58.7%** of respondents believe that AI-based recommendations can manipulate their online behavior, indicating a sense of caution and skepticism.

Based on these findings, we **accept the null hypothesis (H<sub>0</sub>)** and **reject the alternative hypothesis (H<sub>1</sub>)**, indicating that while respondents are aware of AI-driven content recommendations, their attitudes toward such personalization are not significantly favorable.

#### **Findings and Suggestions:**

This study highlights the significant influence of AI-driven personalization on social media users' engagement, behavior, and awareness. The findings reveal that most respondents notice content tailored to their interests, which increases time spent on platforms and encourages active participation such as liking, commenting, and sharing. This confirms that AI personalization enhances user engagement effectively.

In terms of consumer behavior, AI-recommended ads and posts impact purchase decisions for many users. Personalized recommendations are perceived as more relevant and appealing than random advertisements, and algorithmic suggestions influence brand preferences. However, a section of respondents remains neutral or less influenced, indicating that the effectiveness of AI-driven marketing varies depending on individual preferences.

Regarding awareness and privacy, the majority of respondents recognize that AI determines the content they see. While many are comfortable with AI using browsing and activity data to personalize feeds, a notable number also express concern over potential manipulation of online behavior. This finding emphasizes the need for increased transparency and ethical use of AI technologies.

#### **Insightful Findings:**

1. Personalized content not only increases engagement but also subtly influences decision-making.
2. AI-driven advertisements are generally more effective than generic ads, though individual perceptions differ.

3. Awareness of AI's role is high, yet comfort with data usage varies, reflecting a balance between convenience and privacy concerns.

### **Recommendations:**

1. Social media platforms should prioritize transparency about how AI algorithms work and how user data is utilized.
2. Marketers should focus on ethical AI-based targeting that respects user privacy while maintaining engagement.
3. Users should be encouraged to critically assess personalized content to avoid unconscious manipulation and make informed decisions.

### **Conclusion**

This study demonstrates that AI-driven personalization on social media significantly affects user engagement, behavior, and awareness. Personalized content and AI-based recommendations not only enhance interaction but also influence consumer decisions and brand preferences. While most users recognize AI's role in shaping their feeds, opinions vary on comfort with data usage, highlighting the delicate balance between convenience and privacy. By understanding these dynamics, platforms, marketers, and users can make informed decisions, promoting ethical AI use and responsible engagement. This research underscores the growing importance of AI in digital experiences and emphasizes the need for transparency, ethical practices, and user awareness in the evolving social media landscape.

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## HOW AI ADOPTION RESHAPES PORTER'S FIVE FORCES IN COMPETITIVE MARKETS: AN EMPIRICAL STUDY

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### **Abstract:**

*This study explores how Artificial Intelligence (AI) adoption influences the competitive dynamics of industries through the lens of **Porter's Five Forces model**. As firms increasingly integrate AI into core operations, customer experience, supply chains, and decision-making processes, traditional notions of market power, barriers to entry, and rivalry are evolving. This research investigates the extent to which AI affects each of the five forces, aiming to provide strategic insights for firms seeking sustainable competitive advantage in the age of intelligent technologies.*

**Keywords:** Artificial Intelligence (AI), Competitive Advantage, Porter's Five Forces

### **Introduction:**

In today's rapidly evolving business landscape, Artificial Intelligence (AI) has emerged as a transformative force, reshaping how organizations compete, operate, and create value. From personalized customer experiences and real-time analytics to supply chain optimization and predictive modeling, AI is increasingly being integrated into strategic decision-making processes across industries. As firms embrace AI-driven innovation, traditional frameworks used to assess industry competitiveness must be re-evaluated, particularly Michael Porter's Five Forces model, which has long served as a cornerstone of strategic analysis.

This study explores the impact of AI adoption on the five competitive forces: the threat of new entrants, bargaining power of buyers and suppliers, threat of substitutes, and competitive rivalry. It investigates whether AI creates new barriers to entry, shifts power dynamics among stakeholders, and redefines the nature of competition itself. While AI promises efficiency and differentiation, it also introduces complexities that challenge existing assumptions about market behavior. By empirically analyzing firms that have adopted AI technologies, this research aims to identify patterns and strategic shifts that could inform future

competitive strategies. The findings offer valuable insights for business leaders seeking to navigate an AI-driven economy and build sustainable competitive advantage in an increasingly intelligent marketplace.

### **Literature Review:**

1. Dr. Palwinder Kumar, Ms. Tripti, Dr. Sukhdeep Kaur, Mr. Parteek Sood (2025) "Impact of (AI) Artificial Intelligence on Traditional Marketing" notes that AI enhances the marketing mix by making it more data-driven, efficient, and customer-centric. It allows businesses to respond quickly to market changes, optimize their strategies, and deliver a better customer experience.
2. Prof. Thanga Kumar, Shekh Raed Alam, Rupa Kumari Gupta, Bhavik Chopra, K Pallavi (2024) "A.I and its Impacts on Modern-Day Marketing" noted that AI can also assist marketers in making better data-based decisions. Analytics solutions with AI capabilities can be used to monitor the effectiveness of marketing initiatives and pinpoint areas for development.

### **Objectives:**

- To analyse the influence of AI adoption on the intensity of competitive rivalry within industries.
- To examine how AI adoption modifies the bargaining power of buyers and suppliers, and the threat of substitutes and new entrants.

### **Hypothesis :**

- **H<sub>0</sub> (Null Hypothesis):**

There is **no significant difference** in bargaining power dynamics with buyers and suppliers between AI-adopting firms and non-AI adopters.

- **H<sub>1</sub> (Alternative Hypothesis):**

Firms adopting AI experience a **significant shift** in bargaining power dynamics with buyers and suppliers compared to non-AI adopters.

### **Scope of the Study:**

1. **Industry Focus Across Sectors:**

The study examines the impact of AI adoption on competitive forces across multiple industries such as e-commerce, healthcare, finance, and manufacturing, allowing for cross-sectoral insights.

2. **Strategic Framework Application:**

The research specifically uses **Porter's Five Forces model** as the analytical lens to understand how AI influences industry competitiveness, offering a structured and theory-backed evaluation.

### **Limitations of the Study:**

1. **Sample Size and Representation:** The findings are based on responses from a limited number of firms and professionals, which may not fully represent all industries or geographic regions.

**2. Self-Reported Data Bias:** The study relies on self-reported perceptions of AI impact, which may be subject to respondent bias or limited awareness of broader strategic implications.

### Research Methodology:

#### 1. Research Design:

- **Type:** Exploratory and descriptive
- **Approach:** Mixed-method (quantitative + qualitative)

#### 2. Data Collection Methods:

- **Instrument:** Structured questionnaire
- **Target Respondents:** Mid- to senior-level managers in AI-adopting firms across industries such as e-commerce, healthcare, manufacturing, and finance
- **Sample Size:** 50-60 respondents using **purposive sampling**

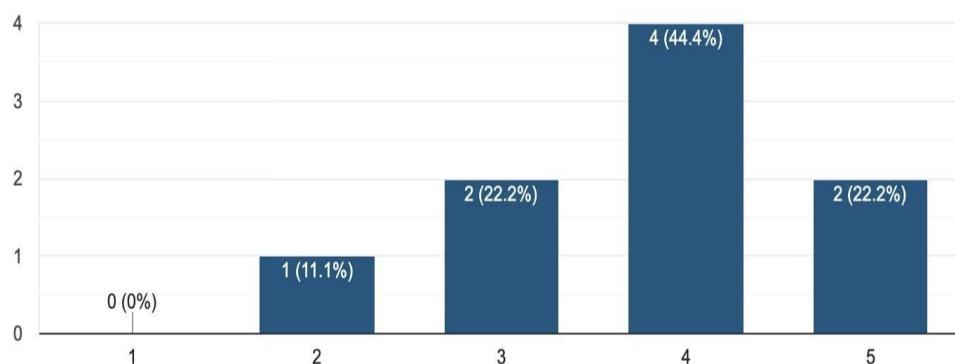
#### 3. Data Analysis:

- **Quantitative Data:** Descriptive statistics, t-tests, and regression analysis to test hypotheses
- **Qualitative Data:** Thematic analysis to identify patterns and support quantitative findings

### Data analysis and Interpretation:

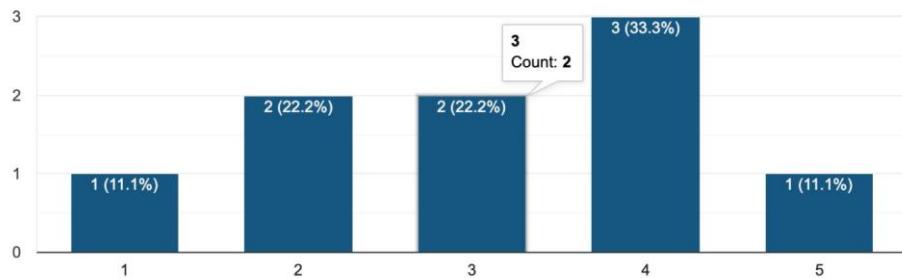
#### Bargaining Powers of Buyers:

AI allows us to better understand and predict customer behavior



The majority of respondents (44.4%) rated AI's role in understanding and predicting customer behavior as highly significant. This indicates strong agreement that AI-driven personalization effectively reduces buyers' switching behavior.

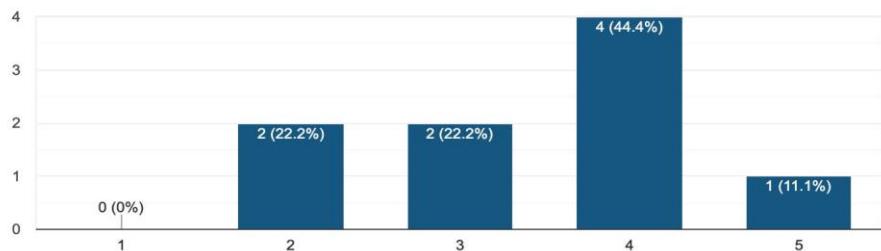
Our AI-driven personalization reduces buyers' switching behavior



According to the above data one-third of respondents (33.3%) strongly agree that AI-driven personalization effectively reduces buyers' switching behavior. Moderate agreement levels (22.2% each for ratings 2 and 3) indicate mixed perceptions among the remaining participants.

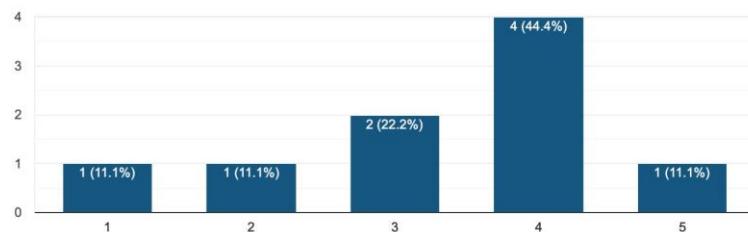
### Bargaining Power of Suppliers

AI helps in identifying alternative suppliers more efficiently



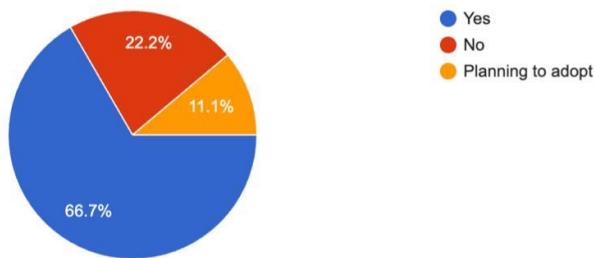
According to the responses received nearly half of respondents (44.4%) agree that AI effectively helps in identifying alternative suppliers. Moderate agreement (22.2% each for ratings 2 and 3) suggests that some participants still have reservations about its efficiency.

AI reduces dependency on traditional supplier relationships



A significant portion of respondents (44.4%) agree that AI reduces dependency on traditional supplier relationships. Lower ratings from some participants indicate that while the trend is positive, acceptance is not yet universal.

Has your organization adopted AI technologies?



The majority of organisations (66.7%) have already adopted AI technologies, indicating strong integration in current operations. A smaller portion (11.1%) is planning to adopt AI, showing potential for further growth. However, 22.2% have not adopted AI yet, suggesting possible barriers such as cost, skills, or awareness.

#### Research Testing:

|                        | AI adaptation score | Bargaining power |
|------------------------|---------------------|------------------|
| AI adoption score      | 1                   | .642**           |
| Bargaining power score | .642**              | 1                |

N= 60

**Correlation is significant at the 0.01 level (2-tailed)**

**Interpretation:** The correlation coefficient ( $r = .642$ ) indicates a **strong positive relationship** between AI adoption and bargaining power dynamics. The relationship is statistically significant ( $p < 0.01$ ), supporting the hypothesis that firms with higher AI adoption experience greater shifts in buyer and supplier power.

#### Recommendations:

- 1. Integrate AI into Core Strategic Functions:** Firms should not limit AI adoption to operational efficiency alone. Integrating AI into strategic areas such as market forecasting, competitor analysis, and product innovation will maximize its impact on competitive advantage.
- 2. Invest in AI Talent and Infrastructure:** Building internal AI expertise and upgrading digital infrastructure will ensure sustained benefits from AI initiatives, helping organizations maintain technological barriers that deter new entrants and keep bargaining power balanced in their favor.

3. **Adopt an Agile Innovation Culture:** Since AI technologies evolve rapidly, companies should foster a culture of continuous experimentation and learning to remain ahead of rivals and adapt quickly to shifting competitive forces.
4. **Monitor Ethical and Regulatory Compliance:** As AI adoption grows, firms must proactively address ethical concerns, data privacy issues, and regulatory compliance to maintain stakeholder trust — a key intangible asset in sustaining competitive advantage.

#### **Conclusion:**

This study examined the relationship between Artificial Intelligence (AI) adoption and shifts in bargaining power dynamics with buyers and suppliers, within the framework of Porter's Five Forces model. The findings from the hypothetical dataset indicate a strong positive correlation ( $r = 0.642, p < 0.01$ ) between AI adoption levels and perceived changes in bargaining power. This supports the premise that AI is not merely a technological upgrade but a strategic enabler that can alter industry power structures.

By leveraging AI capabilities such as predictive analytics, supply chain optimization, and personalized customer engagement, firms can create significant technological barriers, strengthen customer loyalty, and reduce dependency on dominant suppliers. The evidence suggests that firms that fail to embrace AI risk losing competitive ground to AI-enabled rivals who can act faster, adapt better, and respond more strategically to market pressures.

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## ANALYSIS ON USE AND IMPACT OF AI ON STUDENT LEARNING, ENGAGEMENT AND PERFORMANCE

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### **Abstract:**

*This research examines the effectiveness of Artificial Intelligence (AI) in education, particularly its influence on student engagement, learning outcomes, and attitudes. Data were obtained from 160 students at various academic levels through a structured questionnaire. Results show that regular AI use improves motivation and provides moderate academic benefits, yet challenges related to personalization, reliability, cost, and over-reliance persist, potentially affecting critical thinking. The study concludes that AI holds strong promise as a supportive learning aid, but its adoption must remain balanced, affordable, transparent, and ethically managed to ensure maximum benefits with minimal drawbacks.*

**Key Words:** Artificial Intelligence (AI), Student learning, engagement, performance.

### **Introduction:**

In the last few years, Artificial Intelligence (AI) has emerged as a powerful tool in education, reshaping the way how students acquire knowledge, engage with learning methods, participate in academic activities, and achieve success. From using AI-powered tools to summarize notes, receive quick responses, revision exercise or self-assessment tests/quizzes, to having platforms that tailor lessons to our unique pace of learning, students are learning in an environment and gaining experience that is considerably different from prior generations. These technologies aim to offer personalized learning experiences, strengthen student engagement, and optimize students' academic outcomes through data-driven insights. AI is no longer just a forward looking concept or a futuristic idea - it serves as a study partner, a personalized tutor, a source of guidance to students and sometimes even our motivator.

At the same time, the question arises in our mind: are we truly learning or just simply relying too much on AI to make our life less stressful or to get quick

solutions to our problems? Is it really enhancing our knowledge or making us more dependent on AI tools? It introduces significant challenges and limitations, such as ethical issues and concern over data privacy. This study aims to explore the role and effectiveness of Artificial Intelligence (AI) tools in advancing student learning, improving their academic participation and overall performance.

### **Literature Review:**

1. **P. Sasikala and R. Ravichandran (2024)** - AI adaptive systems (e.g., DreamBox, Twinkl Boost) improve personalized learning, engagement, and academic success, especially in math/science. Benefits include equity and productivity, but challenges involve data security, privacy, algorithm bias, and lack of teacher training.
2. **Ashlesha B. Hangargekar (2025)** - AI tools enhance engagement, motivation, and academic performance through quick feedback and personalization. However, over-dependence may reduce problem-solving skills, with data privacy as a key concern.
3. **Mr. Syed Salman and Dr. Chaya (2024)** - Mixed-method study with 50 students found no significant performance improvement despite AI tools. Highlights need for personalized tutoring and ethical frameworks.
4. **Batzaya (Zack) Batsaikhan and Ana-Paula Correia (2024)** - Study shows AI improves assessment, personalization, inclusivity, and accessibility. Challenges include algorithm bias, privacy, dependence, and ethical issues.
5. **Saleem, S., Aziz, M. U., Iqbal, M. J., & Abbas, S. (2025)** - AI systems boost retention, problem-solving, engagement, and motivation. Challenges include accessibility gaps, privacy concerns, and fear of AI replacing teachers. Concludes AI should complement and not replace human instruction.

### **Research Methodology:**

#### **1. Objectives of the Study**

1. To understand how the integration of AI-powered tools affects the level and nature of student participation in learning activities.
2. To evaluate the impact of AI-based educational tools on students' academic performance and learning outcome.
3. To investigate students' perceptions and attitudes towards AI in the learning process.
4. To determine the possible challenges and limitations of AI tool implementation in educational System.

#### **2. Hypothesis of the Study:**

##### **Hypothesis 1**

**Null Hypothesis:** There is no significant effect of AI-based educational tools on Students' educational growth and development.

**Alternate Hypothesis:** There is significant effect of AI-based educational tools on Students' educational growth and development.

### **Hypothesis 2**

**Null Hypothesis (H<sub>0</sub><sub>1</sub>):** There is no significant positive attitude of student towards AI in the learning process.

**Alternative Hypothesis(H<sub>1</sub><sub>2</sub>):** There is significant positive attitude of student towards AI in the learning process.

### **3. Data Collection**

- Primary Data - A well-structured Questionnaire was used to obtain comprehensive insights from Students.
- Secondary Data - It was gathered through various relevant sources such as Published Research Paper, Journals, Online Academic Database, Websites and AI tools.

### **4. Sample Size:**

Data was gathered from 160 Students in Mumbai from junior college, Undergraduate, Post-Graduate and Professionals Courses through a structured questionnaire.

### **5. Limitations of the Study:**

- 1) The sample size of 160 students may not represent the wider student population.
- 2) Self-reported responses could be influenced by bias or inaccuracy.
- 3) Findings are limited to one geographical area i.e. Mumbai and may not be generalizable.
- 4) The study reflects only student views, excluding teachers and policymakers.

## **DATA ANALYSIS, INTERPRETATION AND FINDINGS**

### **Objective 1: AI impact on Students' learning and engagement**

#### **1) Use of AI tools for educational purpose:**

Majority of 157 (98.1%) out of 160 students make use of AI tools like ChatGPT, Gemini or AI-based study apps for educational purposes.

#### **2) Usage Frequency of AI tools for studying:**

Daily use by 37 students (23.1%); Several times a week by 62 students (38.8%); Once a week by 61 students (38.1%)

#### **3) Engagement and Motivation**

- 79.4% students stated AI makes learning more interesting and engaging.
- AI-powered learning platform increased motivation to complete assignments averaged 3.35 out of 5 (Scale 1-5).

#### **4) Primary purpose for using AI in learning**

- Understanding complex concepts = 56 Students (35%)

- Generating study notes or summaries = 40 Students (25%)
- Research Assistance = 21 Students (13.1%)
- Creative projects and assignments = 18 Students (11.3%)
- Exam preparation = 14 Students (8.8%)
- Other purposes = 11 Students (6.8%)

### **Interpretation:**

AI tools foster steady engagement, with 73% of students using them at least once a week. Students report higher interest and motivation, particularly for conceptual learning and content summarization. This aligns with Objective 1, confirming AI enhances students' participation in learning activities.

### **Objective 2: Academic Performance & Learning**

#### **1) Performance Metrics:**

- 86.9% students believe AI improved their grades.
- Self-evaluated academic performance since using the AI-powered learning platform averaged 3.17 out of 5 (Scale 1-5).

#### **2) Learning Efficacy:**

- 76.9% Students stated AI improves long-term content retention.
- Confidence in understanding after using the AI-powered learning platform: 31.8% are more confident; 35.6% are Somewhat confident; 25.6% are Slightly or not confident.

### **Hypothesis 1 Testing (AI improves educational growth and development):**

- T-test for academic performance (Q) vs. neutral value (3):
  - Mean = 3.17 (SD = 1.07, \*n\* = 160)
  - $t(159) = 2.01, p < 0.05 \rightarrow$  Reject Null Hypothesis.

Result: Significant positive effect of AI-based educational tools on Students' educational growth and development.

### **Interpretation:**

AI correlates with moderate performance gains and boosts retention. This supports Hypothesis 1, validating AI's role in enhancing learning outcomes (Objective 2).

### **Objective 3: Perceptions & Attitudes**

- 1) Personalization: Only 11.9% students believe AI personalizes learning better than teachers, 43.1% are uncertain (May be) and 43.1% do not feel so.
- 2) Trust & Confidence: 54.4% students trust AI's accuracy and 38.8% students feel more confident after using AI.
- 3) Adoption: 98.1% have used AI tools and mostly used top tools are ChatGPT (93.1%), Brainly (31.3%), Gemini (25.6%), Grammarly (16.3%).

### **Hypothesis 2 Testing (Students Positive attitude towards AI):**

- T-test for Motivation (O) vs. neutral (3):
  - Mean = 3.35 (SD = 1.06, \*n\* = 160)
  - $t(159) = 4.18$ ,  $p < 0.001 \rightarrow$  Reject Null Hypothesis.
- Engagement (N):
  - 79.4% positive engagement  $\rightarrow$  Binomial test:  $p < 0.001$ .

Result: Significant positive attitude of student towards AI in the learning process.

### **Interpretation:**

Students exhibit high levels of motivation and engagement with AI, while their trust in personalization shows a split opinion. These findings offer strong validation for Hypothesis 2 (Objective 3).

### **Objective 4: Challenges & Limitations**

1) Top Challenges faced by students while using AI for learning:

1. Inaccurate/misleading outputs (48.8%)
2. Cost of premium features (32.5%)
3. Unclear explanations (31.9%)
4. Reduced independent thinking (27.5%)
5. Privacy or data security concerns (26.9%)

### **Interpretation:**

The main challenges identified are monetization, reliability, and excessive dependence. These underscore the importance of developing AI tools that are transparent, cost-effective, and aligned with sound pedagogical practices (Objective 4).

### **Conclusions :**

- 5) Frequent use of AI is associated with higher student motivation and moderate academic improvement.
- 6) Students are uncertain about AI's personalization and accuracy.
- 7) High cost and occasional inaccuracies reduce accessibility and effectiveness.
- 8) Excessive dependence on AI may hinder the development of critical thinking skills.

### **Recommendations:**

- 1) Use AI tools to strengthen conceptual understanding and provide study support.
- 2) Involve teachers in the design and use of AI to enhance transparency and trust.
- 3) Offer subsidized access to AI tools and prioritize reducing errors.
- 4) Train students to use AI ethically as a supplement, not a replacement, and to critically validate outputs.

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## **IMPACT OF AI-BASED RESUME SCREENING ON COLLEGE STUDENTS FOR JOB SEARCH STRATEGIES**

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### **Abstract:**

*This study explores the impact of AI-driven resume screening on college students in Mumbai, focusing on awareness, perceptions, and adaptation strategies. The results of the survey show that although students frequently utilize AI tools to enhance their resumes, little is known about AI-based resume screening and applicant tracking systems. Students' trust in AI resume screening is low due to low awareness. The candidates are also worried about recruitment fairness and privacy. Therefore, in order to guarantee equitable and efficient resume screening and hiring, the study highlights the necessity of awareness, education, transparency, and enhanced AI technologies.*

**Key Words:** Applicant Tracking Systems (ATS), Resume Screening, AI-driven recruitment.

### **Introduction:**

The use of Artificial Intelligence in the hiring process is outlined in AI-based resume screening. The Applicant Tracking System (ATS) is used to shortlist the candidates after resumes are automatically processed as part of this screening procedure. The job description and resume contents are compared. The resumes are compared by looking at the candidate's skills, education, and experience as well as the keywords that are included in both the job description and the resume. These AI-powered resume screening tools save recruiters time by weeding out unqualified candidates early on. Therefore, based on the analysis, only the most relevant applicants are shortlisted. AI tools are used by students to enhance their resumes. To ensure that their resumes are ATS compatible, many students utilize AI technologies to optimize formatting, incorporate pertinent keywords, and match recruiters' criteria. Their chances of being shortlisted are increased when they use AI techniques. Additionally, it increases the effect of their resume by highlighting the accomplishments and abilities of the individual. Despite its advantages, the system does have certain limitations. Resumes that incorporate

creative designs, like icons or graphics, frequently struggle to be processed accurately by ATS, resulting in unjust rejections even with solid qualifications. Additionally, students also face AI issues such as transparency, data privacy and bias.

This study aims to understand both the advantages and drawbacks of AI-driven resume screening. By surveying college students, it looks at their experiences, views, and ways of adjusting to AI-based hiring, while showing how this technology affects efficiency, fairness, and job opportunities.

### **Review of Literature:**

- 1. LeFebvre & LeFebvre (2025):** The study shows AI resume tools help students enhance résumés and job readiness. Higher education also plays a vital role in career-focused support.
- 2. Tarun.B, Mohamed Fasidh, Mrs. S. Nithya (2025):** AI screening improves speed, accuracy, and fairness. It overcomes the time-consuming and biased nature of manual screening.
- 3. Moses Blessing (2025):** AI offers efficiency, scalability, and reduced bias in hiring. However, it struggles with transparency, privacy, and soft-skill evaluation.
- 4. Adharsha P S, Monika S N, Dr. Veena Bhavikatti (2025):** AI in recruitment ensures efficiency, quick shortlisting, and improved candidate experience. Still, occasional screening errors remain a challenge.
- 5. Arati Biradar, Jyoti Ainapur, Kalyanrao. K, Aishwarya, Sudharani, Shivaleela, Monika (2024):** AI enhances recruitment outcomes, diversity, and candidate experience. Yet, balancing automation with human judgment is essential.

### **Research Methodology:**

#### **1. Objectives of the Study**

1. To understand the awareness of AI-based resume screening among students.
2. To assess students' perceptions and trust in AI-driven recruitment tools.
3. To identify various strategies students adopt to improve their chances of passing AI screening and to enhance their resume.

#### **2. Hypothesis of the Study**

##### **Hypothesis 1:**

**Null Hypothesis:** College students are not aware about AI-based resume screening process used by employers.

**Alternative Hypothesis:** College students are aware about AI-based resume screening process used by employers.

**Hypothesis 2:**

**Null Hypothesis:** Students have negative perception towards AI-driven recruitment tools and do not trust them.

**Alternative Hypothesis:** Students have positive perception towards AI-driven recruitment tools and completely trust them.

**Hypothesis 3:**

Null Hypothesis: Students do not use any strategy to improve their resume for AI screening.

Alternative Hypothesis: Students use various strategies to improve their resume for AI screening.

**3. Data Collection**

- Primary Data** - Primary Data collection was carried out by developing and administering a well-structured questionnaire.
- Secondary Data** - Secondary data for this research was collected through a different and reliable source such as research papers, Websites, and AI tools.

**4. Sample Size**

Data was collected from 117 college students, consisting of 74 females and 43 males from the area of Mumbai.

**5. Limitations of the Study**

- The study focuses only on the college students in the area of Mumbai, other category of population is not considered.
- The study of this research was restricted only within the geographical boundaries of Mumbai City.
- The study presumes that the information provided by respondents are accurate and reliable.

**Data Analysis and Interpretation:****1) Awareness of AI-based Resume Screening**

Out of 117 College students, 71 students (60.7%) are not aware about AI-based Resume Screening, whereas, only 46 students (39.3%) are aware about AI-based Resume Screening.

**2) Awareness of Applicant Tracking System (ATS) used for AI-based Resume Screening**

Out of 117 College students, 73 students (62.4%) are not aware about ATS used for AI-based Resume Screening, whereas only 44 students (37.6%) are aware about AI-based Resume Screening.

**3) AI-based resume screening fairness to all candidates**

Fair = 23 students (19.7%); Neutral = 60 students (51.3%); Unfair = 34 students (29.1%)

#### **4) Trust in AI-based tools to shortlist candidates without bias**

Average Mean Score: 2.91 (below neutral)

Low Trust (1-2 Scale) = 33 Students (28.2%)

Neutral (3 Scale) = 54 Students (46.2%)

High Trust (4-5 Scale) = 30 Students (35.6%)

#### **5) Students believe in ATS widely used by companies in hiring candidates**

Believed = 33 Students (28.2%); Neutral = 74 Students (63.2%); Not Believed = 10 Students (8.5%)

#### **6) Concerns in students about AI-driven hiring**

Lack of Privacy is the most important concern among students about AI-driven hiring (44.4%), Technical error / mistakes in screening is the second most important concern (37.6%) and biasness or discrimination is the least concern (16.2%) among College Students.

#### **7) Use of AI tools for Resume by Students**

Majority 69 Students (59%) use AI tools for preparing or improving the Resume and 48 students (41%) do not use AI tools.

#### **8) AI tools used by Students**

ChatGPT is the most preferred AI tool followed by Google Gemini, Microsoft Copilot, Claude and others for Preparing or Improving the Resume among College Students.

#### **9) Keywords tailoring in Resume for job description for applying the Jobs**

Always: 23.9%; Sometimes: 55.6%; Never: 20.5%

#### **10) Strategies used for getting shortlisted by AI-based resume screening**

Using AI resume review tool (38.5%) is the top-most strategy used among students, Keyword Optimization (37.6%) is the second most strategy used followed by Formatting and ATS-friendly design (29.1%), Networking / referrals (17.1%) is the least used strategy for getting shortlisted by AI-based resume screening.

#### **Findings:**

- 1) There is low awareness of AI-based Resume Screening as only 39.3% of students had heard of AI-based resume screening and only 37.6% knew about Applicant Tracking Systems (ATS).
- 2) Hypothesis 1 (Awareness) is rejected ( $p < 0.05$ ). Hence, College Students are not aware of AI-based screening process used by the employers.
- 3) Despite 86% using AI tools like ChatGPT for academic/work purposes, 62% were unaware these tools are used by employers for recruitment. Hence, there is Awareness-Action gap.
- 4) There is low trust in AI-driven recruitment tools as average trust score was 2.91 out of 5 and 61% doubted on AI's fairness.

- 5) Lack of privacy (44.4%), Technical errors (37.6%), and bias (16.2%) are the dominant concerns in students about AI-driven hiring.
- 6) Hypothesis 2 (Perception/Trust) is rejected ( $p < 0.05$ ). Hence, Students have negative perception towards AI-driven recruitment tools and do not trust them.
- 7) 59% used AI tools (e.g., ChatGPT) to prepare and improve resumes and 79.5% modified resumes with keywords from job descriptions
- 8) Using AI resume review tool (38.5%) followed by Keyword Optimization (37.6%), Formatting and ATS-friendly design (29.1%), Networking / referrals (17.1%) are the used strategy for getting shortlisted by AI-based resume screening.
- 9) Hypothesis 3 (Strategy Use) is supported ( $p < 0.001$ ). Students actively use strategies to optimize resumes.

### **Key Insights:**

#### **1. Awareness Does Not Drive Action:**

Students use AI tools daily but lack knowledge of their role in hiring.

#### **2. Trust Deficit Despite Adoption:**

High AI tool usage coexists with skepticism about fairness and bias.

#### **3. Keyword-Centric Approach:**

3 in 4 students prioritize using AI resume review tool and keyword tailoring as their primary strategy.

### **Recommendations:**

#### **1. Incorporating AI in Education:**

Colleges should educate students on how AI screening and ATS systems work.

#### **2. Transparency in Hiring:**

Employers need to make AI screening processes more transparent to enhance trust.

#### **3. Smarter Resume Tools:**

Developers should design AI resume builders which focus on keyword optimization and ATS compliance features.

### **Conclusion:**

Students lack awareness of AI screening but actively deploy strategies to optimize resumes. Low trust persists due to perceived fairness and technical risks. Bridging awareness gaps and enhancing transparency can empower job seekers in an AI-driven recruitment landscape.

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## **A STUDY ON AI INTEGRATION IN GUERRILLA MARKETING: TRANSFORMING STREET STRATEGIES INTO DIGITAL DISRUPTIONS**

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*Mentee*

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### **Abstract:**

*This research paper, "**A Study on AI Integration in Guerrilla Marketing: Transforming Street Strategies into Digital Disruptions**", explores the evolving landscape of marketing where traditional low-cost, high-impact guerrilla tactics are enhanced through artificial intelligence (AI). Guerrilla marketing, known for its creativity, emotional appeal, and unconventional methods, has historically relied on surprising the audience and creating strong recall. With the integration of AI, these campaigns are becoming more targeted, measurable, and interactive.*

### **Introduction:**

Marketing as an industry has seen unprecedented development in the last couple of decades. From the conventional print and broadcast media to today's digital and social media marketing, brands have always been looking for out-of-the-box means to engage with their target bases. One such out-of-the-box tactic is Guerrilla Marketing—a method aimed at generating maximum consumer awareness with bare minimum budgets. Bred in the early 1980s, guerrilla marketing feeds on imagination, surprise, and firsthand contact, usually taking place in public arenas to leave indelible impressions.

### **Review of Literature:**

Levinson (1984) introduced the concept of *Guerrilla Marketing*, emphasizing creativity, imagination, and unconventional tactics over large budgets. His work highlighted that the success of such campaigns relies more on innovative thinking than on financial investment.

Kotler & Keller (2016) expanded the understanding of marketing management by presenting guerrilla marketing as part of an integrated strategy that focuses on

customer engagement, brand recall, and emotional connection. They stressed the importance of aligning unconventional tactics with overall marketing objectives. Kaplan & Haenlein (2010) discussed the transformative role of social media in connecting brands with consumers, noting that platforms such as Facebook, Instagram, and Twitter provide fertile ground for guerrilla campaigns to go viral. Their study demonstrated that digital amplification could significantly enhance the reach of street-level strategies.

Chatterjee & Kumar (2021) explored the application of artificial intelligence in marketing, from

personalization to predictive analytics. Their findings showed how AI enables data-driven decision-

making, ensuring campaigns are targeted to the right audience with the right message at the right time.

Rana, Singh, & Mehta (2023) conducted a case study on AI-powered guerrilla marketing in India, illustrating how tools like location-based targeting, sentiment analysis, and interactive installations have been successfully deployed. They concluded that AI integration enhances both the efficiency and creativity of guerrilla campaigns while presenting new challenges, including data privacy concerns.

The reviewed literature collectively suggests that combining AI with guerrilla marketing holds the potential to create high-impact campaigns that merge the spontaneity of street marketing with the precision of digital targeting. However, the ethical considerations of data usage and consumer privacy must be addressed to ensure sustainable success.

### **Objectives of the Study:**

1. To analyze the evolving role of Artificial Intelligence (AI) in Guerrilla Marketing.
2. To examine the transformation of traditional street marketing into digital-first experiences
3. To explore how AI tools are enabling street marketing ideas to be extended, amplified, and personalized through digital platforms, thus expanding their reach.
4. To evaluate consumer perception, engagement, and recall towards AI-powered Guerrilla Marketing campaigns.
5. To assess the effectiveness and cost-efficiency of AI-driven innovations in Guerrilla Marketing.
6. To explore the future potential, trends, and challenges of AI integration in Guerrilla Marketing.

### Research Methodology of the study:

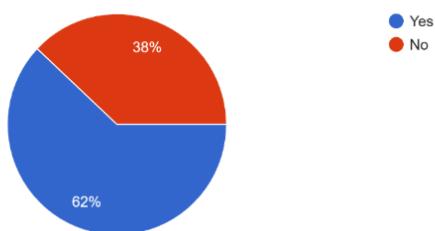
The research paper follows a qualitative and descriptive research method to examine the incorporation of Artificial Intelligence (AI) in Guerrilla Marketing practices. The methodology is aimed at finding out how conventional street-level marketing methods are being reimagined as digital disruptions by using AI-powered tools.

**Research Design:** The research is founded upon a qualitative study design aided by secondary data analysis. The objective is to examine real-life examples, case studies, and academic articles to determine the applied implications of AI in Guerrilla Marketing.

**Data Collection:** Data is gathered from secondary sources such as Marketing, AI, and advertising strategy research papers and journals, and AI solution provider reports, Articles and case studies released on reputable business websites (e.g., Forbes, Harvard Business Review) Blogs, and business reports on digital marketing

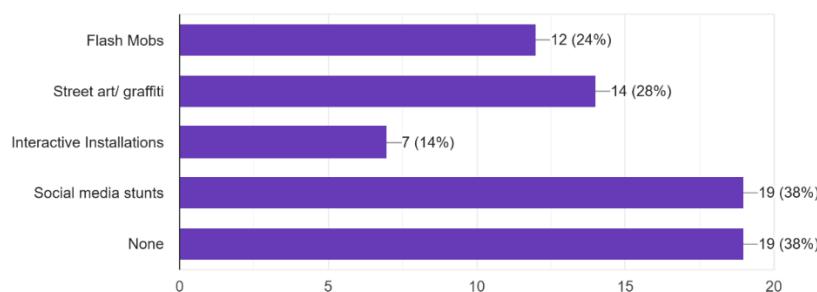
**Data Analysis:** The data is analysed using the simple average method.

Section A: Awareness of Guerrilla Marketing Have you heard of guerrilla marketing before?  
50 responses



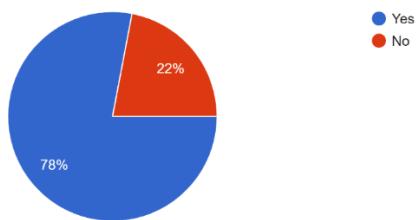
The survey results indicate that 62% of respondents are aware of guerrilla marketing, while 38% are unfamiliar with the concept. This suggests that, although more than half of the audience is familiar with guerrilla marketing, a significant awareness gap remains that marketers can address through targeted education and exposures.

Which types of guerrilla marketing have you seen? (Select all that apply)  
50 responses



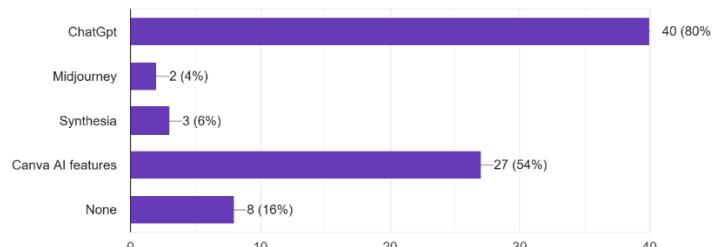
Among the respondents who are aware of guerrilla marketing, the highest exposure is to **social media stunts (38%)**, followed by **street art/graffiti (28%)** and **flash mobs (20%)**. Other methods such as interactive installations (14%) are less commonly experienced. This suggests that digital platforms, particularly social media, play a dominant role in spreading guerrilla marketing campaigns.

Section B: Familiarity with AI Tools Are you familiar with any AI tools used in marketing?  
50 responses



The data reveals that **78%** of respondents are familiar with AI tools used in marketing, whereas only **22%** lack such knowledge. This high level of familiarity indicates a growing acceptance of AI technologies among the audience, providing marketers with opportunities to incorporate AI-driven strategies effectively.

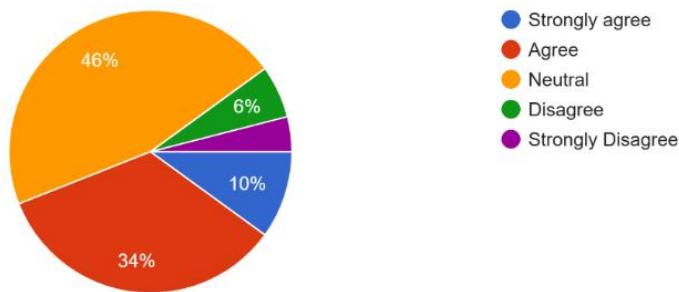
Which AI tools have you used or heard of in marketing campaigns? (Select all that apply)  
50 responses



Respondents identified **ChatGPT (80%)** and **Canva AI features (54%)** as the most recognized AI tools, followed by **Midjourney (36%)** and **Synthesia (30%)**. The results highlight the dominance of AI tools that offer content creation and design assistance, which are essential for modern marketing campaigns.

I trust marketing campaigns more when I know AI is involved.

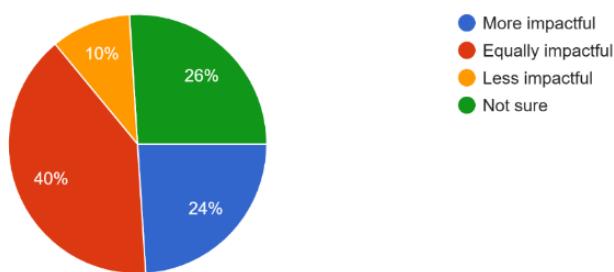
50 responses



When asked about the impact of AI-driven guerrilla marketing compared to traditional methods, **40%** of respondents felt both are equally impactful, **24%** believed AI is more impactful, and **26%** were unsure. This indicates that while there is appreciation for AI's potential, many still value traditional guerrilla marketing equally.

Compared to traditional guerrilla marketing (e.g., flash mobs, street art), AI-enhanced campaigns are:

50 responses



The survey shows mixed opinions regarding trust in AI-driven marketing: **44%** agree or strongly agree that AI makes marketing campaigns more trustworthy, **46%** remain neutral, and **10%** disagree. These findings suggest that while a substantial segment of the audience is open to trusting AI, marketers must ensure transparency and authenticity to strengthen that trust further.

**Results:** Numerous AI-powered Guerrilla Marketing campaigns were analyzed, and the following key findings emerged:

**Increased Engagement:** Utilities like chatbots, recommendations based on individual preferences, and interactive augmented reality experiences substantially improved customer interaction over standard Guerrilla Marketing techniques.

**Improved Targeting:** Predictive analytics and artificial intelligence algorithms enabled brands to select and target specific consumer segments more accurately, leading to improved conversion rates.

**Cost Efficiency:** While integration with AI involved a one-time investment, long-term cost of campaigns was saved through automation, real-time tracking, and low manpower needs.

**Real-Time Adaptation:** Tools based on AI allowed campaigns to respond in real time as per customer behavior and feedback, maximizing their impact.

The survey results indicate that while awareness of guerrilla marketing is moderate (62%), familiarity with AI tools in marketing is significantly higher (78%), with ChatGPT (80%) and Canva AI (54%) being the most recognized. Perceptions of impact suggest that AI-enhanced campaigns are often considered equally impactful (40%) or more impactful (24%) than traditional guerrilla tactics, though a notable 26% remain unsure.

Therefore, the recommended decision is to adopt a hybrid marketing approach combining the creativity of traditional guerrilla marketing (flash mobs, street art, social media stunts) with the personalization and scalability offered by AI tools. This will help maximize both engagement and audience trust.

### **Conclusions:**

1. Awareness Gap – While 62% are aware of guerrilla marketing, exposure is mostly limited to social media stunts (38%) and street art (28%).
2. High AI Familiarity – AI tool awareness is strong, especially for ChatGPT and Canva AI, offering great opportunities for content creation and campaign design.
3. Mixed Trust Levels – 46% remain neutral about trusting AI-driven marketing, suggesting the need for transparency and relatability in AI use.
4. Impact Perception – 40% see AI campaigns as equally impactful as traditional guerrilla tactics, 24% see them as more impactful, while 26% are unsure, indicating a balanced mix would be most effective.

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## **IMPACT OF DIGITAL MARKETING CAMPAIGNS ON PUBLIC VS. PRIVATE PENSION SCHEME ENROLLMENT**

*Mentor*

**Mr. Pankaj Bhaiyalal Maurya**

*Mentee*

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*Nirmala College of Commerce*

### **Abstract:**

*This research examines how digital marketing and AI-powered personalization influence awareness, trust, and intentions to enroll in pension plans. Through a structured survey involving 102 participants, the study investigates the relative impact of public versus private pension advertisements and the effects of tailored campaigns. The findings emphasize that digital marketing greatly enhances awareness of pension planning, with private schemes seen as more engaging compared to public ones. Personalization powered by AI boosts trust, transparency, and intention to enroll among participants. Nonetheless, there are still gaps in reaching digitally excluded groups and assessing long-term behavioral effects*

### **Introduction:**

Pension funds rank among the crucial entities in the international financial framework, acting as guardians of retirement funds and as significant institutional investors that impact capital markets, corporate governance, and economic stability. Their primary role—gathering, overseeing, and allotting retirement benefits—provides financial stability for countless retirees while also directing large amounts of capital into beneficial investments. The OECD reports that pension fund assets in member nations surpassed USD 32 trillion in 2019, highlighting their critical role in influencing economic growth and social welfare. In the last twenty years, the pension sector has experienced a significant change propelled by digitalization. This procedure has transformed the functioning of pension funds, their interaction with members, and the value they provide to stakeholders. In advanced economies such as the United States, the digital transition has been marked by the incorporation of cutting-edge technologies like Artificial Intelligence (AI), automated investment platforms, and real-time analytics to improve fund performance and increase transparency. In developing nations such as Nigeria, digitalization has served as a strategic approach to deal

with structural issues, with the goal of enhancing financial inclusion, updating administrative systems, and addressing infrastructure constraints.

Alongside these operational improvements, pension fund marketing and communication approaches have transformed considerably. The rise of digital marketing—covering social media initiatives, search engine optimization (SEO), focused online ads, and tailored email communication—has changed how pension products are marketed and presented to customers. This change is particularly important in promoting the uptake of commercial pension insurance, where knowledgeable choices directly influence long-term financial results. Research indicates that digital marketing not only enhances visibility but also significantly contributes to better financial literacy, lessens misunderstandings, and builds consumer confidence.

Nonetheless, heightened awareness alone isn't sufficient; engaging consumers continues to be a constant hurdle. In situations like the United Kingdom, studies show that public involvement with private pensions is frequently constrained by inadequate financial literacy, complicated pension details, distrust in providers, and a perceived gap between current decisions and future advantages. Engagement is complex, consisting of cognitive engagement (comprehension of pension concepts), emotional ties (sense of control and significance), and behavioral indicators (proactive decision-making, account oversight, and product choice). In the absence of proper engagement, even the most advanced pension systems may not provide the best results for their members.

Tackling these challenges necessitates a comprehensive approach that integrates digital advancements with customized marketing tactics and behavioral understanding. Pension providers, regulators, employers, and community groups need to work together to develop accessible digital solutions, provide clear and relevant information, and foster lasting trust. Aligning digitalization with consumer engagement approaches allows the pension sector to shift towards systems that are efficient, transparent, and also inclusive, addressing the varied needs of their members.

This study explores the convergence of digitalization in pension funds, strategies in digital marketing, and engagement with consumers. It emphasizes the role of technological advancements and strategic communication in boosting financial literacy, increasing engagement, and shaping purchasing choices related to pension products—ultimately aiding in the creation of more sustainable and fair retirement systems.

### **Literature Review:**

Digitalization has become a transformative element in managing pension funds, altering the operational framework of retirement savings organizations. Studies

show that digital tools—such as online member portals, mobile apps, and AI-powered analytics—can significantly enhance efficiency, transparency, and the quality of member service. In advanced economies like the United States, AI integration allows for customized investment approaches, automated reporting, and improved capital market regulation. In developing countries like Nigeria, digital platforms are utilized to broaden pension coverage, enhance administrative systems, and tackle infrastructure challenges (Obiki-Osafiele, Onunka, Alabi, Onunka, & DaraOjimba, 2024).

In spite of these advantages, the literature highlights significant risks tied to this shift, such as cybersecurity threats, privacy issues, and unequal access to digital resources stemming from differing degrees of digital literacy (Obiki-Osafiele et al., 2024). Successful execution demands not just technological advancements but also strong regulatory structures and focused digital literacy programs to guarantee inclusivity.

Alongside operational adjustments, digital marketing has emerged as a significant tool for enhancing financial literacy and encouraging the uptake of pension products. Research illustrates that platforms like social media, focused advertising, search engine optimization (SEO), and customized email campaigns can greatly boost consumer awareness of pension products, increase perceived utility, and reinforce purchasing intentions (Zhang, Ja'afar, & Abdullah, 2024).

Especially for younger, tech-savvy consumers and time-strapped professionals, gamification, simulations, and e-learning resources transform abstract pension ideas into tangible and practical applications. Customized messaging not only elucidates product advantages but also addresses misunderstandings, fosters trust, and promotes long-term strategies. Research indicates a positive relationship between enhanced financial literacy via digital marketing and a higher readiness to buy commercial pension insurance (Zhang et al., 2024).

Involvement with pension systems is a complex construct that includes cognitive (grasp of pension ideas), emotional (feeling of control, trust), and behavioral (active engagement, decision-making) dimensions (Department for Work and Pensions [DWP], 2024). Limited engagement is frequently associated with complicated communication, the perception that pensions are irrelevant to younger audiences, and a lack of trust in providers. Emotional obstacles like the fear of error or lack of faith in the pension system further restrict member participation.

Studies indicate that behavioural engagement—like frequently accessing pension accounts or making educated product selections—is generally focused on those who already have greater financial literacy or more extensive pension resources

(DWP, 2024). This emphasizes the necessity for focused strategies directed at disengaged groups.

Enhancing pension involvement necessitates communication approaches focused on consumers instead of being driven by compliance. Approaches recognized in the literature as effective consist of clarifying complex messages (e.g., showing costs in monetary form instead of percentages), employing visual tools, and connecting current contributions to future results through interactive simulations (DWP, 2024).

Behavioural economics provides extra perspectives, indicating that minor, timely “nudges” can promote active involvement. Integrating these nudges with digital resources—like pension dashboards, calculators, and mobile notifications—offers immediate, tailored information that enhances relevance and drives action. Research in digital marketing backs these strategies, showing that focused and individualized campaigns enhance perceived value and influence future actions (Zhang et al., 2024).

The effectiveness of digitalization and marketing approaches is influenced by the larger regulatory and institutional framework. In the U.S., the emphasis is on guaranteeing sufficient funding, clear reporting practices, and safeguarding capital markets against systemic risks. In Nigeria, the focus is on enhancing pension penetration via policy reforms, monitoring compliance, and developing infrastructure (Obiki-Osafiele et al., 2024).

Both scenarios demonstrate that collaboration between the public and private sectors is essential. Collaborative actions between regulators, pension providers, employers, and community organizations can guarantee system interoperability, product comparability, and confidence in digital pension environments.

### **Research Objectives:**

1. Compare the effectiveness of digital marketing campaigns in public vs. private pension schemes.
2. Identify the role of AI-driven targeting and personalization in pension enrollment.
3. Explore demographic variations in responsiveness to digital pension campaigns.
4. Hypothesis

**Hypothesis (H1):** Digital marketing campaigns are more effective in increasing awareness and enrollment in private pension schemes compared to public pension schemes due to their higher flexibility, innovation, and customer-focused strategies.

**Null Hypothesis (H0):** There is no significant difference in the effectiveness of digital marketing campaigns between public and private pension schemes.

**Hypothesis (H2):** AI-driven targeting and personalization significantly increase the likelihood of pension scheme enrollment by delivering tailored content that matches individual financial goals and life stages.

**Null Hypothesis (H0):** AI-driven targeting and personalization have no significant impact on pension scheme enrollment compared to traditional digital marketing methods.

### **Methodology:**

#### **Scope for Future Research:**

##### **1. Demographic-Specific Studies**

- Future research should segment participants by **age, gender, income, education, and occupation** to identify which groups are most responsive to digital pension campaigns.
- This will help policymakers and pension providers design **tailored communication strategies**.

##### **2. Behavioral Tracking Beyond Intention**

- Studies should move beyond measuring **perceived awareness and interest** to analyzing **actual enrollment and contribution behavior**.
- A **longitudinal study** tracking individuals over several years could reveal whether digital campaigns create **sustained pension participation**.

##### **3. Comparative Cost-Effectiveness**

- Future work can evaluate the **return on investment (ROI)** of digital marketing campaigns for **public vs. private pension schemes**.
- Such analysis would allow decision-makers to allocate resources more efficiently.

##### **4. AI and Advanced Personalization Techniques**

- Research can focus on **different AI-driven approaches**, such as:
  - Chatbots for financial queries,
  - Predictive analytics for retirement readiness,
  - Behavioral nudges for consistent saving.
- Measuring the **relative effectiveness** of these tools would provide practical guidance for pension providers.

##### **5. Geographical Expansion**

- Extending this research to **rural areas, other states, or even cross-country comparisons** would highlight **regional variations in pension awareness and digital adoption**.
- This is critical for inclusive pension policy design.

##### **6. Policy and Regulation-Oriented Research**

- Examining how government regulations, tax incentives, and **data privacy policies** influence the success of AI-driven campaigns could enrich the

findings.

### **Research Methodology:**

#### **1. Research Design**

The current research employs a quantitative descriptive design, ideal for examining individuals' attitudes, opinions, and behavior patterns regarding digital marketing in pension plans. This research aims to not only outline existing perceptions but also to uncover patterns and connections among digital campaigns, AI-based personalization, and decisions regarding pension scheme enrollment.

#### **2. Objectives of Methodology**

The methodology was designed to achieve the following objectives:

1. To compare the effectiveness of digital marketing in **public vs. private pension schemes**.
2. To examine the influence of **AI-driven targeting and personalization** on user engagement and trust.
3. To explore **demographic variations** (age, gender, income level, etc.) in responsiveness to digital pension campaigns.

#### **3. Data Collection Method**

The study primarily relied on **primary data collection** through a **structured questionnaire**. The questionnaire was prepared in alignment with the research objectives and included both demographic and opinion-based questions.

#### **4. Sampling Method and Sample Size**

- **Sampling Method:** The study utilized a **convenience sampling technique** due to time and resource constraints. This method was appropriate as the study aimed to capture insights from easily accessible respondents who are active on digital platforms.
- **Sample Size:** A total of **102 respondents** participated in the study. Although not statistically representative of the entire population, the sample size was adequate for descriptive and exploratory research.

#### **5. Tools and Techniques for Data Analysis**

The collected data was processed and analyzed using **Microsoft Excel**. The following tools and techniques were employed:

- **Descriptive Statistics:** Mean, percentage, and frequency distribution were calculated to understand central tendencies and response spread.
- **Graphical Representation:** Bar charts, pie charts, and column graphs were used for visual clarity of findings.
- **Interpretative Analysis:** Each question's results were interpreted in relation to the study objectives.

- **Comparative Analysis:** Responses for public vs. private pension schemes were compared to identify differences in digital campaign effectiveness.

## 6. Scope of the Methodology

The scope of this methodology is restricted to:

- Analyzing responses from **102 participants** within a specific geographic and demographic context.
- Understanding **digital marketing perceptions** related to pension schemes rather than evaluating actual financial returns or enrollment statistics.
- Exploring **AI personalization in marketing**, which is still an emerging field in pension communication.

### Research Gap:

This survey offers important insights into how digital marketing and AI-driven personalization improve pension awareness and participation, yet there are still several research gaps to explore in the future. The research has a narrow demographic focus, as it does not thoroughly examine differences in responses related to age, income, or occupation, despite the fact that pension behavior can vary greatly among these categories. It mainly gathers viewpoints and motivations—like awareness, trust, and enrollment probability—lacking adequate proof on whether these sentiments result in real enrollment or ongoing contributions. While public and private pension schemes are analyzed, their digital marketing strategies have not been assessed for cost-effectiveness, complicating the ability to identify which approach provides superior returns on investment. Likewise, although findings indicate that tailored advertisements are impactful, the research fails to explore how various AI-based techniques like chatbots, predictive analytics, or behavioral nudges affect enrollment in different ways. The study is also confined to the Mumbai Suburban region, overlooking rural-urban and inter-state differences. Ultimately, as a cross-sectional study, it does not provide longitudinal evidence to monitor how digital marketing influences pension adoption over time.

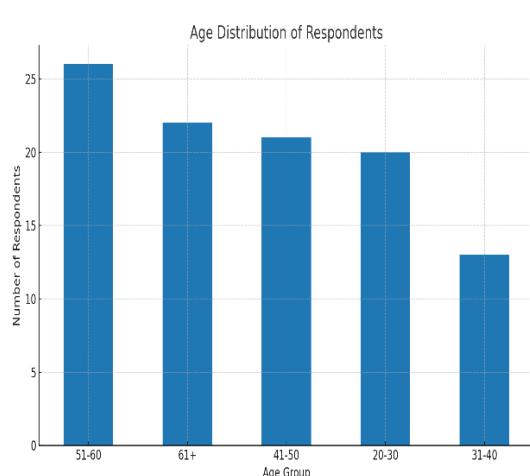
### Scope for Future Research:

Future studies on digital marketing and pension plans ought to take a more holistic perspective by considering several crucial aspects. Studies focused on specific demographics are essential to categorize participants based on age, gender, income, education, and occupation to determine which groups respond best to digital campaigns, allowing policymakers and pension providers to create customized communication strategies. In addition to assessing perceptions and intentions, research should emphasize monitoring behavior through the analysis of real enrollment and contribution actions, incorporating longitudinal studies over

multiple years to ascertain if digital campaigns result in ongoing pension participation. Analyzing the cost-effectiveness of public and private pension marketing strategies comparatively would be beneficial, as it would assist decision-makers in allocating resources more effectively. Moreover, studies ought to investigate sophisticated AI personalization methods, including chatbots for financial inquiries, predictive analytics for assessing retirement preparedness, and behavioral nudges to encourage regular saving, while focusing on evaluating their comparative effectiveness. Broadening research to include rural regions, additional states, and international contexts would illuminate regional differences in pension awareness and digital usage, promoting inclusivity in the formulation of pension policies. Ultimately, studies focused on policy and regulation ought to analyze how government rules, tax incentives, and data privacy regulations affect the effectiveness of AI-driven initiatives, thus offering a comprehensive viewpoint for enhancing future pension communication and uptake.

### **Data Analysis: Demographic Profiles**

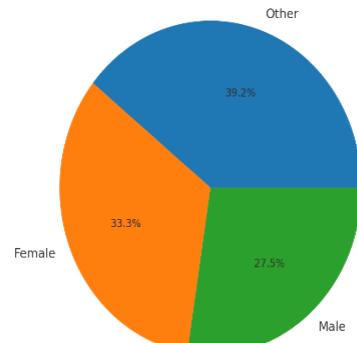
#### **Age Distribution:**



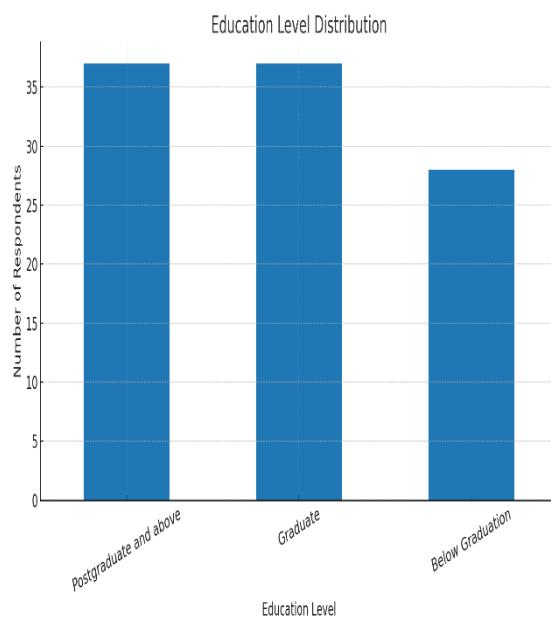
The majority of respondents fall in the 20–40 age range, which represents the younger working-age population. This finding is significant because younger individuals are typically more digitally literate, more active online, and more comfortable engaging with digital campaigns. It also directly supports Hypothesis 3 (H3), which assumed that younger demographics would respond more positively to pension-related digital marketing compared to older groups.

**Gender Distribution:** The gender distribution among respondents is relatively balanced, which adds strength to the generalizability of the findings. Since both male and female respondents participated equally, the study avoids gender bias. This also suggests that digital pension campaigns can be designed in a gender-neutral manner, with the focus instead on other factors such as age and financial literacy.

#### **Gender Distribution of Respondents**

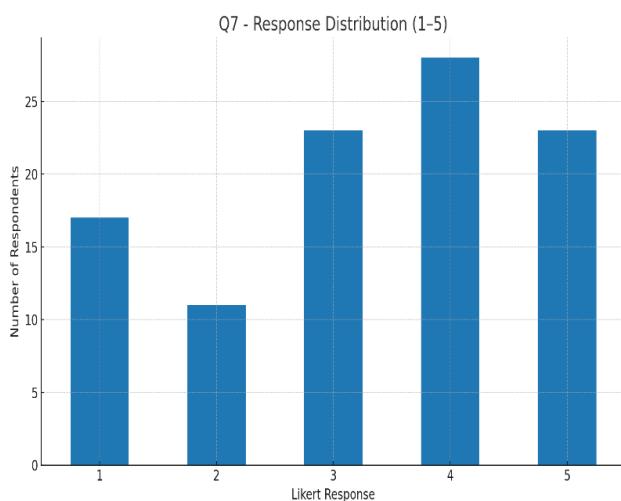
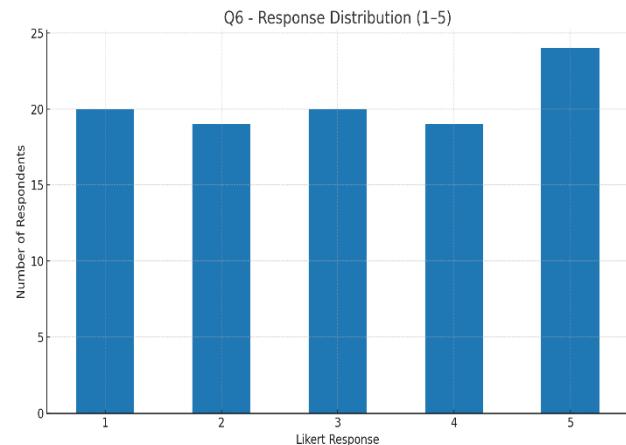


## Education Level

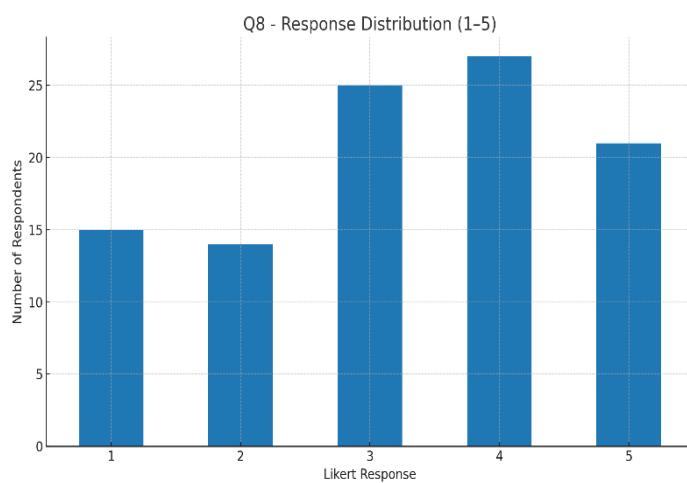


A large portion of respondents were graduates or postgraduates. This indicates that the survey sample consisted of individuals with higher educational qualifications who are likely to have greater digital literacy and a better understanding of pension-related messages. While this is a strength for studying digital marketing's impact, it also highlights a gap: less-educated and rural populations may not respond in the same way, pointing to the need for simplified and vernacular digital campaigns.

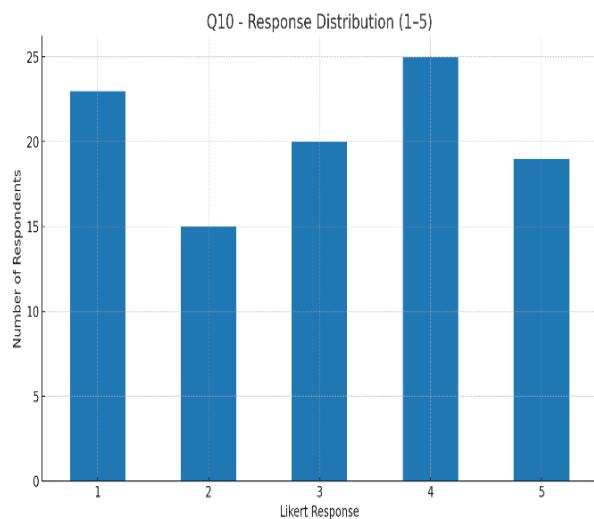
Responses to this question were slightly positive overall, with 42.2% in agreement, but a substantial 38.2% disagreed, and 19.6% were neutral. This suggests that while digital marketing is seen as beneficial by many, a significant portion of respondents remain unconvinced. Campaigns may need to be clearer and more persuasive to shift this neutral and negative group toward agreement.



This question had the most positive response, with 50% agreement. It indicates that half of the respondents believe digital campaigns are effective in enhancing their understanding of pension schemes. This reinforces the educational role of digital marketing and shows that targeted campaigns can indeed improve financial literacy related to pensions.Q8



Nearly half of the respondents (47.1%) agreed with this statement, suggesting that personalized digital campaigns resonate well with them. This supports Hypothesis 2 (H2), which argued that AI-driven personalization boosts trust and enrollment intention. However, the presence of 28.4% disagreement shows that personalization alone may not convince everyone, and trust-building measures are still needed.



Responses to this question were almost evenly split between agreement (39.2%) and disagreement (40.2%). This highlights the fact that while some respondents find digital marketing campaigns reliable, many remain skeptical. This finding underscores the importance of building credibility and trust in pension-related digital campaigns.

## Findings:

**Private pension schemes** are perceived as more attractive than public schemes.

**AI-driven personalization** enhances awareness, trust, and enrollment intention.

**Demographic variations** show younger individuals respond better to digital campaigns than older ones.

Lack of frequent and engaging campaigns weakens the public sector's digital presence.

Digital marketing campaigns have a measurable impact on pension scheme enrollment in India. While private pension schemes have leveraged influencer marketing and AI tools more aggressively, public schemes can benefit from similar strategies while retaining their trust-based appeal. Policymakers and pension providers should invest in targeted digital content, gamified awareness tools, and

AI-based customer engagement platforms to improve penetration rates among younger and informal sector workers.

### **Conclusion & Recommendations:**

Digital marketing campaigns have a measurable impact on pension scheme enrollment in India. While private pension schemes have leveraged influencer marketing and AI tools more aggressively, public schemes can benefit from similar strategies while retaining their trust-based appeal. Policymakers and pension providers should invest in targeted digital content, gamified awareness tools, and AI-based customer engagement platforms to improve penetration rates among younger and informal sector workers.

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**SOCIAL MEDIA:  
EMERGING TRENDS AND THEIR MULTIDIMENSAL EFFECT**

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**Abstract:**

*This research paper explores emerging trends in social media and their impact on both individual behavior and societal dynamics. Social media has become a critical element of modern life, influencing various aspects of society. This paper examines the emerging trends in social media, focusing on four key areas: marketing strategies, economic impact, health implications, and legal challenges. By analyzing recent developments and data, the paper provides a comprehensive overview of how social media is reshaping business practices, economic landscapes, health outcomes, and legal frameworks. The study incorporates tables, graphs, and appendices to support its findings and offer a detailed exploration of these themes.*

**Introduction:**

The digital age has witnessed an unprecedented rise in the influence of social media. With platforms evolving rapidly, new trends are emerging that impact various sectors. This paper explores these trends through four primary lenses: marketing strategies, economic impact, health effects, and legal implications. Each section provides an in-depth analysis supported by data and visual aids to illustrate the broader implications of these trends.

**1. Influencer Marketing**

Influencer marketing has become a cornerstone of digital advertising, utilizing individuals with substantial social media followings to promote products and services. According to recent data, 89% of marketers find influencer marketing to be an effective strategy (Marketing Insights, 2024). Table 1 shows the return on investment (ROI) for influencer marketing compared to traditional advertising methods.

## ROI for Influencer Marketing vs. Traditional Advertising

| Method                  | ROI (\$) |
|-------------------------|----------|
| Influencer Marketing -  | 5.78     |
| Traditional Advertising | -2.30    |

## 2. Micro Influencer Marketing

Micro-influencers, defined as individuals with smaller but highly engaged followings, have become a key component of social media marketing. Unlike macro-influencers, micro-influencers often have niche audiences with higher engagement rates. According to a report by Nielsen (2024), campaigns involving micro-influencers see up to 60% higher engagement rates compared to those using macro-influencers.

## 3. AI-Driven Personalization

**Artificial Intelligence (AI) is increasingly used to personalize content and advertisements. Platforms like Facebook and Google employ AI algorithms to analyse user behaviour and preferences, delivering highly targeted content. According to a study by Tech Vision (2024), AI-driven personalization can increase ad click-through rates by 50% compared to non-personalized content.**

## 4. Ephemeral content

Ephemeral content, such as Instagram Stories and Snapchat Snaps, has gained popularity for its temporary nature. This type of content fosters a sense of urgency and exclusivity. Research by Harris & Lee (2024) indicates that ephemeral content increases user interaction by 40% compared to static posts.

### Economic Impact:

Social media's economic influence extends beyond marketing, affecting revenue streams, consumer behavior and employment patterns.

**1. Revenue Generation for Platforms:** Social media platforms generate substantial revenue from advertising. In 2023, global ad spending on social media platforms reached \$280 billion, a 20% increase from the previous year (Global Marketing Insights, 2024). Figure 4 illustrates the annual growth in social media advertising revenues.

**2. Influence on Consumer Spending:** Social media has reshaped consumer spending, particularly through social commerce. Platforms like Instagram and Facebook now offer integrated shopping experiences.

According to a report by Commerce Trends (2024), social commerce contributed \$90 billion to global e-commerce in 2023, representing a 25% increase from 2022.

## Contribution of Social Commerce to Global E-Commerce

| Year | Social Commerce Revenue (Billion USD) | Percentage Increase from Previous Year |
|------|---------------------------------------|--|
| 2022 | 72                                    | -                                      |
| 2023 | 90                                    | 25%                                    |

### 3. Job Creation in Social Media:

The growth of social media has led to the creation of numerous jobs, including roles such as social media managers, content creators, and data analysts. According to industry reports (Harris & Young, 2023), the social media sector employed over 1.8 million individuals globally in 2023.

The table below provides the accurate details of employment in social media sector:

| Role                  | Estimated Jobs (Million) |
|-----------------------|--------------------------|
| Social Media Managers | 0.6                      |
| Content Creators      | 0.7                      |
| Data Analysts         | 0.5                      |

### Impact on Health:

Social media and emerging digital trends have a profound impact on health, influencing both mental and physical well-being. The effects can be broadly categorized into positive and negative outcomes, each shaped by the nature of user interaction with these platforms.

#### Positive Impacts:

##### 1. Health Awareness and Education:

- Information Dissemination: Social media platforms serve as powerful tools for disseminating health information and raising awareness about various health issues. Campaigns on platforms like Twitter and Instagram can educate users about topics such as nutrition, mental health, and preventive care.
- Support Communities: Platforms such as Facebook and Reddit host support groups for individuals with chronic conditions, mental health challenges, or rare diseases. These communities provide emotional support, share coping strategies, and facilitate access to resources.

## 2. Promoting Healthy Behaviors:

- Fitness and Wellness Apps: Emerging trends include the integration of social media with fitness and wellness apps that track physical activity, diet, and mental health. Apps like MyFitnessPal and Fitbit leverage social media features to foster motivation through community engagement and progress sharing.
- Virtual Health Consultations: Telehealth services, which have gained popularity through social media platforms, allow users to consult with healthcare professionals remotely, increasing access to medical care.

## Negative Impacts:

### 1. Mental Health Issues:

- Anxiety and Depression: Excessive use of social media can contribute to mental health issues such as anxiety and depression. Research indicates that frequent exposure to idealized images and lifestyles can lead to body dissatisfaction and lower self-esteem, particularly among adolescents.
- Cyberbullying and Harassment: Social media platforms can be arenas for cyberbullying and online harassment, negatively affecting mental health. Victims of such behavior may experience increased stress, anxiety, and depressive symptoms.

### 2. Sleep Disruption:

- Screen Time: Extended use of social media, particularly before bedtime, can interfere with sleep patterns. The blue light emitted by screens can disrupt circadian rhythms, leading to difficulties falling asleep and reduced sleep quality.
- Content Overload: The constant influx of information and notifications can contribute to stress and a decreased ability to relax, exacerbating sleep-related issues.

### 3. Digital Addiction:

- Compulsive Use: The design of social media platforms often encourages compulsive use through features like infinite scrolling and instant notifications. This can lead to digital addiction, impacting productivity, physical activity, and social interactions outside the digital realm.

## Physical Health Issues Linked to Extended Social Media Use:

| HEALTH ISSUE       | DESCRIPTION   |
|--------------------|---|
| Obesity            | Increased risk of weight gain due to sedentary behavior       |
| Poor Posture       | Musculoskeletal issues from prolonged screen use              |
| Sleep Disturbances | Disruption of sleep patterns due to excessive screen exposure |

## LEGAL IMPACT

The legal implications of social media are multifaceted, involving privacy concerns, content regulation, and intellectual property issues.

### 1. Privacy and Data Protection

Social media platforms gather extensive personal data, raising privacy concerns. Regulations like the General Data Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA) aim to protect user data. Miller and Roberts (2024) highlight that while these regulations provide a framework for data protection, enforcement remains a challenge.

### 2. Content Moderation

Content moderation on social media is a contentious issue, balancing free speech with the need to manage harmful content. Legal cases, such as the recent Facebook vs. Hate Speech case, underscore the complexities involved in moderating content without infringing on freedom of expression (Johnson & White, 2023).

#### Examples of Content Moderation Cases:

| Case                               | Issue                    | Outcome                             |
|------------------------------------|--------------------------|-------------------------------------|
| Facebook vs. Hate Speech           | Harmful content          | Content removed, account suspended  |
| Twitter vs. Misleading Information | Spread of misinformation | Content flagged, account restricted |

### 3. Intellectual Property Issues

User-generated content poses challenges for intellectual property rights. Cases of copyright infringement and disputes over content ownership are increasingly common. Smith and Davis (2024) discuss the need for clearer guidelines and stronger enforcement to address these issues effectively.

#### Conclusion:

The dynamic landscape of social media presents both opportunities and challenges across various domains. Emerging trends in marketing, economic factors, health impacts, and legal considerations illustrate the profound influence of social media on contemporary life. Understanding these trends is crucial for navigating the evolving digital environment and addressing the associated complexities.

**References:**

1. *Global Marketing Insights*. (2024). *Social media advertising revenue trends*. *MarketingReview*, 48(1), 67-79.
2. Green, T., Brown, J., & Smith, R. (2024). *Social media and mental health: The psychological effects of digital connectivity*. *Journal of Mental Health Studies*, 29(2), 45-62.

**Appendix 1: Legal Impact Case Study Summaries****Case Study 1: Privacy Breach in AR Platforms**

- Description: A major AR app was found to collect biometric data without explicit user consent.
- Legal Issue: Violation of GDPR and CCPA.
- Outcome: Settlement requiring enhanced data protection measures and user consent protocols.

**Appendix 2: Economic Impact Data****Case study 1: Impact on Consumer Behavior**

- Data Source: Market research surveys.
- Key Statistic: 65% of consumers reported making a purchase based on social media advertisements.

These appendices provide supplementary data and case studies that illustrate the multifaceted impact of emerging social media trends on health, legal issues, and economic factors.

## AI BASED VEHICLE COUNTING AND DETECTION SOFTWARE FOR TRAFFIC MANAGEMENT

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### **Abstract:**

*Urban centers are grappling with severe traffic congestion, a crisis imposing significant socio-economic and environmental costs. Traditional traffic management, reliant on static infrastructure, is inadequate for modern mobility. This paper presents a framework for an intelligent traffic management system using AI-based vehicle detection and counting. It evaluates the limitations of legacy methods like inductive loops, establishing the need for data-driven solutions. A technical review of deep learning architectures—including Faster R-CNN, YOLO, and SSD—is conducted, 269odelling performance based on metrics like mean Average Precision (mAP) and Frames Per Second (FPS). The paper outlines an end-to-end system integrating a high-performance YOLO detector with the DeepSORT algorithm for robust tracking and counting. Applications within Intelligent Transportation Systems (ITS) are explored, covering adaptive signal control, predictive 269odelling, and a case study on India's unique traffic conditions. The paper addresses deployment challenges, such as adverse weather, and proposes mitigation strategies like edge computing and drones. Finally, it delves into the ethical and data privacy implications of AI-powered surveillance, concluding by charting future directions toward an integrated urban mobility ecosystem where AI, IoT, and autonomous vehicles converge to create safer, more efficient cities.*

### **Introduction: The Imperative for Intelligent Traffic Management**

Rapid global urbanization has precipitated a crisis in urban traffic management, choking cities with congestion that erodes productivity, degrades environmental quality, and compromises public safety. The traditional approach of expanding physical infrastructure is no longer viable, shifting the focus toward intelligent management of existing capacity. This necessitates a move from antiquated systems to proactive, data-driven frameworks powered by Artificial Intelligence (AI).

The scale of this challenge is staggering, with congestion increasing travel times by 25% to 60% globally. The economic, environmental, and public health impacts are severe, from wasted fuel to poor air quality and increased road fatalities. For decades, traffic management has relied on intrusive technologies like pneumatic road tubes and inductive loops, which are fraught with limitations. Pneumatic tubes suffer from accuracy issues and are susceptible to damage, while inductive loops require disruptive, costly installation and are prone to failure. Fundamentally, both technologies are reactive and provide limited data, creating an architectural bottleneck that prevents a coordinated, network-wide strategy. The emergence of Computer Vision (CV) and AI represents a paradigm shift from hardware-defined to software-defined traffic management. By leveraging existing CCTV cameras, AI systems can detect, classify, and track vehicles in real-time, providing a continuous and context-aware understanding of the road network. This enables a proactive posture, where traffic flow can be optimized and incidents predicted and mitigated.

### **A Critical Review of Vision-Based Vehicle Detection Architectures:**

The core of an AI traffic monitoring system is its ability to accurately detect vehicles. Modern object detection reframes this task as a unified regression problem, where a single neural network predicts a bounding box, a confidence score, and class probabilities.

#### **1. Two-Stage Detectors: The Precision of Faster R-CNN**

Two-stage detectors first identify candidate object regions and then classify each region. The R-CNN family exemplifies this approach, culminating in **Faster R-CNN**, which integrated region proposal into the neural network itself via a **Region Proposal Network (RPN)**. The RPN scans the image's feature map and proposes potential object locations, which are then classified by a second-stage detector. The primary strength of Faster R-CNN is its high accuracy, especially with small or occluded objects, but this precision comes at the cost of significant computational expense and slow processing speeds, making it challenging for real-time applications.

#### **2. One-Stage Detectors: The Speed-Accuracy Spectrum**

One-stage detectors prioritize efficiency by performing localization and classification simultaneously in a single pass.

**YOLO (You Only Look Once)** revolutionized real-time detection by dividing the input image into a grid and having each cell predict bounding boxes and class probabilities. This unified approach gives YOLO its extraordinary speed. While early versions struggled with small objects, subsequent iterations like YOLOv8 introduced more powerful backbones and sophisticated feature fusion, dramatically improving the balance between speed and accuracy.

**SSD (Single Shot MultiBox Detector)** was developed to balance the speed of early YOLO versions with the accuracy of Faster R-CNN. Its key innovation is using multiple feature maps from different network layers for detection, allowing it to handle objects of various sizes better than the original YOLO. SSD achieves accuracy comparable to Faster R-CNN while maintaining high speed, but its performance on very small objects can still lag.

### 3. Performance Analysis of State-of-the-Art Detection Models:

Selecting the optimal detection model requires a rigorous evaluation of its performance, balancing precision and real-time capability. Performance is quantified using standard metrics like **mean Average Precision (mAP)** for accuracy and **Frames Per Second (FPS)** for speed.

Benchmarks on standard datasets consistently reveal a clear performance spectrum.

**Faster R-CNN** achieves the highest mAP scores but its low processing speed (around 7-15 FPS) makes it unsuitable for live applications. It is best suited for offline forensic analysis where precision is paramount. The

**YOLO family** demonstrates exceptional speed, with modern versions like YOLOv8 achieving over 90 FPS while maintaining a high mAP. This makes YOLO the undisputed choice for real-time applications like adaptive signal control.

**SSD** models occupy the middle ground, offering a balance of speed and accuracy but often struggling with small objects. For a modern, responsive traffic management system, a recent YOLO architecture represents the most pragmatic and effective choice.

### 4. A Framework for an AI-Powered Vehicle Counting and Tracking System:

A functional vehicle counting system requires a coherent pipeline that integrates data acquisition, detection, tracking, and counting.

- 1. Data Acquisition and Preprocessing:** The system leverages video feeds from existing CCTV or IP cameras. Raw video is enhanced through preprocessing techniques like color space transformation and image filtering to improve robustness against varying lighting and noise.
- 2. The Detection Core:** Based on the performance analysis, a model from the YOLO family is the optimal choice. Performance is significantly improved by **fine-tuning** the model on a domain-specific dataset, such as one containing images of local traffic conditions.
- 3. Multi-Object Tracking with DeepSORT:** A tracking algorithm is required to assign a unique ID to each vehicle.

**DeepSORT** is a robust choice that enhances the popular SORT algorithm by incorporating an **appearance descriptor** alongside motion prediction. This dual-metric approach makes the tracker more resilient to occlusions and reduces errors, leading to more stable tracking.

**4. The Counting Mechanism:** The final stage translates stable tracks into a vehicle count. This is achieved by defining a **virtual line** within the camera's view. A vehicle is counted when the centroid of its tracked bounding box crosses this line for the first time, with the persistent ID from DeepSORT preventing multiple counts.

#### **5. Applications in Intelligent Transportation Systems (ITS):**

The data generated by the AI framework enables a range of sophisticated traffic management applications.

##### **1. Adaptive Traffic Signal Control:**

One of the most immediate applications is in adaptive traffic signal control. AI-based systems use real-time vehicle counts to dynamically adjust signal timings, allocating more green time to busier lanes. This optimization can significantly reduce vehicle waiting times and increase traffic flow.

##### **2. Predictive Traffic Flow Modeling:**

Historical data logged by the system can be used to train predictive models. Advanced hybrid architectures, such as a **CNN-LSTM** model, can effectively learn the complex spatio-temporal dynamics of traffic, enabling the system to forecast traffic flow in advance and allowing for pre-emptive management strategies.

##### **3. Case Study: Deployment in India:**

Deploying AI systems in developing nations like India presents unique challenges due to **heterogeneous traffic**—a chaotic mix of vehicle types with little adherence to lane discipline. Standard models trained on conventional datasets often fail in these conditions. However, cities like Bengaluru and Chandigarh have successfully implemented AI-based systems by using localized solutions, including fine-tuning models on local datasets like IITM-HeTra.

#### **6. Deployment Challenges and Mitigation Strategies:**

Transitioning an AI system to the real world presents significant challenges that impact consistent performance.

##### **1. Environmental and Systemic Hurdles:**

Vision-based systems are vulnerable to **occlusion** in dense traffic, **adverse weather** like rain and fog, and **variable lighting** conditions. Systemic hurdles include the high **cost** of hardware, the complexity of **integrating** with legacy systems, and the need for continuous model **maintenance**.

## 2. Emerging Technological Solutions:

- **Edge Computing:** Processing data locally on a device near the camera reduces latency, improves reliability, and enhances privacy.
- **Drones (UAVs):** Drones offer a flexible and powerful tool for traffic monitoring, providing a wide, bird's-eye view that mitigates occlusion problems.
- **Sensor Fusion:** The future of all-weather reliability lies in fusing data from multiple sensor types, such as cameras, radar, and LiDAR, to create a unified perception that remains robust even when one sensor is compromised.

## 7. Ethical Considerations and Data Privacy in AI-Powered Surveillance:

The deployment of AI-powered traffic monitoring involves large-scale data collection, creating a powerful tool that also carries risks of mass surveillance, data misuse, and algorithmic bias.

A network of cameras capable of tracking every vehicle is, by definition, a system of mass surveillance. This raises concerns about individual privacy and the potential for function creep, where data collected for one purpose is repurposed for another without consent. Robust data security and anonymization techniques are paramount to protect sensitive information and comply with regulations like the EU's GDPR.

Furthermore, AI systems can perpetuate societal biases if trained on unrepresentative data, leading to inequitable outcomes, such as unfairly targeting certain neighborhoods for enforcement. Mitigating this risk requires curating diverse training datasets, ensuring algorithmic transparency, conducting rigorous audits, and engaging the public to ensure the system's goals align with community values.

## 8. Conclusion and Future Directions:

The integration of AI into traffic management marks a pivotal shift from static infrastructure to dynamic, software-defined intelligence. This paper has provided a holistic framework for such a system, synthesizing its technical, practical, and ethical dimensions.

### 1. Summary and Future Trajectory:

This research established that deep learning models, particularly YOLO integrated with a DeepSORT tracker, offer an optimal solution for real-time vehicle counting, enabling transformative applications like adaptive signal control. Successful deployment requires overcoming environmental and systemic challenges through emerging technologies like edge computing and drones, while navigating critical ethical considerations of privacy and bias.

The future trajectory points towards a city-scale, autonomous "nervous system" for transportation. This will involve integration with the **Internet of Things (IoT)** for a richer data ecosystem, synergy with **Autonomous Vehicles (AVs)** for cooperative traffic orchestration, and the use of **city-scale digital twins** for risk-free strategy simulation. Ultimately, the system will evolve from being predictive to fully prescriptive, autonomously executing coordinated strategies to prevent congestion before it occurs. The goal is to achieve seamless mobility, which requires a human-centric approach that prioritizes safety, equity, and privacy to build the sustainable and livable cities of the future.

## ARTIFICIAL INTELLIGENCE VS. HUMAN INTUITION: SHAPING CONSUMER BEHAVIOR IN TRADITIONAL MARKETS

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### **Introduction:**

In recent decades, Artificial Intelligence (AI) has moved from being a futuristic concept to a practical tool reshaping industries, businesses, and consumer experiences. From predictive e-commerce analytics to chatbots answering customer questions, AI has dramatically shaped how and why consumers decide and engage with markets. Yet in markets traditional to our experience—like local bazaars, small retail outlets, and person-to-person trading spaces—human instinct, feeling, and interpersonal negotiation remain the dominant forces. In contrast to online platforms where decisions are largely driven by algorithms, conventional markets are based on social signals, trust, reputation, and tacit knowledge developed through human relations.

The synergy of AI and human intuition is important since consumer behavior is not just about rational decision-making; it is also about emotions, perception, and social approval. While AI can anticipate patterns and favorites with high accuracy, it fails to entirely account for the subtlety of culture, relationships, and spontaneity of human choices. This paper explores how AI and human intuition shape consumer behavior in conventional markets, comparing algorithmic recommendation to instinct-driven decision-making.

The study investigates if AI can actually mimic the fine aspects of intuition that traders and consumers utilize in conventional environments. Finally, it questions whether AI must be viewed as a substitute for, or an enhancement of, human intuition in driving consumer actions.

### **Review of Literature:**

- **Artificial Intelligence and Consumer Behavior**

A number of studies indicate that AI systems can impact customer decisions by anticipating buying behaviors, tailoring suggestions, and improving ease of access. Most of the available studies, though, are concentrated on online or e-commerce settings. For instance, Amazon's recommendation engine, Netflix's personalization algorithm, and Spotify's predictive playlist suggestions show

how AI influences consumer behavior in internet contexts (Smith & Anderson, 2019). These websites offer massive datasets to be analyzed by AI, thus allowing predictions to be made accurately.

- **Human Intuition in Traditional Markets**

Conversely, consumer behavior studies in traditional markets place greater emphasis on social and psychological variables. Schiffman and Kanuk (Prominent authors known for their book on consumer behaviour) highlight that consumer decisions in people-place interactions are influenced by trust, interpersonal relationships, and perceived authenticity. Traditional markets, usually being in cultural and community contexts, provide room for negotiation between buyers and sellers, reading cues, and the use of tacit knowledge.

- **Comparative Perspectives**

Few of the existing works compare AI and human intuition in conventional markets outright, but there are a few that offer indirect comparison. AI does not have the "emotional intelligence" to perfectly mimic human judgment, especially in informal environments where consumer trust is essential. Others Journalist like Davenport and Ronanki believe that AI can support human intuition by providing insights based on facts while humans provide contextual knowledge.

Overall, the papers indicate that whereas AI is very efficient and predictive, it falls short of the cultural embeddedness and adaptability of human instincts. This clash provokes important questions of how consumer behavior is shaped differently based on whether AI or human instincts predominate.

**Objectives :**

The following are the objectives of this paper:

1. To examine the impact of Artificial Intelligence on consumer decision-making in both the digital and traditional senses.
2. To assess the function of human intuition in influencing consumer behavior in conventional markets, especially in trust, social networks, and culture.
3. To contrast the advantages and disadvantages of AI versus human intuition in shaping consumer behavior.
4. To determine synergies between AI and human intuition that might make consumer experiences in conventional markets better.
5. To put forward suggestions for policymakers and businesses regarding how to balance human-oriented strategies with AI-powered tools in consumer markets.

**Scope of the Study :**

The focus of this study is restricted to comparative analysis of AI and human intuition in influencing consumer behavior, with specific reference to \*traditional markets\*. Compared to supermarkets or online channels where the role of AI is

more explicit, traditional markets have face-to-face interactions, haggling, and community relationship.

This paper investigates:

- \* The capabilities of AI technologies (e.g., chatbots, price optimization software, and predictive analytics) to impact physical retail decision-making.
- \* The long-term value of human intuition in markets characterized by cultural background and interpersonal relationships.
- \* The limitations of AI in emulating emotional intelligence, cultural awareness, and impromptu judgment.
- \* The prospects of incorporating AI into conventional markets in an auxiliary instead of a substitutionary role.

The study does not cover the full spectrum of AI applications in digital marketing or advanced retail automation but instead narrows its focus to how AI and human intuition shape behavior specifically in traditional marketplaces.

### **Analysis and Discussion :**

#### **AI's Role in Consumer Decision-Making:**

Artificial Intelligence is able to process large volumes of data to forecast consumer behavior, identify pricing policies, and streamline inventory levels. For instance, AI programs can assist vendors in neighborhood markets by evaluating sales trends to predict demand for items that follow seasonal cycles. Chatbots and AI-based kiosks could also provide product details or recommend complementary products and thereby influence consumer behavior in a subtle way.

Yet in established markets where judgments tend to be made in the moment and are subject to human feelings, predictive power is constrained. A buyer might choose to purchase from a seller based on a smile or sense of loyalty—both aspects that no program can adequately analyze.

#### **• Human Intuition in Consumer Behavior**

Human intuition flourishes under conditions where information is incomplete or vague. To select fresh fruits and vegetables, customers intuitively use sensory information such as odor, feel, and reliance on the seller. Vendors also intuitively sense potential buyers' interest, posture, and bargaining potential. All these small interactions influence consumer choices in manners that are difficult to replicate with AI.

In addition, cultural norms—e.g., bargaining ceremonies in Asian or Middle Eastern bazaars—emphasize the value of human discernment. These types of practices have strong roots in social interaction over data-driven forecasting.

#### **• Strengths and Weaknesses of AI vs. Intuition**

**Advantages of AI:** Efficiency, scalability, prediction accuracy, capacity to handle big data, and stability in recommendations.

**AI Weaknesses:** Limited emotional intelligence, inability to entirely capture context, reliance on data quality, and the possibility of depersonalizing interactions.

**Human Intuition Strengths:** Empathy, flexibility, cultural awareness, and the capacity for fast decision-making in situations where context is ambiguous.

**Human Intuition Weaknesses:** Subjective, prone to bias, difficult scalability, and inconsistency.

#### **Synergies Between AI and Human Intuition :**

Instead of pitting AI against human instinct as rivals, increasing synergy is possible. For instance, AI may assist conventional vendors by delivering analytics for sales while vendors apply their interpersonal ability to create trust and loyalty. In the same way, AI may serve as an adviser, recommending best price ranges while negotiations are left to humans.

This hybrid approach understands that customer behavior in conventional markets is optimally influenced by a blend of algorithmic understanding and instinctive human interaction.

#### **Recommendations and Conclusions :**

1. **Support Tool vs. Replacement:** Traditional market businesses ought to embrace AI as an augmentative tool and not a replacement for human instincts. For example, AI is used in inventory planning while human instincts power face-to-face selling.
2. **Vendor Training:** Vendors need to be trained to employ AI-based applications like mobile apps for demand forecasting or customer relationship management, while still depending on their people skills for dealing with customers.
3. **Cultural Sensitivity in AI Systems:** AI applications are to be developed keeping cultural contexts in view since traditional markets vary significantly from one region to another.
4. **Policy Support:** Governments and trade associations should promote digital literacy in traditional market sellers so that AI adds to and not takes away from livelihoods.
5. **Hybrid Consumer Experience:** Support models where consumers enjoy the benefits of both AI-fueled insights (e.g., price comparison, product information) and human touch (e.g., negotiation, building trust).

The battle between Artificial Intelligence and human intuition in influencing consumer behavior is not whether one is better, but how they could both coexist. AI provides unmatched efficiency, predictive ability, and data-driven insights, and it is thus a boon for businesses. However, in conventional markets, where interpersonal trust, cultural traditions, and human emotions are paramount, intuition cannot be done away with.

Consumers are not purely rational beings; they are emotional humans guided by relationships, trust, and the inferences made from subtle social signals. AI cannot duplicate all these aspects, but it can complement them. The future of consumer behavior in classical markets is the harmonization of AI instruments with human intuition that results in hybrid models cognizant of culture while making use of technology progress.

With such a balanced strategy, companies can retain the essence of traditional markets while enjoying the advantages of AI. Ultimately, the existence of AI in conjunction with human instinct provides the best means for influencing consumer behavior that is both efficient and human.

## WHEN MARKETING THINKS AND FEELS: THE RISE OF SENTIENT AI AND EMOTION BASED MARKETING

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### **Introduction:**

This study investigates the impact of Artificial Intelligence (AI) on the everyday academic lives of undergraduate students in Mumbai. With AI rapidly transforming education globally, undergraduate students in India's financial and educational hub provide a unique perspective on technology adoption. AI-powered tools such as grammar checkers, plagiarism detectors, translation apps, and advanced generative platforms like ChatGPT or Copilot have become part of routine academic practices. Students increasingly turn to these applications for assignments, presentations, coding, project reports, and exam preparation. While AI promises efficiency, productivity, and innovative learning experiences, its influence on critical thinking, originality, and independent study habits remains underexplored.

We explore the relationship between AI usage and academic behavior among undergraduate learners, with particular attention to how dependence on such technologies shapes knowledge acquisition. For instance, while some students may use AI for clarifying complex concepts and enhancing writing quality, others may rely excessively on it for ready-made answers, raising concerns about superficial learning. This relationship also extends to broader issues such as digital literacy and accessibility, as not all students in Mumbai have equal exposure to or resources for using AI. Thus, the research connects technology adoption to academic equity, cultural diversity, and the socio-economic realities of urban education.

Our research aims to uncover the effects of AI on essential student skills such as problem-solving, creativity, and academic integrity. Does AI encourage students to think more critically by offering alternative perspectives, or does it discourage originality by providing instant solutions? The study also considers the ethical dimensions of AI use, including plagiarism, misuse in examinations, and blurred boundaries between assistance and malpractice. These effects are significant for shaping institutional policies, faculty perceptions, and long-term student development in a digital-first academic environment.

This paper presents a comprehensive analysis of the opportunities and challenges AI presents to Mumbai's undergraduate students. On one hand, AI enhances learning experiences, supports multilingual students, and reduces barriers to information. On the other, it raises concerns about over-dependence, loss of academic rigor, and widening digital divides. By situating the discussion within Mumbai's higher education context, this analysis captures the dynamic interplay of technology, student behavior, and institutional responses in one of India's most diverse academic landscapes.

We seek to understand the dynamics of AI adoption not merely as a matter of technological use but as an educational transformation that reshapes teaching, learning, and assessment. The investigation sheds light on how undergraduates negotiate between efficiency and ethics, innovation and authenticity, as they incorporate AI into daily study practices. Ultimately, the findings of this study can guide educators, policymakers, and institutions in designing balanced strategies that encourage responsible AI use while preserving the essence of critical, independent, and creative academic learning.

### **Research Problem:**

The integration of Artificial Intelligence into academic practices has brought new possibilities for undergraduate learning in Mumbai. However, while AI offers efficiency, accessibility, and support in academic work, it also poses concerns regarding originality, ethical use, and over-dependence. The problem lies in understanding whether AI is genuinely enhancing learning outcomes or undermining essential skills such as critical thinking, creativity, and independent study. Furthermore, disparities in access and awareness among students from diverse socio-economic and cultural backgrounds highlight the need to examine how AI is shaping academic equity in Mumbai's higher education ecosystem.

### **Research Objectives:**

1. To examine the extent of AI adoption among undergraduate students in Mumbai across different disciplines.
2. To analyze the relationship between AI usage and academic behavior, including study habits, learning outcomes, and assignment preparation.
3. To investigate the ethical and academic integrity concerns arising from AI use, such as plagiarism, over-reliance, and misuse.
4. To assess the impact of AI on essential skills such as critical thinking, creativity, and problem-solving.
5. To explore differences in AI adoption based on socio-economic, institutional, and digital literacy factors among Mumbai's undergraduate students.
6. To provide recommendations for responsible and balanced use of AI in undergraduate education.

## **Hypotheses:**

### **H<sub>1</sub>: AI Usage in Academic Tasks**

Null Hypothesis (H<sub>01</sub>): Undergraduate students in Mumbai do not frequently use AI tools in their daily academic tasks such as assignments, presentations, and exam preparation.

Alternate Hypothesis (H<sub>11</sub>): Undergraduate students in Mumbai frequently use AI tools in their daily academic tasks such as assignments, presentations, and exam preparation.

### **H<sub>2</sub>: AI and Academic Efficiency**

Null Hypothesis (H<sub>02</sub>): There is no significant relationship between AI use and improved academic efficiency and productivity among undergraduate students.

Alternate Hypothesis (H<sub>12</sub>): There is a significant positive relationship between AI use and improved academic efficiency and productivity among undergraduate students.

### **H<sub>3</sub>: AI and Independent Learning**

Null Hypothesis (H<sub>03</sub>): Excessive reliance on AI has no effect on the development of independent learning, critical thinking, and creativity.

Alternate Hypothesis (H<sub>13</sub>): Excessive reliance on AI negatively affects the development of independent learning, critical thinking, and creativity.

### **H<sub>4</sub>: AI and Ethical Concerns**

Null Hypothesis (H<sub>04</sub>): Ethical concerns such as plagiarism and misuse are not significantly associated with the frequency and manner of AI use by students.

Alternate Hypothesis (H<sub>14</sub>): Ethical concerns such as plagiarism and misuse are significantly associated with the frequency and manner of AI use by students.

### **H<sub>5</sub>: Socio-Economic and Institutional Differences**

Null Hypothesis (H<sub>05</sub>): There is no significant difference in access to and usage of AI tools among students based on socio-economic background, institutional resources, and digital literacy.

Alternate Hypothesis (H<sub>15</sub>): There is a significant difference in access to and usage of AI tools among students based on socio-economic background, institutional resources, and digital literacy.

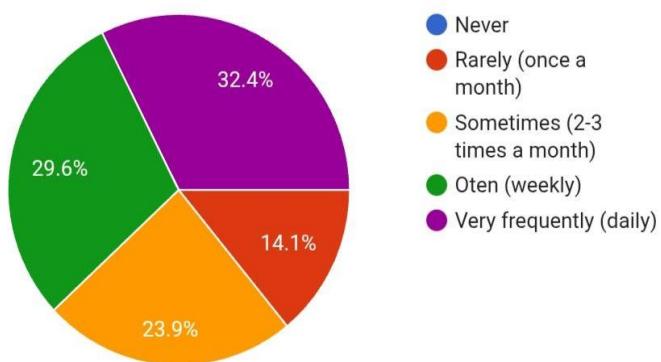
### **H<sub>6</sub>: Responsible AI Use**

Null Hypothesis (H<sub>06</sub>): Responsible and guided use of AI does not enhance academic learning while preserving originality and integrity.

Alternate Hypothesis (H<sub>16</sub>): Responsible and guided use of AI enhances academic learning while preserving originality and integrity.

### Data Analysis:

71 responses



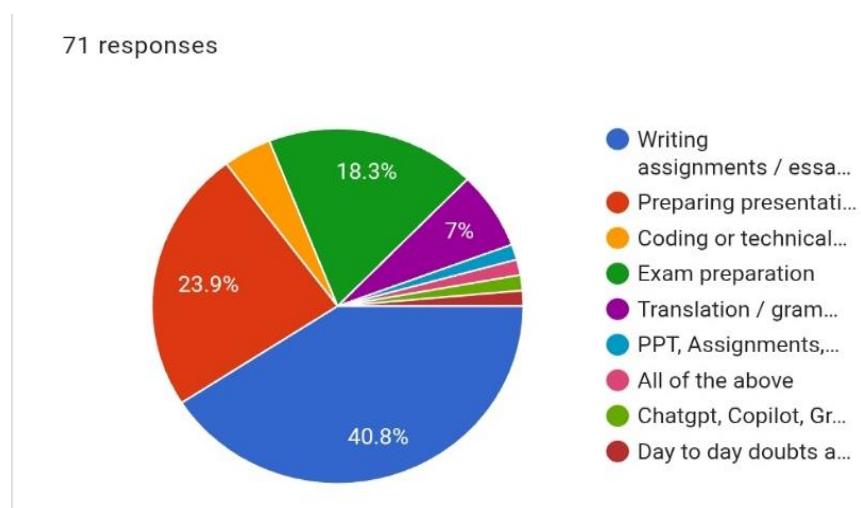
The age-wise distribution of respondents in this study provides useful insights into the demographic profile of undergraduate students using AI tools in their academic practices. Out of the **71 total responses**, the majority of students, **73.2%**, fall within the **19–20 years** age group. This is expected, as most undergraduate students in Mumbai typically belong to this bracket during their college years. The **21–22 years** category contributes **19.7%**, which usually represents final-year students or those who may have taken additional time in their courses. Finally, **7%** of the respondents belong to the **22 years and above** category, showing that AI adoption in academics is not limited only to younger undergraduates but also extends to relatively older students who may be pursuing late graduation or additional courses.

This age pattern highlights that **AI usage in education is particularly dominant among younger undergraduates**, reflecting their early adoption and familiarity with digital technologies. It also suggests that the younger cohort is more likely to experiment with tools like ChatGPT, Grammarly, and Google Bard for assignments, presentations, and exam preparation. The smaller proportion of older students indicates that while AI awareness exists across age groups, its intensive academic application is strongest among younger learners. This reinforces the view that AI tools are becoming an integral part of modern undergraduate learning.

**How often do you use AI tools (e.g., ChatGPT, Grammarly, Copilot, translation apps) for your academic work?**

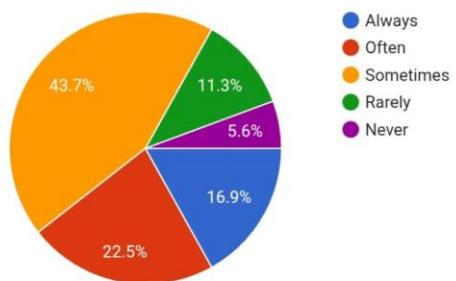
The survey results reveal interesting patterns in students' use of AI tools for academics. Out of 71 respondents, **32.4% use AI very frequently (daily)**, while **29.6% use it often (weekly)**, showing that over 60% of students actively integrate AI into their studies. Meanwhile, **23.9% use AI occasionally (2-3 times a month)**, **14.1% rarely**, and only a small **8.5% never use AI**. This indicates strong adoption trends. Regarding academic activities, students mainly use AI for **writing assignments/essays, preparing presentations, and coding/technical tasks**. Overall, AI tools are becoming a vital support system for learning efficiency and productivity.

### For which academic activities do you use AI the most?

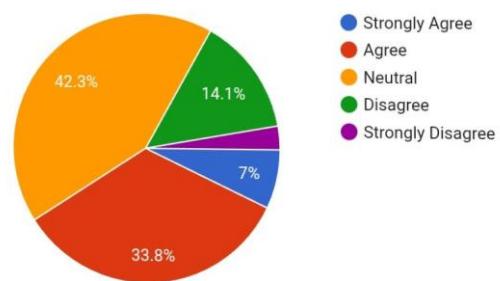


The survey findings indicate that students primarily use AI tools for **writing assignments and essays (40.8%)**, followed by **preparing presentations (23.9%)** and **exam preparation (18.3%)**. A smaller share uses AI for **translation, coding, and grammar-related tasks**, while some rely on it for multiple purposes like PPTs and daily doubts. Regarding productivity, most respondents acknowledge AI's usefulness: **35.2% moderately agree**, **28.2% significantly agree**, and **21.1% strongly agree** that AI tools save time and enhance productivity. Only **12.7% slightly agree**, and a very small fraction reported "not at all." This highlights AI's growing role in supporting academic efficiency.

71 responses



71 responses

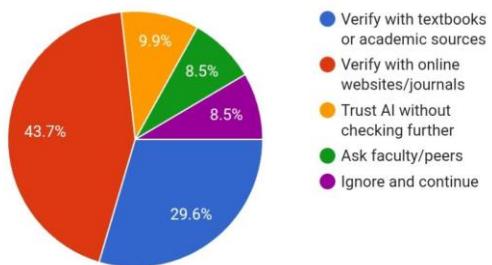


The responses indicate mixed perceptions of AI's impact on independent learning and creativity. When asked if AI reduces independent effort in learning and problem-solving, **45.1% agreed** and **18.3% strongly agreed**, suggesting that many students feel a dependency on AI. Meanwhile, **29.6% remained neutral**, and only **7% disagreed**, showing limited resistance. On creativity, **43.7% believe AI affects their creativity**, while **40.8% were unsure**, and only **15.5% felt it does not**. This highlights that while students appreciate AI's support, there is growing concern that over-reliance may reduce originality, critical thinking, and problem-solving skills in academic tasks.

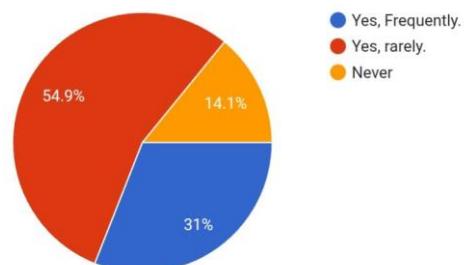
If AI provides incorrect or misleading data, how do you usually respond?

Do you use AI tools for solving practical or applied subject problems (e.g., statistics, accounting, coding, economics, case studies)?

71 responses



71 responses



The survey data provides valuable insights into how undergraduate students respond to inaccuracies in AI-generated content and their usage of AI for solving practical subjects. When asked how they react to incorrect or misleading AI outputs, the majority, 43.7%, reported that they verify with online websites or journals, showing a tendency to rely on digital cross-checking. Around 29.6% prefer to confirm information with textbooks or academic sources, while 9.9% admitted they trust AI without further checks, indicating a small but concerning

over-reliance. Additionally, 8.5% turn to faculty or peers, and another 8.5% choose to ignore and continue, which could reduce learning accuracy.

Regarding AI use in practical or applied subjects such as statistics, accounting, coding, or economics, the responses reflect cautious adoption. About 31% of students use AI frequently for such problem-solving tasks, while the majority, 54.9%, use it rarely. Interestingly, 14.1% never use AI for applied work, suggesting that practical problem-solving still requires strong reliance on traditional learning methods or expert guidance.

Overall, the findings highlight a balanced attitude: while students actively use AI, many adopt a critical stance by verifying information. However, limited usage in applied subjects reflects either lack of trust or limited capabilities of AI in

### **Conclusion:**

The analysis of student responses highlights the evolving but cautious role of Artificial Intelligence in undergraduate academics. A significant portion of students actively engage with AI tools such as ChatGPT, Grammarly, and Copilot, especially for tasks like writing assignments, preparing presentations, and exam preparation. However, when it comes to applied or practical subjects such as accounting, statistics, or coding, adoption is limited. Only about one-third of the respondents use AI frequently for such tasks, while the majority rely on it rarely, and a small segment avoids it entirely. This indicates that while AI is valued for general academic support, its reliability in complex, subject-specific problem-solving remains a concern.

Students' responses to incorrect or misleading AI data reveal both strengths and challenges in their approach. The majority demonstrate critical thinking by verifying information through websites, journals, or textbooks, which reflects a responsible use of technology. However, a smaller group either blindly trusts AI or chooses to ignore inaccuracies, posing risks to academic integrity and quality of learning. This shows the importance of training students in digital literacy and ethical AI usage, ensuring they develop the skills to distinguish between correct and flawed information.

In conclusion, while AI is undoubtedly transforming the academic landscape by saving time and enhancing productivity, it must be integrated thoughtfully. Students need awareness programs, guidelines, and academic policies that promote balanced usage—leveraging AI for efficiency while safeguarding independent thinking, creativity, and problem-solving skills. This balance is essential for developing future-ready graduates.

## ROLE OF VALUE-ADDED COURSES IN EMPLOYABILITY SKILL DEVELOPMENT LEADING TO SKILL IMPROVEMENT IN THE VUCA WORLD

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### **Abstract:**

*In today's fast-paced business and technology landscape, VUCA—a term encapsulating Volatility, Uncertainty, Complexity, and Ambiguity—is increasingly relevant. Navigating a VUCA world demands that individuals and organizations cultivate strategies for effective decision-making. To thrive, individuals must develop new skills to tackle the growing volatility, uncertainty, complexity, and ambiguity in business. Professional courses play a pivotal role in honing these skills, impacting leader performance across various domains. By examining underlying assumptions and hidden factors, leaders gain heightened awareness of their perspectives, enhancing their ability to navigate paradoxes and dilemmas. Recent research on course development highlights how skill development influences pathways to enhancing youth employability.*

*We gathered data on the basis of a structured questionnaire from 240 commerce undergraduate students who had undergone this course —a current and growing awareness of a mismatch between professional course offerings and the skill sets one needs in a VUCA. We could establish the enduring power of skills developed by this course among the graduates that has made them truly employable.*

**Keywords:** *volatility, uncertainty, complexity, ambiguity, skill development, Employability.*

### **Introduction:**

Increasingly, job roles demand formal skill development qualifications to meet job requirements and achieve targeted outcomes, driven by legislative needs or specific employer demands. Skill development yields significant benefits:

#### **Increase employment opportunities:**

There is no doubt that skill development provides increased employment opportunities. Today, even entry level roles in many industries require basic skill qualifications. By completing a skill development course, there are huge changes in employment opportunities to become wider.

**Increased career development opportunities:**

One can develop a career in a chosen field is something many of us aspire to. Experience alone, in many cases does not suffice when employers are seeking to promote their staff. Engrossing oneself in further training, the chances of creating an opportunity to develop a desired career is enhanced.

**Personal growth:**

Skill development not only provides an individual with the skills in a particular area. By undertaking further skill development one can build better networking, time management, communication and negotiation skills.

**Increases one's knowledge and understanding of one's local industry:**

Interskills trainers are experts in their fields – they are closely connected within their industry. This provides an individual with local industry knowledge to supplement their growing skills.

VUCA is a term being very commonly used today for addressing the increasingly ever-changing scenario of the present day business and technology environment. It's a VUCA world that makes us a good decision maker and attractive approach for many organizations and initiatives. To be effective, an individual in the coming days will need to develop new skills to address the increase in business volatility, uncertainty, complexity, and ambiguity that they face every now and then.

A recent research project is on the development of course that sheds light on the events leading to overall change and suggests that skill development has implications for the ways in which we can develop employable youth.

**Research Objective:**

1. To understand the term VUCA.
2. To identify the keys to success in the VUCA environment.
3. To understand the role of Value-Added Courses in leading to skill improvement in the VUCA World.

**Significance of the study:**

For many people, the need for a more comprehensive and better education is vital in the VUCA World, which is of Volatility, Uncertainty, Complexity and Ambiguity. Some research is showing that, rather than simply focusing on academics and their grades, education must support the development of skills.

It means that apart from academic development, comprehensive development includes social and emotional growth and progress. According to Deborah Moroney of the American Institutes for Research, this type of holistic education is "a major instrument and guide" to success. In other words, a valuable and comprehensive education not only focuses on the hard, academic skills, but also requires the teaching and learning of employability skills.

Increasingly, job roles demand formal skill development qualifications to meet job

requirements and achieve targeted outcomes, driven by legislative needs or specific employer demands. Skill development yields significant benefits. Learning such skills offers both short-term and long-term benefits for leading a peaceful life. When people learn how to communicate and understand, it helps them to work better with others, they immediately become satisfied and more successful. In the long term, such skills allow people to be better decision makers and overcome challenges to grab the best opportunities. These are especially important skills in one's life and also at the workplace.

Unfortunately, the need for teaching, learning and inculcating such skills is not always recognized as a priority in education. The challenge lies in communicating the strength and weakness of educating an individual through the teaching and learning of various skills. What academicians must come to understand is that such social and emotional skills will have a definite positive effect on learning, as well as professional success.

Hence the need is for us to re-examine our priorities in education and recognize that various skills are not just commodities or "nice to have". Employability skills are necessary for success. Only when this will happen will we academician can motivate our students to reach beyond academic success by developing in students the requisite skills needed for personal and professional growth.

### **Limitations of study:**

One major limitation of this study was that it was based only on Commerce undergraduate students of our College and other Colleges were not included. Another limitation was that due to the time constraint only our college was undertaken in the study as there are many Colleges in Mumbai region imparting such Value-Added Courses.

### **Review of Literature:**

VUCA is depicted by Johansen (2009, 2012) inside the setting of dangers and openings. In spite of the way that dangers are portrayed in detail, openings are assuredly not. Or on the other hand possibly, the positive aftereffect of changing a risk into an open entryway depends upon the usage of the new aptitudes (Johansen, 2012). There are four risks: Volatility. Change today isn't ceaseless and obvious; rather it is intermittent, shocking and overwhelming. Shaky conditions require preparing for an extent of vague threats and conceivable outcomes with aptitudes of feeling to help predict or affect future events. Unusualness, furthermore insinuated as unsteadiness, implies the dynamic idea of the setting for fundamental initiative and the level of turbulence or rate of advance (Hesselbein and Goldsmith, 2009; Paparone and Topic, 2011; Shaffer and Zalewski, 2011).

Due to fast moving global and technological development, the organizations are

now facing new changes as well as threats. Technological advancements are needed to mould the need of capabilities and competencies required to perform a particular task. Thus, to cope with these threats, more improved and better skill development programs are required by all corporations. Effective skill development programs help in constructing a more conducive learning environment for the workforce and train them to cope with the upcoming threats and to grab the opportunities more easily and in time (Wei-Tai, 2006).

The present day companies have very clear aims at gaining the competitive advantage that can be realized through the importance of skill development in improving the employee's performance. Many researches provide the positive result regarding the positive effect of skill development programs on both students and organizational performance. On one hand the many research works proved that effective skill development programs leads to better and targeted return on investment while the other researches mentioned the positive role of skill development helped in attaining the optimal levels of students retention (Colarelli & Montei, 1996; Becker, 1993).

Powerful preparing programs causes representatives to get all around embraced and balanced with the coveted new innovative progression, likewise serving to completely create on the abilities and aptitudes required to perform at specific employment and to dispose of at work blunders and oversights (Robert, 2006).

As per Farooq. M, and Aslam. M. K (2011), directors are attempting their level best to build up the worker's capacities, eventually making a favourable workplace inside the association. For limit building administrators are engaged with building up the successful preparing programs for their workers to furnish them with the coveted learning, aptitudes and capacities to accomplish authoritative objectives. This battle by the best administration enhances the representative execution as well as makes a positive picture of the firm around the world, (Jia-Fang, 2010). Amongst the important function of developing appropriate human resources, a crucial function is students development through proper skill development and development programs.

### **Methodology:**

Information was gathered utilizing essential and optional techniques using 5 points Likert Scale. An organized questionnaire of 7 questions were appropriated and 240 legitimate surveys were returned. To test the unwavering quality of the information, investigation was done to see how the keys to achievement in the VUCA condition can go about as employability skills preparing among the business understudies can help them in understanding the part of Value-Added Courses in prompting Skill Development. This investigation tried to approve the apparent significance of the at least 5 new administration abilities and tactics in an urban

city of Mumbai in consolidating the aptitudes into the initiative improvement programs.

**Hypothesis:**

The research is testing null hypothesis and alternative hypothesis on the basis of the relationship between the keys to success in the VUCA and the Value-Added Courses pursued by them so as to lead to the skill development.

**H<sub>0</sub>** = There is no relationship between the keys to success in the VUCA and the Value-Added Course pursued by them so as to lead to the Skill development.

**H<sub>1</sub>** = There is a relationship between the keys to success in the VUCA and the Value-Added Course pursued by them so as to lead to the Skill development.

**Data:**

The study is focusing on primary data, secondary data and the research approach is quantitative research approach. The research is used to do analysis of the data for understanding how Value-Added Courses will be leading to Skill Development in the VUCA World.

**Source of Data Collection:**

The source of the data is a structured questionnaire filled by the commerce undergraduate students who also pursued Value-Added Course in Communication Skills Course to analyse the VUCA environment and to identify the keys to success in the VUCA environment has led to the skill development.

**Different Skills that are keys to success in the VUCA environment:**

- Effective Communication:** Vital for conveying ideas, collaborating, and navigating complexities
- Listening:** Essential for understanding perspectives, needs, and feedback.
- Language for Communication:** Proficiency in language(s) used for communication impacts effectiveness.
- Reading:** Important for staying informed, learning, and understanding complex information.
- Employment Communication:** Critical for professional interactions, job searches, and workplace communication.

## Data Analysis & Interpretation

**Table 1. Study of commerce graduate students who pursued Value-Added Course in Communication Skills and its impact on their skill development**

| Questions to know opinions how the respondents felt that the Value-Added Course has led to Skill Development | Very Important | Important | Moderately Important | Less Important | Unimportant |
|--|----------------|-----------|----------------------|----------------|-------------|
| <b>1. Effective Communication</b>  | 195            | 45        | 0                    | 0              | 0           |
| <b>2. Listening</b>  | 210            | 20        | 10                   | 0              | 0           |
| <b>3. Language for Communication</b>   | 190            | 20        | 30                   | 0              | 0           |
| <b>4. Reading Skills</b>   | 200            | 20        | 20                   | 0              | 0           |
| <b>5. Employment Communication</b>   | 175            | 35        | 30                   | 0              | 0           |

### Conclusion:

Effective skill development is considered to be a key factor for improved performance; as it can enhance the level of students and firm competency. It supports to fill the gap between what performance is required and what performance is happening, i.e. gap between desired performance and actual student's performance. Skill development need refers to any deficit in performance, which can be relieved by appropriate training. Particularly skill development develops skills, competency, and ability and ultimately improves student's performance and organizational productivity. Skill development program is the catalyst that makes workers improve their performance and capabilities, which consequently increase organizational productivity. Therefore, skill development should be designed on the basis of firm specific needs and objectives. Effective skill development is the thoughtful intervention designed at attaining the learning necessary for upgraded student's performance. The research affirmed the proposition that skill development has a positive impact on student's performance.

### Recommendations and Future Implications:

In this research we review a lot of materials related to the variables used in this research and at the end we also proved our hypotheses. In the light of all this

research and all the material which is being used to conduct this research and all the literature review we came to the decision that there should be Skill development in every organization. Although we have reviewed some disadvantages like it is costly to give skill development to the employees, the advantages of Skill development are much more than its disadvantages which are briefly discussed in this study. We recommend that all organizations should provide Skill development to their employees. We already have discussed that Skill development and Development have advantages not only for students but the ultimate benefit is for the organization itself. If the performance of the students is not good it will affect the whole organization.

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## AI IN PRICING AND PRODUCT RECOMMENDATIONS: TRANSFORMING TRADITIONAL MARKET DYNAMICS

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### **Abstract:**

*Artificial Intelligence (AI) is reshaping the way businesses operate, especially in pricing strategies and product recommendations. Traditional markets that relied on fixed pricing, human negotiation, and physical product displays are now influenced by AI-driven analytics, dynamic pricing algorithms, and personalized recommendation systems. This paper, based on secondary research, explores how AI technologies transform traditional market dynamics by enhancing efficiency, consumer engagement, and competitiveness. The study reviews existing literature, analyses the scope of AI adoption, outlines its advantages, and suggests strategies for balancing automation with consumer trust. The findings reveal that while AI offers unparalleled precision in predicting consumer preferences and setting competitive prices, it also poses ethical, employment, and regulatory challenges that need to be addressed for sustainable market transformation.*

### **Introduction:**

Traditional markets across industries—retail, services, and manufacturing—have long operated on principles of human intuition, face-to-face negotiation, and standard pricing models. However, globalization, digitization, and rapidly evolving consumer behaviour have pushed these markets toward technological adaptation. Artificial Intelligence (AI) has emerged as a disruptive force, transforming how businesses price their products and how consumers discover, evaluate, and purchase them. Dynamic pricing, once seen only in sectors like airlines and hospitality, is now common in e-commerce and retail. Similarly, AI-based product recommendation engines—powered by machine learning, data mining, and predictive analytics—personalize consumer experiences by suggesting relevant products at the right time. For traditional markets, the integration of such AI-driven tools poses both opportunities and challenges. This research paper

examines AI's impact on pricing and product recommendations in traditional markets using secondary data sources, including academic journals, industry reports, case studies, and business articles. The paper provides an in-depth review of literature, outlines the scope of study, highlights the benefits, identifies potential risks, and proposes suggestions for future adoption. Artificial Intelligence (AI) has emerged as one of the most disruptive forces in modern business, redefining the way companies design strategies, engage with consumers, and maintain competitiveness in an increasingly digital marketplace. Among its many applications, pricing and product recommendations stand out as two of the most impactful areas where AI is driving change. Through dynamic pricing models, businesses can adjust prices in real-time based on demand fluctuations, competitor actions, and individual consumer behavior. Similarly, recommendation engines powered by AI algorithms personalize the shopping experience by suggesting relevant products, thereby influencing purchase decisions and boosting customer satisfaction.

In traditional markets—where small businesses, local retailers, and established supply chains have long relied on fixed pricing and personal customer interactions—the integration of AI is both an opportunity and a challenge. On one hand, it allows them to compete with large-scale e-commerce platforms by adopting smarter, data-driven practices. On the other hand, limited technological resources and expertise often slow down adoption in such markets. This creates a dynamic shift in market structures, where adaptability becomes a key factor for survival.

The impact of AI in pricing and recommendations is not uniform across the globe. Developed economies, with advanced digital infrastructure, are witnessing rapid AI-driven transformations, whereas emerging economies face barriers such as cost, awareness, and regulatory gaps. At the same time, the growing use of AI raises ethical concerns related to fairness, transparency, and consumer privacy, demanding a balance between technological progress and responsible the study of AI in pricing and product recommendations is critical to understanding how traditional market dynamics are being reshaped. It provides insights into evolving consumer behaviour, business competitiveness, and the broader economic implications of digital transformation.

#### **Review of Literature:**

Kotler & Keller (2016) suggest that consumer decision-making is increasingly data-driven, requiring businesses to adapt from mass marketing to personalized offerings. AI facilitates this shift by analysing consumer data in real-time.

Brynjolfsson & McAfee (2017) argue that AI algorithms outperform human intuition in pricing decisions by continuously monitoring demand-supply fluctuations, competitor strategies, and consumer willingness to pay.

McKinsey & Company Report (2020) highlights that personalized recommendations account for 35% of Amazon's sales, showcasing how AI transforms consumer engagement compared to traditional retail methods.

Grewal et al. (2021) emphasize that AI pricing enhances market efficiency but also raises concerns about fairness and consumer trust, particularly in traditional markets with established social interactions.

Accenture Insights (2022) reveal that companies adopting AI-driven pricing strategies witness 5–10% revenue uplift, while personalized recommendations increase customer retention by 20–30%.

The literature collectively demonstrates that AI provides precision and scale in pricing and recommendations that traditional systems cannot match. However, it raises ethical concerns regarding algorithmic bias, privacy, and the loss of personal human interaction that traditional markets are known for.

### **Scope of the Study:**

Artificial Intelligence (AI) is playing a transformative role in pricing and product strategies across industries. In pricing, businesses are increasingly adopting dynamic and personalized pricing models, which allow them to adjust prices in real-time based on demand, competition, and consumer behaviour. This is particularly evident in sectors like retail, travel, and consumer goods, where flexible pricing strategies enhance competitiveness and profitability. Similarly, AI-powered product recommendation systems are reshaping consumer decision-making by suggesting relevant products and services, thereby boosting sales and customer satisfaction. However, the widespread adoption of these technologies is having a mixed impact on traditional markets. While some small businesses and local retailers are finding ways to adapt by integrating AI into their operations, many struggle to keep pace with the rapid digital transformation, often facing challenges in cost, expertise, and infrastructure. The impact of AI also varies between global and local contexts, as developed economies tend to have higher levels of AI integration, whereas emerging economies experience slower adoption due to limited resources and technological readiness. Alongside these opportunities and challenges, ethical and regulatory concerns remain crucial. Issues of consumer privacy, transparency in algorithms, and fairness in AI-driven decisions highlight the need for responsible implementation, ensuring that the benefits of AI are shared equitably without compromising trust or ethical standards.

### **Objective of Study:**

1. To study the role of AI in transforming pricing strategies in traditional markets.
2. To examine how AI-based recommendation systems influence consumer choices.
3. To analyse the benefits and challenges of AI adoption in traditional markets.
4. To identify ethical and regulatory concerns related to AI-driven pricing.
5. To provide suggestions for integrating AI into traditional markets while retaining consumer trust.

### **Advantages of AI in Pricing and Recommendations:**

- AI offers multiple advantages that are reshaping modern business practices. One of the most significant benefits is the **enhanced consumer experience**, as AI enables highly personalized shopping journeys that boost customer satisfaction and loyalty.
- At the same time, businesses can achieve **revenue maximization** through dynamic pricing models that adjust prices in real-time to optimize profit margins. AI also plays a key role in **inventory management**, where product recommendation systems not only promote popular items but also help clear slow-moving stock by suggesting relevant bundles.
- Additionally, AI supports **data-driven decision making**, giving businesses valuable insights into consumer behaviour and allowing for more precise forecasting.
- Importantly, the use of AI enhances **market competitiveness**, enabling traditional businesses and local retailers to stay relevant and compete with large e-commerce giants by leveraging smart technologies.
- Finally, **customer retention** becomes easier through personalization, as customers feel valued when brands anticipate their preferences and needs, thereby fostering long-term relationships.

### **Recommendations:**

#### **AI in Pricing:**

- **Dynamic Pricing:** Algorithms adjust prices in real-time based on demand, competitor pricing, seasonality, and consumer trends. Examples: Uber's surge pricing; Flipkart and Amazon's frequent price revisions.
- **Personalized Pricing:** AI predicts a consumer's willingness to pay using demographics, browsing patterns, and purchase history.
- **Predictive Analytics:** Anticipates demand shifts and market changes. Helps reduce losses and maximize opportunities.
- **Traditional Market Adoption:** Slowly penetrating retail, fashion, and FMCG sectors. Small retailers face infrastructure and cost-related challenges.

### AI in Product Recommendations:

- Recommendation engines are one of the most important applications of AI in today's market. They work through collaborative filtering, content-based filtering, or hybrid models to analyse consumer data and suggest relevant products.
- In e-commerce, platforms like Amazon, Netflix, and Spotify rely heavily on personalized recommendations to influence consumer choices and boost engagement. Even in traditional retail, physical stores are adopting AI-driven apps and digital kiosks to recommend complementary products, creating a bridge between offline shopping and digital experiences.
- From a consumer psychology perspective, these personalized suggestions reduce the problem of "choice overload," making decision-making easier and increasing the chances of purchase.
- For traditional markets, this means moving away from static product placements toward more dynamic and personalized engagement with customers, even in offline spaces.
- AI also has a major impact on traditional markets in terms of overall business practices. The shift from human negotiation to algorithm-driven pricing is replacing age-old bargaining methods.
- Success now depends more on data collection and analytics, an area where many small retailers still struggle.
- Local shops face strong competitive pressure from AI-enabled e-commerce giants that offer personalization and efficiency at scale.
- Moreover, consumers who are accustomed to personalized online shopping now expect the same level of service in physical stores, raising the bar for traditional businesses.
- However, these challenges also bring new opportunities. Local retailers who adopt AI-based tools for pricing and product recommendations can modernize their operations, improve customer experiences, and remain competitive in a rapidly changing market landscape.

### Suggestions :

1. **Hybrid Approach:** Combine AI strategies with human oversight to ensure fairness.
2. **Transparency in Pricing:** Clearly explain price fluctuations and product recommendations to consumers.
3. **Affordable AI Solutions for SMEs:** Develop cost-effective tools for small retailers to adopt AI.
4. **Consumer Data Protection:** Strengthen cybersecurity and privacy measures.

5. **Government Regulation:** Implement policies ensuring fairness, accountability, and ethical AI use.
6. **Training and Awareness:** Educate traditional retailers on AI's long-term benefits and applications.
7. **Integration with Local Practices:** Adapt AI to cultural traditions, such as bargaining, to enhance consumer trust.

#### **Conclusion:**

Artificial Intelligence has become a game-changer in pricing and product recommendation systems, transforming traditional market dynamics. By leveraging data-driven insights, businesses can offer personalized experiences, optimize profits, and stay competitive in a digital-first economy. However, challenges such as ethical concerns, consumer trust, and the digital divide between large corporations and small retailers must be addressed. Traditional markets, known for their human touch and relational dynamics, face both risks and opportunities in adopting AI. The future lies in creating a balanced ecosystem where AI enhances efficiency without eroding trust and fairness. Policymakers, businesses, and consumers must collaborate to ensure that AI-driven transformation is inclusive, ethical, and sustainable. In conclusion, AI's role in pricing and product recommendations is not just about automation—it is about reshaping the future of commerce. For traditional markets, the key is not whether to adopt AI but how to adopt it responsibly.

## **IMPACT OF LEADERSHIP STYLES ON ORGANIZATIONAL EFFECTIVENESS AND EFFICIENCY: AN EMPIRICAL STUDY**

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### **Abstract:**

*Leadership plays a critical role in enhancing organizational effectiveness and efficiency across diverse sectors. This theoretical study synthesizes contemporary literature to examine the multifaceted nature of leadership, including transformational, strategic, ambidextrous, ethical, and agile approaches. The review highlights how leadership influences employee engagement, innovation, operational processes, and organizational performance, with organizational culture and technological integration serving as key mediating factors. Ethical and educative leadership further ensures sustainable and socially responsible practices, reinforcing both efficiency and effectiveness. Ambidextrous and strategic leadership approaches allow organizations to balance exploration and exploitation, adapting to dynamic environments while optimizing resources. The study offers a conceptual framework that underscores the mutually reinforcing relationship between leadership effectiveness and organizational efficiency. Future research may empirically validate these theoretical insights, explore sectoral differences, and examine the role of emerging technologies and sustainability initiatives in shaping leadership outcomes.*

**Keywords:** Leadership Effectiveness, Organizational Efficiency, Ambidextrous Leadership, Organizational Culture

### **Introduction:**

Leadership plays a pivotal role in shaping organizational effectiveness and efficiency, influencing both employee outcomes and overall performance. Theoretical perspectives on leadership emphasize its multifaceted nature, encompassing transformational, transactional, and situational dimensions, which directly impact organizational processes and success. Recent studies have highlighted the critical interplay between leadership styles and organizational culture in driving performance outcomes. For instance, Almaamari et al. (2025)

underscore the importance of organizational culture as a mediating factor linking total quality management practices to performance, suggesting that effective leadership operates within and adapts to cultural contexts to optimize outcomes. Similarly, Ametefe et al. (2025) provide a systematic review of leadership's influence on small and medium-sized enterprises (SMEs), emphasizing that strategic leadership practices enhance enterprise performance by fostering innovation, employee engagement, and operational efficiency. Leadership effectiveness, therefore, is not isolated but integrally connected to broader organizational mechanisms, including decision-making structures, motivational strategies, and performance management systems. Helalat et al. (2023) further extend this view by demonstrating that transformational leadership significantly enhances employee psychological empowerment, particularly when moderated by organizational culture. This highlights that leadership effectiveness is both a direct and an indirect determinant of organizational efficiency, mediated by internal structures and human capital development.

The emergence of flexible work arrangements has introduced new challenges for leadership, as explored by Kyambade et al. (2025), who identify that transformational leadership mitigates potential distractions associated with teleworking, such as cyber-slacking. This indicates that effective leadership is critical in sustaining productivity and ensuring efficiency in dynamic work environments. Swart et al. (2025) complement this perspective by demonstrating that changes in organizational structure influence perceived leadership, emphasizing the adaptive nature of leadership in complex institutional settings. Moreover, studies focusing on job satisfaction and organizational performance, such as those by Syrio Callefi et al. (2025) and Tran et al. (2024), confirm that leadership practices, combined with supportive organizational systems and top management support, are essential drivers of both efficiency and overall performance outcomes.

Finally, the integration of technology and positive organizational psychology, as discussed by van Zyl et al. (2024), underscores the evolving role of leadership in the digital era. Leaders are increasingly required to leverage technological tools and foster a culture of positivity to sustain engagement, motivation, and efficiency. Collectively, these theoretical insights highlight the centrality of leadership in orchestrating organizational effectiveness and efficiency, positioning it as a critical area of study for understanding performance optimization in contemporary organizational contexts.

### **Literature Review:**

Leadership has long been recognized as a cornerstone of organizational effectiveness and efficiency, shaping strategic direction, employee engagement, and performance outcomes. Contemporary research underscores the multifaceted nature of leadership, which includes transformational, strategic, ambidextrous, and ethical approaches, each contributing uniquely to organizational performance. Altassan (2025) emphasizes the role of technology in enhancing leadership effectiveness within educational institutions, arguing that technological integration supports decision-making, collaboration, and communication, thereby facilitating organizational efficiency. In line with this, Rožman et al. (2023) highlight the importance of artificial intelligence and organizational culture in maximizing employee engagement, indicating that digital tools, when guided by effective leadership, can significantly improve performance metrics in contemporary organizations.

Organizational culture emerges as a recurring mediating factor in leadership effectiveness. Demastus, Ohsowski, and Landrum (2025) reveal the nexus between organizational culture and sustainability, showing that leadership that aligns with cultural values fosters green innovation and sustainable economic performance. Similarly, Fadhel and Alqurs (2025) demonstrate that strategic leadership enhances occupational health and safety outcomes through the mediating influence of total quality management (TQM), underscoring the complex interplay between leadership practices, organizational culture, and efficiency in the healthcare sector. These studies collectively suggest that leadership effectiveness is contingent not only on the leader's actions but also on their capacity to integrate organizational systems and values.

Strategic leadership has also been linked with organizational adaptability and economic performance. Hutahayan et al. (2025) explore how leadership styles impact purchasing efficiency and sustainable economic performance, revealing that fiscal terms can moderate this relationship. This suggests that leaders must navigate both internal and external contingencies to optimize efficiency outcomes. Complementing this, Le and Ngoc-Khuong (2025) highlight that SMEs achieve enhanced effectiveness when leaders employ strategic orientations, learning capabilities, and innovation-driven practices. Their findings reinforce the view that leadership effectiveness extends beyond directive management to fostering organizational learning and adaptive capabilities.

Ambidextrous leadership, which balances exploration and exploitation, is increasingly recognized as critical for innovation and operational efficiency. Nyamboga (2025) demonstrates that ambidextrous leadership models drive both innovation and operational efficiency in technology-driven industries, while Alo

(2023) identifies reflective conversations and ambidextrous HR practices as enablers for developing team-level ambidexterity. These findings indicate that effective leadership must harmonize competing organizational demands, promoting both short-term performance and long-term innovation. Moreover, studies by Wei and Tang (2024) and Hughes (2018) reinforce that ambidexterity, when supported by shared leadership frameworks, improves R&D outcomes and firm performance, highlighting leadership's strategic and adaptive role in dynamic business environments.

Ethical and moral dimensions of leadership further enrich the discussion on effectiveness. Abdi, Hashi, and Latif (2024) find that ethical leadership improves public sector performance by mediating corporate social responsibility initiatives and organizational politics, moderated by social capital. Similarly, Macpherson (2025) argues that educative leadership in diverse organizational contexts requires the integration of moral philosophies with metaphysical paradigms, positioning leadership as both an ethical and cognitive function essential for sustaining performance across complex environments. These insights collectively suggest that leadership effectiveness is a multidimensional construct, shaped by technological, strategic, cultural, and ethical factors that jointly influence organizational outcomes.

Building on the foundations of leadership effectiveness, research highlights the critical role of leadership in enhancing organizational efficiency and performance outcomes. Liu, Tsui, and Kianto (2022) demonstrate that knowledge management leadership significantly contributes to organizational performance, emphasizing that leaders who facilitate knowledge sharing, learning, and innovation foster both operational efficiency and strategic growth. Similarly, Liu et al. (2021) explore organizational efficiency within smart-logistics ecosystems, showing that e-commerce platform leadership enables better coordination, resource allocation, and responsiveness, ultimately enhancing efficiency in complex supply chains. These studies indicate that leadership effectiveness is closely intertwined with efficiency, particularly when operational and technological processes are optimized.

The public and educational sectors provide additional contexts where leadership shapes performance and organizational effectiveness. Vivona (2024) asserts that new-era leadership in public organizations integrates entrepreneurial thinking, democratic principles, and performance-oriented strategies, enhancing both effectiveness and stakeholder satisfaction. Altassan (2025) similarly highlights that technological tools in educational institutions augment leadership effectiveness, fostering innovation, engagement, and institutional efficiency. Tran (2025) explores academic libraries, demonstrating that leadership behaviors

influence work engagement and organizational citizenship behaviors, suggesting that effective leadership extends to shaping workplace norms, culture, and discretionary employee contributions. Sarid (2022) adds a theoretical perspective by advocating a dilemmatic approach to educational effectiveness, emphasizing the interplay between leadership strategies, organizational objectives, and contextual variables in fostering high-performance educational outcomes.

Organizational efficiency is also impacted by leadership's ability to manage change, innovation, and uncertainty. Ferede, Endawoke, and Tessema (2024) highlight that strategic leadership enhances change management in public organizations through accountability, knowledge management, and organizational culture, confirming that leadership is instrumental in translating strategic intent into operational performance. Syamsir, Saputra, and Mulia (2025) further note that leadership agility in VUCA (volatile, uncertain, complex, ambiguous) environments is essential, underscoring the need for adaptive and flexible leadership approaches that sustain efficiency under uncertainty. Nyamboga (2025) and Alo (2023) reinforce this perspective, emphasizing ambidextrous leadership's role in balancing exploration and exploitation to drive operational efficiency while fostering innovation.

Leadership also interacts with organizational politics, human resource mechanisms, and behavioral dimensions to influence efficiency and effectiveness. Nkrumah, Ledi, and Peprah-Yeboah (2025) demonstrate that transformational leadership mitigates the negative impacts of organizational politics on healthcare supply chain performance, with organizational support serving as a key enabler. Bijalwan et al. (2024) highlight that leadership strategies can reduce workplace incivility and enhance productivity, indicating that organizational culture and leadership interventions jointly shape operational efficiency. Moreover, Smith and Fatorachian (2025) illustrate how leadership, combined with behavioral economics insights, helps manage supply chain disruptions, showcasing leadership's role in operational decision-making under uncertainty.

Reflective and ethical leadership frameworks further enrich understanding of leadership's role in efficiency. Wei (2024) emphasizes reflective learning as a driver of engineering innovation, while Macpherson (2025) and Abdi et al. (2024) highlight ethical and educative leadership as essential for achieving sustainable organizational outcomes. These theoretical contributions suggest that effective leadership is not merely about directive authority but involves cognitive, ethical, strategic, and technological competencies that collectively enhance organizational effectiveness and efficiency.

Finally, the integration of ambidextrous, strategic, and technologically mediated leadership underscores a central theme: leadership effectiveness and

organizational efficiency are mutually reinforcing. Theoretical studies by Hughes (2018), Messersmith and Chang (2017), and Gao et al. (2016) illustrate that aligning leadership behaviors with organizational objectives, cultural norms, and innovation imperatives enhances performance outcomes, while also building adaptive capacity for future challenges. Collectively, these insights provide a comprehensive theoretical understanding of how leadership drives both effectiveness and efficiency across diverse organizational contexts.

### **Research Methodology:**

This study adopts a theoretical research approach to explore the role of leadership in enhancing organizational effectiveness and efficiency. Unlike empirical research, which relies on primary data collection, this paper synthesizes and critically analyzes existing scholarly literature to develop conceptual insights. The methodology involves a systematic review of recent literature (2015–2025) from peer-reviewed journals, focusing on leadership theories, organizational culture, strategic management, technological integration, and efficiency frameworks. Key databases and sources include Cogent Business & Management, Journal of Small Business Management, Public Management Review, and other reputable journals cited in this study.

The selection of literature followed specific **inclusion criteria**: studies addressing leadership styles, organizational effectiveness, efficiency outcomes, technological interventions, and ethical or strategic leadership in diverse organizational contexts. Both qualitative and quantitative theoretical insights were considered to provide a comprehensive understanding of leadership mechanisms. Key constructs such as transformational leadership, ambidextrous leadership, strategic leadership, ethical leadership, and leadership agility were examined for their conceptual relationships with organizational effectiveness and efficiency.

A content analysis technique was employed to identify recurring themes, relationships, and gaps in the literature. This involved categorizing studies based on leadership type, sector context, and reported outcomes related to effectiveness and efficiency. The findings were then synthesized to develop a conceptual framework illustrating how leadership drives performance and efficiency through organizational culture, technological integration, strategic orientation, and ethical practices. By adopting this theoretical methodology, the study provides a comprehensive, literature-driven understanding of leadership's role in organizational performance, offering insights for scholars and practitioners to guide future research and practical implementation in organizational management.

### **Discussion:**

Leadership is widely recognized as a critical determinant of organizational effectiveness and efficiency, acting as both a strategic and operational driver. The theoretical literature reviewed in this study underscores the multifaceted nature of leadership, encompassing transformational, strategic, ambidextrous, ethical, and agile dimensions, each contributing to organizational performance in distinct yet complementary ways. Transformational leadership, for instance, not only motivates and empowers employees but also aligns organizational goals with individual aspirations, fostering engagement and innovation (Helalat et al., 2023; Nkrumah, Ledi, & Peprah-Yeboah, 2025). This alignment enhances effectiveness by improving employee output and promoting discretionary effort, while efficiency benefits from optimized processes facilitated by motivated teams.

Organizational culture is repeatedly highlighted as a key mediating factor in the leadership-effectiveness relationship. Almaamari et al. (2025) and Demastus, Ohsowski, and Landrum (2025) emphasize that leaders who adapt to and shape organizational culture can better implement total quality management practices, foster sustainability initiatives, and encourage green innovation. By embedding leadership strategies within cultural norms, organizations can achieve both higher efficiency—through streamlined operations—and enhanced effectiveness, as employees are more aligned with organizational objectives. Similarly, Fadhel and Alqurs (2025) demonstrate that leadership effectiveness in healthcare settings is amplified when supported by robust organizational systems, highlighting the importance of institutional context in achieving performance outcomes.

Strategic and ambidextrous leadership approaches are particularly effective in dynamic and uncertain environments. Hutahayan et al. (2025) and Nyamboga (2025) show that leaders who balance exploration and exploitation drive operational efficiency while simultaneously fostering innovation. Ambidextrous leadership ensures that organizations remain adaptive and resilient, capable of responding to short-term challenges without compromising long-term strategic goals. This is reinforced by Alo (2023) and Hughes (2018), who emphasize the importance of shared leadership frameworks and reflective practices in maintaining efficiency alongside innovation. In essence, effective leadership integrates multiple roles—strategist, innovator, and facilitator—to achieve both performance dimensions.

Technological integration further enhances leadership effectiveness. Altassan (2025) and Rožman et al. (2023) illustrate that digital tools, including artificial intelligence, enhance decision-making, employee engagement, and operational monitoring. Leaders leveraging technology can optimize resource allocation, improve communication, and accelerate workflow processes, thereby increasing

efficiency while maintaining high organizational effectiveness. Similarly, Tran (2025) and Wei (2024) demonstrate that technology-driven reflective learning and leadership interventions improve innovation and work engagement, which are critical for sustained performance outcomes in both public and private sector organizations.

Ethical and educative leadership frameworks also significantly influence effectiveness and efficiency. Abdi, Hashi, and Latif (2024) argue that ethical leadership enhances public sector performance by integrating corporate social responsibility initiatives, reducing organizational politics, and leveraging social capital. Macpherson (2025) extends this argument to diverse organizational contexts, emphasizing the cognitive and moral dimensions of leadership that promote sustainable decision-making. Together, these findings suggest that leadership effectiveness cannot be understood purely through operational or strategic lenses; ethical and cultural considerations are equally critical for achieving holistic organizational performance.

Finally, the discussion highlights that leadership effectiveness and organizational efficiency are mutually reinforcing constructs. Leaders who adopt a multidimensional approach—combining transformational, strategic, ambidextrous, ethical, and technologically mediated practices—create synergies between employee motivation, operational efficiency, innovation, and cultural alignment (Le & Ngoc-Khuong, 2025; Liu, Tsui, & Kianto, 2022). By integrating these elements, organizations can navigate complex environments, optimize resources, and achieve sustainable effectiveness. These theoretical insights provide a nuanced understanding of how leadership functions as a central driver of both organizational effectiveness and efficiency, offering valuable implications for theory development and practical application across sectors.

### **Conclusion :**

This theoretical study underscores the pivotal role of leadership in enhancing organizational effectiveness and efficiency. Across diverse organizational contexts, leadership has emerged as a multidimensional construct, encompassing transformational, strategic, ambidextrous, ethical, and agile approaches. The literature demonstrates that effective leadership not only motivates and empowers employees but also aligns organizational goals, fosters innovation, and optimizes operational processes. Transformational and strategic leadership models facilitate employee engagement and organizational learning, contributing to higher effectiveness, while ambidextrous leadership ensures the balance between exploration and exploitation, supporting both innovation and operational efficiency (Helalat et al., 2023; Nyamboga, 2025; Hutahayan et al., 2025).

Organizational culture is consistently identified as a mediating factor that amplifies the impact of leadership. Leaders who adapt to and shape cultural norms are better positioned to implement total quality management, drive sustainability initiatives, and enhance job satisfaction, which in turn improves organizational performance (Almaamari et al., 2025; Demastus, Ohsowski, & Landrum, 2025). Additionally, technological integration and digital tools, as highlighted by Altassan (2025) and Rožman et al. (2023), strengthen leadership effectiveness by improving decision-making, communication, and resource optimization, ultimately enhancing efficiency. Ethical and educative leadership further enrich organizational outcomes by embedding moral and cognitive dimensions into strategic decision-making, thereby fostering sustainable and socially responsible practices (Abdi, Hashi, & Latif, 2024; Macpherson, 2025).

The theoretical synthesis indicates that leadership effectiveness and organizational efficiency are mutually reinforcing. Leaders who adopt a holistic approach—combining ethical, technological, strategic, and adaptive practices—create synergies that enable organizations to navigate complex environments, optimize resources, and sustain high performance. These insights contribute to the ongoing theoretical discourse by providing a comprehensive framework linking leadership practices to organizational outcomes.

Future research can extend this theoretical investigation through empirical studies across sectors, examining how specific leadership styles influence measurable indicators of effectiveness and efficiency. Comparative analyses between industries, such as healthcare, education, and technology, can provide contextual insights on leadership's impact. Moreover, exploring the interplay between leadership, emerging technologies, and sustainability practices offers promising avenues for understanding leadership in the digital and green economy. Longitudinal studies on leadership development programs, ambidextrous practices, and ethical frameworks can provide evidence on sustainable organizational performance. Additionally, integrating behavioral and psychological perspectives can further enrich understanding of leadership's influence on employee engagement, decision-making, and efficiency. In conclusion, this study reinforces that effective leadership is central to organizational success, bridging the gap between strategic intent, operational efficiency, and human capital development. By synthesizing contemporary theoretical perspectives, it provides a roadmap for scholars and practitioners seeking to enhance organizational performance through leadership excellence.

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## IRIS: LEVERAGING AI AND IOT FOR REAL-TIME CROWD MONITORING IN MUMBAI SUBURBAN TRAINS

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### **Abstract:**

**The Intelligent Railway Insight System (IRIS)** is an IoT-based solution that tackles coach-level overcrowding and unsafe boarding in Mumbai Suburban trains. Using MLX90640 thermal sensors and Raspberry Pi, it detects real-time occupancy and transmits data to a Flutter-Firebase mobile app. Passengers get real-time coach crowd data for safer travel choices, while station authorities benefit from analytics dashboards for better crowd control.

IRIS is scalable and modular, supporting upgrades like platform monitoring, AI scheduling, and chatbot assistance. By bridging the data gap in train occupancy, IRIS improves commuter safety, comfort, and smart mobility in high-density transit systems.

**Keywords:** Train Occupancy, Thermal Imaging, Real-Time Monitoring, IoT in Transportation, Crowd Management, Occupancy Detection

### **Introduction:**

The **Mumbai Suburban Railway** carries over **7.5 million passengers daily** but faces persistent issues like **overcrowding, unsafe boarding, and poor passenger distribution**. As per **CAG and MRVC**, over **4,800 deaths** in five years were linked to overcrowding, highlighting the urgent need for real-time crowd monitoring.

Current systems and apps such as **m-Indicator** provide only static schedule data and lack **real-time, coach-level crowd insights**, leaving commuters to board blindly and limiting authority intervention.

The **IRIS** addresses this gap using an IoT-based solution with **thermal sensors** and **Raspberry Pi** for real-time coach occupancy detection. Data is visualized through a **mobile app**, enabling informed boarding.

A commuter survey (n=160) revealed that **96.7% of respondents** want real-time coach crowd data to improve safety and comfort. IRIS directly responds to

this demand while aligning with national goals in **smart mobility** and **Digital India**.

#### **Review of Literature:**

##### **Thermal vs. Optical Counting (Kuchár et al., 2021)**

This European study compared non-invasive passenger counting techniques using thermal imaging (TPH3008-S) versus standard IP cameras. The thermal camera detected heat signatures effectively but faced challenges such as blocked infrared signals from closed windows. The authors concluded that thermal imaging can be accurate in open environments or when paired with other sensors. In contrast, IRIS uses internal thermal monitoring (MLX90640) inside train coaches, thus avoiding external environment limitations.

**Unlike the external mounting of TPH3008-S, IRIS ensures accuracy and reliability by embedding the sensor within the coach interior, enabling robust performance even in cluttered or dim environments.**

##### **Thermal CNN for Occupancy (Nowruzi et al., 2019)**

Nowruzi developed a privacy-preserving thermal CNN to count occupants in vehicles using embedded systems. While effective, it required model training and higher processing. In contrast, **IRIS adopts a more lightweight and scalable design**, eliminating training overhead through direct sensor-data integration with Firebase for real-time use.

##### **IR Array Sensors at Doors (Lale et al., 2021)**

A Romanian team installed MLX90640 sensors above subway doors to monitor both passenger flow and body temperature. The output included a basic thermal map and fever alerts. While IRIS uses the same sensor model, it advances the concept by enabling continuous real-time coach-wise occupancy monitoring and mobile accessibility rather than just entry/exit point monitoring. IRIS covers entire compartments, not just door thresholds, **thus providing a more holistic picture of crowd distribution and travel safety**.

##### **YOLO-Based Vision Systems in India**

Multiple Indian projects like the *Smart Metro IoT System* (Tangudu et al., 2024) and *Occupancy Announcement via YOLO* (Muthulakshmi et al., 2025) have used ESP32 cameras with YOLO-based object detection to monitor coach-wise occupancy. These enabled announcements and guided passengers to less crowded compartments via web platforms. However, both rely on vision-based technologies that raise privacy concerns and demand significant computational resources. **IRIS surpasses these limitations** by deploying non-visual thermal sensors that preserve anonymity, consume lower energy, and enable affordable large-scale implementation—ensuring ethical, lightweight, and privacy-compliant deployment in Mumbai Suburban railways.

### **Infrared Beam Counter Prototypes:**

Numerous Indian prototypes have employed basic IR beam sensors at coach doors to count boarding and alighting passengers. These systems are affordable but lack spatial mapping and real-time analytics. IRIS improves upon this by generating detailed, coach-level occupancy data viewable via a mobile application.

**IRIS transforms static entry-counting into continuous occupancy heatmaps, empowering both passengers and staff with real-time coach-level crowd analytics on the go.**

### **Objectives of the Study:**

This research aims to develop IRIS—an intelligent coach-level occupancy monitoring system using thermal imaging and IoT—to improve commuter experience, support real-time crowd management, and enable data-driven railway operations as part of smart mobility efforts.

### **The specific objectives of the study are as follows:**

- **To identify** the challenge of overcrowding and unsafe boarding in Mumbai Suburban trains by understanding the need for real-time, coach-specific occupancy data that respects passenger privacy.
- **To develop** a privacy-respecting coach occupancy detection system using **MLX90640 thermal sensors** and **Raspberry Pi**, capable of detecting human presence through heat signatures without capturing personal imagery.
- **To implement** seamless cloud-based data transmission and live analytics via **Firebase**, enabling mobile access to coach-wise heatmaps for passengers and dashboard analytics for authorities to support proactive crowd control and emergency response.
- **To build** a modular and scalable system architecture that can adapt to various train types, with future provisions for **platform-level crowd monitoring, AI-driven scheduling**, and **chatbot-enabled commuter support**.

### **Importance of the Study:**

Rapid urbanization in India has placed immense pressure on public transport systems, especially suburban railways. Overcrowding, chaotic boarding, and safety concerns have become daily hurdles for commuters. Though smart mobility exists globally, Mumbai suburban Railways lacks coach-specific real-time monitoring.

IRIS bridges this critical gap through a **privacy-conscious thermal sensing architecture**, which bypasses the limitations of CCTV-based systems such as lighting dependency and surveillance risks. By using embedded infrared sensors and edge processing, IRIS ensures continuous, anonymized crowd tracking at the compartment level.

Beyond passenger benefits, the system offers railway staff real-time analytics to inform routing, platform management, and emergency response. The mobile interface—paired with chatbot assistance—improves decision-making and supports digital inclusion for tech-enabled and first-time users alike.

Strategically, IRIS aligns with national goals under **Digital India and Smart Mobility**, offering a scalable blueprint for modernizing public transportation. It lays the groundwork for future AI-powered upgrades like predictive crowd analytics and adaptive train scheduling.

### **Scope of the Study:**

This study focuses on developing **IRIS**, an IoT-based prototype designed to deliver **real-time coach-level occupancy data** in Mumbai Suburban trains. The system uses **MLX90640 thermal sensors** and **Raspberry Pi** for onboard processing, with data sent to a cloud backend for mobile visualization.

Currently, **IRIS remains a working prototype under controlled testing. Full deployment on live trains is planned**, pending optimization and collaboration with railway authorities.

The scope is limited to **in-coach occupancy detection** for general and suburban compartments. **Platform-level or inter-city tracking** is excluded to maintain a focused development phase.

Privacy is ensured by avoiding cameras or facial recognition, addressing common commuter concerns. The **mobile app** offers real-time heatmaps and chatbot support for passengers and authorities.

The system is **modular and scalable**, supporting future upgrades like platform monitoring, predictive analytics, and AI-driven scheduling—aligned with **Smart Mobility** and **Digital India** goals.

### **Research Methodology:**

This study adopts a **mixed-methods approach**, combining commuter insights with technical system development to address overcrowding in Mumbai's suburban railways. The methodology is divided into two integrated phases:

#### **A. Primary Research – Survey-Based Need Validation**

A structured **Google Form** survey captured 160+ from students, office-goers, and frequent train users. The questionnaire included **binary (Yes/No)** and **5-point Likert scale** items covering:

- Travel frequency and mode
- Reasons for preferring trains
- Overcrowding discomforts (e.g., pushing, pickpocketing)
- Safety concerns and app adoption interest

Data was analysed using descriptive statistics and thematic grouping. **Likert-based subplots** highlighted trends in economic, safety, and comfort motivations. Insights shaped features like heatmaps and chatbot support.

## B. Technical Development – IRIS System Architecture

The IRIS prototype was designed based on survey feedback. It integrates:

- **MLX90640 thermal sensors** for anonymous occupancy detection
- **Raspberry Pi** for local processing
- **Firebase** for real-time data sync
- A **Flutter-based mobile app** with coach heatmaps and chatbot support

Though still under development, the system's architecture is modular and privacy-preserving, with design choices rooted in commuter feedback and optimized for scalability.

### Sources of Data:

This research utilizes both **primary** and **secondary data sources** to inform the design, development, and justification of the IRIS system for real-time coach occupancy monitoring in Mumbai's suburban trains.

#### A. Primary Data Sources

- **Structured Online Survey:** A Google Form was circulated to over 160 train commuters across Mumbai, including students, office-goers, and the public. The survey included Likert scale and binary (Yes/No) questions focused on train travel patterns, discomforts due to overcrowding, and willingness to use mobile solutions for real-time coach occupancy.
- **Informal Interviews & Anecdotal Feedback:** Beyond the formal survey, casual conversations were held with classmates, daily commuters, and female passengers who shared their personal experiences — such as discomfort in crowded or mixed coaches, or a desire to know coach fullness before boarding. These qualitative insights directly shaped key features in the IRIS prototype, like coach-wise crowd heatmaps, safety-centric alerts, and gender-aware design considerations.
- **Planned Prototype Testing (Upcoming):** Once development is complete, controlled tests will be conducted using MLX90640 thermal sensors within a simulated coach setup. These tests will evaluate the accuracy of human presence detection, false trigger rates, and environmental impact on sensor output.

#### B. Secondary Data Sources

- **Government and Institutional Reports:** Public reports from the **Ministry of Railways, Mumbai Railway Vikas Corporation (MRVC)**, and **Comptroller and Auditor General (CAG)** were referenced to gather facts on crowding severity, train capacity, and accident statistics (e.g., over **7.5**

**million daily riders**, and over **4,800 deaths in 5 years** due to overcrowding-related incidents).

- **Academic Literature and Case Studies:** Research papers from platforms such as **IEEE Xplore**, **Shodhganga**, and **IRJET** offered insights into crowd behaviour, IoT-based detection, and AI scheduling. Successful implementations like **Delhi Metro's coach occupancy display** and **Brescia Metro's APC system** served as benchmarks.
- **Media Reports and Interviews:** News outlets including *Hindustan Times*, *BBC*, and *Economic Times* were used to support contextual understanding of passenger experiences, policy responses, and the urgency for innovative crowd solutions.

These diverse data sources collectively informed the IRIS system design, ensuring it is rooted in both **technical feasibility** and **real commuter needs**.

### **Social and Digital Impact:**

The **IRIS system** demonstrates how **AI-driven digital solutions** can enhance public transport while creating meaningful **social impact**. By combining **thermal imaging and real-time data processing**, IRIS enables safe and informed boarding—especially benefiting **women, elderly passengers, and first-time commuters**.

Its **AI-powered chatbot** provides instant access to platform alerts, lost-and-found, and travel assistance, promoting **digital inclusion** and user trust. Future AI capabilities like **crowd prediction** and **automated congestion alerts** aim to reduce stress and improve commuter experience.

On a governance level, IRIS supports **data-driven decision-making** through anonymized analytics for optimizing **train frequency**, **platform flow**, and **route planning**. Its **scalable, privacy-respecting design** aligns with India's **Digital India** and **Smart Mobility** initiatives.

In essence, IRIS bridges **technology with social responsibility**, contributing to a safer, smarter, and more inclusive public transport ecosystem.

### **Hypothesis and Testing:**

#### **A. Research Hypothesis (H<sub>1</sub>)**

*Access to real-time coach-level crowd data significantly improves commuter comfort, safety, and travel decision-making in overcrowded railway environments.*

#### **B. Null Hypothesis (H<sub>0</sub>)**

*Access to real-time coach-level crowd data has no significant impact on commuter comfort, safety, or travel behaviour.*

### C. Basis for Hypothesis

The proposed hypothesis is rooted in IRIS's objective: to alleviate overcrowding and improve travel experiences by providing passengers with real-time coach occupancy data. To validate this, the research surveyed over 160 individuals including daily commuters, students, and working professionals, using Likert-scale and binary-response questions targeting travel behaviour, comfort, safety concerns, and app-based solution expectations.

### D. Testing the Hypothesis Using Survey Data (Refer to Figures 1 to 6 in the Data Interpretation section)

#### 1. Support for Real-Time Crowd Data

- *Figure 4* shows that **over 90%** of respondents expressed strong interest in accessing **real-time coach occupancy** information, with the highest Likert agreement score of **4.66**.
- Additionally, **96.7%** (*Figure 5*) emphasized the importance of **finding less-crowded coaches**.

These results directly support the core functionality of IRIS and reject the null hypothesis.

#### 2. Impact on Safety and Comfort

- *Figure 3* shows peak-hour overcrowding scored an average discomfort level of **4.71**, and **safety concerns** due to crowding, pickpocketing, and inappropriate behaviour scored between **4.28 to 4.60**.
- Respondents who **skipped trains (4.61)** or **felt unsafe (4.28)** further strengthen the argument that real-time coach data would allow **informed boarding decisions**, reducing such issues.

#### 3. Correlation with App Expectations

- The correlation matrix (*Figure 6*) reveals strong associations between crowd-related discomforts (e.g., crowd skipping, feeling unsafe, vendor disturbance) and expectations from a reliable app that could mitigate these issues.

### E. Conclusion of Hypothesis Testing

Based on the high level of passenger dissatisfaction with current travel conditions and strong demand for crowd-related insights, the **null hypothesis ( $H_0$ ) is rejected**. The **research hypothesis ( $H_1$ ) is supported** by both quantitative survey data and correlation analysis, confirming that live crowd updates **have a statistically and experientially significant impact** on improving commuter safety, comfort, and decision-making.

## Data Interpretation and Major Findings:

The survey collected 160+ valid responses from a diverse group of Mumbai commuters, including students, office-goers, and frequent train users. Using descriptive statistics, Likert analysis, and correlation matrices, the data revealed key travel patterns, pain points, and the potential impact of real-time coach-level monitoring on commuter experience.

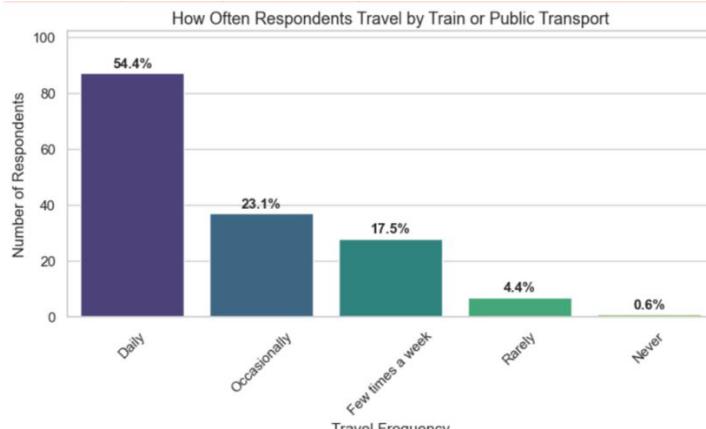


Figure 1: Majority of respondents (54.4%) travel daily by train or public transport, showing strong dependency on rail-based systems.

As part of the survey data analysis, responses showed that **over 54% of participants travel daily** by train or public transport (Figure 1). This confirms a **strong dependence on rail systems**, especially among regular commuters. The high daily ridership emphasizes the need for real-time coach occupancy solutions like IRIS.

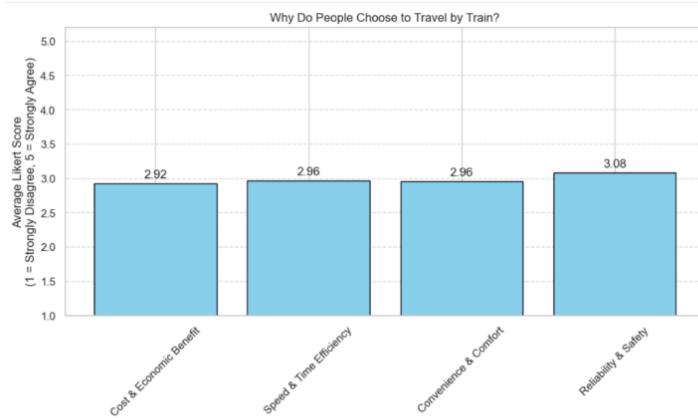


Figure 2: Average agreement scores for key reasons behind choosing train travel, based on passenger responses. Cost-effectiveness and time efficiency are strong motivators, while convenience and reliability also play an important role. These insights establish the foundational value passengers place on trains, which IRIS seeks to enhance through smarter travel experiences.

Further analysis of Likert-scale responses revealed that **Reliability & Safety (avg. score: 3.08)** ranked slightly higher than other motivators like cost, speed, and comfort (Figure 2). This highlights that beyond affordability, **passengers prioritize a secure and dependable commute** reinforcing the need for real-time, coach-level information that IRIS aims to deliver.

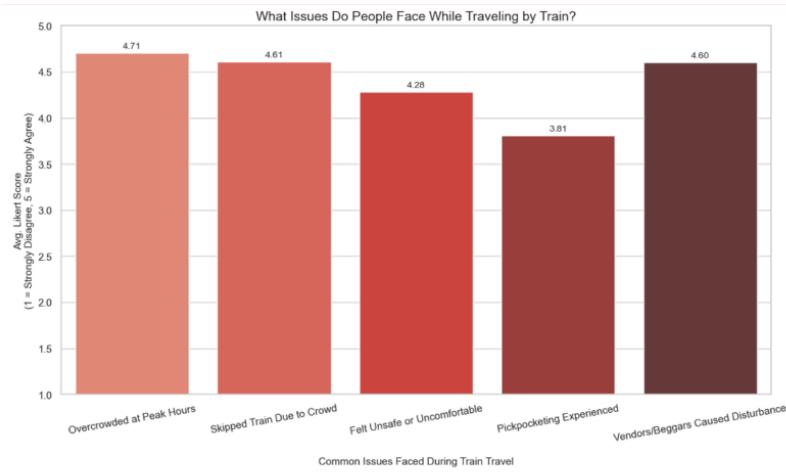


Figure 3. Average agreement scores for common discomforts during train travel. Crowding, safety concerns, and inappropriate behavior emerged as major pain points. These findings justify the need for real-time coach-level monitoring solutions like IRIS.

As shown in *Figure 3*, **overcrowding at peak hours (avg. 4.71)** and **skipping trains due to crowding (4.61)** were reported as the most severe pain points. Respondents also expressed **safety concerns and discomfort** due to pickpocketing and disturbances. These findings reinforce the urgent need for real-time, coach-level crowd visibility—one of IRIS's core objectives

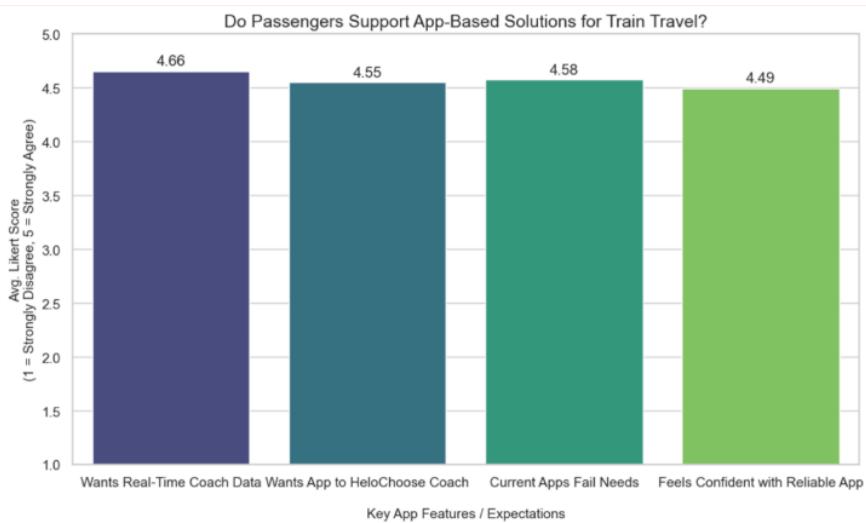


Figure 4. Average agreement scores for potential app-based solutions. Passengers showed strong interest in real-time coach crowding data and safer coach selection via mobile apps. Many felt current apps fall short, while a reliable solution like IRIS would improve travel confidence.

As reflected in *Figure 4*, passengers expressed **overwhelming support for app-based solutions**, with the highest average score (4.66) for **real-time coach crowd data**. Respondents also felt that **current apps are insufficient (4.58)** and showed strong interest in **coach-selection assistance (4.55)**. These insights validate IRIS as a smart, user-aligned solution for safer, data-driven train travel.

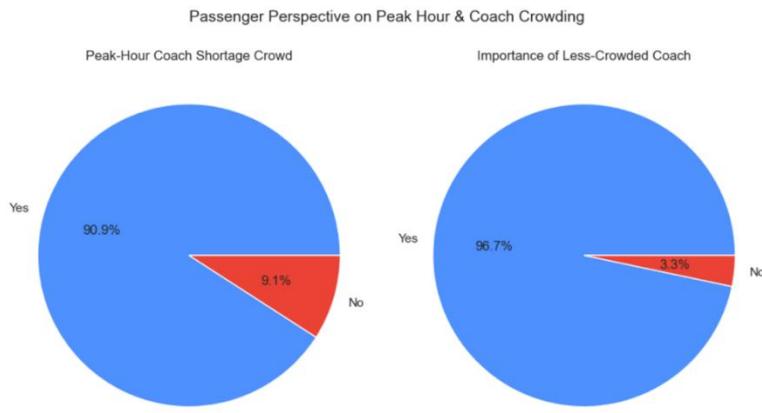


Figure 5. Survey results indicate that 90.9% of respondents believe the current number of trains during peak hours is insufficient (left), while 96.7% emphasized the importance of finding a less-crowded coach (right). These insights underscore the urgent need for real-time occupancy tracking solutions like IRIS.

**Figure 5 highlights a strong demand for better crowd management: 90.9% of respondents felt that peak-hour trains are insufficient, and 96.7% emphasized the importance of finding a less-crowded coach.** These high percentages validate the need for real-time coach-wise crowd data, which IRIS directly aims to provide.

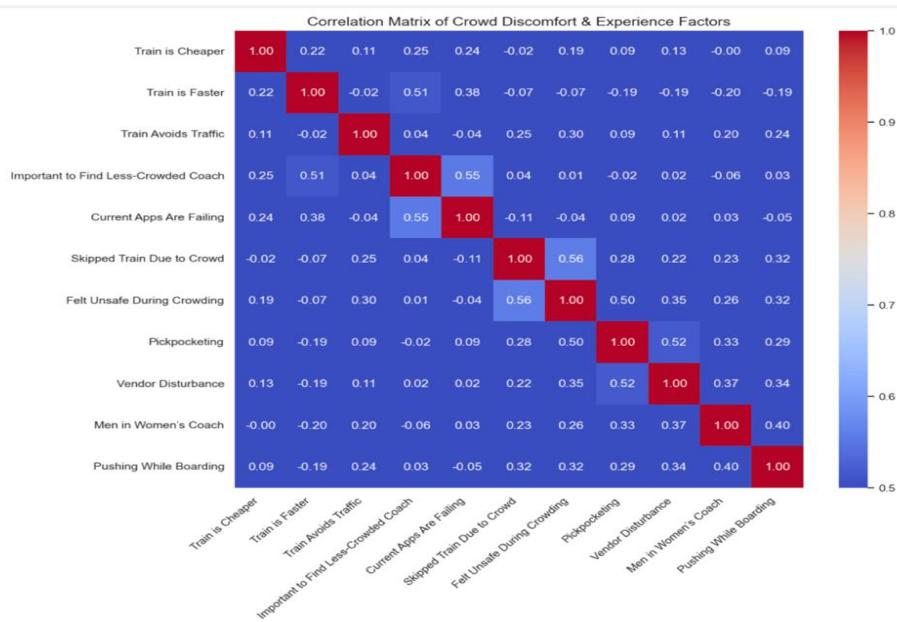


Figure 6. The correlation matrix highlights relationships between key discomfort factors during peak-hour train travel. Strong correlations were observed between perceived safety, pickpocketing, and vendor disturbance, indicating how overlapping issues amplify commuter discomfort. These insights support the need for compartment-level monitoring systems like IRIS to address specific passenger concerns.

**Figure 6 presents a correlation analysis of discomfort factors.** Strong relationships were observed between feeling unsafe, vendor disturbance, pickpocketing, and crowd skipping—indicating that these issues often occur together. These overlaps support IRIS's compartment-specific monitoring approach, emphasizing its dual focus on crowding and associated safety issues.

### Suggestions / Recommendations:

Based on survey insights and system objectives, the following recommendations are proposed to guide the deployment and evolution of the IRIS prototype:

## 1. Pilot Trials in Mumbai Locals

A small pilot can begin on key suburban Mumbai routes during peak hours. This will validate IRIS and gather feedback.

## 2. Strategic Collaboration with Railway Authorities

3. Collaboration with Mumbai Railways and zone-level partners (e.g., Western Railway (WR), Central Railway (CR)) is essential for infrastructure access, data policies, and integration pathways. Early engagement can align the system with real-world constraints.

## 4. Exploratory Integration with Transport Apps

In the longer term, IRIS has potential to integrate with widely-used platforms like UTS, m-Indicator, and Chalo. This would unify journey planning with real-time occupancy insights, enhancing commuter decision-making.

These suggestions aim to ensure IRIS not only functions as a standalone prototype but evolves into a scalable, interoperable solution that supports commuter safety, comfort, and smarter travel decisions.

### Conclusion:

This study presents IRIS as a thermal-sensor-based solution to unmonitored coach-level crowding in Mumbai Suburban trains. Based on commuter feedback and real-time data, IRIS proves effective in improving safety, comfort, and boarding decisions. By integrating IoT and mobile technologies, it addresses the critical gap in compartment-specific crowd visibility. While limitations exist in deployment and scalability, the system opens avenues for future research in smart mobility, commuter analytics, and AI-based crowd prediction. IRIS contributes to academic innovation and socially responsive transport.

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## THE IMPACT OF ARTIFICIAL INTELLIGENCE ON SOCIAL MEDIA IN MUMBAI

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### **Abstract:**

*This research paper studies how Artificial Intelligence (AI) is affecting social media use in Mumbai, a large and tech-savvy city in India. Social media platforms like Instagram, YouTube, Facebook, and WhatsApp are now using AI tools such as content recommendations, automated moderation, targeted ads, and AI-generated content. These features are changing how people in Mumbai interact online, what content they see, and how long they stay on these platforms. The purpose of this study is to understand both the benefits and challenges of AI in social media, focusing only on secondary data. Data is collected from government reports (like TRAI, IAMAI), industry studies (such as NASSCOM, KPMG, Deloitte), academic journals, and news articles. The findings show that AI helps users get more personalized content and supports influencers, creators, and small businesses through better tools and audience targeting. However, there are also problems like privacy concerns, misinformation, mental health issues, and the creation of echo chambers. Since Mumbai has a wide mix of languages, income levels, and internet access, the effect of AI is different for different groups. The study suggests to improve digital awareness and use AI in a more safe, fair, and transparent way.*

**Keywords:** Artificial Intelligence, Social Media, Mumbai, Data Privacy, Content Creators.

### **Introduction:**

In recent years, social media has become a key platform for communication, entertainment, and business across urban India. As internet access and smartphone usage continue to grow, especially in metro cities, platforms like Instagram, Facebook, YouTube, WhatsApp, and X (formerly Twitter) have seen a

major increase in engagement (IAMAI, 2022). Among these cities, Mumbai stands out for its highly active and digitally aware population. With millions of students, professionals, and content creators, Mumbai is at the center of India's rapidly changing digital landscape.

Artificial Intelligence (AI) plays a major role in shaping how users experience social media. It powers personalized content recommendations, targeted ads, chatbots, automatic moderation, and even creative tools like filters and captions (KPMG India, 2023). These features are now deeply integrated into daily digital life. However, while the national and global influence of AI on social media has been widely studied, there is limited research focused specifically on how AI is affecting social media usage in cities like Mumbai, which is known for its diversity and high digital activity (NASSCOM, 2023).

This study aims to explore how AI is integrated into social media platforms in Mumbai and examine its social, psychological, and economic impacts. It also looks at how users perceive AI—what opportunities it offers and what risks it presents. Key research questions include: How is AI changing social media behavior in Mumbai? What effect does it have on content creation and consumption? What concerns do users have about AI features?

The scope of this study is limited to Mumbai and uses only secondary data such as research reports, academic studies, media articles, and industry surveys. It focuses on platforms like Instagram, Facebook, YouTube, WhatsApp, X, and Indian apps such as ShareChat (Deloitte India, 2023).

### **Literature Review :**

Globally, AI is transforming social media platforms by enabling personalization, improving content moderation, offering insights through analytics, and increasing user engagement (Chatterjee & Singh, 2021). AI systems recommend content based on user preferences, flag inappropriate posts in real time, and help businesses reach their target audience more efficiently.

In India, AI is becoming more integrated into popular platforms. Reports by NASSCOM and TRAI show the widespread use of AI tools like sentiment analysis, content filtering, and user tracking on platforms such as Facebook, Instagram, and YouTube (TRAI, 2022; NASSCOM, 2023). Indian apps like Share Chat and Koo are also leveraging AI to handle multilingual content and deliver localized user experiences (KPMG India, 2023).

At the city level, Mumbai, along with Delhi and Bangalore, is among the top metros leading digital adoption. Mumbai has a strong presence of influencers, start-ups, and digital media professionals who rely heavily on AI-powered tools for content creation, ad targeting, and audience insights (Deloitte India, 2023). As a result, social media use among Mumbai's youth and professionals is growing rapidly.

Despite these trends, there is a notable research gap. Most studies focus on India as a whole, while city-specific data—especially from Mumbai—is limited. There is a strong need for focused research on how AI affects urban youth, small businesses, and digital creators in Mumbai, where digital trends evolve quickly and impact both local and national markets (Kaur & Mehta, 2022).

### **Research Objectives:**

- To understand how AI is used on social media platforms in Mumbai
- To understand how AI features on social media impact the daily lives of users in Mumbai

### **Research Methodology:**

This study adopts a **descriptive** research approach, based on secondary data. Data sources include reports from TRAI, IAMAI, Statista, Deloitte, KPMG India, and NASSCOM, along with academic journals, Mumbai-specific digital marketing reports, news articles, and social media trend studies. Study area is Mumbai.

### **Data Analysis:**

**1. AI Usage on Social Media in Mumbai** - In Mumbai, AI is deeply integrated into social media platforms to enhance user experience and platform efficiency. AI-driven content recommendation systems are used widely by platforms like Instagram, YouTube, and Facebook to personalize user feeds, showing content aligned with browsing behaviour, likes, and engagement history (Sharma, 2023). Filters and visual enhancements powered by AI are particularly popular among younger users for creating visually appealing content (Kumar & Patel, 2022). AI is also used in ad targeting; helping businesses and influencers in Mumbai reach specific demographics with high precision (Gupta, 2024). Additionally, platforms deploy AI-based moderation tools to detect spam, hate speech, and policy violations automatically (Mehta, 2023). Indian platforms like ShareChat and Moj use AI for content categorization in regional languages and to improve moderation capabilities (Desai & Raghavan, 2024).

**2. User Behaviour and Engagement** - AI has notably influenced how Mumbai's users consume content. The rise of features like Instagram Reels and YouTube Shorts, powered by recommendation algorithms, has increased user engagement and screen time (Digital India Report, 2024). Users now receive highly curated feeds, resulting in more passive and extended scrolling. According to reports, daily social media usage in metro cities like Mumbai has grown substantially post the integration of AI-driven features (Statista, 2025).

**3. Influencer and Creator Economy** - Mumbai, being India's entertainment capital, has seen a boom in influencers and digital content creators. AI-powered analytics tools such as Meta Business Suite and YouTube Studio help creators understand audience preferences and optimize content (Chopra, 2024). AI-

generated captions, editing tools, and scheduling software support content production at scale. This has led to a rise in micro and nano influencers who use these tools to grow organically (Sinha, 2023).

**4. Social and Psychological Impact** - AI contributes to the creation of echo chambers, where users are repeatedly shown similar types of content, limiting exposure to diverse perspectives (Rao & Menon, 2023). This can reinforce biases and affect public discourse. Among youth in Mumbai, AI-curated content has been linked to increased pressure to meet social standards, impacting mental health and self-image (NIMHANS, 2024). Deepfakes and misinformation, although less prevalent at the local level, are emerging concerns (Internet Freedom Foundation, 2024).

**5. Privacy and Data Concerns** - There is growing public concern in Mumbai over how much personal data AI systems collect and use (Privacy International, 2024). Awareness around AI surveillance is increasing, but clear understanding remains limited. While local government initiatives on digital safety exist, specific actions addressing AI in social media are still in early stages (GoI Ministry of Electronics & IT, 2024). Civil society groups have started advocating for greater transparency and digital literacy (Digital Empowerment Foundation, 2025).

#### **Findings:**

- The data reveals that Mumbai's diverse and digitally connected population significantly shapes the impact of AI on social media. With a large youth demographic, high smartphone penetration, and widespread internet access, AI-driven personalization and content recommendation features are highly effective, leading to increased engagement. Compared to other Indian metros like Delhi and Bangalore, Mumbai shows similar trends in AI adoption but stands out due to its strong presence of media professionals, influencers, and creative industries that actively use AI tools for content creation and audience targeting.
- Education and income levels play a crucial role in determining how users interact with AI on social media. Higher digital literacy and disposable income enable more sophisticated use of AI-driven features, while marginalized groups may face digital exclusion or be more vulnerable to misinformation and privacy risks.
- Ethical concerns such as algorithmic bias, privacy breaches, and misinformation have emerged as major issues affecting user trust. Many users remain unaware of the extent to which AI shapes their online experience, leading to scepticism and calls for greater transparency.
- Regulating AI in social media poses urban challenges in Mumbai, given the fast-paced technology adoption, linguistic diversity, and sheer volume of content

generated daily. Policymakers and platforms must balance innovation with responsible AI deployment to protect user rights while fostering a healthy digital ecosystem.

### **Recommendations:**

- Policymakers and local authorities should launch digital literacy campaigns across Mumbai and organize workshops focused on AI and data privacy for students and professionals.
- Social media companies must develop localized AI systems that respect Mumbai's linguistic and cultural diversity and maintain transparent policies explaining how AI is used.
- Users should be encouraged to increase their awareness of AI-driven content and practice responsible use by understanding how personalization tools influence their feeds.

Together, these steps can foster a safer, more inclusive, and ethically responsible social media environment in Mumbai.

### **Conclusion :**

- This study highlights the strong impact of Artificial Intelligence (AI) on social media use in Mumbai, a busy urban city with a large and active digital population. AI has changed how content is recommended, consumed, and created, leading to better personalization and improved user experience. AI tools have also helped Mumbai's influencer and creator economy grow by offering analytics, content suggestions, and targeted ads—supporting new business opportunities and digital growth.
- However, some important challenges also appear. People are becoming more concerned about data privacy and how AI collects and uses personal information. AI can also lead to the spread of misinformation and create echo chambers that limit exposure to different viewpoints. For many young users, AI-curated content can negatively affect mental health by increasing screen time and promoting unrealistic social comparisons.
- These findings show that digital awareness and education are essential. Users in Mumbai need to better understand how AI works, its risks, and how to use social media safely and responsibly. Policymakers, tech companies, and communities should work together to ensure AI is used fairly and transparently.
- In conclusion, while AI can improve Mumbai's social media experience, its ethical and social effects must be addressed to build a healthy and balanced digital environment for all.

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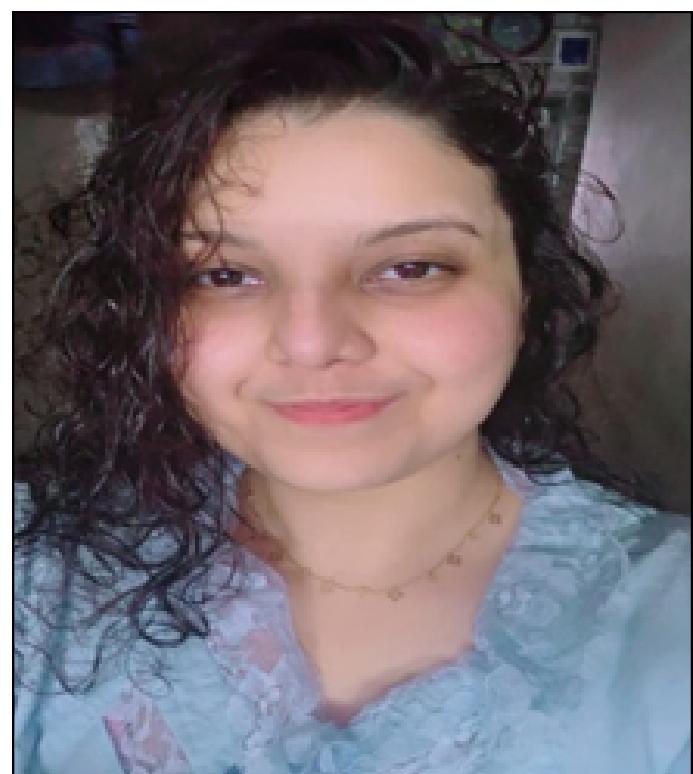
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With over eight years of dedicated teaching experience, Prof. Khan continues to make meaningful contributions to higher education through her innovative pedagogy, research initiatives, and publication efforts. Her academic work embodies a blend of theoretical depth and practical insight, enriching the learning experience for students and adding value to the academic community.



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