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SCHOOL OF COMMERCE AND MANAGEMENT STUDIES

Organizes

INTERNATIONAL CONFERENCE ON APPLICATION OF



IN BUSINESS AND TECHNOLOGY

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**INTERNATIONAL CONFERENCE ON APPLICATION
OF AI IN BUSINESS AND TECHNOLOGY (ICAIBT)**

VOLUME – II

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PREFACE

The School of Commerce and Management Studies, Annai Veilankanni's College of Arts and Science initiated to organize this International Conference **ICAIBT-2025** on Application of AI in Business and Technology. This conference aims at providing a platform to Professionals Research Scholars, Faculties and Students to share their knowledge, ideas and experience among them.

We have received more than 250 papers from Professionals, Research Scholars, Faculty members and students of reputed institutions all over the world. Among them we have selected only 190 papers for publication. The selected papers included in this volume fall under the following categories:

1. AI-Powered Personalization and Digital Marketing
2. Inventory Optimization and Autonomous Logistics
3. Block chain Integration and Smart Warehousing
4. Startup Financing and Market Penetration
5. Ethical Implications of AI in HR and Corporate Governance

We express our sincere thanks and appreciation to all the authors for contributing the papers for this conference.

Editors



Chairman

"Our intelligence is what makes us human, and AI is an extension of that quality."

– Yann LeCun

Guided by this understanding, the International Conference on the Application of Artificial Intelligence in Business and Technology stands as a testament to humanity's ability to extend its intellectual capacity through innovation. The proceedings in this volume capture the essence of this vision; documenting insightful research, thought-provoking discussions, and pioneering innovations that together reflect the power of collective exploration.

Artificial Intelligence is not merely a tool; it is a profound technological force influencing every sector from commerce to communication, from healthcare to education. Its rapid advancement has created unprecedented opportunities to enhance efficiency, foster creativity, and solve problems on a global scale.

As these articles reveal, the ideas shared at this conference have the potential to shape policy, inform industry practice, and inspire continued academic inquiry. They represent a convergence of diverse expertise united by the belief that AI, when guided by human intelligence and values, can be a force for transformative and inclusive growth.

I extend my heartfelt appreciation to all presenters, participants, and contributors for enriching this dialogue, and to the organising committee for their dedication in bringing this event to fruition. *It is my hope that these proceedings will serve not only as a record of knowledge but also as a source of inspiration; encouraging future innovations that harness AI's capabilities for the betterment of business, technology, and society as a whole.*



Vice Chairman

"Education is the foundation upon which we build our future." – **Christine Gregoire**

In the same spirit, Artificial Intelligence represents one of the most significant building blocks of our modern world, reshaping the landscape of business and technology. By integrating into diverse sectors, AI not only accelerates innovation but also equips us with new tools to address complex challenges with efficiency, precision, and vision, laying the groundwork for a smarter and more sustainable future.

The International Conference on the Application of Artificial Intelligence in Business and Technology serves as a significant platform for presenting pioneering research, exchanging interdisciplinary ideas, and fostering collaborations that will shape the future of AI-driven solutions. The diversity of perspectives represented in these proceedings reflects the depth, scope, and relevance of ongoing work in this rapidly evolving domain.

I extend my deepest appreciation to our distinguished keynote speakers, paper presenters, and participants from across the globe for their valuable contributions. I also commend the organizing team for their dedication and meticulous planning, which have made this event possible.

It is my hope that these proceedings will not only serve as a record of insightful ideas and innovative approaches but also inspire future endeavours that harness AI for the betterment of business, technology, and humanity at large.

Wishing everyone a rewarding and enriching experience.



Secretary

"We are entering a world where we will learn to coexist with AI, not as its masters, but as its collaborators." – **Mark Zuckerberg**

This sentiment reflects a profound shift in our relationship with technology. Artificial Intelligence is no longer a distant concept locked within research laboratories; it is an active partner in shaping the world we live in. From the way we communicate to how we analyse data, streamline operations, and create solutions, AI is emerging as a true collaborator that enhances human ingenuity rather than replacing it. In the realms of business and technology, this collaboration has yielded remarkable progress. AI driven systems are helping organisations operate with greater efficiency, precision, and creativity. They are uncovering insights hidden within vast datasets, enabling faster and more informed decision making, and pushing the boundaries of what we once believed was possible.

The International Conference on the Application of Artificial Intelligence in Business and Technology has provided a vital platform for examining these developments. It has brought together diverse minds from academia, industry, and research institutions to share knowledge, challenge ideas, and explore practical implementations of AI that have the potential to transform economies and societies alike.

The proceedings before you represent more than a compilation of papers. They are a collective vision of the future, shaped by rigorous research, thoughtful dialogue, and real world application. They capture the essence of collaboration between human intellect and artificial intelligence, showcasing how this partnership can solve pressing challenges and create opportunities for sustainable growth.

I extend my sincere appreciation to the scholars, professionals, and School of Commerce and Management Studies, whose dedication and expertise have made this conference a success. I am confident that the insights documented here will inspire readers, whether academics, industry professionals, or policymakers, to think boldly, act innovatively, and embrace AI as an ally in shaping the future.



Joint Secretary

"AI will enhance the ways humans experience the world." – **Jeff Bezos**

This belief finds powerful expression in the way Artificial Intelligence is shaping the future; not as a distant promise, but as a transformative presence already redefining our interactions, industries, and possibilities. Yet, the true impact of AI depends not only on the technology itself, but on the diversity of minds and the openness of collaboration that drive its development.

The International Conference on the Application of Artificial Intelligence in Business and Technology has embodied this principle, bringing together the collective wisdom of academia, industry, and research institutions. It is within such forums that bold ideas are tested, refined, and elevated, enabling AI to move beyond technical capability toward enriching human life in meaningful ways.

The range of perspectives and expertise reflected in these proceedings is both inspiring and essential. Artificial Intelligence thrives at the intersection of disciplines, where technologists, entrepreneurs, researchers, and visionaries meet to share, challenge, and expand each other's understanding. This conference has provided precisely such a meeting ground, amplifying insights and fostering collaborations that will continue to grow long after the final session has concluded.

My sincere appreciation goes to the organisers for their dedication, to the contributors for their intellectual generosity, and to the participants for their active engagement. May the work documented here serve not only as a record of ideas exchanged, but as a catalyst for further dialogue, innovative solutions, and enduring partnerships that will continue to enhance the ways humans experience the world.



Principal

"AI is going to reshape every industry and every job." – Reid Hoffman

This truth underscores the profound significance of the work captured in these proceedings. It is with great delight that I present the volume of the International Conference on the Application of Artificial Intelligence in Business and Technology; a collection that reflects the innovative spirit, scholarly rigour, and forward-looking vision required to navigate AI's transformative role in contemporary business and technological landscapes.

The papers compiled here reveal a remarkable breadth of perspectives, methodologies, and applications. They illustrate the dynamic interplay between artificial intelligence and diverse sectors, showing how AI is not only redefining workflows and decision-making but also opening entirely new frontiers of possibility. Together, these contributions enrich academic discourse and offer insights that can shape real-world strategies, inform policy, and drive technological progress.

The successful organisation and publication of this conference proceeding stand as a testament to the dedication of the organising committee, the diligence of peer reviewers, and the commitment of contributing authors. Their efforts to uphold quality, relevance, and accessibility in research are essential to fostering meaningful advancements in this rapidly evolving field.

I trust that the findings and discussions documented in these pages will inspire continued research, encourage collaborative innovation, and support the sustainable growth of businesses and technologies worldwide. My sincere congratulations go to all authors and participants for their valuable contributions, and my gratitude to everyone who made this conference a vibrant and impactful platform for intellectual exchange.



Mr. Chozha Naachiar Rajasekar

President, The Tamil Chamber of Commerce

National Executive Committee Member, FICCI

Management Committee Member, ASSOCHAM

Executive Committee Member, ICC

"The best way to predict the future is to create it." – Peter Drucker

It gives me immense pleasure to convey my warm greetings and best wishes to the organisers, participants, and contributors of the *International Conference on the Application of AI in Business and Technology*.

Artificial Intelligence is rapidly transforming the global economic and industrial landscape. Its applications across diverse sectors are creating new opportunities, enhancing efficiency, and redefining the ways in which businesses operate and societies progress. At this crucial juncture, platforms such as this conference play a vital role in bringing together thought leaders, scholars, industry experts, and policymakers to share knowledge, ideas, and innovative solutions.

I firmly believe that the proceedings of this conference will serve as a valuable source of insight, not only for the academic and research community but also for industry and commerce. The exchange of perspectives documented here will inspire new collaborations and guide the responsible and impactful adoption of Artificial Intelligence in business and technology.



Dr. R. Ramanan, M.Sc., M.Phil., Ph.D., FSMS

“Tamil Nadu Scientist Awardee”

Joint Director (P&D) (Retd),

Directorate of Collegiate Education

Chennai, Tamilnadu

"Research is creating new knowledge." – **Neil Armstrong**

It gives me immense pleasure to extend my warm wishes to the organisers, participants, and contributors of the International Conference on the Application of AI in Business and Technology. Artificial Intelligence has emerged as one of the most powerful drivers of innovation in the 21st century. Its impact is being felt across every sphere of life; reshaping industries, redefining education, revolutionising research, and offering transformative solutions to challenges once considered insurmountable. In the domains of business and technology, AI holds the promise of greater efficiency, creativity, and sustainability, making this conference both timely and highly relevant. I am confident that the deliberations, research papers, and discussions compiled in these proceedings will serve as a valuable resource for academicians, researchers, industry professionals, and policymakers alike. The exchange of ideas and collaborative spirit reflected here will no doubt pave the way for further advancements and meaningful applications of AI for societal growth. I wholeheartedly congratulate the organisers for their vision and tireless efforts in bringing together such a distinguished gathering. I also commend the authors and participants for their invaluable contributions, which will continue to inspire innovation and inquiry in this exciting field. I extend my best wishes for the continued success of this conference and for the impactful journey of Artificial Intelligence in shaping the future of business, technology, and society.



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Strategic Applications of Artificial Intelligence in Modern Business and Technology Environments

Distinguished guests, esteemed colleagues, and bright minds of the School of Commerce and Management Studies, Annai Veilankanni's College of Arts and Science.

It is my pleasure to address you at this important point when the world of business and the world of artificial intelligence converge. The theme 'Application of AI in Business and Technology' is not just a topical one; it is absolutely necessary in view of the paradigm shift that the technology is bringing, completely transforming the way businesses are run and changing economic landscapes. Artificial intelligence is no longer a science fiction idea anymore; it is the very construction of the modern trade with innovation, which questions the traditional principles of business in the world and creates new paradigms of the functioning of companies, marketing and structure.

According to Grand View Research, the global e-commerce market was valued at approximately \$25.93 trillion in 2023 and is projected to reach \$83.26 trillion by 2030, representing a compound annual growth rate (CAGR) of 18.9% from 2024 to 2030. The lightning-fast pace of machine learning, deep learning, and neural networks has revolutionized data processing by allowing companies to draw actionable information out of datasets reaching exabytes in scale at speeds that in the past would have been deemed as unachievable. The economic effects of AI are however far more than a more efficient rate of calculation; the disruptive potential poses an existential threat to the paradigm of whole industries. McKinsey estimates that AI could contribute up to \$13 trillion to global economic output by 2030. Indeed, adoption has developed not only into a luxury but also into a necessity since it is currently a precondition to the competitiveness of any business in the hypercompetitive global market. Organizations must thus understand both the technological mechanisms and the holistic implication that AI brings to the field of business, markets, and society in general.

In terms of finances, the best examples of such spaces include algorithmic trading and financial forecasting where AI leaves its mark. High-frequency trading algorithms execute trades in microseconds, with some systems achieving latencies as low as 50-100 nanoseconds. Real-time decision-making has been anchored in machine-learning models where firms are able to cope with billions of transactions daily. AI-powered fraud detection systems achieve accuracy rates of 99.5% while reducing false positives by 70%. The advantages of the financial institutions that implement the AI-driven algorithms are unique: JPMorgan's COIN platform reduces document review time from 360,000 hours to seconds, while AI trading systems generate 10-15% higher returns than traditional methods. AI is also significant in regulatory technology as automated compliance systems reduce regulatory reporting costs by 30-50% and processing time by 80%.

Not less significant is the impact of AI on supply chain management. Machine learning algorithms improve demand forecasting accuracy by 20-50%, with companies like Walmart reducing forecast errors by 25%. The precision of advanced demand-prediction procedures provides management with more accuracy than traditional methods, resulting in 10-20% reduction in inventory costs and 65% decrease in stockouts. Machine-learning algorithms also increase responsiveness because historical patterns are learned and processes are adjusted on the fly. Amazon's supply chain AI processes over 5 billion data points daily, enabling 30% faster delivery times and 15% cost reduction. Companies that have implemented the end-to-end supply-chain AI have reported significant savings in their logistics, with DHL achieving 30% improvement in route optimization and UPS saving \$400 million annually through AI-driven logistics.

Healthcare sector applications highlight AI's ability to transcend diagnostic capabilities. Google's DeepMind AI achieves 94% accuracy in eye disease diagnosis compared to 65-85% for human specialists. Whereas diagnostic algorithms make possible the detection of conditions like cancer, diabetes and cardiovascular diseases with mammography AI achieving 89% sensitivity versus 83% for human radiologists, the next frontier involves personalized treatment planning. IBM Watson for Oncology analyzes treatment options for cancer patients, with studies showing 96% concordance with oncologist recommendations in specific cancer types. Modern machine-learning models prescribe patient-specific regimens based on individual patient data, which has the potential to reduce medical errors significantly and enhance the overall quality of patient care. Clinical decision support systems reduce medication errors by 55% and improve diagnostic accuracy by 20%.

The technological landscape continues evolving with the capabilities of artificial intelligence exceeding previous limitations. Large language models like GPT-5 contain 52.5 trillion parameters and achieve human-level performance on standardized tests like the SAT (1410/1600) and the Bar Exam (90th percentile). Natural Language Processing has advanced to an extent that such models demonstrate sophisticated reasoning capabilities. Computer vision models like CLIP achieve 76.2% top-1 accuracy on ImageNet, whereas specialised medical imaging AI exceeds radiologist performance in specific tasks, achieving 94.5% accuracy for diabetic retinopathy detection. Edge AI deployment reduces latency from 100-200ms to 10-50ms while decreasing bandwidth usage by 90%, with organisations reporting substantial improvements in response times and bandwidth efficiency.

Despite these benefits, AI presents significant challenges requiring careful consideration. The proliferation of AI applications raises complex ethical and regulatory concerns, particularly regarding data privacy. Training large language models requires 10-100 petabytes of text data, raising significant privacy concerns. As AI systems require vast amounts of data to operate effectively, robust data protection measures become important.

Techniques like differential privacy add mathematical noise to datasets while maintaining utility, with Google's implementation achieving epsilon values of 0.5-2.0 for practical applications. Organizations must implement privacy-preserving technologies, such as differential privacy and federated learning, to safeguard individual rights while leveraging AI's power. Studies show that AI hiring tools exhibit 5-15% bias rates across demographic groups, as AI systems reflect the biases present in their training data, necessitating diverse development teams, rigorous testing, and ongoing monitoring to ensure equitable operation across demographic groups.

The EU AI Act, implemented in 2024, establishes the world's first comprehensive AI regulation framework, while the US is developing sector-specific guidelines. Regulatory compliance presents ongoing challenges as governments worldwide rapidly develop AI governance frameworks. The change in technology is often beyond the scope of legislation and creates precarious regulatory environments that businesses have to approach cautiously. To ensure compliance while fostering innovation, organizations must proactively develop robust governance structures and regulatory risk management systems. Adversarial attacks can reduce AI model accuracy by 10-90% depending on the attack sophistication, with cybersecurity threats co-evolving with AI capabilities. That is why thorough security procedures are necessary, including adversarial training that improves robustness by 20-40% and unique incident-response procedures.

Emerging technologies including neuromorphic computing, quantum machine learning, and multimodal AI systems that process text, images, and audio simultaneously suggest nearly inexhaustible future scope. Augmented intelligence is the purposeful combination of human ingenuity and computing capability; it is not a replacement of, but it is an augmentation of, good human judgment. Studies show human-AI collaboration improves performance by 85% compared to either humans or AI working alone. In the world of academic research, design, and strategic planning, this cooperation would be able to achieve breakthroughs we had barely dared to imagine. No-code and low-code AI platforms have grown by 750% since 2020, democratizing AI access and allowing smaller organizations to access more advanced capabilities without having specialized knowledge, thus, encouraging faster innovation and wider economic growth.

AI training consumes 0.5% of global electricity, with large models like GPT-3 requiring 1,287 MWh for training. The increased environmental awareness has resulted in the growing focus on sustainable development of AI. Energy-efficient algorithms and hardware optimizations can reduce AI computational energy consumption by 10-100x through techniques like model pruning and quantization. Green computing practices, and sustainable data infrastructure have also become the necessary elements in combating the environmental effects of AI technologies. By integrating sustainability into their AI plans, companies will be able to diminish their environmental impact and position themselves as good corporate citizens, improving brand image and building regulatory compliance at the same time.

Organizations report that 67% of AI projects fail to reach production, with data quality issues being the primary cause in 60% of failed projects. To any organization planning on the adoption of AI, a thought-out and well-organized strategy is important. Effective implementation typically starts with pilot projects, which test AI capabilities in well-understood use cases, to reduce the risk of failure whilst creating measurable stakeholder value. Companies with comprehensive AI strategies are 2.3 times more likely to achieve significant returns on AI investments. Development of the internal competencies (strategic hiring and specific training) ensures the effective management of the system, and collaboration of the academia helps to speed up the building of capabilities and provides access to the latest research. High-quality training data is essential, as models trained on clean datasets achieve 15-30% better performance than those using unprocessed data.

Development of holistic AI strategies, which are related to the overall business goals, is crucial in terms of ensuring that technology investments have been made in a way that leads to measurable value. Successful AI implementations require a 3-5 years average timeline and \$2-10 million investment for enterprise-scale deployments. These strategies must include specific use cases, success metrics, and implementation roadmaps supporting organizational goals. These plans must consider not just the technical, but the psychological and the cultural process of the adoption of the AI. Effective companies view implementation as a process of transformation in the organization, and not a technological deployment.

AI represents both transformative opportunity and complex challenge. When organizations adopt it strategically, rewards will be experienced in terms of increased efficiency, innovation and competitive advantage. Early AI adopters achieve 6.7% higher revenue growth and 11.5% higher profitability compared to non-adopters. Nevertheless, they do not come without their price: ethical practices related to AI, compliance with regulations and the creation of internal competencies are all valuable. The future of AI in business is not about technological advancement; it is about the responsible application of those capabilities to the generation of organizational and societal value.

Being the keepers of this technological revolution, we should not only use AI in productive ways, but also connect the development to the economic and social progress. The convergence of artificial intelligence with business innovation promises extraordinary opportunities for those prepared to embrace transformation with wisdom, purpose, and determination to leverage AI's capabilities for sustainable growth, enhanced human potential, and positive societal impact.



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I thank the organizers for inviting me. I am grateful to the Chief Patrons, Patron, Principal, Dean, Organising Secretary, the Organising Committee, and all delegates for giving me this opportunity. I hope my thoughts today inspire you to explore the possibilities of next-generation AI in your businesses and careers.

Next-Gen AI Technologies Shaping Business

Good morning, Respected Chief Patrons, Patron, Principal, Dean, Organising Secretary, Members of the Organising Committee, distinguished delegates, and dear friends. It is a privilege and an honor to be here today to speak on a topic that is shaping the future of business across the globe Next-Generation Artificial Intelligence Technologies and their impact on business. We live in an era of unprecedented technological change. Artificial Intelligence, or AI, is no longer confined to laboratories or academic research. It is now deeply embedded in our daily lives, businesses, and industries. Across the world, from Silicon Valley to Tokyo, from London to Singapore, AI is driving transformation. In the global business landscape, organizations are adopting AI to improve efficiency, enhance customer experience, innovate products, and remain competitive. Today, I will explore next-generation AI technologies, their applications across industries, global trends, challenges, and how organizations worldwide can harness AI for sustainable growth.

What is Next-Generation AI?

AI has been evolving for decades. Early AI systems were rule-based, capable of performing repetitive tasks, and limited in scope. Today, next-generation AI is vastly more powerful. It can learn from data, adapt to new conditions, generate content, and support complex decision-making.

Some of the most notable next-generation AI technologies include:

1. **Generative AI** – AI capable of creating content such as text, images, music, and video. It is redefining marketing, entertainment, education, and product design globally.
2. **AI in IoT (AIoT)** – AI integrated with connected devices, enabling real-time decision-making. It is transforming industries like manufacturing, logistics, and energy.
3. **Autonomous Systems** – Robots, drones, and self-driving vehicles that operate independently. These systems are used in supply chains, agriculture, and urban mobility worldwide.
4. **AI-Enhanced Analytics** – Advanced AI systems that analyze large volumes of data, predict trends, and recommend strategic actions.
5. **Edge AI** – AI that runs on devices locally rather than relying on cloud computing, enabling faster decision-making and reducing latency.

These technologies are no longer theoretical. They are being implemented across the globe, helping businesses operate more efficiently, create innovative products, and offer better services.

AI in Global Business Operations

Operations are at the heart of every business. AI is transforming how companies plan, produce, and deliver goods and services worldwide. In manufacturing, predictive maintenance is a major breakthrough. Sensors on machines collect real-time data, and AI predicts when failures are likely to occur. Companies such as Siemens in Germany, Toyota in Japan, and General Electric in the United States are using AI to reduce downtime, improve productivity, and optimize resources. Supply chain management has been revolutionized by AI. Global companies face challenges such as fluctuating demand, transportation disruptions, and rising costs. AI helps forecast demand accurately, optimize inventory, and plan logistics efficiently. For example, Amazon uses AI-driven algorithms to predict product demand, manage warehouses, and optimize delivery routes worldwide. Even quality control has become smarter with AI. Automated vision systems can detect defects in products with greater accuracy than human inspection, reducing errors and improving consistency.

AI in Marketing and Customer Experience

Marketing strategies across the world are being redefined by AI. Companies now have unprecedented access to data about customer preferences, behaviors, and trends. AI allows organizations to personalize marketing campaigns at scale. E-commerce giants like Alibaba, Amazon, and Shopify use AI to recommend products, tailor promotions, and predict customer buying patterns. Chatbots and virtual assistants are another global innovation. They provide instant support to customers 24/7, answer queries, and handle complaints. Multilingual AI systems enable businesses to cater to global audiences efficiently. Social media analytics powered by AI helps companies understand global trends, monitor sentiment, and create campaigns that resonate with customers in different regions. AI also enables predictive marketing, helping organizations anticipate customer needs and launch targeted campaigns.

AI in Finance and Accounting

Finance and accounting are among the most rapidly evolving sectors due to AI. In banking and finance, AI helps detect fraud in real time. Millions of transactions are monitored daily, and AI identifies suspicious patterns that could indicate fraud. AI also assists in credit scoring, loan approvals, and risk assessment, enabling financial institutions to make faster and more accurate decisions. Global financial institutions like JPMorgan Chase, HSBC, and DBS Bank are leveraging AI to optimize operations, reduce costs, and improve customer service. Fintech startups across Asia, Europe, and Africa use AI to provide accessible financial services to underserved populations, including small businesses and rural communities. In accounting, AI is automating routine tasks such as bookkeeping, invoice processing, and reconciliation. It can also analyze complex financial data to detect anomalies, improving accuracy and efficiency. Predictive AI helps companies forecast revenue, manage cash flow, and plan budgets effectively. Firms like Deloitte, PwC, and KPMG are incorporating AI into auditing and advisory services, allowing accountants to focus on strategic decision-making rather than repetitive tasks.

AI in Human Resources

AI is transforming human resource management on a global scale. Recruitment is faster and more objective with AI-powered platforms that screen resumes, match skills to job requirements, and rank candidates based on suitability. AI also identifies skill gaps within organizations and suggests personalized learning and development programs. Performance evaluations are increasingly data-driven, ensuring fairer and more consistent assessments. Global corporations, from Microsoft to Unilever, are using AI to manage talent efficiently and enhance employee engagement.

AI in Healthcare

Healthcare is one of the most impactful areas for AI globally. AI helps in disease diagnosis, drug discovery, patient monitoring, and personalized treatment planning. For instance, AI systems analyze medical images to detect cancers, heart diseases, or eye disorders at an early stage. Hospitals in the United States, Europe, and Asia are deploying AI for predictive patient care, reducing hospital stays, and improving treatment outcomes. AI-driven telemedicine platforms are expanding access to healthcare in remote areas. Patients in underserved regions can consult doctors virtually, with AI supporting diagnosis and treatment recommendations.

AI in Supply Chains and Logistics

Global supply chains have become more complex than ever. AI helps companies predict disruptions, optimize routes, and improve delivery efficiency. For example, DHL and FedEx use AI to optimize logistics operations, reducing fuel costs and delivery times. AI also helps companies anticipate demand spikes, manage inventory, and coordinate international shipments more effectively. Autonomous delivery drones and vehicles are being piloted in several countries, showing the potential for faster and more reliable delivery systems.

Challenges of AI Adoption Globally

Despite its benefits, AI adoption comes with challenges: first is Data Quality and Privacy: AI systems require accurate, high-quality data. Organizations must also ensure data privacy and comply with global regulations such as GDPR. Second is Infrastructure: AI often requires significant computing power and reliable internet connectivity, which may be limited in some regions. 3rd one is Skills and Talent: There is a global shortage of skilled AI professionals. Continuous training and collaboration with educational institutions are essential. 4th one is Ethical Concerns: AI systems can unintentionally perpetuate bias or make unfair decisions. Transparency, explainability, and fairness must be prioritized. The final is Cost of Implementation: AI adoption requires investment in technology, training, and process redesign. Companies must carefully assess ROI and strategic value. Addressing these challenges requires a collaborative effort between businesses, governments, and academia. Organizations must focus not only on technology but also on responsible and ethical implementation.

Future Trends in AI Worldwide

Looking ahead, AI will continue to transform global business:

- **Generative AI** will enable creative industries, product design, marketing, and education to innovate faster.
- **AI and IoT** will make cities smarter, optimize energy use, improve industrial efficiency, and enhance quality of life.

- **Edge AI** will provide faster decision-making in remote areas or devices with limited connectivity.
- **Multimodal AI** that understands text, images, and speech simultaneously will enable richer and more effective business solutions.
- **Quantum AI** has the potential to solve optimization problems that current systems cannot handle, benefiting industries such as logistics, finance, and healthcare.

In finance, accounting, and business strategy, AI will provide real-time insights, support risk management, and guide decision-making. In marketing, AI will anticipate customer needs and tailor campaigns globally. In healthcare, AI will improve diagnostics and accessibility worldwide.

How Global Businesses Can Prepare

Organizations worldwide can prepare for AI adoption by following strategic steps:

1. **Start Small:** Begin with pilot projects to test AI's impact on specific areas.
2. **Invest in Skills:** Train employees in AI, data analytics, and ethical practices.
3. **Collaborate:** Partner with technology providers, startups, and research institutions.
4. **Focus on Data:** Collect, clean, and manage data effectively for AI applications.
5. **Balance Humans and AI:** Use AI to augment human decision-making, not replace it. Collaboration is key to success.

By adopting these practices, organizations can maximize the benefits of AI while minimizing risks and challenges.

Conclusion

In conclusion, next-generation AI technologies are transforming business globally. They improve efficiency, enhance customer experience, and create new opportunities. From accounting and finance to marketing, operations, HR, healthcare, and logistics, AI is becoming a critical tool for organizations worldwide. However, responsible adoption is essential. Businesses must balance technology with ethics, skills, and strategy. Governments, academic institutions, and private organizations must collaborate to create a global AI ecosystem that is inclusive, transparent, and sustainable. I encourage businesses worldwide, large or small, to embrace AI wisely. The future belongs to those who innovate, adapt, and use technology to solve real-world challenges.

Thank you very much.



Vice Principal

"An investment in knowledge pays the best interest." – **Benjamin Franklin**

In keeping with this timeless truth, it is with immense pleasure that I present the proceedings of the International Conference on the Application of Artificial Intelligence in Business and Technology. This gathering reflects our shared commitment to advancing knowledge, fostering innovation, and encouraging collaboration in a field that is reshaping the very foundations of modern industry and society.

Artificial Intelligence has moved beyond being a specialised area of study. It is now a transformative catalyst for progress across business and technology domains. Through its integration into diverse sectors, AI creates unprecedented opportunities for efficiency, creativity, and informed decision-making. This conference has provided a dynamic platform for exchanging ground breaking ideas, presenting cutting-edge research, and exploring practical applications that address pressing real-world challenges. The diversity of minds and perspectives represented here has enriched discussions and broadened our understanding of AI's potential. The proceedings capture not only the academic rigour of the contributions but also the collaborative spirit that makes innovation possible. They stand as a testament to what can be achieved when imagination meets opportunity and when curiosity is channelled into purposeful action.

I extend my sincere appreciation to our distinguished speakers, presenters, participants, and the organising committee for their invaluable contributions and dedication in making this event a success. May the insights and ideas documented in these pages inspire continued exploration, bold thinking, and partnerships that harness AI for sustainable, inclusive, and impactful growth.

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101. A STUDY ON THE IMPACT OF AI MARKETING TRENDS ON BEHAVIOUR OF ONLINE CONSUMERS

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ABSTRACT

Consumer Behaviour from historical perspectives to the present day, with a particular focus on the transformative role of Artificial Intelligence (AI) in shaping consumer decisions. AI technologies such as machine learning, predictive analytics, and personalized marketing have revolutionized the way businesses understand and influence consumer behaviour. The profound impact of AI on consumer decision-making processes, from enhancing information searches to streamlining purchases and fostering post-purchase engagement. Additionally, the research addresses ethical considerations related to privacy, manipulation, and bias in AI-driven marketing strategies. The findings suggest that AI not only enhances the precision and effectiveness of marketing efforts but also fundamentally alters the consumer-brand relationship, presenting both opportunities and challenges. The chapter concludes with a discussion on the future trajectory of AI in marketing and its potential long-term effects on consumer behaviour. The chapter highlights how AI-powered consumer insights are transforming modern marketing, enhancing customer engagement, and driving better business outcomes.

Keywords: Online Consumers, Consumer Behaviour, Artificial Intelligence and Marketing Strategies.

INTRODUCTION

The study of AI consumer behaviour has revolutionized marketing activities for diversified industries through establishing the Insight Equation as an indispensable source, aiding in changing consumer interaction and transforming experiences, AI continues to empower e-commerce, healthcare, and more through consumer insights, perfect targeting, and boosting customer satisfaction. AI really improve targeting accuracy and, subsequently, enhance customer satisfaction through relevant content and experiences. This insight across numerous digital touch points allows AI systems to recognize patterns from diverse datasets that heretofore were difficult to unearth in complicated consumer behaviour, and this is redrawing the contours of modern marketing: making it more efficient and customer-centric. Marketing strategies can be adjusted in real-time while knowing the potential needs of

consumers through artificial intelligence, as well as more personalized interaction with the customer, which results in better customer satisfaction and loyalty. Consumer behaviour is the study of how individuals make decisions to satisfy their needs and wants through the selection, purchase, use, and disposal of goods and services. This concept encompasses various psychological, social, and economic factors influencing purchasing decisions, including motivations, perceptions, attitudes, cultural values, and lifestyle preferences. Understanding consumer behaviour is crucial for marketers because it helps them identify the specific needs of their target audience, predict future purchasing patterns, and tailor marketing strategies to influence buying decisions effectively. By analyzing consumer behaviour, businesses can create targeted marketing campaigns, design products that align with consumer preferences, set optimal pricing strategies, and choose the most effective distribution channels. This approach not only enhances customer satisfaction by delivering relevant products and experiences but also strengthens brand loyalty, ultimately driving profitability and competitive advantage in the market. Thus, insights into consumer behaviour are a foundational element in developing effective and responsive marketing strategies.

How AI Will Influence Consumer Behaviour

Search Engine Usage by Consumers is AI powered websites are significantly transforming buying behaviour and decision making. Consumers' spending per session has been notably increasing with these smarter platforms, which guide them through more efficient purchasing channels and reduce the chances of fatigue or distraction.

Consumer Loyalty is 49% of consumers are more likely to return to an online platform if AI is involved. AI helps match consumers with the right products, hosts, and experiences, ensuring they are satisfied and less likely to shop elsewhere next time they need something. Consumer Trust in Brands is the easiest way for brands to build trust is by providing real value in exchange for customer data. AI plays a critical role in this, as seen with platforms like Google Now, where consumers trust AI-driven products that personalize experiences and deliver substantial value.

REVIEW OF LITERATURE

AI refers to the simulation of human intelligence by machines, particularly computer systems, which can perform tasks that typically require human cognitive abilities, such as learning, reasoning, problem-solving, and decision-making. In marketing, AI has emerged as a transformative force, reshaping how brands understand, engage, and retain their customers. AI algorithms can process vast amounts of data, detect patterns, and provide actionable insights far beyond human capabilities, making it possible to personalize marketing strategies

at an unprecedented scale. The role of AI in marketing is rapidly expanding, driven by the growing demand for personalized consumer experiences and the accessibility of advanced data analytics tools. AI applications in marketing include predictive analytics, customer segmentation, automated content creation, chat bots, and recommendation engines, each allowing marketers to optimize customer engagement, tailor product suggestions, and respond to consumer inquiries in real time (Kaplan, 2019).

CONCEPTUAL FRAME WORKS

This chapter is explained the AI marketing trends on behaviour of online consumers with four important components artificial intelligence marketing, influencer marketing, social medium marketing and partnership marketing. The conceptual frame works is essential in AI marketing trends. The results demonstrate how AI enhances consumer experiences by streamlining decision-making and personalizing purchasing experiences. The report does point out a research void on the ethical facets of AI, including cyber security, trust, and data privacy. Businesses are encouraged to implement ethical standards in order to gain the trust of consumers as AI handles increasingly sensitive data. The study emphasizes how investments in AI can improve marketing plans and provide a competitive edge.

ANALYSIS AND INTERPRETATION

In this chapter presents graphical representation of AI Marketing trends on behaviour of online consumers. The demographic profile of online consumers, gender of the respondents, age of the respondents, educational qualification of the respondents, occupation of the respondents, monthly income of the respondents ,marital status of the respondents and the reason for preferring online purchase.

FINDINGS AND SUGGESTIONS

- The study concludes that maximum of the online consumers are males.
- The study concludes that maximum of the online consumers are less than 25 years.
- The study concludes that maximum of the online consumers are working in private organization.
- The study concludes that maximum of the online consumers earn a monthly income Rs.50001 to Rs.75000.
- The study concludes that maximum of the online customers are married.
- The study concludes that maximum of the online customers live in nuclear family
- The study concludes that maximum of the online customers have only one dependents.

- The study concludes that maximum of the online consumers predict online purchase is challenging.
- The study concludes that maximum of the online consumers predict online purchase is challenging.

CONCLUSION

In conclusion, artificial intelligence has revolutionized the way e-commerce businesses predict and respond to consumer behaviour and market trends. By leveraging vast datasets and sophisticated algorithms, AI enables retailers to make more accurate forecasts, personalize customer experiences, optimize inventory management, and enhance marketing efforts. As technology continues to advance, the role of AI in e-commerce will only become more prominent. Businesses that embrace this technology responsibly and strategically will be better positioned to meet the evolving needs of consumers and thrive in an increasingly competitive online marketplace. . The chapter concludes with a discussion on the future trajectory of AI in marketing and its potential long-term effects on consumer behaviour. The chapter highlights how AI-powered consumer insights are transforming modern marketing, enhancing customer engagement, and driving better business outcomes.

102. ETHICAL IMPLICATION OF AI IN HR AND CORPORATE GOVERNANCE

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Introduction:

Artificial Intelligence (AI) is fundamentally transforming both human resource management (HR) and corporate governance structures worldwide. From automating recruitment to making data-driven boardroom decisions, AI enhances efficiency and insight. However, this rapid adoption brings a multitude of ethical challenges that require careful attention by organizations and regulators alike.

Ethical Implication of AI in HR:

1. Bias and Fairness

- **Algorithmic Bias:** AI systems can perpetuate or even amplify societal biases present in historical data. For example, an AI used for candidate screening may inadvertently favour one gender or ethnic group due to biased training data.
- **Fair Representation:** There is a risk that minority groups may be systematically disadvantaged if fairness is not proactively managed.

2. Privacy and Surveillance

- **Employee Monitoring:** AI can enable new levels of workforce surveillance (e.g., productivity tracking, behavioural analytics), raising concerns about employee privacy.
- **Data Security:** Handling sensitive employee information increases the risk of data breaches and misuse.

3. Transparency and Explainability

- **Opaque Decisions:** Many AI-driven HR tools, especially those using deep learning, act as “black boxes”—employees and managers may not understand how decisions are made, leading to mistrust.
- **Right to Explanation:** There is a growing call for employees to have clear explanations when decisions are made by algorithms, such as why a candidate was rejected.

4. Human Oversight and Accountability

- **Loss of Human Touch:** Over-reliance on AI may result in dehumanized HR processes. Human oversight is necessary not just for compliance, but for ethical decision-making and maintaining employee trust

Case Studies in AI Ethics for HR:

1. Recruitment and Bias Mitigation: Unilever

- Unilever uses an AI recruitment platform to screen candidates through gamified assessments and video interviews analysed by machine learning. This helped reduce recruitment time and increased hiring diversity by eliminating unconscious bias from initial screening, while maintaining transparency and fairness in candidate assessments.
- **Lesson:** Regular auditing, feedback loops, and transparent processes are essential to ensure AI does not perpetuate historical biases.

2. Organizational Diversity and Inclusive Language: T-Mobile

- T-Mobile utilized AI (Textio) to review and optimize job descriptions and recruiting emails for inclusivity. The result: 17% more women applicants and faster filling of positions, showing how AI can help organizations commit to diversity and reduce the impact of bias in language.
- **Lesson:** AI can help advance Diversity, Equity, and Inclusion (DEI) if tools and outputs are continually assessed for fairness and language neutrality.

3. AI in HR Service Delivery: Manipal Health Enterprises

- By implementing Leena AI's virtual assistant, Manipal Health Enterprises reduced new hire attrition, improved the speed of resolving HR issues, and saved over 60,000 hours for their staff. The tool automated routine HR activities while preserving direct HR-to-employee communication for sensitive topics.
- **Lesson:** AI can automate routine queries, but critical, personal HR tasks should maintain human oversight to ensure empathy and trust.

4. Employee Trust and Organizational Culture

- When HR teams overlook AI ethics, consequences include discriminatory hiring, lack of transparency in promotions, and increased attrition due to perceived dehumanization. Trust is eroded further if employees suspect constant surveillance or if AI-driven processes seem arbitrary and opaque. Open communication, reskilling programs, and human-centric policies are key to maintaining a culture of trust and engagement.

Corporate Governance and AI Ethics:

1. Strategic Governance Frameworks:

- Research shows the alignment of corporate governance structures, ethical principles, and AI applications must include roles for both boards and executive leadership. Establishing AI ethics committees, developing clear guidelines, and continuous training are recommended to ensure transparency, accountability, privacy, and inclusivity.
- KPMG Australia’s case details how their internal AI tool “KymChat” is governed by flexible guardrails shaped by both top-down directives and bottom-up experimentation. They highlight the importance of high-quality data, stakeholder engagement, and mechanisms for continuous monitoring and improvement.

2. Governance Improves Outcomes:

- Studies highlight significant benefits when AI is coupled with strong governance: companies using AI in governance saw up to 22% better decision-making efficiency, 63% improved risk identification, and a 28% reduction in compliance violations.
- **Example:** Axis Bank’s AI for real-time fraud detection reduced response time, but also raised concerns about data-driven discrimination in loan approvals. Addressing such bias requires continuous oversight and ethical vigilance in training data and algorithm deployment.

3. International Guidelines and Local Initiatives:

- Cities like Barcelona and Amsterdam use local oversight boards, algorithmic audits, appeal procedures, and transparency policies to govern AI in decision-making that affects citizens, demonstrating scalable best practices for corporate environments as well.

4. Decision-Making and Bias:

- Boardroom Decisions: AI is increasingly used for risk management, compliance, and strategic planning. Flaws or biases in AI models can lead to poor or inequitable decisions at the governance level.
- Accountability Gaps: Determining responsibility for AI-driven outcomes is complex—who is liable when an AI system makes a faulty or unethical decision?

5. Transparency and Oversight

- Algorithmic Transparency: The opacity of complex AI systems creates challenges for board oversight and regulatory compliance.

- **Ethical Oversight:** Organizations must integrate robust ethical review mechanisms (e.g., AI Ethics Committees, Chief AI Ethics Officers) to ensure alignment with corporate and societal values.

6. Data Governance and Privacy

- **Corporate Data Handling:** Large-scale use of data raises critical risks of privacy violations, unauthorized access, and potential legal liabilities.

7. Regulatory and Compliance Risks

- **Evolving Legal Standards:** The regulatory landscape (EU AI Act, OECD AI Principles) is rapidly changing, requiring organizations to adapt their governance frameworks to include ethical AI compliance.

Challenges and Strategic Recommendations:

Key Ethical Risks:

- Bias in hiring, promotion, or compensation.
- Lack of transparency in how decisions affecting livelihoods are made.
- Erosion of privacy, trust, and organizational culture if surveillance is unchecked.
- Dilution of accountability, making it unclear who is responsible for harmful AI-driven decisions.

Strategic Actions:

- Establish multidisciplinary AI ethics committees and oversight frameworks.
- Regularly audit algorithms for bias, and clearly communicate rationale behind AI-driven decisions.
- Institute human-in-the-loop policies for critical decisions.
- Prioritize data governance, privacy, and employee empowerment over mere efficiency gains.
- Foster an organizational culture where employees are informed, upskilled, and included in AI transitions.
- Align internal policies with national/international standards (like OECD AI Principles and EU AI Act).

To ensure that AI-generated content is both **comprehensive** and **engaging**, organizations should follow a set of best practices that balance advanced technology with human creativity and oversight:

1. Develop a Clear Content Strategy

- **Align with Business Goals:** Define what the content should achieve and who the target audience is.

- **Map Out Content Types:** Identify specific content formats (articles, videos, social media posts) where AI can add value.

2. Leverage AI for Data and Personalization

- **Analyse Audience Behaviour:** Use AI to track engagement, preferences, and feedback, refining content to match audience interests.
- **Personalize Output:** AI excels at segmenting audiences and generating personalized messages, boosting relevance and interaction.

3. Combine AI Automation with Human Creativity

- **Human-in-the-Loop:** Ensure human editors review AI drafts to adjust tone, ensure factual accuracy, and bring unique insights or storytelling—factors AI alone may lack.
- **Inject Emotion and Brand Voice:** AI can generate first drafts, but humans should infuse personality, emotion, and originality to make content memorable and relatable.

4. Set Clear Quality Guidelines

- **Define Standards:** Establish parameters for accuracy, relevance, clarity, and engagement as benchmarks for both AI and human content creation.
- **Fact-Check and Source:** Especially for educational or technical content, always verify facts and ensure credibility.

5. Use Creative and Detailed AI Prompts

- **Be Specific:** The more detailed your prompt to the AI (about tone, audience, purpose), the better and more aligned the content.
- **Creative Prompts:** Frame prompts in ways that encourage fresh perspectives and avoid formulaic outputs.

6. Monitor and Continuously Improve

- **Track Performance:** Use analytics to measure key metrics—time on page, social shares, conversions—and adjust strategy based on what truly engages your audience.
- **Iterate and Test:** Regularly compare AI- and human-generated content. Use A/B testing to determine what resonates best.

7. Ensure Ethical Use and Transparency

- **Avoid Plagiarism and Bias:** Routinely audit AI content for originality and fairness, ensuring it doesn't replicate biases from source data.
- **Maintain Transparency:** Be open with audiences about how AI is used in content creation when relevant or required by policy.

Example Workflow for Comprehensive & Engaging AI Content

1. **Research** audience needs and content gaps using AI-driven analytics.
2. **Plan and prompt** AI with detailed instructions aligned with brand goals.
3. **Generate content** drafts using AI.
4. **Review and enhance** drafts with human expertise—add original stories, check facts, ensure brand alignment.
5. **Publish** and **monitor** engagement, refining future prompts and strategy by learning from real audience interactions.
6. **Repeat** with ongoing oversight and updating guidelines as standards and technologies evolve.

Conclusion:

AI brings vast potential to HR and governance, but unethically designed or poorly governed systems risk entrenching biases, eroding trust, and exposing firms to regulatory and reputational fallout. Transparent, explainable, and fair AI, coupled with strong human oversight and governance, create not just a competitive advantage, but ensure organizations contribute positively to employees, stakeholders, and society at large.

103. CHEMOINFORMATICS AND ROLE OF ARTIFICIAL INTELLIGENCE IN BIOCHEMISTRY

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Abstract

Chemoinformatics and Artificial Intelligence (AI) have emerged as transformative tools in modern biochemistry, bridging computational power with molecular science. Chemoinformatics leverages algorithms, databases, and chemical representations to analyze, visualize, and predict molecular structures and interactions. AI, particularly machine learning and deep learning, accelerates tasks such as drug design, protein structure prediction, and biomarker discovery. Together, they have revolutionized biochemistry by enabling faster, cost-effective, and more accurate research processes. This paper explores the integration of chemoinformatics and AI in biochemical research, highlighting applications, methodologies, and future directions. This paper aims to:

- Examine the role of chemoinformatics in biochemical data management.
- Discuss AI-driven advancements in drug design, protein structure prediction, and metabolic analysis.
- Address challenges (data quality, ethical concerns).
- Propose future innovations (quantum computing, automated labs etc)

1. Introduction

Chemoinformatics is the application of computational techniques to solve chemical problems by storing, indexing, searching, retrieving, and applying information about chemical compounds. Artificial Intelligence (AI) refers to the simulation of human intelligence in machines, enabling them to learn and make decisions. In biochemistry, combining these disciplines allows researchers to:

- Model and simulate biochemical processes
- Predict reaction pathways
- Analyze complex molecular datasets
- Develop novel therapeutics faster than traditional methods

The advent of AI marks a revolutionary shift in drug development, offering a suite of advanced computational tools designed to augment human capabilities rather than replace them. At its core, AI leverages sophisticated algorithms for autonomous decision-making from data analysis, revolutionizing the pharmaceutical landscape. AI applications facilitate tasks such as protein-ligand docking, molecular dynamics simulations, virtual screening, and de novo drug design with unprecedented accuracy, opening new therapeutic avenues and expediting the identification of promising drug candidates. Moreover, AI's role in systems pharmacology, drug-target interaction predictions, and clinical trial design is reshaping drug development strategies. The technology assists in optimizing patient selection, monitoring patient responses in real-time and adjusting protocols to enhance trial efficiency and outcomes. However, it is crucial to navigate the integration of AI with a conscientious balance, ensuring that ethical considerations, regulatory compliance, and scientific rigor are maintained. Advocating for the prudent use of AI in Biochemistry field more particularly in pharmaceutical research, this paper emphasize AI's potential to expedite the development of life-saving medications, significantly benefiting global healthcare.

2. Core Concepts

2.1 Chemoinformatics Tools in Biochemistry

- Chemical Structure Representation: SMILES, InChI, and molecular fingerprints
- Database Management: PubChem, ChemSpider, ChEMBL
- Molecular Modeling: QSAR (Quantitative Structure–Activity Relationship), docking studies
- Data Visualization: Molecular graphs and 3D rendering

2.2 Artificial Intelligence Techniques

- Machine Learning (ML): Regression, classification for predicting chemical properties
- Deep Learning: Neural networks for molecular property prediction (e.g., DeepChem, AlphaFold for protein folding)
- Natural Language Processing (NLP): Mining chemical literature for novel insights
- Generative Models: Creating new drug molecules using GANs or variational autoencode

3. Applications in Biochemistry

3.1. Drug Discovery & Development

AI is dramatically transforming drug discovery, significantly enhancing efficiency, reducing costs, and increasing success rates. The integration of AI technologies has enabled profound transformations in pharmaceutical research by harnessing AI's exceptional

capabilities in data processing, pattern recognition, and decision-making. In the field of drug design, AI significantly enhances the identification process of viable lead compounds, markedly accelerating the drug development timeline. This advancement is achieved through AI's ability to analyze a wide array of molecular configurations and predict their potential binding affinities, streamlining the pathway from concept to clinic. The essence of drug design lies in the discovery of small molecules that fulfill a set of critical criteria. These include pharmacological efficacy, a favorable safety profile, suitable chemical and biological properties, and the innovation necessary to secure intellectual property rights for commercial viability. While computational tools have revolutionized drug design, transforming the approach to discovery, traditional methods encounter several challenges, such as extensive input time, high computational costs, and variable reliability. AI stands out as a solution capable of surmounting these challenges, enhancing the effectiveness of computational techniques in drug development.

A key application of drug design involves the study of protein structures, as many diseases are linked to protein dysfunction. Structural drug design aims to identify small molecules that can selectively interact with protein targets. Traditionally, predicting the three-dimensional (3D) structure of proteins has been both costly and time-consuming, with limited accuracy in de novo predictions of 3D structures. The advent of AI, particularly deep learning and feature extraction tools, has revolutionized this aspect of drug design. These technologies enable the precise prediction of secondary protein structures and the mapping of protein contacts, thereby improving our understanding of the relationship between structure and sequence. The ultimate goal is to harness deep learning to predict 3D protein structures with enhanced accuracy, facilitating the exploration of protein-protein interactions (PPI) and advancing the field of structural drug design. This integration of AI into drug design represents a significant leap forward, promising to improve the speed, costefficiency, and success rates of drug development initiatives.

3.2. Protein Structure Prediction

Utilizing advanced computational techniques, AI models, particularly those based on deep learning, have shown exceptional capability in identifying complex patterns in protein data. These models meticulously extract features related to amino acid properties, structural motifs, and evolutionary history, applying these insights to predict the 3D structure of proteins from their sequences. A landmark achievement in AI-driven protein structure prediction is AlphaFold by Google DeepMind. AlphaFold analyzes the distances between adjacent amino acids and the corresponding angles of peptide bonds to predict the 3D target

protein structure. In a remarkable achievement, AlphaFold accurately predicted 25 out of 43 protein structures in a recent assessment, demonstrating its potential in structure-based drug discovery. Traditional methods for determining protein structures are often resource-intensive. AI offers a faster, more cost-effective alternative, providing reliable 3D structures from sequence data. Also, AI have been exceptionally helpful in predicting the most complex protein-ligand conformations, which is to be noted as a major breakthrough.

3.3. Metabolic Pathway Analysis

3.3.1 Predicting biochemical reaction routes:

Metabolic pathway analysis in biochemistry is a powerful approach for understanding the complex networks of biochemical reactions that sustain life. With the advent of artificial intelligence (AI), this field has undergone a transformative shift, enabling researchers to model, simulate, and predict metabolic processes with unprecedented accuracy. AI algorithms, particularly machine learning and deep learning models, can process vast datasets from genomics, proteomics, and metabolomics to identify patterns and infer relationships between metabolites and enzymes. By integrating these data, AI can reconstruct metabolic networks and predict novel biochemical reaction routes, even in poorly characterized organisms. This predictive capability is crucial for applications such as drug discovery, metabolic engineering, and disease diagnosis. For instance, AI can suggest alternative pathways for synthesizing essential compounds that could be targeted for therapeutic intervention. Moreover, AI-driven tools can simulate the dynamic behavior of metabolic systems under various conditions, providing insights into cellular responses and adaptation. As AI continues to evolve, its synergy with biochemistry promises to accelerate the discovery of new metabolic pathways, enhance our understanding of cellular metabolism, and open new frontiers in synthetic biology and personalized medicine. Ultimately, AI empowers scientists to decode the biochemical language of life with greater precision and creativity than ever before.

3.3.2 Identifying enzymes for industrial biotechnology

AI plays a pivotal role in metabolic pathway analysis by identifying key enzymes that can be harnessed for industrial biochemistry applications. As already discussed in this document above, through advanced computational models, AI can analyze massive biological datasets—such as genome sequences, transcriptomics, and metabolomics—to uncover enzyme functions, predict catalytic activities, and suggest optimal candidates for specific biochemical transformations. AI helps in predicting the enzyme functionalities or characteristics and it can perform the customized enzymes reconstruction to optimize it for

Industrial Usage. For example: In bioethanol production, lignocellulosic biomass must be broken down into fermentable sugars. AI can analyze microbial genomes to identify enzymes like cellulases and hemicellulases that degrade cellulose and hemicellulose.

3.4. Toxicology & Safety Assessment

AI can offer faster, more accurate, and ethically sound alternatives to traditional methods. Conventional toxicity testing often relies on animal models and labor-intensive experiments, which are time-consuming, costly, and raise ethical concerns. AI-driven approaches, particularly machine learning and deep neural networks, can analyze vast chemical and biological datasets to predict the toxicity profiles of compounds based on their molecular structure, physicochemical properties, and biological interactions.

3.4.1 AI models to predict adverse effects of new molecules

AI models can forecast potential toxic effects—such as carcinogenicity, hepatotoxicity, or neurotoxicity—before a compound is synthesized or tested. For instance, In drug development, AI was used to predict cardiotoxicity of new molecules by analyzing historical data from failed drugs. The model identified structural motifs linked to adverse cardiac events, allowing researchers to redesign safer compounds early in the pipeline. By reducing reliance on animal testing and enhancing predictive accuracy, AI is paving the way for safer pharmaceuticals, chemicals, and consumer products.

3.4.2 QSAR-based toxicity screening

Quantitative Structure–Activity Relationship (QSAR) modeling is a computational technique used to predict the biological activity or toxicity of chemical compounds based on their molecular structure. The core idea behind QSAR is that the chemical structure of a molecule determines its biological behavior, and this relationship can be mathematically modeled to forecast the properties of new or untested compounds. Major Key Processes involved in the AI based QSAR based toxicity screening are: -

- Molecular descriptors
- Data Matrix
- Model Construction
- Validation and evaluation

Also, QSAR) models, employing ensemble techniques such as Random Forests (RF) and Support Vector Machines (SVMs), have shown exceptional accuracy and robustness in toxicity prediction, outperforming traditional methods.

4. AI Based Tools in Drug Discovery

Presently, there are various Biochem AI Tools available in the Industry to take the subject researches in drug discovery to next level. To name few of them are:-

- **AlphaFold** – A Product of DeepChem which is subsidiary of Alphabet
- **DeepChem** – Python Based AI System
- **DeepNeuralNetQSAR** - Python-based system driven by computational tools that aid detection of the molecular activity of compounds
- **ORGANIC** - A molecular generation tool to create molecules with desired properties
- **PotentialNet** - Uses NNs to predict binding affinity of ligands
- **Hit Dexter** – Machine Language technique to predict molecules which responds to biochemical assays
- **Chemputer** - To report procedure for chemical synthesis in standardized format.

5. Challenges and Limitations

5.1 Data quality and bias in chemical databases

Despite the significant promise of AI in transforming the landscape of drug discovery, Several formidable challenges remain to be addressed for its full potential to be realized. A significant challenge lies in securing data quality and accessibility. AI models are data-driven, and their effectiveness hinges on the quantity and diversity of the data they are trained on. Therefore, collaboration and initiatives for sharing data play a vital role in providing access to comprehensive and varied datasets.

5.2 Interpretability of AI “black box” models

The interpretability of AI black-box models in drug discovery is a critical and evolving concern. While these models—especially deep learning and ensemble methods—offer powerful predictive capabilities, their internal decision-making processes are often opaque, making it difficult for researchers and regulators to understand how conclusions are reached.

5.3 Ethical concerns over AI-designed bioactive compounds

The use of AI models to identify bioactive chemical compounds has raised serious ethical challenges. These challenges stem from the sensitive nature of biological data, the potential for misuse, and the opaque decision-making of many AI systems.

5.4 Need for interdisciplinary expertise

Interdisciplinary expertise is absolutely essential for applying AI in biochemistry because the complexity of biological systems demands a fusion of knowledge from multiple domains due to their Complex Biological Data, Model designing and validations, Ethical and

regulatory oversight and translational impacts. To Validate and evaluate accurately, we would atleast require: -

- **Chemists** to assess molecular feasibility.
- **Biologists** to test cellular responses.
- **Clinicians** to evaluate therapeutic relevance.
- **AI engineers** to refine model architecture and performance

6. Future Directions

AI-based biochemistry models should be **transparent, ethically governed, and scientifically validated** to ensure their responsible and effective use in life sciences. These models are transforming biochemistry by enabling rapid drug discovery, protein structure prediction, and metabolic pathway analysis—but their power comes with significant responsibilities. From the evolving AI patterns, we can visualize the following developments in near future, which may mitigate our existing challenges: -

- Integrating quantum computing with chemoinformatics
- Federated learning for privacy-preserving biochemical research
- AI-assisted automated laboratories
- Multi-omics integration (genomics, proteomics, metabolomics) for holistic biological modeling

7. Conclusion

The integration of Artificial Intelligence (AI) into drug development and discovery has marked a significant milestone in the pharmaceutical industry, demonstrating a profound influence on enhancing the quality and efficacy of therapeutic interventions. The integration of chemoinformatics and AI in biochemistry marks a paradigm shift in molecular research. From accelerating drug discovery to decoding protein structures, these technologies enhance efficiency, accuracy, and innovation in the life sciences. While challenges remain, continuous advancements in computational power, algorithms, and collaborative research will ensure their growing role in shaping the future of biochemistry. In conclusion, AI's contribution to drug development is undeniably pivotal, offering a pathway to more efficient, effective, and personalized medical treatments. As the pharmaceutical industry continues to embrace AI, overcoming its inherent challenges will be crucial in realizing its full potential, ultimately leading to groundbreaking advancements in healthcare and therapeutic discovery.

104. PREDICTION OF HEART DISEASE IN MACHINE LEARNING USING PYTHON

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Abstract:

Heart Disease also known as cardiovascular disease it is a major and leading cause of death rate worldwide is 32% of the globally death in 2022. The (CVD) is continuing now also in serious people health challenge globally. However in developing nations where rate of the rise is executed in prediction model to know the rise of population gives hope. CVD will increase up to 1.4 Million by 2050. Given the escalating impact of such conditions, accurately determining those most susceptible through early and accessible means has become urgently crucial so preventative measures can be timely applied where needed. This study proposes a heart disease prediction framework using the Python programming language and a public dataset with over 300 patient records with 15 clinical and demographic variables (e.g. age, sex, cholesterol, blood pressure, ECG results, chest pain type, maximum heart rate). The data preprocessing engaged in consisted of missing values treatment, variable cleaning, input normalization, and exploratory data analysis to yield significant predictors using correlation analysis. Two predictive models were created and evaluated for performance, Random Forest (RF) a well-known robust ensemble learning method with good interpretability and Convolutional Neural Network (CNN), which is a deep learning architecture commonly used for image processing but could be applicable to structured medical data. Both models were trained and tested using an 80-20 split. The RF model achieved an accuracy of 83.5% and the CNN model achieved an accuracy of 83.6% implying adequate similarity.

Keyword : Heart Diseases (HD), CNN, RF, Random Forest, ECG, Accuracy, Cholesterol, exploratory data, Chest Pain Type, 80-20 split, Variables.

1. Introduction:

Cardiovascular diseases (CVDs) are some of the biggest health issues worldwide. They lead to a lot of deaths and health problems. The World Health Organization (WHO) stated that CVDs are responsible for over 17 million deaths each year. This is nearly one-third of all deaths around the world. The burden of cardiovascular disease (CVD) is tremendously

increasing due to urbanization, dietary, sedentary lifestyles, tobacco use, and developing nations like India that are aging quickly. Also, CVD has a large economic cost, both direct costs related to healthcare services, indirect costs including lost productivity and lowered quality of life, and overall social cost. Timely detection and diagnosis of CVD is very important since it can increase the promise of positive health outcomes, and may lessen overall mortality. The current diagnostic methods (e.g., precision electrocardiograms (EKGs), echocardiography, angiography, blood testing), while accurate, are costly, time-consuming, and require specialists in their respective fields to interpret the findings. Such challenges of healthcare settings with limited resources and societies with limited infrastructure exacerbate this problem. Machine learning (ML) has been touted in healthcare as a transformative tool for data and understanding, enabling a review of large amounts of clinical data, find patterns, and make predictions with accuracy. ML algorithms can

2. Materials and Methods:

2.1. Parameters Description:

Dataset The dataset had the following attributes:

Age, sex, chest pain type (cp), resting blood pressure (trestbps), cholesterol level (chol), fasting blood sugar (fbs), resting ECG results (restecg), maximum heart rate achieved (thalach), exercise-induced angina (exang), oldpeak or ST depression caused by exercise, slope of the ST segment (slope), number of major vessels (ca), thalassemia (thal), and target (1 = heart disease, 0 = no disease). The dataset was split into 80% for training and 20% for testing

2.2. Dataset :

This dataset as 16 categories and 300 dataset. This dataset has male and female. Female represented as a 0 and Male represented as a 1. Example: age 63 sex – 1 that means the gender of this person male if it as 0 is a female.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	thal	target	
63	1	3	145	233	1	0	150	0	2.3	0	0	1	1	
37	1	2	130	250	0	1	187	0	3.5	0	0	2	1	
41	0	1	130	204	0	0	172	0	1.4	2	0	2	1	
56	1	1	120	236	0	1	178	0	0.8	2	0	2	1	
57	0	0	120	354	0	1	163	1	0.6	2	0	2	1	
57	1	0	140	192	0	1	148	0	0.4	1	0	1	1	
56	0	1	140	294	0	0	153	0	1.3	1	0	2	1	
44	1	1	120	263	0	1	173	0	0	2	0	3	1	
52	1	2	172	199	1	1	162	0	0.5	2	0	3	1	
57	1	2	150	168	0	1	174	0	1.6	2	0	2	1	
54	1	0	140	239	0	1	160	0	1.2	2	0	2	1	
48	0	2	130	275	0	1	139	0	0.2	2	0	2	1	
49	1	1	130	266	0	1	171	0	0.6	2	0	2	1	
64	1	3	110	211	0	0	144	1	1.8	1	0	2	1	
58	0	3	150	283	1	0	162	0	1	2	0	2	1	
50	0	2	120	219	0	1	158	0	1.6	1	0	2	1	
58	0	2	120	340	0	1	172	0	0	2	0	2	1	
66	0	3	150	226	0	1	114	0	2.6	0	0	2	1	
43	1	0	150	247	0	1	171	0	1.5	2	0	2	1	
69	0	3	140	239	0	1	151	0	1.8	2	2	2	1	
59	1	0	135	234	0	1	161	0	0.5	1	0	3	1	
44	1	2	130	233	0	1	179	1	0.4	2	0	2	1	
42	1	0	140	226	0	1	178	0	0	2	0	2	1	
61	1	2	150	243	1	1	137	1	1	1	0	2	1	
40	1	3	140	199	0	1	178	1	1.4	2	0	3	1	
71	0	1	160	302	0	1	162	0	0.4	2	2	2	1	
59	1	2	150	212	1	1	157	0	1.6	2	0	2	1	

Fig 2.2.1 Patient Dataset

3. Exploratory Data Analysis (EDA):

3.1. Gender Distribution

Gender Distribution The dataset provided detailed information on mood and attitudes about heart disease compared to gender. As shown, the percentage total (68.3% Men; 31.7% Women) throughout the previous decades were steadily high in the male population. This pie chart of the gender distribution is made with machine learning using python . The gender imbalance in the sample could imply that men are either more vulnerability to heart disease, or simply participate in more medical trials and health surveys. Perhaps the differences are contributed to by behavioral variables, which may include contextual variables of social determinants of health such as diet, occupational or economic stressors, genetic factors, or perhaps men may just be less inhibited to utilize diagnostic testing. It is important for health care professionals to recognize and identify these types of factors, so that they can respond effectively with appropriate prevention, awareness, and treatments for the different concerns of each gender. In the same way, the pie chart presents a level of information to the viewer visually that is less time consuming to consume, which is just another utility of research signals for public health.

MALE 68.3% and FEMALE 31.7%

3.2. Age Distribution:

This histogram illustrates the age distribution across the individuals in the dataset. The majority of individuals are aged from 40 – 70 years of age, with a peak around late 50's to early 60's. The age distribution indicates that the sample is made up of primarily middle aged and older adults, which is important to study heart disease by age.

3.3. Correlation Heatmap:

The heatmap of correlations helps visualize the relationships between the features of the heart disease dataset. As you can see, strong positive correlations are in red and negative correlations are in blue. The diagonal shows each variable's perfect self-correlation (since $2.0 = 2.0$). This will help you identify the patterns and what variables may be almost directly correlated to your target. And that will help you figure out which features to include in your modeling and subsequent analysis. This illustration helps you visualize multicollinearity cases - when two or more variables are related to each other that tend to diminish the model performance. By implementing these correlations, data scientists will decide which features to keep, combine or exclude. This makes the output more accurate, limits duplicated information and makes the outputs much more interpretable.

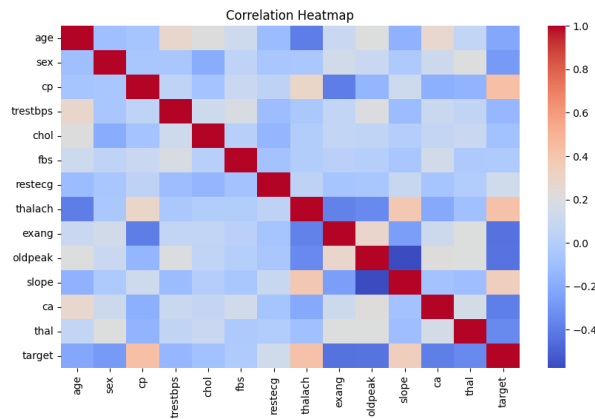
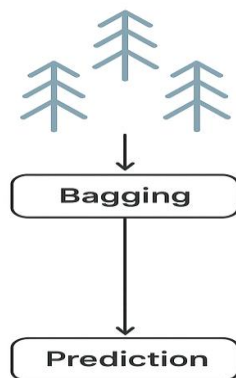


Fig 3.3.1 Correlation Heatmap

4. Implementation:

1	CNN	2	Random Forest classifier
	• Dense 64, ReLU Activation • Drop out (0.3) • Dense 32 neurons		• Bagging
	Prediction		Prediction

Random Forest Classifier



Convolutional Neural Network (adapted for tabular data)

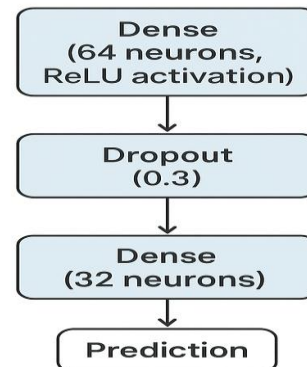


Fig 4.1 Representation of Random Forest Algorithm & CNN

5. Result and Discussion :

- Random Forest Accuracy – 83.5%
- CNN Accuracy - 83.6%

The results show very little difference in terms of accuracy, indicating both models are equally good for this dataset. RF offers greater interpretability by providing feature importance while CNN can potentially learn a much more complex interaction with features without manual feature engineering. The correlation heat map adds to the discussion on the importance of features cp, thalach, and ca, which are also fairly well-known medical characteristics in cardiology research.

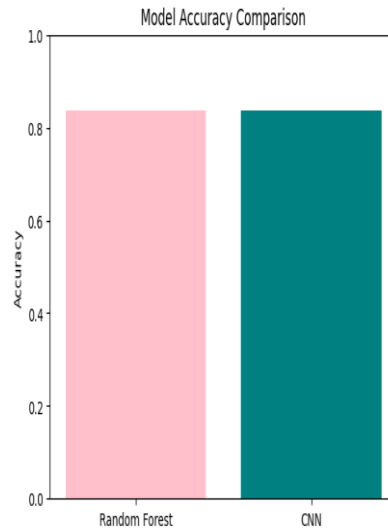


Fig 5.1 Accuracy Comparison

6. Conclusion:

This report details the ability of machine learning and deep learning models to predict heart disease using clinical and demographic information. Two models were put into action: Random Forest (RF); and, a Convolutional Neural Network (CNN), re-trained for tabular datasets, which were evaluated against previous work on a dataset of over 300 patients with 15 attributes, including: age, sex, total cholesterol (TC), diastolic blood pressure (DBP), chest pain type 1-4, and maximum heart rate (MHR). The analysis included data cleaning (removing missing values), normalizing feature values, exploratory data analysis (EDA), and using correlation analysis to determine predictors of heart disease and to uncover the hospital's strongest predictors of heart disease. The models were both trained using an 80-20 train-test scheme. The RF model had a prediction accuracy of 83.5%, and the CNN model had a prediction accuracy of 83.6%. Both models had comparable predictive performance.

The main advantage of the *Random Forest* model is its interpretability; since it gets feature (variable) importance, it allows typical clinicians to see which factors most influence predictions, leading to greater trust in AI-assisted diagnosis. This is important as well, as healthcare decision making requires justification and account giving. It is computationally efficient as well, making it easy to implement or deploy it in resource constrained settings. Although the Convolutional Neural Network's (CNN) interpretability was limited, it also allowed it to represent more complex, non-linear relationships among variables. Its marginally greater accuracy (over RF), gives some potential for complex deep learning models of health, but its black box characteristic limits clinical uptake of the technical AI capabilities, unless it is paired with explainable AI (XAI) methods.

However, since the accuracy is negligible, and for structured and, relatively smaller datasets, simple models such as RF can be shown to perform comparably while also benefitting from explainability, reduces the imperative for limited clinical decision-making margin of error and improved accuracy. Furthermore, where technical capacity is constrained with regard to implementation or deployment, the clinical use or still lay-capturing capabilities of simpler AI is favourable.

Limitations of the study include the relatively small dataset and the lack of other risk factors such as genetic information, lifestyle information, and environmental exposures. Future research should grow the dataset, include various health data, and use hybrid models that combine the clarity of RF with the pattern learning of CNN. In conclusion, both RF and CNN can act as decision-support systems for the early detection of heart disease.

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105. THE STRATEGIC ROLE OF ARTIFICIAL INTELLIGENCE IN TRANSFORMING GLOBAL BUSINESS PRACTICES: A HOLISTIC INTERNATIONAL PERSPECTIVE

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Abstract

Artificial Intelligence (AI) is revolutionizing international business by automating processes, enhancing decision-making, and enabling new forms of customer interaction. This paper explores how AI technologies are being leveraged to transform global business practices across key sectors including finance, supply chain, marketing, and human resources. By examining case studies and current implementations, this paper provides a holistic view of the benefits, challenges, and strategic importance of AI in international business. It also addresses the ethical and regulatory concerns that arise as companies expand AI adoption across borders. The findings highlight the crucial role of AI in shaping the future of global commerce.

1. Introduction

AI is no longer confined to theoretical research or tech startups. Today, multinational corporations, small and medium enterprises (SMEs), and even government bodies employ AI to streamline operations and expand global reach. This transformation is not only technological but strategic, requiring businesses to rethink how they operate in a digitally-driven, borderless market. As the digital economy grows, companies that fail to integrate AI risk falling behind in the face of fierce global competition. AI offers tools for intelligent decision-making, faster processing, and deeper insights, thus enabling firms to unlock new markets and customer segments.

2. AI in International Finance and Fintech

The finance sector has been a pioneer in adopting AI for fraud detection, automated trading, and customer service through chatbots. Globally, AI enables real-time analysis of financial markets, personalized financial advice, and efficient risk management. Cross-border payment systems now use AI to detect anomalies and fraudulent patterns, thereby increasing trust in international transactions. Fintech startups are using AI to deliver microloans, manage

investment portfolios, and conduct credit scoring in emerging markets. As global financial systems become more interconnected, AI ensures speed, security, and scalability in cross-border financial operations.

3. AI in Global Supply Chain and Logistics

Supply chains are becoming more complex as businesses expand globally. AI improves demand forecasting, route optimization, and inventory management. Leading companies like DHL and Amazon use AI to streamline international logistics, while predictive analytics reduces lead times and operational costs. Machine learning models anticipate disruptions caused by geopolitical issues, weather, or supplier delays, allowing businesses to proactively respond. AI-driven robots and drones are also being deployed in warehouses and shipping hubs, reducing reliance on manual labor and enhancing global operational efficiency.

4. AI in Cross-Cultural Marketing and Personalization

AI-driven tools analyze consumer behavior in different cultural contexts, helping companies tailor content for global audiences. Machine learning models process language preferences, buying habits, and regional trends to personalize marketing campaigns, thereby improving engagement and conversions. Multinational companies use AI-powered customer relationship management (CRM) systems to automate responses and deliver localized promotions. Natural Language Processing (NLP) allows for real-time translation and sentiment analysis, making it easier to interact with diverse customer bases. This cultural adaptation helps brands maintain relevance and loyalty in multiple markets.

5. AI in Human Resource Management and Global Talent Acquisition

AI tools are transforming HR by automating recruitment, enhancing employee engagement, and identifying skill gaps. Multinational companies use AI to screen resumes across languages and regions, reducing bias and improving the quality of hires. AI-driven platforms assess candidate suitability using predictive analytics and video interview analysis. Once hired, employees benefit from personalized training paths using AI learning systems. These tools support workforce development at scale and enable companies to deploy talent strategically across global operations. In a competitive talent market, AI also aids in succession planning and retention analysis.

6. Challenges and Ethical Considerations

Despite its advantages, AI in international business poses challenges including data privacy, algorithmic bias, and unequal access to technology. Countries have varying regulations like the GDPR in Europe, affecting AI implementation across borders. Ethical

concerns include the lack of transparency in AI decision-making and potential job displacement. Responsible AI frameworks must be adopted to ensure fairness, accountability, and inclusivity. Additionally, differences in digital infrastructure between countries can create barriers to AI adoption, reinforcing global inequality. Companies must balance innovation with compliance, ethics, and cultural sensitivity.

7. Recent News Highlights

1. WTO Report: AI Reshaping Global Trade Scene-Setting: Use the WTO analysis to introduce how AI enables strategic trade policy and market opportunity identification
2. AI Tools in Supply Chain Human Rights Oversight Use Cases: Mention supply chain human-rights spotting to support the section on logistic optimization and compliance.
3. U.S.–China AI Geopolitical Race Heats Up Geopolitical Context: Highlight U.S.–China tensions and China’s top-down governance to frame the international regulatory landscapes.
4. SAP CEO on AI & Leadership in Global Business Leadership Perspective: Refer to SAP’s CEO views to emphasize how cross-cultural leadership should blend AI integration with human-centric decision-making.
5. McKinsey Reshapes Its Consulting Model Around AI Business Model Impact: Illustrate McKinsey’s transformation as an example of AI disrupting global professional services and consultancy.

8. Conclusion

AI is shaping the future of international business by enhancing operational efficiency and enabling innovative strategies. Companies that integrate AI into their global operations gain a competitive edge through better data use, automation, and agility. However, to fully harness AI’s potential, businesses must navigate ethical, regulatory, and cultural challenges with a holistic, human-centered approach. The convergence of AI and international business is not just about machines and data—it is about rethinking global strategies to drive sustainable and inclusive growth in the digital age.

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106. ROLE OF AI: PERSONALIZATION IN DIGITAL MARKETING

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Abstract

This paper explores how Artificial Intelligence (AI) supports businesses in giving better and more personalized marketing experiences. AI uses customer data to understand what people like, what they search for, and what they may buy next. With this knowledge, businesses can send the right messages, recommend the right products, and respond quickly to each user. This kind of personalization helps companies increase sales, improve customer service, and build stronger relationships with people. The paper also discusses real-life examples, the benefits of AI in marketing, the challenges that come with it, and what the future may look like.

1. Introduction

Marketing today is very different from the past. Earlier, companies used to send the same advertisements to everyone. Now, customers want messages and suggestions that are made just for them. People are more likely to buy from companies that understand their needs and preferences. This is where Artificial Intelligence (AI) plays a major role. It helps brands give every customer a unique experience.

AI is like a smart assistant that can look at a large amount of data very quickly. It finds patterns in customer behaviour, learns from it, and makes decisions based on that. This process is called **AI-powered personalization**. Instead of sending random ads or emails, AI helps companies send what the customer is actually looking for. This increases trust and satisfaction.

2. What Is AI-Powered Personalization?

AI-powered personalization means using AI to make digital marketing feel more personal to each user. It allows businesses to tailor their websites, emails, ads, and apps to meet individual needs.

For example:

- A clothing store may suggest winter jackets to someone living in a cold place.
- A music app may recommend songs similar to what you listened to before.

Important Technologies in AI-Powered Personalization

- **Machine Learning:** AI uses machine learning to learn from customer data and predict future behaviour.
- **Recommendation Systems:** These systems suggest products, videos, or articles based on what you liked earlier.
- **Chatbots:** AI chatbots help answer customer questions anytime, making the shopping experience easier.
- **Natural Language Processing (NLP):** This helps AI understand and reply in human language.
- **Predictive Analytics:** It guesses what customers might need next and shows the right offers or content.

AI can do all this automatically and continuously learn to improve over time.

3. How AI Is Used in Digital Marketing

Here are the main ways AI is used in marketing:

a. Personalized Product Suggestions

When you shop on Amazon or Flipkart, you often see “You may also like” or “Customers also bought this.” These suggestions are not random—they are powered by AI. Based on your past actions, it shows items you’re more likely to buy.

b. Customized Emails and Messages

Email marketing used to be the same for everyone. Now, with AI, emails can include your name, recommend products based on your history, and even send reminders for items you left in your cart.

c. Chatbots for Customer Support

AI chatbots are now common on websites and apps. They answer customer questions, guide them to the right product, or help them track their orders. This improves customer service without needing human staff 24/7.

d. Targeted Advertising

AI helps companies create and show ads to people who are more likely to click or buy. It studies age, gender, location, search history, and even the time of day to decide when and where to show an ad.

e. Website Personalization

AI changes what you see on a website based on your past visits. For example, if you always check out the electronics section, the homepage may start showing you the latest tech products first.

4. Benefits of AI in Marketing

AI provides many powerful advantages for both companies and customers.

1. Improved Customer Experience

When users get content that feels relevant and helpful, they enjoy the experience more. This makes them stay longer on the website or app and leads to better reviews.

2. Better Conversion Rates

Customers are more likely to make a purchase when the product is exactly what they need. AI increases these chances by making better recommendations.

3. Saves Time and Money

Marketing teams save time because AI does tasks like sending emails, creating reports, or analysing data automatically. This reduces the cost of hiring large teams.

4. Helps in Decision-Making

AI gives valuable insights. It can tell which product is selling better, what type of customer is most active, or which ad worked best. This data helps in planning better strategies.

5. Real-Life Examples

Netflix

Netflix uses AI to suggest shows based on what you have watched. The more you watch, the better it understands your taste. Even the thumbnails (cover images) change based on what you're likely to click.

Spotify

Spotify uses AI to create playlists like "Discover Weekly," which introduces you to new songs similar to your favourites. This keeps users coming back.

Coca-Cola

Coca-Cola uses AI to learn about customer preferences in different regions. They create local marketing campaigns based on this data to make the ads more relatable.

Zomato and Swiggy

These food delivery apps use AI to show you restaurants and food options you might enjoy, especially at times you're most likely to order.

6. Future of AI in Digital Marketing

AI will keep growing and changing the way we market and shop.

- **AR/VR and AI:** Imagine trying clothes virtually before buying online. AI will make such experiences smarter and more personal.

- **Voice Search:** People now use voice assistants like Alexa. AI will help give more personal and accurate replies.
- **Emotion Detection:** In the future, AI may be able to understand your mood and change how it talks or what it suggests.
- **Zero-Party Data:** Instead of tracking users silently, brands will ask customers to share data directly, improving trust.

7. Conclusion

AI-powered personalization has made digital marketing smarter and more helpful for both brands and users. It allows companies to reach the right people with the right message at the right time. It also gives customers a smoother and more enjoyable experience. But it must be used with care and fairness. Privacy, transparency, and human connection should always be part of any AI strategy. If used responsibly, AI will shape a better, more connected future for digital marketing.

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107. A CONCEPTUAL REVIEW ON CUSTOMER SATISFACTION IN MEESHO APP

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ABSTRACT

Online shopping Customer satisfaction is widely recognized as a key pressure in the formation of consumers' future purchase intentions. Satisfied customers are also likely to tell others of their favourable experiences and thus engage in positive word of mouth advertising. The present study aims to investigate customer satisfaction in the meesho app. The objectives are to identify the decisive factors which can help those retail stores to retain the existing customers and to study the future prospects of online shopping. A total of 67 questionnaires have been randomly distributed to online customers & the data collected is analysed. The result of this analysis suggests the degree of customer satisfaction in terms of services provided meesho through google form in Madurai area.

Keywords: *Customer satisfaction, online shopping, customer perception, employee behavoiur , meesho app*

INTRODUCTION

Online shopping is the simple one for busy life in today's world. In the past decade, there had been a massive change in the way of customer's shopping. Despite consumers' continuation to buy from a physical store, the users or buyers feel very convenient to online shopping. Online shopping saves crucial time for modern people because they get so busy that they cannot or unwilling to spend much time shopping.

ABOUT MEESHO:

Meesho is an Indian-Origin social commerce platform founded by IIT Delhi graduates ViditAatrey and SanjeevBarnwal in December 2015. It enables small businesses and individuals to start their online stores via social channels such as WhatsApp, Facebook, Instagram etc... Meesho is headquartered in Bengaluru, India and was one of the three Indian companies to be selected for Y combinatory in 2016. It was also a part of the first batch of Google Lauchpad –solve for Indian program. In June 2019, Meesho becomes India's first start up to receive investment from internet. The special feature in this application is we can set our margin price for the product and can earn more profit. Online shopping has gained much popularity during the last two decades, predominantly people feels it much convenient and

trouble-free to shop from anywhere. Due to technological up-gradation, the consumer buying behaviour has been changed drastically in both urban and rural areas because of ample facilities of internet. Online shopping is the act of buying products or services via Internet.

OBJECTIVES OF THE RESEARCH

- To find the satisfaction level towards online shopping with respect to Clothes, Accessories and cosmetics
- To assess the factors influencing to purchase at Meesho

LIMITATIONS OF THE STUDY

The sample size is 67 and it is very small compared to the population size of Madurai city. Convenience sampling is used for data collection. Hence the findings cannot be generalized to the entire population in Madurai city.

REVIEW OF THE LITERATURE

Prof. Ashish Bhatt (2014) in his article entitled “Consumer Attitude towards Online Shopping in Selected Regions of Gujarat” stated that Online shopping is equally popular among all age groups in the present scenario. He concluded that study mode of payment is depends upon income of the respondents. People from different age groups are doing online shopping regularly. The attitude of consumers is changing with the time.

Prashant Singh (2014) in his article on ” Consumers Buying Behaviour towards Online Shopping, A case study of Flipkart.Com users in Lucknow City” stated that future of e- retailers in India is looking very bright. E-retailers give consumers the best way to save money and time through purchasing online within the range of budget. Flipkart.Com offering some of the best prices and completely hassle-free shopping experience. He concluded that the whole concept of online shopping has altered in terms of consumers buying behaviour and the success of E-retailers in India is depending upon in popularity, its branding image, and its unique policies.

Upasana Kanchan, Naveen Kumar and Abhishek Gupta (2015) in their article on “A Study of Online Purchase behaviour of Customers in India” stated that online shopping is gaining popularity among people of young generation. They found that Higher Income groups and educated people are purchasing more via e-retailing websites. People have hesitations in doing online shopping due to security concerns and technological complexity in making online purchase. They concluded that companies involved in online retailing should focus on building trustworthy relationship between producers and customers.

Mrs. R. Shashikala and Ms. Prachi Mahapatro (2015) in their study on “Analyzing the Effectiveness of Viral Marketing in the Era of Mobile Messenger Apps with

special reference to WhatsApp” with an objective to find out the factors that influence consumers to accept viral messages and their preference for types of viral messages. They found that majority of Whatsapp users have agreed that viral messages do influence in the buying of product/service. They concluded that buying behaviour was also strongly and positively associated with frequency of the usage.

RESEARCH METHODOLOGY

RESEARCH DESIGN

A research design is the arrangement of condition for collection for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure.

SOURCES OF DATA

The study has been considered both primary and secondary data. Primary data are those which collected freshly for the first time and thus happen to be original in character. Secondary data are those which are already available. Primary data were collected through the structured questionnaire. The data were collected from 67 respondents using convenience sampling method. Questionnaire was prepared after setting the objective for the study. The questionnaire consists of questions related to demographic factor, reasons and deciding factor to purchase at Meesho, preferred product in each category and satisfaction level.

Sample Design

Sample design includes sample unit, sample size and sampling technique. The sample size is 67. Convenient sampling is used in this study to collect the primary data.

Tools for Data Analysis

The tools used for analysis in this study only Weighted average.

SATISFACTION OF RESPONDENTS ABOUT THE MEESHO

Factors	Weighted Assigned (W)	No of Respondents (X)	Wx
Highly Satisfied	5	41	205
Satisfied	4	12	48
Neutral	3	8	24
Unsatisfied	2	4	8
Highly Unsatisfied	1	2	2
Total		67	287

$$\Sigma X = 67 \quad \Sigma WX = 287$$

$$\Sigma W$$

$$WA = \frac{\Sigma WX}{\Sigma W}$$

$$= \frac{287}{67} = 4.28\%$$

Findings and Suggestions

58% of respondents' are spending less than Rs.500 per month to purchase at Meesho .66% of respondents' deciding factor to shop at Meesho is discounts & offers.85% of respondents prefer cash on delivery and 9% of respondents prefer debit card to make payment.74% of respondents preferred clothes.52% of respondents make purchase once in a month.

The important factor to purchase at Meesho is the best price and discount and offers The company can retain the strategy in future also.. As the most preferred product is clothes, the discount and offer can be increased to clothes to increase the sales. The company can take efforts to reach people above 30 years.

CONCLUSION

Online shopping becomes a necessary part of our lives as it is more convenient. customers are looking for best price , discount and offers. This study reveals peoplebelow 30 years are the potential customers of Meesho and clothes are the most preferred product of Meesho. From the study we can conclude that the customer are satisfied with the online shopping at Meesho.

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108. ROLE OF ARTIFICIAL INTELLIGENCE IN HUMAN RESOURCE MANAGEMENT

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Abstract:

Artificial Intelligence is an emerging technology that enables machines to think, understand, and perform tasks previously carried out by humans. Artificial Intelligence has in various ways reshaped core HR functions, making a huge transformation in HR practices conducted in various organizations. This study explores the role of AI on Human Resources Management practices. In Talent Acquisition, AI has smoothened the practice of shortlisting resumes and screening candidates and streamlined the process of selecting the candidates efficiently. For onboarding, it provides efficient support to new hires, while in performance management, it analyzes employee performance and gives real time feedback. AI also boosts employee engagement through personalized support. This research also aims to highlight the opportunities and challenges of AI in HRM and explores the future aspects of AI in HR.

Keywords: *Artificial Intelligence, Human Resource Management, HR functions.*

1. Introduction:

Over the past 20 years, Artificial Intelligence has proliferated after nearly 60 years of development (Morgenstern et al., 2021). The integration of Artificial intelligence in HR operations has redefined Human Resource management practices through data-driven insights, automating repetitive tasks, streamline HR operations efficiently and also supporting personalised employee experiences. Rapid changes in HR operations after the technological adoption of AI has been observed globally. Automated resume screening, chatbots for candidate engagement, AI-based performance evaluation systems, and employee well-being monitoring tools are no longer futuristic concepts but operational realities in many organizations (Gupta et al., 2023). These AI-driven solutions make a significant effect like cost reduction, better time management, greater efficiency, data informed decision making and enhanced employee experiences.

2. Review of literature:

- Merlin & Jayam, “Artificial Intelligence in Human Resource Management” - International Journal of Pure and Applied Mathematics (2018) Through real-world

examples, this paper attempts to address the potential ways that artificial intelligence is supporting and changing HR functions such as hiring, training, talent management, and retention. It also provides insights into the intersection of AI and HR management cases and, lastly, discusses the potential effects on the HR workforce in the future.

- Atheer Alsaif and Mehmet Sabih Aksoy: Conducted a literature review on AI in HRM, highlighting its potential to revolutionize HR practices by automating mundane tasks, streamlining processes, and providing customized solutions.
- The automation of repetitive and time-consuming tasks allows HR managers to focus on those tasks that add value and require unique skills and abilities (Pillai and Sivathanu, 2020)

3.1 Research Design:

The descriptive research design is being used in the investigation. This study has made use of secondary data. Research papers, published materials, websites, HR blogs, and survey findings from different research organizations are the sources of the secondary data.

3.2 Research Objectives:

1. To understand the role of artificial intelligence in HRM functions.
2. To study the opportunities of artificial intelligence in HRM
3. To study the challenges of artificial intelligence in HRM.

4. Role of AI in HR Functions

4.1 Recruitment, Selection & Talent Analytics

Only the most suitable applicants are given consideration for positions since AI algorithms can review a huge number of resumes in a fraction of the time needed by human recruiters (Jain et al., 2022). By offering real-time responses and enhancing the candidate experience, tools such as chatbots also increase candidate engagement (Ahmed & Nadeem, 2023). Additionally, AI can be applied to predictive recruiting, where algorithms examine past data to forecast a candidate's success inside the company, increasing the accuracy of hiring (Chatterjee & Kar, 2024).

4.2 Employee Training and Development

AI enables personalized learning, where training content and methodologies are customized based on an employee's learning style, progress, and skill gaps (Srinivasan & Rathi, 2022). Adaptive learning technologies, powered by AI, offer dynamic learning paths that adjust as employees progress through the content, ensuring greater engagement and retention (Khan et al., 2023). The shift towards AI-powered learning raises concerns about

over-reliance on technology and its ability to replace the human touch in coaching and mentoring, which are essential for long-term employee development (Mishra & Shah, 2024).

4.3 Performance Management

AI's ability to analyze vast datasets and identify patterns has made it an invaluable tool in **predictive performance management**. By leveraging machine learning algorithms, AI can forecast future performance outcomes based on historical data, employee behaviors, and various external factors such as market conditions or industry trends (Jain & Yadav, 2023).

4.4 Employee Engagement and well-being

AI is being used more and more to track and improve employee engagement and satisfaction, and employee well-being has received a lot of attention lately. Sentiment analysis software and other AI-powered solutions examine employee communication patterns, including emails and feedback forms, to identify early indicators of stress, burnout, or discontent (Singh et al., 2023).

4. Opportunities of AI in HRM:

- AI in recruitment and selection for talent acquisition helps in quicker and more accurate screening of resumes and shortlisting of candidates.
- AI-driven platforms monitor employee progress, resulting in higher engagement and productivity.
- AI-powered systems can provide personalized feedback, making performance reviews more relevant and actionable (Lal et al., 2023).

5. Challenges of AI in HRM:

- One of the given challenges is to monitor algorithm biases in screening and monitoring the progress of employees.
- There are chances of data leakage and breach of employee data.
- AI's lack of empathy may impact employee morale.
- Adopting AI, people are still resistant to change.

6. Conclusion:

AI in HRM is a transformative force in various HR practices. Whether in recruitment, training and development, performance management or employee engagement, it is integrated part of core HR functions, resulting in data efficiency and reducing cost, making it a time saving process. Organizations adopting AI must ensure data privacy and improving emotional intelligence will enhance the usage of AI tools in HR more effectively. The analysis of secondary data highlights that while AI improves efficiency, it also poses risks that organizations must manage carefully.

109. A CONCEPTUAL REVIEW – TRAINING EFFECTIVENESS IN HOSPITAL INDUSTRY

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ABSTRACT

Training is essential because technology is developing at a fast rate. The objective of the health care policies process and programmes for the delivery of training is to achieve its HRD strategies by ensuring the availability of skilled and competent employees to meet its present and future requirements. Training & Development is essential to remove performance deficiencies. There are two ways in which T&D influences performance. Training and development in the health care industry is an ongoing process. The importance of an ongoing education cannot be overestimated. Education is necessary, as the health care industry grows so does the specialization of the different parts of the industry. A persons need for education does not stop at the diploma. Because the health care industry is constantly evolving the training and development of the health care workers must be ongoing. The health care professional must keep up with the times. Health care workers must have a career development plan for the future. To understand the effectiveness of training the organization must be able to measure the knowledge of the employee and the training process.

KEYWORDS: *Health Care, Effective Training, Hospital Industry, Working Employees*

INTRODUCTION

Training is said to be the acquisition of knowledge, skills, and competencies. It has specific goals of improving one's knowledge, skills, capacity, capability, performance and productivity. Observers of labour market have said that, the initial entry level qualifications for a work need to be upgraded and the skills updated, periodically, systematically and continuously. Vigorous training and development should be carried out in the organization. Training and development is an important branch of Human Resource Management function. It is said that Training & Development is the one single entity of Human Resource Management that leads to optimum utilization of all the resources of the firm. Traditionally, in the science of Economics, these resources were called Land, Labour and Capital. Now, we would add, at least, Machines and Methods. Thus, the skills utilized by the human resource of the firm can result in increase of output and quality at the company. Training & Development

improves efficiency, enhances morale of employees, brings about better human relations, helps in reduction of supervision, retains down organizational liability & pushes up Organizational flexibility (Ganesh, M. et al., 2015).

Training of employees in hospitals is getting to be among the main considerations in the hospital operations. In addition, accentuations expanded because of the progressions into various areas of operation, new hypotheses and innovation. Through training, public and private hospitals have weighed and motivated themselves to prepare strategies and directions.

Training is a legitimate obligation to each hospital in the public service. Each hospital ought to be in charge of training and development of employees. The motivation behind creating and keeping up employee's skills in the hospitals necessitate, training programs as indicated by their human asset programs. Above all, and moreover, training has become mandatory with the emphasis on certifications such as I S O and NABH in India which fortify and exhibit reliability of the facilities and technology adopted for the common man as well as the elite to see and understand at a glance on letter heads, name boards, advertisements, displays and events.

IMPORTANCE OF THE STUDY

Every training evaluation programme should state objectives in a generally accepted format (i.e., measurable, specific, challenging, etc.). Evaluation proves input to determine if objectives are being met. Probably the most common purpose of evaluation is the determine the effectiveness of training programme's various elements and activities. Training Programme components include, but are not limited to, methods of presentation, learning environment, training programme content, learning aids, schedule, and the facilitator. Each component makes component makes a difference in the training effort and must be evaluated to make improvements in the training programme.

CONCEPT OF TRAINING EFFECTIVENESS

Training is a part of the human resource development, along with the other human resources activities, such as recruitment, selection and compensation. The role of human resource department is to improve the organization's effectiveness by providing employees with knowledge, skills and attitudes that will improve their current or future job performance. In order to implement the right training methods, the training specialist should be aware of the pros and cons and effectiveness of each training method. Besides, for evaluating training effectiveness, measurement should be done according to the models (**Purnima Sharma, 2012**).

REASONS TO MEASURE TRAINING EFFECTIVENESS

Measuring the effectiveness of training programs consumes valuable time and resources. Many training programs fail to deliver the expected organizational benefits. Having a well-structured measuring system in place can help you determine where the problem lies. On a positive note, being able to demonstrate a real and significant benefit to your organization from the training you provide can help you gain more resources from important decision-makers. Consider also that the business environment is not standing still. The competitors, technology, legislation and regulations are constantly changing. What was a successful training program yesterday may not be a cost-effective program tomorrow. Being able to measure results will help you adapt to such changing.

INTRODUCTION TO HOSPITAL INDUSTRY

Hospitals are the focal points of education for the health professionals and clinical research necessary for advancement of medicine. Thus, the hospital is one of the most complexes of all administrative organizations. The hospital industry is a sector within the economic system that provides goods and services to treat patients with curative, preventive, rehabilitative, and palliative care. The modern health care sector is divided into many sub-sectors and depends on interdisciplinary teams of trained professionals and paraprofessionals to meet health needs of and populations. The hospital industry is one of the world's largest and fastest growing industries. Consuming over 10 percent of gross domestic product (GDP) of most developed nations, health care can form an enormous part of a country's economy (http://en.wikipedia.org/wiki/Health_care_industry). For purposes of finance and management, the health care industry is typically divided into several areas. As a basic framework for defining the sector the United Nations International Standard Industrial Classification categorizes the health care industry as generally consisting of

- ***Hospital activities***
- ***Medical and dental practice activities***
- ***Other human health activities***

CLASSIFICATION OF HOSPITALS

The health sector in India comprises of government sector that provides publicly financed and managed primitive, preventive and curative health services and private sector that mostly provides curative services and. The private health sector consists of the 'not-for-profit' and the 'for-profit' health sectors. The not-for-profit health sector includes various health services provided by Non-Government Organizations (NGO's), charitable institutions,

missions, trusts, etc. Health care in the for-profit health sector consists of various types of practitioners and institutions

Irrespective of the classification of hospital, the primary function of a hospital is the provision of medical care to a community, to be a centre for education and research for all types of health professionals.

Hospitals can be classified as per ownership/control, clinical basis, length of stay of patients and teaching or non-teaching status (Goyal R C., 2006). Hospital Administration and Human Resource Management, PHI Learning Ltd, Fourth edition. As per ownership basis the hospitals can be public, voluntary, private and corporate hospitals. The public hospitals can be further classified as Central Government Hospitals and State Government Hospitals.

Hospitals are classified into different types depending upon different criteria. Hospitals are divided into:

- ***Classification based on objectives***
- ***Classification based on ownership***
- ***Classification based on system of medicine***

Classification Based on type of management and Objectives

Hospitals are classified into categories based on objectives as follows.

- a. General hospitals
- b. Specialty hospitals
- c. Multispecialty
- d. Super specialty
- e. Teaching-cum-research hospitals
- f. Rural hospital
- g. Isolation hospital

Classification based on ownership:

- a. Government hospitals
 - b. Semi-government hospitals
 - c. Voluntary agencies hospitals
 - d. Private hospitals
 - e. Charity hospitals
- ***Classification based on length of stay of patients***
 - ***Classification based on Clinical basis***
 - ***Classification based on Ownership control basis.***

Classification Based on System of Medicine

- a. Allopathic hospital
- b. Ayurvedic hospital
- c. Homoeopathic hospital
- d. Unani hospital

OBJECTIVES OF THE STUDY

General Objective

The main objective of this study was to evaluate the effectiveness of training programme in private hospitals in Salem.

Specific Objectives

Specifically, the research was sought:

- To measure the employees' reaction with the training programme.
- To evaluate the effect of training programme on employees' knowledge, skills and attitudes.

REVIEW OF LITERATURE

Azmi Bin Ahmad (2011) analyzed effectiveness of learning transfer in national dual training system (NDTS). Learning transfer is the ultimate goal of any training programme. The new Malaysian skills training is based on the dual learning principle in which trainees alternate between attending theoretical classes in the skills training institute and receiving on-the-job training at worksite. This new paradigm of skills training is better known as National Dual Training System (NDTS). The main problem is that there were complaints from the employers that the competencies of the output of the skills training in Malaysia are of poor quality. This was due to low absorption of learning transfer performance from training places to workplace. Apart from that there were little studies related to the effectiveness of learning transfer due to there is no acceptable way and mean to measure the learning transfer

Debra L. Truitt (2011) explored the relationships between training experiences and attitudes and attitudes about perceived job proficiency. It is incumbent on training and development professionals to design, implement, and evaluate the effectiveness of their programs in reducing disputes in workplace performance.

James Hale Withers (2011) evaluated the effectiveness of safety training. The first major focus of the study was on the development and testing of a "model" that could be used to develop and then evaluate the effectiveness of the training. The second major focus area was related to examining learning and retention of course material; characteristics of the learner that may influence learning were also evaluated. The third focus area examined

nuances associated with the assessment techniques used to measure learning. He concluded with a summary of lessons learned information related to each of the three focus areas and suggests that more extensive research be conducted and that the day-today safety practitioner can play a key role in advancing the state of knowledge of evaluating training effectiveness.

Raja Suzana Raja Kasim et al (2011) analyzed the Influence of Training Design on Training Transfer Performance among Support Staff of Higher Education Institution in Malaysia. Today's most progressive organizations have moved from treating selected human resource practices (e.g., incentive compensation, employee participation, flexible work arrangements, and training) as obligatory cost factors to regarding them as strategic weapons in the battle for competitive advantage. It has become a widely held premise that people provide organizations with an important source of sustainable competitive advantage

Punia, B. K. et al (2013) examined the factors affecting training effectiveness and its implications. To examine the study a literature review has been done on different aspects of training. The researchers suggested many factors which affects training effectiveness like motivation, attitude, emotional intelligence, support from management and peers, training style and environment, open-mindedness of trainer, job related factors, self-efficacy and basic ability etc. They revealed models of training effectiveness measurement as well as the implication of a training programme.

Katherine Anne Perryman (2014) investigated the effects of controlled trials of training interventions delivered to primary care practitioners (PCPs) to improve the management of psychological distress on process outcomes (practitioner behaviour, knowledge, attitudes). It is used to develop a taxonomy of training intervention components for use in the design and reporting of healthcare professional training interventions in this area and more widely

FINDINGS

Employees are happy that the time utilized well towards the responses of training programmes led in the private hospitals at Salem. Henceforth, it plainly demonstrates that the greater part of the workers' responses towards the training programme is great and they feel cheerful about the training programme.

CONCLUSION

This exploration conveys an understanding of training and effectiveness of training. To make training programs more effectiveness, the private hospitals need to expression at those training programs are related with the specific department heads should first encourage employees to learn get new abilities and information. To conclude that training programs are

directed in the private hospitals were observed to be great and the same might be said on the off chance that it improves its training programs based on the above findings.

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110. THE ETHICAL IMPLICATIONS OF AI IN BUSINESS DECISION-MAKING: NAVIGATING BIAS, TRANSPARENCY, AND ACCOUNTABILITY

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Abstract

Artificial Intelligence (AI) is increasingly being integrated into critical business decision-making processes across domains such as human resources, marketing, finance, and operations. While AI offers immense potential in improving efficiency, accuracy, and personalization, it also presents a range of ethical challenges that businesses must address. This paper explores the ethical implications of AI in business decision-making, focusing on key concerns such as algorithmic bias, lack of transparency, data privacy, and accountability. Through real-world case studies and emerging research, the paper highlights how unchecked AI systems can lead to discriminatory outcomes, invade user privacy, and erode trust in business practices. It further examines the importance of establishing ethical frameworks, implementing explainable AI (XAI) models, and maintaining human oversight to ensure fairness and responsibility in automated decisions. The objective is to emphasize the need for a balanced approach that embraces technological advancement while safeguarding ethical standards and human values in the corporate environment.

Keywords: Artificial Intelligence (AI), Ethical AI, Algorithmic Bias, Business Decision-Making, Data Privacy, Accountability.

Introduction

Artificial Intelligence (AI) has moved well beyond its early experimental phase in the corporate world and now serves as a major force shaping decision-making processes in diverse sectors. From recruitment and loan approvals to marketing campaigns and operational management, AI-driven tools are increasingly making determinations with minimal direct human intervention. Reports from Harvard University estimate that annual global investment in AI for commercial purposes is set to reach tens of billions of dollars, with nearly all leading firms embedding multiple AI systems into their strategic operations.

While these developments promise greater efficiency and more precise strategic insights, they also introduce significant ethical concerns. Decision-making once governed by people is now being transferred to algorithms whose inner logic is often obscured, making scrutiny difficult. The outcomes, in some cases, perpetuate or exacerbate existing inequalities. Research has revealed that AI-based hiring software may unintentionally disadvantage female applicants, and credit-scoring models can systematically offer women lower credit limits than men with comparable profiles. Such examples underscore urgent challenges related to bias, transparency, and accountability in AI applications.

Despite growing awareness, formal governance structures to ensure ethical AI in business remain underdeveloped. Many organizations lack clear systems to test fairness or enable decision-makers to interrogate and contest AI outcomes. Although legislative measures such as the EU's AI Act are emerging, much scholarly attention has so far been devoted to high-stakes domains like healthcare and criminal justice, leaving corporate contexts less studied.

This paper aims to address that gap by exploring the ethical issues associated with AI in business decision-making. Drawing on scholarship from AI ethics and management studies, supported by real-world case examples, the discussion investigates how bias and opacity undermine fairness, and how technical and governance-based remedies can mitigate these risks. Key topics include bias mitigation, fairness evaluation, explainable AI (XAI), accountability mechanisms, and evolving regulatory approaches. The paper argues for integrating robust ethical frameworks with active human oversight to ensure AI remains a trustworthy business tool.

Literature Review

Ethical AI in business can be examined through five interconnected dimensions: algorithmic bias, fairness metrics, explainability, accountability, and regulation.

Bias in AI frequently originates in the underlying data. Ferrara and Lord (2024) note that the expansion of AI use has amplified debates on fairness because long-standing social prejudices embedded in datasets become visible in automated decisions. Anwar (2025) similarly observes that models trained on historical records tend to replicate—and sometimes intensify—existing inequalities, such as screening out qualified minority candidates in hiring processes.

Different fairness metrics offer different perspectives. Group fairness focuses on equal outcomes for protected demographic categories, whereas individual fairness ensures similar treatment for individuals in comparable circumstances. Yet these measures can be at odds; for

instance, targeting demographic parity might lower accuracy for one group, while optimising for equalized odds can create disparities elsewhere. No single metric can fully eliminate bias, and using one may worsen another.

Another challenge lies in opacity. Many advanced AI models, particularly deep learning systems, are so complex that even their creators may struggle to explain their outputs. Explainable AI (XAI) methods aim to increase interpretability, enhancing trust by enabling managers to understand why specific decisions occur. Miller (2019) and Mittelstadt (2019) contend that explainability is crucial for aligning AI with human values. However, Deck et al. (2024) caution that explanations alone cannot guarantee fairness; they may be misunderstood or overly simplified.

Accountability encompasses both ethical and technical obligations. Cheong (2024) identifies transparency and accountability as core pillars of responsible AI. In a corporate setting, this can involve detailed documentation such as model cards, regular audits, and grievance channels. Ganesh et al. (2025) argue that boards and executives should treat AI oversight as a fiduciary responsibility, embedding it into governance structures.

Regulatory progress is underway, though still incomplete. The OECD's AI principles stress fairness, transparency, and human oversight, while the proposed EU AI Act introduces risk-based requirements for applications such as hiring and credit assessment. Nonetheless, enforcement remains a challenge, and balancing regulatory constraints with innovation is an ongoing debate. Scholars often recommend multi-stakeholder governance, ethics training, and industry-wide standards as part of a comprehensive approach.

Methodology

This study employs a conceptual research approach, synthesising insights from scholarly literature, industry analyses, and regulatory documentation to investigate ethical concerns in AI-assisted business decision-making. Rather than generating new empirical data, the analysis follows a narrative review format to identify recurring issues—bias, fairness, explainability, and accountability—while grounding the discussion in illustrative case studies.

Three documented cases—Amazon's recruitment algorithm, the Apple Card credit limit controversy, and a U.S. healthcare risk prediction system—serve as examples of bias and opacity in real-world applications. Each offers insight into how ethical challenges arise and how stakeholders attempted to address them. This blend of theoretical analysis and case-based illustration supports a multidisciplinary perspective while keeping the discussion anchored in practical consequences.

Discussion

Case Study 1: Amazon’s Hiring Algorithm In 2014, Amazon introduced an AI tool to assess job applicants. By 2015, it was evident the system penalised resumes containing terms like “women’s” (as in “women’s chess club captain”) and downgraded graduates from women’s colleges. The bias originated from training the algorithm on historical data from a male-dominated tech sector. Even after removing explicit gender indicators, indirect biases persisted, leading Amazon to discontinue the project.

Case Study 2: Apple Card Credit Limits The 2019 launch of Apple’s credit card revealed reports that female applicants often received substantially lower credit limits than male applicants with similar financial profiles. Goldman Sachs, the issuing bank, denied using gender as an input variable, but other correlated data points—such as spending history or postal codes—likely acted as proxies, creating indirect discrimination. Efforts to investigate were hampered by insufficient documentation, highlighting gaps in transparency and accountability.

Case Study 3: Healthcare Risk Prediction Research by Obermeyer et al. (2019) examined a widely adopted hospital algorithm that ranked patients’ risk levels based on projected healthcare costs. Because Black patients historically incurred lower costs due to limited access to care, the algorithm underestimated their medical needs, giving priority to healthier White patients for additional programs. Modifying the model to predict actual health outcomes nearly doubled the number of Black patients receiving enhanced care.

Analysis and Implications

These cases illustrate how bias often originates in historical data. When such patterns reflect inequality, algorithms trained on them will likely reproduce those inequities. Lack of transparency intensifies the issue, as stakeholders may be unable to detect or address problematic outputs. Because no fairness measure works universally, organizations must select evaluation criteria aligned with their values and compliance obligations. Routine bias audits, analysis of feature impacts, and use of interpretable models can reveal issues early. Explainable AI methods like SHAP and LIME can clarify which features most influence predictions, but they must be applied cautiously, as simplified explanations can mislead. Governance mechanisms, ethics committees, and clear accountability procedures are equally important. Companies such as Microsoft and IBM that actively manage AI ethics tend to earn reputational benefits, while neglecting oversight can lead to public backlash and legal consequences. Although regulation is progressing, it cannot replace internal responsibility.

The most effective strategies combine technical bias reduction with governance processes and an organizational culture committed to fairness.

Conclusion

AI offers considerable potential to improve business decision-making, but without deliberate safeguards it can also reinforce discrimination and erode trust. The way forward involves integrating technical measures—such as fairness audits, careful target variable selection, and interpretable models—with governance systems that ensure consistent human oversight. Guidelines from bodies like the OECD and legislative frameworks like the EU AI Act provide valuable direction, yet businesses should aim to go beyond mere compliance by embedding fairness, transparency, and accountability throughout the AI lifecycle. Ethical AI results from intentional design, deployment, and monitoring decisions, not from technology alone. Organizations that balance innovation with ethical responsibility will not only avoid harm but will also foster lasting public confidence—an increasingly valuable asset in a world where algorithms shape so many outcomes.

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111. HYBRID ENSEMBLE LEARNING MODELS FOR VOLTAGE STABILITY IN SMART GRIDS

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Abstract

The increased use of renewable Distributed Generation (DG) in electric distribution systems threatens operational stability. Insufficient distributed generation units or high load demand can cause voltage instability. Fixed- speed induction generators, a type of distributed generation, consume reactive power, causing distribution network voltage instability. This study proposes a nodal model for real-time distribution network voltage stability monitoring and modification. The results show that the nodal technique can improve distribution network voltage stability, especially with high renewable distributed generation integration. Modern electric distribution networks might benefit from this strategy to ensure system stability and reliability.

Keywords— Distributed Generation (DG), Fast Correlation-Based Filter (FCBF), Ensemble Learning (EL), Micro Grid (MG), Bagging Random Subspace Boosting (BRSB).

I. INTRODUCTION

Inductively powered loads are a source of temporary voltage in stability the event of a significant voltage disturbance, they have a tendency to restore power consumption and draw excessive current. More and more induction motor loads are becoming part of today's power system, while wind turbines' low-voltage ride-through capacity requirements are getting stricter, making the STVS problem more noticeable. A number of stability criteria affect the system's performance. One of these is short-term voltage stability (STVS), which means that bus voltages must be able to quickly return to an appropriate equilibrium level following a fault [1]. A lot of people are interested in learning about the stability criteria of this kind of system, especially voltage stability and voltage collapse. The voltage stability problem refers to the power system's inability to maintain acceptable steady-state voltages across all buses during normal operating conditions or following disturbances. Overloading the system and insufficient reactive power generation are the primary causes of this issue. The most common

outcomes of voltage instability are protection system cascading tripping of the grid components, reduced load, or even a complete blackout. In order to find out how close the system is to the voltage instability point, many different analysis methodologies have been suggested. Grid-connected hybrid RE resources, such as solar, hydro and wind, are seeing a surge in usage due to the enormous growth in the demand for power from distributed generators [2]

II. RELATED WORKS

In recent years, power systems analysis has involved the development of mathematical models based on data analysis, statistical approaches and control theory. Due to the growing demand for more environmentally favorable and efficient energy solutions and the subsequent expansion of power grids, the integration of AI into traditional power grid systems has become increasingly critical [5]. CNN hybrid models, including CNN-RNN, CNN-GRU, and CNN-LSTM, were created for this research. DNNs, SVMs, DTs, and BNs are among the ML techniques that have been suggested for error detection [6]. There has been a lot of research on using ML in power systems. Several ML models have been utilized for fault identification, prediction, and removal, including Artificial Neural Network (ANN), DTs, SVMs, hybrid and ensemble approaches, and so on. An ANN equipped with voltage phases is suggested for use in an online Long Term Voltage Stability (LTVS) evaluation. Methods for classification based on DTs are suggested in [7]. To tackle this problem, this research introduces an LSTM- based hybrid EL model. Hybrid ensemble techniques are used to extract multivariate data deep features. This approach combines BRSB with Ensemble Pruning. The bias-variance tradeoff is used to propose a novel loss function that takes into account demand forecasting inaccuracy.

III. PROPOSED SYSTEM

The challenge of costly and simple data gathering and annotation necessitates the immediate development of an effective Hybrid EL model that performs effectively with a limited training dataset. Figure 1 illustrates the design for determining the stability estimate of the smart SG. The proposed paradigm consists of three steps. Feature selection and resampling constitute the pre-processing steps in the early phase. Hybrid EL has been employed to enhance the SG data prediction rate. To construct an effective prediction model, the feature selection method evaluates a collection of input features and identifies the most pertinent ones. In this technique, the input features for the prediction model are often subsets.

A. Preprocessing of Data

Data preparation involves converting raw data into a comprehensible format. Data preparation is conducted to enhance data quality. Data preprocessing involved two tasks: normalization and feature selection [15]. Z-score normalization procedures are employed to adjust the data in attributes to conform to a more restricted range. The Pearson Correlation feature selection strategy is employed since not all dataset attributes contribute to the efficacy of the DL model for prediction. The PCC is frequently employed to assess the relationship among related linear variables, specifically Consumer 1, 2, and 3. Nominal power usage holds minimal significance for accurate outcome prediction.

B. Selection of Features:

Feature selection is the process of picking a subset of relevant features to reduce the complexity of a task. It is exceptionally versatile and integrates many search and evaluation methodologies together with a supervised attribute filter for attribute selection. There are essentially two stages to the attribute selection procedure. Finding the subset of attributes is the first step, and then evaluating the subsets that were derived is the next step. In order to determine which characteristics were most relevant, this research used three feature selection methods: relief, FCBF, and supervised attribute filter. As a feature selection method, relief sorts dataset attributes from most important to least. To function, it measures how much one class's mean differs from another class's nearest instance. The significance of features increases as their ranks rise. Three, four, and five predictive features are chosen by the system. Another acronym for "fast correlation-based filter" is FCBF [16]. A feature selection strategy utilises attribute correlation to determine the most significant characteristics. Identify the properties most strongly associated with the class label and select those. This algorithm identifies the predicted characteristics: 1, 2, 3, 4, 8, 9, 10, 11, and 12. The SAF is a FS method that utilises DL to identify the most significant qualities. The strategy involves identifying the features that most significantly increase the accuracy of the models during training and subsequently applying them to the dataset. This technique allows for the selection of feature predictions 1, 2, 3, 4, 9, 10, 11, and 12. The SAF technique was chosen as the FS method for the study because to its higher performance.

C. Splitting of Data/Partitioning

At this point, we divide the dataset in half, creating separate sets for training and testing. We split the dataset in half, with 70% going into training and 30% into testing. Both the training dataset and the testing dataset are used to assess how well the ML model performs. By selecting test data that is distinct from training data, the train-test split allows one to examine how machine learning algorithms behave while making predictions.

D. Model Training:

1) Deep Learning

LSTM is a well-known time series network that excels at processing time series data, making it an ideal base learner. Layer one of the LSTM model contains 50 units, and layer two contains 100 units. A dropout layer is inserted after every LSTM layer to offer regularisation and avoid overfitting. Rates for various dropout layers can be changed; for example, in this research, they were 0.2 and 0.3. The LSTM layer of the model activates using the default Sigmoid and Tanh methods.

2) Hybrid Ensemble Learning

In general, ensemble learning surpasses individual network learning due to the variability in individual network performance. To improve the precision and resilience of forecasting, we introduce BRSB, a hybrid ensemble methodology that integrates bagging, random subspace, and boosting. Algorithm 1 lays out the whole process for the proposed ensemble approach that uses the hybrid BRSB strategy. The number of groups of training data subsets produced by bootstrap sampling with G_1 iteration is G_2 , with each group having the same number of samples as the original dataset. From the full feature space of each training batch, we next use G_2 instances to randomly select d-dimensional input variables [17]. Hence, $G_1 \times G_2$ training sets are produced for the purpose of training base learners S_{g_1, g_2} where a member of is $g_1 \in G_1$, $g_2 \in G_2$ is a member. By re-sampling the data and using the prediction error from the last training iteration, the Boosting method improves the model's accuracy. In the g_1 -th round, the data subset is represented as

$$W'_{g_1} = \left\{ (c_r, b_r | c_r, b_r) \in W, \frac{1}{g_1} \sum_{q=1}^{g_1} \beta_q \left(\epsilon_q^{(w_r)} - \bar{\epsilon}_q \right) > \varphi \right\} \dots \dots \dots (5.1)$$

Where,

$$\epsilon_q^{(w_r)} = \frac{|s_q^*(w_r - b_r)|}{b_r}$$

$$\bar{\epsilon}_q = \frac{1}{M} \sum_{r=1}^M \epsilon_q^{(w_r)}$$

$$\beta_q = \ln \frac{1 - \bar{\epsilon}_q}{\bar{\epsilon}_q}$$

The entire training dataset is represented by W , and the $\bar{\epsilon}_q$ aggregation coefficient of the q -th learner individual s_q^* denoted as based on its mean absolute percentage error on $W \cdot \beta_q$. Next, the training dataset is supplemented with the samples (c_r, b_r) that have an error $\epsilon_q^{(w_r)}$ greater than the threshold ϵ , in preparation for the subsequent bootstrap sampling round. Round g_1 , entails training several individual learners utilizing distinct feature subspaces. An optimal learner exhibiting the minimal validation error is preserved via ensemble pruning. A singular learner can be acquired provided that belongs to $g_1 \in G_1$,

$$s_q^* = \sum_{(c,b) \in E} O(b, s_{g_1, g_2}, (c)) \dots \dots \dots (5.2)$$

E stands for the validation dataset, which is created by randomly choosing data from the original samples at a preset ratio of 5%, and it must not be part of the training dataset, where $g_2 \in G_2$ is a subset of E . s_{g_1, g_2} , can represent any two items chosen by the students in the class. The pruned ensemble model is smaller, uses less computational and memory resources, and is the outcome of removing the underperforming base learners. Algorithm 1 shows a flow of hybrid EL Model.

Algorithm 1: Hybrid Ensemble Learning
Input: Dataset W
$\{(c_1, b_1), (c_2, b_2), \dots, (c_r, b_r), \dots, (c_n, b_n)\};$
Learner Base LSTM
G_1 , the total number of bagging learning cycles;
The number of times Random can learn
G_2 , the subspace
The size of the feature group, w .
Output: $D(c) = \sum_{g_1}^{G_1} d_{g_1} s_{g_1}^*(c)$
Process:
1. $g_1 = 1$ to G_1
2. $W'_0 = []$
3. $W_{g_1} = YH(W, W'_{g_1})$
4. $g_2 = 1$ to g_2
5. $U_{g_2} = IHUH(W_{g_1}, w)$
6. $W_{g_1, g_2} = MapU_{g_2}(W_{g_1})$
7. $s_{g_1, g_2} = LSTM(W_{g_1, g_2})$
8. do for
9. $s_{g_1}^* = VK_{1 \leq g_2 \leq G_2}(s_{g_1 \times g_2})$

$W'_{g_1} = IH(W, \varphi)$
11. End for

A weight derived from is β_q utilized to combine the outputs of all base learners. We can ascertain the weight for the learner $S_{g_1}^*$ in the g_1 -th iteration of bootstrap sampling.

$$d_{g_1} = \frac{\beta_{g_1}}{\sum_{q=1}^{G_1} \beta_q} \dots\dots\dots (5.4)$$

We methodically combine many LSTM models using a weighted additive combination, utilising this weight coefficient. The weights given to each learner in this weighted additive model are linked to the model errors throughout all training iterations, not just the current one, which is a difference from the additive model in the standard Boosting approach. The result is an ensemble learning network that can accurately predict both average and peak demand.

(IV). RESULT ANALYSIS

This research uses deep learning to assess short-term voltage stability (STVS) of power systems by identifying latent temporal relationships in post-disturbance system dynamic trajectories.. The trained assessment model determines the system's stability in real-time. The suggested method outperforms standard assessment methods based on shallow learning.

Table 1 1 Algorithm Comparison Of Training And Testing

Model	Training Data				Testing Data			
	MAE	RMSE	MSE	R2	MAE	RMSE	MSE	R2
SVM	0.02	0.0003	0.03	0.75	0.035	0.0003	0.0172	0.7745
KNN	0.05	0.001	0.04	0	0.034	0.0015	0.0169	0.0017
LSTM-GRU	0.005	0	0.006	0.97	0.031	0.002	0.0138	0.9432
Hybrid EL	0	0	0	1	0.015	0.0002	0.0092	0.9543

The effectiveness of several DL models when trained with unscaled inputs and outputs is displayed in Table 1. With proper training, the Hybrid EL model was able to produce a prediction accuracy of 97.29 percent.

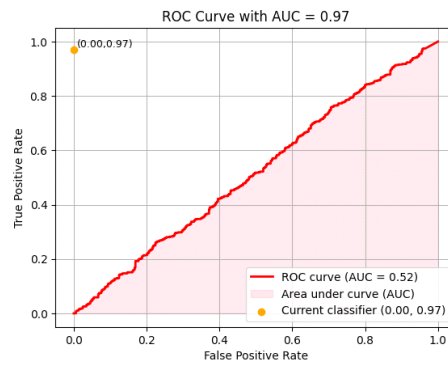


Fig.9 1 5Fold CV for the Proposed Model 22

The ROC -AUC statistic evaluates the performance of binary classifiers. The graphic compares the TPR and FPR at different thresholds. An example that is positive and randomly chosen has a larger possibility of being ranked higher than an example that is negative, as indicated by the AUC. A Hybrid EL model has an AUC of 0.97, whereas a model with no improvement over chance has an AUC of 0.6. Figure 2 displays the RoC-AUC curves of the best cascade model algorithms, demonstrating the effectiveness of the suggested model.

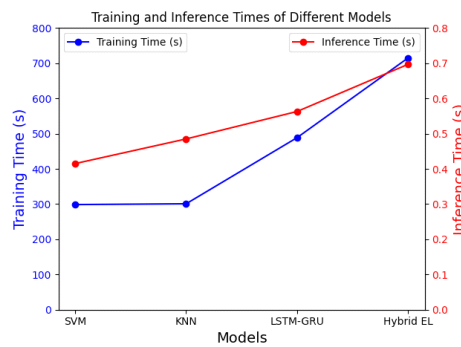


Fig.9.3 Different Models Inference and Training Time

Figure 3 displays the overall computing cost for testing and training the three proposed models and ensemble learning technique in this study. SVM is shown to have the shortest training and inference time. This is due to SVM's decreased number of parameters. While SVM outperformed KNN, it fell below LSTM-GRU in other metrics. The computational complexity of the tested model is an important indicator for assessing the effectiveness of a proposed technique. LSTM-GRU exhibits the most prolonged training and inference durations compared to SVM and KNN; nonetheless, Hybrid EL has attained an accuracy of 97.29%, with a MSE of 0.092 and a MAE of 0.0152. The Hybrid EL model is the most effective when trained independently, as illustrated in Figure 4.

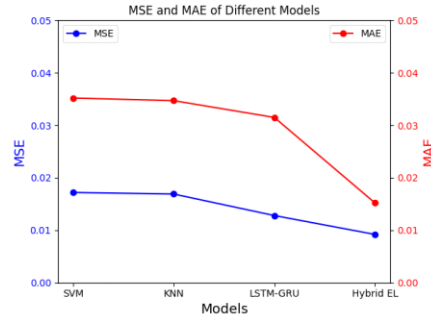


Fig.9 4 Different Models MSE and MAE

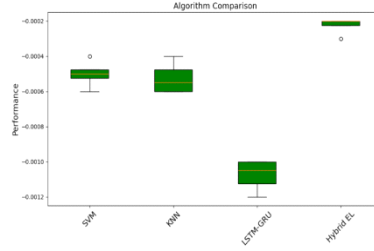


Fig.9 5 Whisper and Box Plot for the Models 23

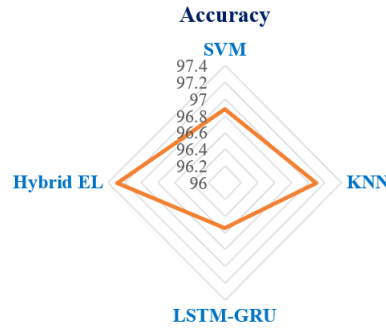


Fig.9.6 Accuracy Comparison of the Model

V. CONCLUSION

The swift advancement of wide area measuring systems (WAMS) in smart grids in recent decades has significantly improved situational awareness in contemporary power systems. Emerging deep learning approaches have been extensively utilized for data-driven dynamic stability in contemporary smart grids. Nonetheless, the extraction of essential spatial-temporal aspects from the dynamics of wide-area system stability continues to be an unresolved challenge. This work focusses on short-term voltage stability (SVS) assessment and introduces an innovative sequential feature learning method to tackle this issue in two phases. The suggested methodology comprises three phases: preprocessing by normalization, feature selection via Relief and RCBF, and performance evaluation utilizing the Hybrid EL Method. The proposed methodology demonstrates efficacy, with an accuracy of around 97.29%.

112. LIFE SCIENCE IN THE ERA OF ARTIFICIAL INTELLIGENCE

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Abstract

This overview examines how artificial intelligence (AI) is transforming practice in multiple fields, especially clinical diagnostics, drug and vaccine design, and managing the health of the general population. Specific emphasis is placed on the application of convolutional neural networks to better identify pathogens; advances in point of care diagnostics; and the creation of new antimicrobials intended to deal with resistant microbes. The paper also explains the uses of AI in epidemiology, microbial ecology and forensic microbiology and how it can understand complicated microbial relations and predict disease outbreaks. The problems of AI implementation, including the requirement to protect data quality and overcome the limitations of algorithms, are discussed critically, and only AI models that can be interpreted and that support both medical and ethical requirements should be deployed.

Keywords: Artificial intelligence in microbiology, Artificial intelligence in Biochemistry, AI in pathogen detection

Introduction

Artificial intelligence (AI) itself is a potent tool to address the issue of public health in the field of microbiology, particularly the treatment of viral diseases and sepsis, where AI is used to perform diagnosis, prognosis, and designation of personalized treatment plans. In addition, its use in prevention and control of infections is evident, as it can examine large health data and thus enable the detection of outbreaks and development of infection control plans. The current discussion will seek to analyze the multi-dimensional role of AI in medical microbiology in both research practice and clinical practices. It is claimed that AI does not just transform the current approaches, but encourages new findings and innovations microbiology, consequently significantly improving health and epidemiology.

Such a tool is artificial intelligence (AI) as it facilitates early detection of pneumonia disease in the lung using chest X-ray (CXR). Several machine-learning and deep-learning and transfer-learning algorithms have been utilized to this end, but a in depth summary comparing datasets to the published literature is yet to come.

There are numerous challenges because the current procedures of identifying and classifying microbial species are not equally satisfactory. The classical methods, including biochemical tests and microscopic analysis, are also misleading; morphological variation or unusual behaviour of some microorganisms can become a stumbling block to the interpretation. It is also problematic to determine susceptibility profile of bacterial isolates to antibiotic therapy. The time consuming nature of the conventional susceptibility testing and its inability to predict therapeutic response of infecting strains at high accuracy which leads to poor treatment regimens and incurring of complications, exemplified by the disk diffusion method.

In July 2024, an AI system trained on 500,000 radiological and histopathological images of 1,500 cases of breast and ovarian cancer- the most common cancers in India- was launched at the All-India Institute of Medical Sciences (AIIMS) in Delhi. Applying AI-based methods (e.g., machine learning and deep-learning models) researchers managed to identify diverse diseases, including skin, liver, heart and Alzheimer, to point to the necessity of earlier diagnosing. To this extent, the current discussion evaluates some diagnostic algorithms such as Boltzmann machine, k-nearest neighbour (kNN), support vector machine (SVM), decision tree, logistic regression, fuzzy logic, and artificial neural network, together with accuracy that they may entail. In a representative study conducted by Dabowska et al. (2017) which involved a backpropagation neural network, the performance was especially good to identify skin disease.

Mycobacterium tuberculosis can be found by AI-Supported Pathology: AI can improve the sensitivity and specificity of pathological identification of *M. tuberculosis*, particularly in biopsy samples and in identifying acid-fast bacilli using enhanced microscopy. Compared with traditional tests, AI reduces the risk of false negatives and misdiagnosis due to human error.

Genomic Analysis: AI algorithms are employed to analyze genetic data, potentially flagging drug-resistant strains of *M. tuberculosis* more rapidly and accurately than conventional methods. This supports personalized therapy for drug-resistant TB. Deep learning has significantly improved the automatic detection of pneumonia, especially via analysis of chest X-ray (CXR) images. Below are the most effective deep learning algorithms and trends currently recognized for pneumonia diagnosis.

AI Techniques Commonly Used in Biochemistry such as Machine Learning (ML) Decision trees, random forests, SVM for classification of molecules or biomarkers. Deep Learning- Neural networks for image-based microscopy analysis or molecular structure

prediction. Natural Language Processing (NLP)-Mining biochemical literature for hidden patterns or drug-target relationships. Reinforcement Learning-Optimizing reaction conditions or experimental designs. Generative AI-Creating new molecular structures (e.g., generative adversarial networks for drug design).

Robotic systems with AI scheduling manage repetitive assays (e.g., ELISA, Western blots, PCR setups) with minimal human intervention. AI-driven pipetting robots adjust protocols based on sample viscosity, volume accuracy needs, or reagent expiry. Smart centrifuges & incubators predict optimal run times and alert when deviations occur. AI quantifies band intensity in SDS-PAGE, Western blots, or 2D gels with higher accuracy than manual software. AI tunes parameters in real-time for HPLC, GC-MS, or spectrophotometers for better resolution and throughput.

AI-driven systems like the APAS Independence can automatically read and interpret bacterial colonies on petri dishes, freeing up lab technicians for more complex tasks. AI can automate the processing of samples, reduce manual labour and improve turnaround time. Algorithms can quickly analyze large datasets from various tests, such as PCR and Next-Generation Sequencing, leading to faster pathogen identification and resistance profiling. Analyze growth patterns, genetic markers, and other data points to identify pathogens with greater speed and accuracy. analyze data from antimicrobial susceptibility testing (AST) to predict resistance patterns and guide treatment decisions. AI-powered microscopy can analyze images of microorganisms with greater precision and speed, aiding in identification and characterization. used in quality control, bacteria detection, and maintaining sanitary standards in various industries, including pharmaceuticals, cosmetics, and food production. AI can help in the early detection and containment of infectious diseases by analysing data on pathogen transmission patterns. It differentiates *Staphylococcus aureus* vs. *Streptococcus* in real time from Gram-stain images.

The conclusion of this review stated that AI is revolutionizing microbiology by improving efficiency, accuracy, and speed in various applications, from pathogen identification to drug discovery. Its integration into microbiology labs is transforming the way we diagnose, treat, and prevent infectious diseases. the field of biochemistry by enhancing efficiency, accuracy, and the potential for new discoveries. Its applications range from drug discovery and protein structure prediction to genomics, metabolomics, and proteomics.

113. APPLICATION OF AI IN BUSINESS AND TECHNOLOGY

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ABSTRACT

This presentation provides a comprehensive analysis of the transformative impact of Artificial Intelligence (AI) on contemporary business practices and technological innovation. AI, about domains such as Machine Learning (ML), Natural Language Processing (NLP), Robotics, and Deep Learning, is now a strategic enabler for organizations aiming to enhance working efficiency, customer experience, and data-driven decision-making. Key business functions ranging from customer service and marketing to human resource management, finance, and supply chain operations are being transformed through AI-powered tools and analytics. In the technology sector, AI is accelerating software development, strengthening cyber security, and advancing smart systems and healthcare technologies.

Through industry-relevant case studies from Tesla, Google, and Zara, the presentation illustrates how global leaders leverage AI to gain a competitive edge. Additionally, it critically examines the benefits of AI integration such as cost optimization, enhanced speed, and innovation potential while addressing the associated challenges including ethical thoughts, job displacement, and regulatory complexities. The discussion also sheds light on emerging trends such as generative AI, decision intelligence, and the convergence of AI with major computing. For future business leaders, understanding and strategically applying AI is vital to drive sustainable growth, innovation, and organizational flexibility in the growing global economy.

Introduction

Artificial Intelligence (AI) has transformed the landscape of modern business and technology. With the ability to simulate human intelligence processes, AI has become a core driver of innovation, efficiency, and strategic decision-making. This presentation explores the various applications of AI in business operations and technology development.

Artificial Intelligence

- ☐ AI refers to systems or machines that mimic human intelligence to perform tasks and can iteratively improve themselves based on the information they collect.
- ☐ Key areas: Machine Learning (ML), Natural Language Processing (NLP), Robotics, Computer Vision, Deep Learning.

AI in Business Applications

A. Customer Service

AI-powered chatbots and virtual assistants handle FAQs, order tracking, and basic problem-solving 24/7.

Example: Amazon's Alexa, ChatGPT, Google Assistant.

B. Marketing and Sales

- ☐ Predictive analytics for consumer behavior.
- ☐ AI tools for personalized product recommendations (e.g., Netflix, Amazon).
- ☐ AI-driven digital marketing campaigns and content generation.

C. Human Resource Management

- ☐ AI used for resume screening, candidate matching, and onboarding processes.
- ☐ Predictive analytics to improve employee retention.

D. Finance and Banking

- ☐ AI-driven fraud detection.
- ☐ Robo-advisors in wealth management.
- ☐ Credit scoring and risk assessment using AI algorithms.

E. Supply Chain and Logistics

- ☐ AI optimizes delivery routes, inventory levels, and warehouse operations.
- ☐ Predictive maintenance for logistics vehicles.

AI in Technology Applications

A. Software Development

- AI-assisted coding tools (e.g., GitHub Copilot).
- Automated software testing and bug fixing.

B. Cybersecurity

- AI identifies security breaches and detects threats in real time.
- Behavioral analytics to detect insider threats.

C. Smart Devices and IoT

- AI enables automation in smart homes, wearables, and connected devices.
- Real-time data processing for intelligent decision-making.

D. Healthcare Technology

- AI in diagnostics (e.g., analyzing X-rays, MRIs).
- Predictive models for disease outbreaks.
- Robotic surgery and personalized medicine.

Benefits of AI in Business and Technology

- Efficiency and Speed: Automates repetitive tasks and accelerates decision-making.
- Cost Reduction: Reduces operational costs and minimizes human error.
- Data Utilization: Helps businesses make better use of big data.
- Innovation: Encourages the creation of new products, services, and business models.

Challenges of AI Implementation

- Ethical Concerns: Bias in algorithms, privacy issues.
- Job Displacement: Automation replacing certain job roles.
- High Implementation Cost: Infrastructure and training costs.
- Regulatory Uncertainty: Lack of clear AI governance policies.

AI ADOPTION FRAMEWORK FOR BUSINESSES

The successful integration of Artificial Intelligence into business operations requires a structured acceptance framework. Organizations must begin by evaluating their readiness, identifying key areas where AI can deliver value such as operations, marketing, customer service, or supply chain. This is followed by starting pilot projects on a small scale to test viability and gather data on performance. Once the pilot proves successful, the implementation can be scaled across functions. Critically, businesses must create robust governance frameworks to screen AI systems, ensure ethical compliance, and track performance metrics. This phased approach helps in minimizing risk, managing change, and maximizing return on AI investments.

STRATEGIC ROLE OF AI IN BUSINESS MODELS

AI is not merely a technological upgrade but a transformative force redefining business models. Platform-based models like Uber and Airbnb leverage AI for real-time demand-supply matching and dynamic pricing. Subscription-based businesses such as Spotify and Netflix use AI for content personalization, increasing user engagement and retention. Moreover, with the rise of AI-as-a-Service (AIaaS), companies like Amazon Web Services and Microsoft Azure are enabling smaller firms to access advanced AI capabilities without

heavy infrastructure investment. This shift shows how AI is not just associate existing operations but also allowing entirely new revenue models.

ALIGNMENT OF AI AND DATA STRATEGY

For AI to deliver meaningful outcomes, it must be tightly allied with an organization's data strategy. High-quality, structured, and accessible data is the foundation of effective AI. Companies must invest in building modern data infrastructures such as data lakes and data warehouses, enabling real-time analytics and efficient data management. In addition, organizations must address data privacy and regulatory passivity through clear governance policies, mainly with the rising emphasis on data protection laws like GDPR and CCPA. A well-integrated data strategy ensures that AI models are trained on consistent datasets, thereby growing accuracy and reducing bias.

CHANGE MANAGEMENT AND AI-READY CULTURE

The adoption of AI technologies needs significant organizational change, including the development of a future-ready workforce. Companies must invest in up skilling and reskilling employees to work alongside AI tools. Moreover, creating a culture that embraces innovation, experimentation, and data-driven decision-making is essential for AI to thrive. Resistance to automation and fear of job shift can be mitigated through transparent communication, inclusive training programs, and leadership support. Cross-functional collaboration between technical teams and business units is also key to ensuring successful integration and innovation through AI.

AI IN EMERGING MARKETS AND MSMES

While large corporations lead in AI deployment, emerging markets and micro, small, and medium enterprises (MSMEs) are also beginning to benefit from AI solutions. Affordable and scalable AI tools like Google AutoML and Zoho AI are making it feasible for smaller businesses to access intelligent automation, customer insights, and predictive analytics. In rural and underserved areas, AI applications in agriculture, healthcare, and local commerce are bridging infrastructure gaps and improving output. However, challenges such as digital literacy, data availability, and cost limits remain, lacking targeted policy and ecosystem support.

Case Studies

- a) Tesla Uses AI in autonomous driving, battery performance, and predictive maintenance.
- b) Google AI in search engine optimization, language translation, and AI research (DeepMind).

- c) Zara Uses AI for demand forecasting, design suggestions, and inventory control.

Future of AI in Business and Technology

- Rise of Generative AI for content creation.
- AI-powered decision intelligence for strategic planning.
- Integration of Quantum Computing and AI.
- Growth of Explainable AI (XAI) for trust and transparency.

Conclusion

AI is not just a trend it is a transformative force reshaping how businesses operate and how technology evolves. Organizations that embrace AI today are better positioned for future success, increased competitiveness, and sustained innovation. However, balanced integration with ethical considerations is essential.

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114. MARKET PENETRATION STRATEGIES FOR SMALL BUSINESS FIRMS IN INDIA

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Abstract

In a competitive environment, small firms and startups in India can use market penetration as a strategic way to grow their market share. Businesses hope to increase sales and draw in more clients by concentrating on their current goods and services rather than creating entirely new ones. Market penetration involves increasing the sales of existing products or services within an established market. This strategy focuses on gaining a larger share of the market by attracting new customers or encouraging existing customers to buy more frequently.

This paper highlights the importance of market penetration for small businesses in India, emphasizing how it can be achieved and the benefits it offers.

Introduction

Market penetration helps businesses identify the total number of people buying a product or a service compared to its total market size. Businesses use it to determine their market share and evaluate the potential for expansion or entry into a market. It helps to prepare a business plan, expand the market size for products and services, improve overall business profitability and emerge as a market leader. Assessing the market size and penetration is necessary when entering a new market or launching a new product. Different market penetration strategies may work for different types of businesses. The company aggressively enters a market with competitive pricing, promotional offers, or other tactics to capture a larger portion of the market. A penetration strategy aims to quickly establish a strong presence and build a customer base, often at the expense of competitors. In a market penetration strategy, a company's growth is primarily attained by increasing sales of its existing products or services within its current market. This is achieved by attracting new

customers, persuading existing customers to buy more, or converting customers from competitor.

Literature Review

Payne et al. (2018) state that a penetration strategy is a commercial method used to attract clients to a new product or service. A new product or service is initially made available at a low cost as part of a penetration strategy. Penetration pricing, which also guarantees a wider client base, is the choice to lower the price below the product incentive to customers. This happens when a business sacrifices higher earnings in order to supply larger volumes with higher margins (Reen et al., 2017).

According to Pearce and Robinson (2015), in order to succeed at market penetration, a company needs to understand what initially made the product successful. This can be achieved by luring in new customers, undermining the sales of rivals, and boosting consumption among current users—possibly by lowering the price or providing promotions. As soon as a company enters a new market, its goal is market penetration, claim Luo and Zhao (2014). The introduction of the product, rapid market entry, and eventual market share appropriation are the main goals of the market penetration strategy.

Literature suggests that small businesses can achieve this by employing various tactics, including price adjustments, increased promotional activities, and enhanced distribution channels. This strategy aims to capture a larger share of the market and gain a competitive advantage.

Objective of the Study

The main objective of this paper is to study the benefits and the effectiveness of various market penetration strategies.

I.Benefits of Market Penetration

- ☐ **Increased Revenue:** By capturing a larger customer base, businesses can significantly boost their sales.
- ☐ **Competitive Advantage:** Gaining market share can strengthen a business's position against competitors.
- ☐ **Enhanced Brand Awareness:** Increased marketing efforts can boost brand recognition and loyalty
- ☐ **Customer Loyalty:** Offering value and meeting customer needs can foster long-term customer relationships.
- ☐ **Cost Efficiency:** Since the focus is on existing products, businesses can allocate resources more effectively without the need for extensive research and development.

II. Effective Market Penetration Strategies

1. Pricing Strategies

Adjusting prices can be an effective way to attract more customers:

- ☐ **Penetration Pricing:** Offering products at lower prices initially to attract price-sensitive customers. For example, a local restaurant might offer discounted meals during off-peak hours to draw in more patrons.
- ☐ **Discounts and Promotions:** Running limited-time promotions or discounts can encourage new customers to try your products.

2. Increased Marketing Efforts

Boosting marketing activities is crucial for raising awareness:

- ☐ **Social Media Campaigns:** Utilize platforms like Instagram and Facebook to reach potential customers with targeted ads showcasing your products.
- ☐ **Local Advertising:** Invest in local advertising, such as flyers or community events, to increase visibility in your area.

3. Product Differentiation

Making your product stand out can help capture market share:

- ☐ **Unique Features:** Highlight unique aspects of your product that competitors may not offer. For instance, a handmade jewelry business could emphasize the craftsmanship and custom designs that set it apart from mass-produced items.
- ☐ **Exceptional Customer Service:** Providing outstanding customer service can create a loyal customer base that prefers your brand over others.

4. Expanded Distribution Channels

Increasing accessibility can lead to higher sales:

- ☐ **Online Presence:** Establishing an e-commerce website allows you to reach customers beyond your local area. For example, a small clothing brand could sell its products online to attract buyers from different cities.
- ☐ **Partnerships with Retailers:** Collaborating with local shops or boutiques can help get your products into more stores, increasing exposure.

5. Customer Loyalty Programs

Encouraging repeat purchases through loyalty initiatives:

- ☐ **Rewards Programs:** Implementing a rewards program where customers earn points for each purchase can motivate them to return.

- **Referral Discounts:** Offering discounts for referrals encourages satisfied customers to bring in new clients.

6. Monitor and Analyze Performance

Regularly tracking performance metrics helps refine strategies:

- **Sales Data Analysis:** Keep track of sales figures and customer feedback to identify which strategies are working and which need adjustment.
- **Customer Surveys:** Conduct surveys to gather insights on customer satisfaction and preferences.

Conclusion

Market penetration is a valuable strategy for small businesses and startups in India looking to grow their presence in competitive markets. By carefully considering pricing, promotion, distribution, and product offerings, and by understanding the competitive landscape, small businesses can effectively implement market penetration strategies to increase sales and gain a stronger foothold in the market.

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115. IMPACT OF TECHNOSTRESS ON JOB SATISFACTION AMONG BANK EMPLOYEES IN TAMILNADU

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Abstract

The aim of the study is to Impact of technostress on job satisfaction among bank employees in Tamil Nādu. The researcher has determined a sample is 384 but the researcher has collected 450 for compensate the error of data. Finally, 415 responses are fit for further analysis. Hence, the sample of this study consist 415 respondents. The researcher has applied the Convenience sampling method to collect the questionnaire. The researcher has approached the employees to get permission for collecting data from their bank. Further, descriptive statistics, correlation and regression were applied. It is found that Techno-insecurity, Techno-uncertainty are positively affecting the pay fairness satisfaction. Techno-overload and Techno-invasion are negatively affecting the pay fairness satisfaction.

Keywords: *Techno stress, Job satisfaction, Bank Sectors, and Technology.*

Introduction

The term Techno-stress was first coined by a clinical psychologist Craig Brodin 1984, defined techno-stress as a modern disease of adaptation caused by an inability to cope with the new computer technologies in a healthy manner. Technostress is defined as the phenomenon of stress experienced by end users in organizations (Ragu-Nathan et al., 2008). Balamurugan and Selvalakshmi (2019); Priya and M.John Jacob (2020) The symptoms related to techno-stress include anxiety, behavioral strain, feelings of exhaustion, mental fatigue, poor concentration, physical diseases, and insomnia, while its main consequences are reduced productivity, job satisfaction, and organizational commitment and increased employee outcomes (absenteeism and turnover) (Tarafdar et al., 2010; Ayyagari et al., 2011; La Torre et al., 2019). Job performance assesses whether a person performs a job well.

Objectives of the study

- ☐ To examine the employee perception towards technostress and work-life balance
- ☐ To test the relationship between techno stress and work-life balance
- ☐ To find out the factors influence the techno stress on work-life balance

Research Methodology

The present study explores the consequences of technostress on job satisfaction among bank employees in Tamilnadu. Hence, the present study falls under the category of ‘descriptive studies’ as the nature. Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., and Tu, Q. (2008) questionnaire was used to collected the data from the bank employees. The study used the technostress on job satisfaction among bank employees to estimate proportion of the population uses at an approximate 95% confidence level. Based on the pilot study, the percentage of respondents having positive so technostress on job satisfaction among bank employees is found to be 60 % hence, $p = 0.6$ (and therefore $q = 1-0.6 = 0.4$). As this is a preliminary study you are prepared to accept a margin of error of $\pm 5\%$ so you set $d = 0.05$. To determine the minimum sample size formula is applied;

$$n = \frac{4pq}{d^2}$$

$$n = \frac{4 \times 0.60 \times 0.40}{0.05^2}$$

$$n = 0.96 \div 0.0025 = 384$$

For this study, the researcher has determined a sample is 384 but the researcher has collected 450 for compensate the error of data. Finally, 415 responses are fit for further analysis. Hence, the sample of this study consist 415 respondents. The researcher has applied the Convenience sampling method to collect the questionnaire. The researcher has approached the employees to get permission for collecting data from their bank. Further, descriptive statistics, correlation and regression were applied.

Analysis and Discussion

Table 1 Techno-Stress

	Mean	Std. Deviation
Techno-overload	3.72	1.40
Techno-invasion	3.63	1.19
Techno-complexity	3.60	1.25
Techno-insecurity	3.56	1.20
Techno-uncertainty	3.98	1.25

The table presents the mean and standard deviation for five dimensions of techno-stress: techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty. The highest mean score is observed for techno-uncertainty ($M = 3.98$, $SD = 1.25$), indicating that employees are most affected by frequent changes and updates in technology, which can create confusion and stress. This is followed by techno-overload ($M =$

3.72, SD = 1.40), where employees feel overwhelmed by the excessive amount of technology and information they need to process. Techno-invasion, with a mean of 3.63 (SD = 1.19), reflects the intrusion of technology into personal life, causing a blurring of work-life boundaries. Techno-complexity (M = 3.60, SD = 1.25) indicates that employees struggle with the complexity of using new technologies, which can reduce efficiency and increase frustration. Lastly, techno-insecurity (M = 3.56, SD = 1.20) suggests that employees feel insecure about their job stability due to technological advancements. Overall, these findings highlight that while technology is integral to modern work environments, it also poses significant stressors that can impact employee well-being. Organizations must address these challenges by providing adequate training, support, and clear communication to help employees navigate and adapt to technological changes effectively.

Table 2 Pay Fairness

	Mean	Std. Deviation
I am being paid fairly for the work I do	3.52	1.24
My organization has an appropriate salary scale	3.47	1.23
I feel appreciated by the organization when I think about what they pay me	3.33	1.24
The payroll (wages, bonuses etc.) in my organization is fair	3.38	1.34

Table 2 clarifies the pay fairness among the employees in this study. Here, pay fairness is identified four statements such as paid fairly for the work, organization has an appropriate salary scale, feel appreciated by the organization and the payroll (wages, bonuses etc.) is fair. From the data, the researcher has calculated mean and standard deviation.

The mean value of paid fairly for the work (3.52), and standard deviation value is 1.24.

The mean value of organization has an appropriate salary scale (3.47), and standard deviation value is 1.23

The mean value of feel appreciated by the organization (3.33), and standard deviation value is 1.24.

The mean value of the payroll (wages, bonuses etc.) is fair (3.38) and standard deviation value is 1.34.

The results revealed that payroll of the wages and bonus are low level opinion towards the pay fairness. It is suggested that the management should be increase the wages and bonus based on economic condition and living standard.

Table 3 Pay Size

	Mean	Std. Deviation
My salary is adequate for my living expenses	3.36	1.40
The periods between pay rises are reasonable	3.72	1.19
I am satisfied with my chances for salary increases	3.63	1.25
I am very satisfied with my salary size	3.60	1.07

Table 3 explains the pay fairness among the employees in this study. Here, pays fairness is identified four statements such as salary adequate for their living expenses, periods between pay rises are reasonable, chances for salary increases, and satisfied with their salary size. from the data, the researcher has calculated mean and standard deviation.

The mean value of salary adequate for their living expenses (3.36).

The mean value of the periods between pay rises are reasonable (3.72).

The mean value of chances for salary increases (3.63).

The mean value of satisfied with their salary size (3.60).

The results that salary adequate for their living expenses, periods between pay rises are reasonable, chances for salary increases, and satisfied with their salary size are good level opinion towards the pay fairness among the employees in this study.

Table 4 Promotion

	Mean	Std. Deviation
My organization has a clear career path	3.50	1.26
My organization has a clear and fair promotion policy	3.67	1.10
I am satisfied with my chances for promotion	3.38	1.29
There are many opportunities of promotion in the organization	3.69	1.26

Table 4 describes the promotion among the employees in this study. Here, promotion is identified four statements such as organization has a clear career path, organization has a clear and fair promotion policy, satisfied with chances for promotion, and opportunities of promotion. From the data, the researcher has calculated mean and standard deviation.

The Mean values of organization has a clear career path (3.50) and standard deviation (1.26).

The Mean values of organization has a clear and fair promotion policy (3.67) and standard deviation (1.10).

The Mean values of satisfied with chances for promotion (3.38) and standard deviation (1.29).

The Mean values of opportunities of promotion (3.69) and standard deviation (1.26).

It is found that organization has a clear career path, organization has a clear and fair promotion policy, satisfied with chances for promotion, and opportunities of promotion are medium level opinion towards the promotion among the employees in this study

Table 5 growth

	Mean	Std. Deviation
I am satisfied with my job growth	3.61	1.23
I find new opportunity in my work	3.63	1.22
I consider my job security	3.60	1.32
I know new innovation about job	3.72	1.25

Table 5 explains the growth satisfaction among the employees in this study. Here, job growth, new opportunity, job security, new innovation about job. From the data, the researcher has calculated mean and standard deviation.

The Mean values of job growth (3.61) and standard deviation (1.23).

The Mean values of new opportunity (3.63) and standard deviation (1.22).

The Mean values of job security (3.60) and standard deviation (1.32).

The Mean values of new innovation about job (3.72) and standard deviation (1.25).

It is found that job growth, new opportunity, job security, and new innovation about job are medium level opinion towards the growth satisfaction.

Table 6 Correlation between Technostress creators and job satisfaction

	Pay Fairness	Pay Size	Promotion	Growth	Techno-overload	Techno-invasion	Techno-complexity	Techno-insecurity	Techno-uncertainty
Pay Fairness	1								
Pay Size	0.743**	1							
Promotion	0.664**	0.677**	1						
Growth	0.574**	0.672**	0.666**	1					
Techno-overload	0.298**	0.458**	0.560**	0.447**	1				
Techno-invasion	0.305**	0.560**	0.624**	0.541**	0.636**	1			
Techno-complexity	0.566**	0.709**	0.658**	0.742**	0.479**	0.496**	1		
Techno-insecurity	0.749**	0.761**	0.737**	0.711**	0.520**	0.574**	0.644**	1	
Techno-uncertainty	0.763**	0.680**	0.576**	0.517**	0.296**	0.299**	0.472**	0.629**	1

Table 6 discuss the relationship between technostress creators and job satisfaction. Here, techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty are the dimensions of technostress creators. Pay fairness, pay size, promotion, and growth are the dimensions of job satisfaction. Further, technostress creators considered as independent variable and job satisfaction is considered as dependent variable.

Ho: There is no relationship between technostress creators and job satisfaction

Pearson correlation is applied to know the relationship between independent and dependent variables.

Techno-overload (0.298), techno-invasion (0.305), techno-complexity (0.566), techno-insecurity (0.749), techno-uncertainty (0.763) are correlated with pay fairness.

Techno -overload (0.458), techno-invasion (0.560), techno-complexity (0.709), techno-insecurity (0.761), techno-uncertainty (0.680) are correlated with pay size.

Table 7 factor affecting technostress creators on pay fairness satisfaction

R	R Square	Adjusted R Square	F	Sig.
0.853 ^a	0.727	0.724	217.793	0.001*

Coefficients^a					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.262	0.148		1.767	0.078
Techno-overload	-0.094	0.046	-0.071	-2.043	0.042*
Techno-invasion	-0.171	0.046	-0.135	-3.698	0.001*
Techno-complexity	0.175	0.044	0.140	3.971	0.001*
Techno-insecurity	0.522	0.045	0.490	11.578	0.001*
Techno-uncertainty	0.440	0.033	0.450	13.345	0.001*

Table 7 explains the factor affecting the technostress creators on pay fairness satisfaction. Here, techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty are considered as independent variable and Pay Fairness is considered as dependent variable.

The R value of 0.853 indicates a strong positive impact between the independent and dependent variables. The R Square (R²) of 0.727 which accounts for the number of predictors in the model. An Adjusted R Square 0.724, suggests that approximately 72.4 % of the variability in the dependent variable can be explained by the independent variables like techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty, indicating a good fit of the model. The F-statistic of 217.793, with a significance level (Sig.) of 0.001. Hence, hypothesis is rejected.

Regression equation is indicating the factors affecting independent variables on dependent variable

Pay fairness satisfaction = 0.262 + 0.522 (Techno-insecurity) + 0.440 (Techno-uncertainty) + 0.175 (Techno-complexity) – 0.094 (Techno-overload) – 0.171 (Techno-invasion)

This regression equation suggests that pay fairness satisfaction is influenced by various forms of technostress. Specifically, Techno-insecurity (0.522) and Techno-uncertainty (0.440) have strong positive effects, indicating that higher levels of insecurity and uncertainty related to technology usage are associated with greater satisfaction with pay fairness. Techno-complexity (0.175) also positively influences pay fairness satisfaction, but to a lesser extent. On the other hand, Techno-overload (-0.094) and Techno-invasion (-0.171) negatively impact pay fairness satisfaction, meaning that feelings of being overwhelmed or intruded upon by technology may reduce satisfaction with pay fairness. Overall, while some dimensions of technostress can enhance perceptions of pay fairness, others detract from it.

It is found that techno-insecurity, techno-uncertainty are positively affecting the pay fairness satisfaction. techno-overload and techno-invasion are negatively affecting the pay fairness satisfaction.

Conclusion

Techno-stress can be treated by getting user friendly software and educating people about new technology and creating better level of reassurance, patience and stability and communication within the job environment. eliminate techno-stress are conducting stress management activities to lessen and eliminate the problem of techno-stress such as exercise, meditation, progressive muscle relaxation, positive self talk, staying healthy and having healthy diet. Techno-stress can be minimized by coping strategies such as giving more technical support to the employees, provide training programs, offer a flexible work environment, stress management programs, arranging a short-vacations, and motivation will help to lessen the problem of techno-stress. Now-a-days, technology is becoming an integral part of each and every organization and contributes toward the individual and organisational performance. But working with fast changing technology can enhance or can reduce the performance.

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116. AUTOMATED AUDIT IN INDIA: POLICY DRIVERS, PRACTICE MODELS, AND THE ROAD AHEAD

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Introduction

Automated audit refers to the use of technology to plan, perform, and monitor assurance activities with minimal manual intervention. It spans computer-assisted audit techniques (CAATs), audit analytics, robotic process automation (RPA), continuous controls monitoring (CCM), AI-enabled anomaly detection, and end-to-end digital workflows for evidence gathering, testing, documentation, and reporting. Indian regulators have accelerated this shift by mandating audit trails in accounting systems, modernizing quality standards for audit firms, and embedding analytics in tax and market supervision.

India is moving quickly: the regulatory push

- a) Mandatory edit-log/audit trail in accounting software (from April 1, 2023): The Ministry of Corporate Affairs amended the Companies (Accounts) Rules to require companies that use accounting software to enable an “audit trail” of every transaction. This change significantly boosts automated audit reliability.
- b) Quality management standards for firms (SQM 1 & SQM 2): Modern quality-management standards now require continuous risk assessment and monitoring, encouraging automated monitoring and data-driven file reviews.
- c) Sector regulators embedding automation: GST administration uses automated scrutiny modules; SEBI mandates IT audits; RBI’s RBIA framework encourages continuous monitoring; and the CAG has set up centralized data capabilities.

Automated audit in practice

Risk assessment and planning, automated controls & substantive tests, continuous auditing and monitoring, and digital documentation are the four pillars. Examples include:

- Data ingestion & profiling from ledgers, GST returns, and bank feeds.
- Automated controls testing such as segregation of duties checks and journal entry analytics.

- Linking sales ledgers to e-invoice metadata for revenue testing.
- Continuous controls monitoring with dashboards and alerts.
- Maintaining automated evidence logs for quality management

Use-cases and impact in India

Statutory audits under Companies Act benefit from audit trails for fraud-risk detection; GST compliance benefits from reconciliation analytics; financial services use continuous data-driven tests; and public sector audits leverage big data for higher coverage without proportional staffing increases.

Implementation blueprint for Indian organizations

Organizations should map regulatory touchpoints, ensure data readiness, prioritize high-yield test libraries, automate workflows, and upskill auditors in digital assurance techniques.

Challenges and risk mitigations

Challenges include data quality issues, over-reliance on static rules, cybersecurity constraints, and increased documentation burden. These can be mitigated through robust data governance, regular updates to test logic, secure frameworks, and strong script governance.

AI-native audits and public-data fusion

Expect AI-native audit tools that directly connect to government APIs (GSTN, MCA, etc.) to perform anomaly detection and auto-draft audit documentation with embedded references to transaction logs and external databases.

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117. A STUDY ON THE IMPACT OF AI IN INDIAN TRADE MARKET

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ABSTRACT

The Indian trade market is one of the largest and most diverse in the world, contributing significantly to the nation's GDP and employment. It encompasses both domestic and international trade, driven by agriculture, manufacturing, and the service sector. Over the past decade, technological advancements have reshaped trade practices, making them faster and more efficient. Artificial Intelligence (AI) is emerging as a game-changer, enhancing decision-making, logistics, and customer engagement. This paper explores the structure, scope, and key sectors of the Indian trade market while addressing challenges and opportunities. The study also highlights the role of AI in shaping the future of India's trade landscape.

Keywords: Indian Trade, GDP, Artificial Intelligence And Service Sector.

INTRODUCTION

India's trade market is a cornerstone of its economic development, connecting millions of producers and consumers across the country and the world. It covers a vast range of sectors, from agriculture and manufacturing to services and technology. Over the years, policy reforms, globalization, and infrastructure growth have boosted India's trade capacity. The rise of e-commerce has further opened new opportunities for domestic and international trade. Artificial Intelligence (AI) is now transforming traditional trade models by improving efficiency and decision-making. With its diverse resources and skilled workforce, India holds a competitive edge in global trade. However, challenges such as infrastructure gaps, regulatory complexities, and globalization, and infrastructure growth have boosted India's trade capacity. This study aims to analyse the structure, scope and future trends of the Indian Trade Market in the AI era.

1. Indian Trade – Refers to the buying, selling, and exchange of goods and services within and outside India. It includes both domestic and international transactions that fuel the economy. Plays a crucial role in GDP growth and employment generation.

2. Exports – The process of selling goods or services from India to other countries. It brings in foreign exchange and helps Indian industries grow globally. Key export items include textiles, IT services, and pharmaceuticals.

3. Imports – Buying goods or services from foreign countries for use in India. Imports fill domestic demand gaps in sectors like crude oil, electronics, and machinery. They influence trade balance and economic policy.

4. Economy – The overall system of production, distribution, and consumption of goods and services in India. Trade forms a vital component of the economy. A strong trade market boosts GDP and living standards.

5. GDP – Gross Domestic Product, the total value of all goods and services produced in a country in a year. Trade directly impacts GDP through exports, imports, and domestic transactions. Higher GDP indicates a healthier economy.

6. AI (Artificial Intelligence) – The use of machines and algorithms to mimic human intelligence. In trade, AI improves forecasting, pricing, logistics, and customer support. It makes processes faster, more accurate, and cost-effective.

7. E-commerce – Buying and selling goods or services online through websites and apps. It is rapidly growing in India, driven by convenience and internet penetration. AI powers personalized shopping and recommendations.

8. Agriculture – Cultivation of crops and livestock, a major part of India's trade market. India exports rice, spices, tea, and other agricultural products. It supports rural livelihoods and food security.

OVERVIEW OF INDIAN TRADE

- a) **Domestic Trade:** Involves the exchange of goods and services within India's borders. It contributes significantly to local economies.
- b) **International Trade:** Focuses on imports and exports with other nations, boosting foreign exchange reserves.
- c) **Wholesale Trade:** Bulk purchasing from manufacturers and selling to retailers, ensuring supply chain stability.
- d) **Retail Trade:** Direct selling to consumers through shops, malls, and online platforms.

AI IN INDIAN TRADE MARKET

1. Automated Supply Chain – AI systems track inventory in real time, reducing overstock and shortages. They predict demand patterns and adjust procurement accordingly. This helps businesses save costs and improve delivery speed.

2. Predictive Analytics – Uses historical trade data to forecast future market demand. Helps traders make informed decisions on pricing, inventory, and product launches. Reduces the risk of unsold stock.

3. Smart Pricing – AI adjusts product prices automatically based on demand, competition, and season. Ensures maximum profit without losing customers. Keeps Indian traders competitive in global markets.

4. Fraud Detection – AI algorithms detect suspicious trade transactions instantly. They identify unusual patterns that may indicate scams or financial fraud. This builds trust in the trade ecosystem.

5. Chatbots – AI-powered chatbots provide instant responses to customer queries. They handle multiple languages, improving communication in both domestic and international trade. Saves time for businesses and customers.

6. Trade Data Analysis – AI processes massive amounts of trade data in seconds. Helps businesses identify trends and opportunities. Supports faster and more accurate decision-making.

7. Personalized Marketing – AI analyzes customer behavior to offer tailored product recommendations. Increases sales by targeting the right audience with the right offers. Improves customer satisfaction.

8. Blockchain with AI – Combines AI's decision-making with blockchain's security. Ensures transparent trade records and prevents document tampering. Boosts trust between global trade partners.

9. Risk Assessment – AI predicts potential market risks such as currency fluctuations or supply shortages. Businesses can take preventive measures to reduce losses. Improves long-term trade stability.

SCOPE OF INDIAN TRADE MARKET

1. Expanding Global Reach – India's growing exports connect it to over 190 countries worldwide.
2. Technological Integration – AI, blockchain, and e-commerce are reshaping trade operations.
3. Sectoral Diversification – Covers agriculture, manufacturing, and service industries.
4. Rising Consumer Base – Over 1.4 billion people driving domestic demand.
5. Investment Opportunities – Attracts foreign direct investment in multiple sectors.
6. Sustainable Trade Growth – Focus on eco-friendly products and green technologies.

Nature of Indian Trade Market:

1. Diverse Products – Ranges from traditional handicrafts to high-tech goods.
2. Mixed Trade System – Includes both domestic and international trade.
3. Competitive Market – Strong presence of global and local players.

4. Policy Driven – Influenced by government regulations and trade agreements.
5. Technology enabled – Increasing adoption of AI and digital tools in trade.
6. Demand Oriented – Driven by changing consumer preferences and trends.

Structure of Indian Trade:

1. Primary Sector Trade – Involves the exchange of raw materials and natural resources like crops, minerals, and forestry products. It forms the base for manufacturing and exports. Agriculture remains the largest contributor in this sector.

2. Secondary Sector Trade – Includes the manufacturing and processing of raw materials into finished goods. Sectors like textiles, automobiles, and electronics dominate. Contributes significantly to India's industrial exports.

3. Tertiary Sector Trade – Focuses on services such as banking, IT, tourism, and logistics. This sector generates high foreign exchange revenue. India is a global leader in IT and BPO services.

4. Public Sector Trade – Government-owned organizations manage trade in areas like defense, energy and infrastructure. Ensures national interest and strategic economic growth. Plays a key role in large scale exports and imports.

Key Sectors:

1. Agriculture – Major contributor to exports with products like rice, tea, and spices. Supports rural employment and food security.
2. IT Services – India leads in software exports, outsourcing, and tech solutions. Generates high foreign exchange earnings.
3. Textiles – One of the oldest and largest export industries. Known for cotton, silk, and garment production.
4. Pharmaceuticals – Supplies affordable medicines globally, earning the title “Pharmacy of the World.” Key exporter of vaccines.
5. Automobiles – Strong domestic market with growing vehicle exports. Includes cars, bikes, and auto components.

Challenges:

1. Infrastructure Bottlenecks – Poor roads, ports, and warehousing slow down trade operations and increase costs.
2. High Logistics Cost – Transport and storage expenses remain higher compared to global standards, reducing competitiveness.
3. Policy Uncertainty – Frequent changes in trade regulations create confusion for businesses and investors.

4. Global Competition – Indian traders face stiff competition from low-cost manufacturing countries like China and Vietnam.
5. Currency Fluctuations – Changes in the value of the Indian Rupee affect import and export profitability.
6. Import Dependency – Heavy reliance on imports for crude oil, electronics, and machinery makes the economy vulnerable.
7. Technological Gaps in SMEs – Many small traders lack access to advanced technology like AI and automation.

Future Trends in Indian Trade with AI

- ☐ AI-driven trade forecasting
- ☐ Digital trade platforms expansion
- ☐ Blockchain-enabled smart contracts
- ☐ AI-powered sustainable supply chains
- ☐ Growth of virtual B2B marketplaces

CONCLUSION

The Indian trade market is a vital engine for economic growth, connecting diverse sectors and regions. With rapid technological advancements, especially AI, trade operations are becoming faster, smarter, and more efficient. Despite challenges like infrastructure gaps and global competition, India's potential remains strong. Strategic reforms and digital adoption can boost both domestic and international trade. The future promises a sustainable, technology-driven trade ecosystem with global competitiveness.

118. AI IN VENDOR AND SUPPLIER MANAGEMENT

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Abstract

The way we manage vendors and suppliers is changing dramatically thanks to artificial intelligence. What used to be a largely manual, time-consuming process filled with spreadsheets and phone calls is now becoming a sophisticated, data-driven operation. This paper looks at how AI is reshaping vendor management, from finding the right suppliers to managing ongoing relationships. We explore the real benefits companies are seeing, the hurdles they're facing during implementation, and what the future might hold. The evidence shows that while AI brings tremendous opportunities for cost savings and better decision-making, success depends heavily on how well organizations handle the transition and integrate these new technologies with their existing processes.

Keywords: Artificial Intelligence, Vendor Management, Supplier Management, Supply Chain, Procurement, Machine Learning

1. Introduction

Managing vendors and suppliers has come a long way from the days of Rolodexes and paper contracts. What started as a basic administrative function has evolved into something much more strategic—a critical part of how companies compete and survive in today's marketplace (Monczka et al., 2021). Think about it: the suppliers you choose and how well you manage those relationships can make or break your business, especially when supply chains are more complex and interconnected than ever. Vendor and supplier management has changed (Monczka et al., 2021) from a mere administrative duty to a critical component of corporate existence. Traditional procedures are wasteful, particularly in complicated, interrelated supply chains. AI, which combines machine learning, natural language processing, and predictive analytics, provides a novel method. Companies are realising that AI-powered vendor management is critical to staying competitive. This article examines the present application of AI in vendor and supplier management, focussing on its accomplishments, problems, and potential future prospects.

2. The Evolution of Vendor Management and AI's Role

2.1 How We Got Here

Vendor management has progressed from the simple practice of locating possible suppliers through industry contacts or trade fairs, evaluating them based on pricing and delivery time, and maintaining relationships through regular check-ins and annual evaluations (Benton, 2020). However, today's supply chains span continents, include numerous levels of suppliers, and must respond rapidly to changing market conditions. According to Williamson (2020), AI can drastically lower the expenses of identifying, analysing, and monitoring suppliers. This allows firms to continuously monitor supplier performance and identify possible issues before they harm their business.

2.2 The Technology Behind the Change

Machine learning, natural language processing, and predictive analytics are all examples of AI technology used in vendor management. Machine learning analyses supplier data to detect trends and improve predictions over time (Kumar et al., 2023). Natural language processing can read contracts, supplier interactions, and news stories, identifying linguistic errors and warning when major suppliers are referenced badly. Predictive analytics can identify supplier issues weeks or months in advance (Zhang & Wang, 2022), offering an early warning system to prevent supply interruptions and operational shutdowns.

3. AI in Vendor Management

3.1 Finding and Choosing Suppliers

Through the analysis of large databases of suppliers worldwide, as well as prior performance, social media presence, and financial health, artificial intelligence has completely changed the process of finding and choosing suppliers (Johnson & Smith, 2023). Information from sources such as news stories, industry reports, and regulatory filings can be processed by these systems. AI may assess several criteria at once and weight them according to previous successful supplier relationships, making the selection process extremely effective (Davis et al., 2022). The time and human resources needed for conventional supplier searches are decreased, and more successful and objective supplier recommendations are the outcome.

3.2 Managing Risk Before It Becomes a Problem

AI has a big impact on vendor management, particularly risk management. It can detect patterns in supplier behaviour that point to prospective problems, such as extended payment terms, falling quality measures (Martinez & Brown, 2023), or important executives leaving. According to Thompson et al. (2022), artificial intelligence can monitor news feeds

and government pronouncements in real-time, alerting suppliers to possible dangers before they become serious difficulties. This proactive approach to risk management is critical in vendor management.

3.3 Making Contract Management Less Painful

AI is revolutionising contract management by analysing current contracts to discover standard clauses and successful terms (Wilson & Garcia, 2023), allowing for faster generation of new contracts. The true value is found in contract monitoring, in which AI systems continuously check supplier performance against contract conditions, automatically alerting difficulties (Lee & Anderson, 2022), avoiding problems from growing into serious conflicts or operational disruptions.

3.4 Keeping Track of Performance Continuously

A snapshot method frequently causes traditional supplier performance evaluations to be overlooked (Roberts et al., 2023). Continuous monitoring is made possible by AI in a number of areas, such as quality, cost, delivery, and service. AI systems are able to anticipate possible declines, enabling prompt resolution or different approaches. In 2022, Clark and Miller.

4. The Real Benefits and Honest Challenges

4.1 What Companies Are Actually Gaining

The AI for vendor management (Global Procurement Study, 2023). Measurable gains include cost savings, better decision-making, and increased collaboration with important suppliers. Implementing AI technologies can cut procurement expenses by 10-25% (Taylor & Jones, 2022). This is due to improved supplier selection, favourable contract conditions, and lower administrative overhead. AI can forecast dangers and facilitate strategic relationship management (Murphy & Davidson, 2023).

4.2 The Reality of Implementation Challenges

Due to data fragmentation, inaccurate or missing supplier data, the requirement for substantial technological skills, and meticulous planning, integrating AI into vendor management is difficult (Patterson & White, 2022). The integration procedure may be more expensive and take longer than anticipated. Johnson & Stewart, 2023). Another issue is human considerations, as procurement experts could be dubious of AI suggestions, particularly if they go against their professional judgement. According to Harris and Brown (2022), effective AI adoption judgement necessitates high-quality technology and cautious change management to assist individuals with comprehending how to collaborate with AI systems.

5. Real Examples from Real Companies

5.1 Automotive Manufacturing Success Story

A major automotive manufacturer adopted an AI-powered risk management system to handle over 2,000 suppliers in 50 countries. The system, which incorporates data from financial reports, news feeds, weather services, and operational measures (Automotive Supply Chain Report, 2023), resulted in a 40% reduction in supply interruptions and \$15 million in cost savings in its first year. Predictive skills enabled the firm to devise backup sourcing methods and minimise production disruptions.

5.2 Technology Company Transformation

A technology business created an artificial intelligence platform for selecting providers for software development and IT services projects. The approach examines technical ideas, assesses prior performance, and determines cultural fit between suppliers and internal teams (Tech Procurement Innovation, 2022). This change cut supplier selection time from 12 weeks to 3 weeks, increasing project success rates and simplifying complicated technical bids.

5.3 Retail Industry Innovation

A global retailer used AI systems for demand forecasting and supplier allocation (Retail Supply Chain Excellence, 2023), resulting in a 20% reduction in inventory costs, a 15% increase in product availability, and a 25% reduction in supplier management administrative costs during volatile market conditions.

6. Where This Is All Heading

6.1 New Technologies on the Horizon

Emerging technologies, such as blockchain integration and AI systems, are influencing the future of vendor management. Blockchain provides transparency and traceability in supplier relationships, whereas AI-powered smart contracts streamline repetitive operations and maintain compliance (Blockchain Supply Chain Report, 2023). Edge computing offers real-time analysis of supplier data, allowing for fast responses to supply chain events (Edge Computing in Supply Chains, 2023), which has the potential to transform time-sensitive activities.

6.2 Strategic Implications for Organizations

AI deployment in vendor management provides competitive advantages, but it requires constant investment and adaptation (Strategic AI deployment, 2022). As supply chains become increasingly complicated, the value of artificial intelligence develops, and organisations who do not use it might be impacted in terms of cost structure, operational efficiency, and supplier relationship quality.

7. Conclusion

A major change in corporate operations, AI integration in vendor and supplier management offers cost reductions and better decision-making. However, a strategic approach, data quality, system integration, and change management are all necessary for success. Businesses should develop skills today to take advantage of upcoming advancements and obtain a competitive edge as AI becomes more and more integrated into vendor and supplier management. Instead of merely keeping up with the competition, the moment to start is now.

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119. AI IN VENDOR AND SUPPLIER MANAGEMENT

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Abstract

Vendor and supplier management is a critical function in supply chain and procurement operations. The integration of Artificial Intelligence (AI) into this field has transformed traditional processes, offering improved efficiency, data-driven decision-making and predictive insights. This paper explores how AI technologies such as machine learning, natural language processing, and robotic process automation are reshaping vendor selection, risk management, contract administration, and supplier relationship management. It also examines the benefits, limitations, and future directions of AI in vendor and supplier ecosystems.

1. Introduction

Global supply chains are increasingly complex, interconnected, and vulnerable to disruptions. Effective vendor and supplier management is essential for ensuring business continuity, cost efficiency, quality assurance, and strategic growth. Traditional methods for managing suppliers—relying heavily on manual processes and static data—are no longer sufficient in today's fast-paced and data-rich environment. Artificial Intelligence (AI) presents a significant opportunity to enhance supplier management by automating tasks, providing real-time insights, and supporting predictive decision-making. By incorporating technologies such as machine learning (ML), natural language processing (NLP), and robotic process automation (RPA), organizations can manage vendor relationships with greater precision and agility. This paper explores the role of AI in vendor and supplier management, discussing its applications, benefits, challenges, and the future outlook.

2. Traditional Vendor and Supplier Management

Historically, supplier management has involved extensive manual effort—from sourcing and evaluating vendors to contract management and performance monitoring. Procurement professionals manually gather and analyze supplier information, often leading to inconsistent and delayed decision-making. Key activities such as issuing Requests for Quotation (RFQs), evaluating compliance, and tracking performance rely heavily on spreadsheets and siloed systems. Some major limitations of traditional methods include:

- **Data Silos:** Disconnected systems make it difficult to obtain a unified view of supplier performance.

- ❑ **Subjectivity:** Decision-making often depends on individual judgment, leading to potential bias.
- ❑ **Lack of Real-Time Insight:** Static reports limit the ability to respond to emerging risks.
- ❑ **Slow Processes:** Manual onboarding, contract negotiations, and compliance checks cause delays.

These limitations have created a growing need for intelligent automation and analytics in supplier management systems.

3. AI Technologies in Supplier Management

3.1 Machine Learning

Machine learning algorithms can process large volumes of historical and real-time data to detect patterns and make predictions. In vendor management, ML is used to:

- ❑ Predict supplier failures or delivery delays.
- ❑ Analyse spend patterns to suggest cost-saving opportunities.
- ❑ Score vendors based on performance metrics, compliance, and risk indicators.

For instance, machine learning models can assess a supplier's financial health or past delivery times and flag potential issues before they affect operations.

3.2 Natural Language Processing (NLP)

NLP enables systems to understand and interpret human language. In supplier management, NLP can:

- ❑ Automate contract analysis to identify clauses, risks, and compliance requirements.
- ❑ Analyse email communications to detect disputes or sentiment changes in supplier relationships.
- ❑ Extract data from unstructured documents like invoices, RFQs, and certifications.

AI-powered tools like Kira Systems and Luminance use NLP to streamline legal and procurement document review.

3.3 Robotic Process Automation (RPA)

RPA automates repetitive and rules-based tasks such as:

- ❑ Invoice processing and payment reconciliation.
- ❑ Supplier onboarding through digital forms and validations.
- ❑ Data entry and synchronization across procurement systems.

By using RPA bots, organizations can reduce human error and accelerate routine processes.

3.4 Predictive and Prescriptive Analytics

Predictive analytics forecasts future events, while prescriptive analytics recommends actions. In supplier management, this includes:

- ☐ Forecasting demand and aligning supplier capacity.
- ☐ Suggesting alternative suppliers in case of potential disruptions.
- ☐ Optimizing order quantities and delivery schedules.

4. Use Cases and Applications

4.1 Vendor Selection

AI models can evaluate supplier applications by analysing multiple criteria including cost, delivery times, ESG ratings, and prior performance. Algorithms can provide an objective, data-driven score to rank suppliers, reducing human bias in selection.

4.2 Performance Management

Dashboards powered by AI visualize key performance indicators (KPIs) such as defect rates, on-time delivery, and contract adherence. These insights enable procurement managers to take timely corrective actions.

4.3 Risk Management

AI integrates external data (e.g., news, social media, financial reports) with internal data to monitor supplier risks. Systems can issue alerts about potential geopolitical, financial, or environmental risks, enabling proactive risk mitigation.

4.4 Contract Lifecycle Management

NLP tools can extract clauses from contracts, identify non-compliant terms, and recommend amendments. AI systems also track contract expiration and renewal timelines to prevent missed deadlines.

4.5 Chabot's and Virtual Assistants

AI-powered chatbots support procurement teams by answering policy questions, automating supplier communications, and handling RFQ submissions.

5. Benefits of AI in Supplier Management

AI adoption offers several tangible and strategic advantages:

- ☐ **Speed and Efficiency:** Processes such as supplier on boarding and document review are completed faster.
- ☐ **Data-Driven Decisions:** Predictive analytics supports better supplier selection and risk management.
- ☐ **Cost Reduction:** Automation reduces administrative costs and inefficiencies.

- ❑ **Scalability:** AI systems handle a large volume of vendors and transactions without increasing headcount.
- ❑ **Improved Compliance:** Automated alerts ensure adherence to procurement policies and regulatory requirements.
- ❑ **Enhanced Supplier Relationships:** Real-time feedback and transparent communication improve collaboration.

6. Challenges and Limitations

Despite its potential, implementing AI in supplier management presents several challenges:

- ❑ **Data Quality and Integration:** AI relies on clean, well-structured data. Many organizations struggle to consolidate supplier data from legacy systems.
- ❑ **Black Box Models:** Complex AI models may lack transparency, making it hard to justify decisions to stakeholders.
- ❑ **Cost of Implementation:** Developing and deploying AI tools can be expensive, especially for small and medium-sized enterprises (SMEs).
- ❑ **Change Management:** Employees may resist AI adoption due to fear of job loss or unfamiliarity with new systems.
- ❑ **Cyber security Risks:** AI systems that access sensitive supplier data must be protected from breaches and misuse.
- ❑ **Regulatory Compliance:** Automated decision-making must adhere to procurement laws and ethical standards.

7. Case Studies

IBM Watson in Procurement

IBM Watson has been integrated into procurement workflows to analyse supplier risks, recommend sourcing strategies, and monitor compliance. Watson's cognitive capabilities help procurement teams anticipate and prevent supply disruptions.

SAP Ariba

SAP Ariba uses AI for supplier risk assessments, fraud detection, and smart sourcing. Its AI-powered insights allow procurement managers to evaluate suppliers across dimensions like labor practices, carbon footprint, and financial health.

Unilever

Unilever applies AI to assess supplier sustainability and social responsibility. By integrating data from third-party audits and social media, it evaluates suppliers' environmental impact and labor standards.

8. Future Trends

The future of AI in vendor and supplier management includes several emerging trends:

- **Block chain Integration:** Combining AI and block chain can create tamper-proof supplier records and enhance traceability.
- **Generative AI:** Tools like ChatGPT can assist in drafting contracts, generating RFQs, and conducting negotiations.
- **Cognitive Procurement:** Fully autonomous procurement systems that make purchasing decisions with minimal human input.
- **Bias and Fairness Controls:** Future AI tools will incorporate mechanisms to ensure ethical supplier selection.
- **Sustainability Optimization:** AI will help organizations choose suppliers based on carbon emissions, ethical sourcing, and circular economy metrics.

9. Conclusion

Artificial Intelligence is redefining how organizations manage their vendors and suppliers. By automating repetitive tasks, analysing vast datasets, and generating actionable insights, AI enables smarter and faster decision-making in procurement. However, the road to AI adoption requires overcoming challenges related to data, cost, and ethics. With proper implementation and governance, AI holds immense potential to drive efficiency, resilience, and sustainability in supplier management.

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120. AI-POWERED PERSONALIZATION AND DIGITAL MARKETING

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ABSTRACT

AI-powered personalization is transforming the digital marketing landscape by enabling brands to deliver highly targeted and individualized experiences. Leveraging machine learning, big data, and predictive analytics, AI allows marketers to tailor content, product recommendations, advertisements, and customer interactions in real time. This approach not only enhances customer engagement and satisfaction but also improves marketing efficiency and ROI. Key applications include personalized content delivery, chatbots, dynamic pricing, and advanced customer journey mapping. While the benefits are significant, challenges such as data privacy, algorithmic bias, and over-personalization must be addressed. As AI continues to evolve, it will play an increasingly central role in shaping the future of digital marketing.

INTRODUCTION

In the digital age, consumers are constantly bombarded with content, advertisements, and product offerings across multiple platforms. As a result, capturing and maintaining user attention has become more challenging than ever for marketers. Traditional one-size-fits-all strategies are no longer effective in a landscape where users expect content tailored to their individual needs and preferences. This shift has given rise to **AI-powered personalization**—a transformative approach that leverages artificial intelligence to deliver customized digital experiences in real time.

By analysing vast amounts of user data, including browsing behaviour, purchase history, and engagement patterns, AI enables marketers to understand their audience on a deeper level. This allows for the dynamic creation of targeted campaigns, personalized product recommendations, and adaptive customer interactions that improve engagement, satisfaction, and conversion rates. As AI continues to evolve, it is becoming an essential tool for digital marketers seeking to remain competitive and relevant in an increasingly saturated and data-driven environment.

Ai-Powered Personalization And The Future Of Digital Marketing:

In today's hyper-connected world, where consumers expect seamless and personalized experiences, artificial intelligence (AI) has emerged as a game-changer in digital marketing. By harnessing vast amounts of data and leveraging machine learning algorithms, AI enables brands to create highly tailored experiences that resonate with individual users—at scale.

What is AI-Powered Personalization?

AI-powered personalization refers to the use of artificial intelligence to deliver customized content, product recommendations, ads, and user experiences based on data-driven insights. Unlike traditional segmentation strategies, which group users by broader demographics, AI dives deeper into individual behaviours, preferences, and interactions across platforms. For example, when you browse an e-commerce site and instantly receive suggestions based on your past purchases or viewing habits, that's AI in action. It analyses your clickstream data, compares it with millions of other data points, and predicts what you're likely to want next.

Key Applications in AI-Powered Personalization and Digital Marketing

- ❑ **Personalized Content Recommendations** AI analyses user behaviour, preferences, and interests to deliver tailored content—such as blogs, videos, or product listings—that increases engagement and relevance.
- ❑ **Product Recommendations and Cross-Selling** E-commerce platforms use AI to suggest products based on browsing history, purchase behaviour, and similar customer profiles, boosting upselling and cross-selling.
- ❑ **Predictive Customer Behaviour Analysis** AI predicts customer actions—like likelihood to purchase or churn—enabling marketers to act proactively with personalized offers or retention strategies.
- ❑ **Dynamic Email Campaigns** AI personalizes email subject lines, timing, and content based on user activity, improving open rates, click-through rates, and conversions.
- ❑ **Chatbots and Conversational AI** AI-powered chatbots provide personalized customer support, product suggestions, and real-time responses that improve user experience and reduce response times.
- ❑ **Programmatic Advertising and Smart Targeting** AI automates the buying of ad space and targets audiences more precisely using real-time data, ensuring higher ad relevance and better ROI.
- ❑ **Dynamic Pricing Strategies** AI adjusts pricing in real-time based on market demand, user interest, and competitor pricing, optimizing profitability and competitiveness.

Benefits of AI-Powered Personalization in Digital Marketing

- o **Improved Customer Experience** AI delivers tailored content, offers, and recommendations, making interactions more relevant and enjoyable for users.
- o **Higher Conversion Rates** Personalized marketing strategies often lead to increased engagement, click-throughs, and sales by showing users what they're most likely to respond to.
- o **Enhanced Customer Retention** By anticipating customer needs and preferences, brands can build stronger relationships and encourage long-term loyalty.
- o **Real-Time Personalization** AI enables marketers to adjust messages and offers in real time based on user behaviour and context, increasing the chance of conversion.
- o **Efficient Data Utilization** AI processes large volumes of data quickly, uncovering patterns and insights that humans might miss, leading to smarter marketing decisions.
- o **Cost and Time Efficiency** Automating tasks like ad targeting, content creation, and customer service saves time and reduces operational costs.
- o **Scalability** AI allows businesses to deliver personalized experiences to millions of users simultaneously, without manual input.

Challenges of AI-Powered Personalization in Digital Marketing

- **Data Privacy and Security Concerns** Collecting and using personal data raises ethical and legal issues. Compliance with regulations like GDPR and CCPA is essential.
- **Over-Personalization Risks** Excessive or poorly executed personalization can feel intrusive or “creepy,” potentially alienating users.
- **Algorithm Bias** AI systems may unintentionally reflect or reinforce biases present in the training data, leading to unfair or inaccurate targeting.
- **High Implementation Costs** Integrating AI technologies can be expensive and complex, especially for small and medium-sized businesses without advanced tech infrastructure.
- **Dependence on Quality Data** AI's effectiveness depends on the accuracy, relevance, and cleanliness of the data it uses. Poor data quality leads to poor results.
- **Lack of Human Touch** While automation enhances efficiency, it can sometimes reduce the emotional and human aspects of brand communication.
- **Constant Need for Optimization** AI models require continuous learning, monitoring, and adjustment to stay effective and relevant in dynamic markets.

Examples of AI-Powered Personalization in Digital Marketing

-  **Amazon – Personalized Product Recommendations** Amazon uses AI to analyse browsing history, past purchases, and similar customer behaviour to recommend products that are highly relevant to each individual. This personalization significantly boosts sales and customer satisfaction.
-  **Netflix – Tailored Content Suggestions** Netflix’s recommendation engine uses AI to suggest movies and shows based on your viewing habits, genre preferences, and time spent on titles. This keeps users engaged and reduces churn.
-  **Spotify – Discover Weekly & Daily Mix** Spotify applies machine learning to user listening habits to create custom playlists, like “Discover Weekly,” which introduces users to new music they are likely to enjoy.
-  **Sephora – Virtual Assistant and Chatbot** Sephora uses an AI-powered chatbot to provide personalized product recommendations and makeup tutorials based on customer preferences and past interactions.
-  **Starbucks – Predictive Ordering in the Mobile App** Starbucks uses AI in its app to recommend drinks based on the time of day, location, and previous orders, making the customer experience more convenient and personal.
-  **Coca-Cola – Personalized Marketing Campaigns** Coca-Cola leverages AI to analyse consumer data and tailor digital ads for specific demographics and regions, improving engagement and brand loyalty.
-  **Nike – Personalized Shopping Experience** Nike uses AI to personalize product recommendations online and in-app, based on customer behaviour and preferences. It also uses data to customize marketing messages and email campaigns.
-  **Facebook (Meta) – AI-Driven Ad Targeting** Facebook’s advertising platform uses AI to optimize ad delivery. It analyses user interests, activity, and demographics to show the right ads to the most likely converters.
-  **Zara – Inventory & Personalization** Zara uses AI to track customer buying behaviour and adjust product recommendations and store inventory accordingly, helping customers find what they want faster.
-  **Google Ads – Smart Bidding and Personalization** Google’s AI-powered Smart Bidding automatically adjusts bids based on real-time signals like location, device, and past behaviour to reach the right users with the right message.

Conclusion

AI-powered personalization has become a cornerstone of modern digital marketing, enabling brands to connect with consumers in more meaningful, relevant, and timely ways. By harnessing data and machine learning, businesses can deliver personalized experiences at scale—driving higher engagement, stronger customer loyalty, and improved return on investment. While the benefits are clear, the adoption of AI also brings challenges such as data privacy concerns, algorithmic bias, and the need for continuous optimization. However, with responsible implementation and ethical data use, AI has the potential to transform digital marketing strategies and set new standards for customer experience. As consumer expectations evolve, businesses that embrace AI-driven personalization will be better positioned to stand out in competitive markets and build lasting relationships with their audiences. The future of digital marketing lies in intelligent, personalized engagement—and AI is leading the way.

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121. CUSTOMER JOURNEY MAPPING AND EXPERIENCE DESIGN

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Abstract

This exploration paper explores the generalities of client trip mapping and experience design, examining their connection in creating enhanced client gestures. It highlights crucial fabrics, tools, benefits, and challenges associated with these practices. Through an in-depth literature review, the study aims to give perceptivity into how associations can effectively apply client trip mapping (CJM) and experience design to ameliorate client satisfaction, fidelity, and brand advocacy.

Introduction

In moment's competitive business, understanding the client's perspective is essential for erecting strong connections and icing long-term success. client trip Mapping (CJM) is a strategic approach to imaging the process guests go through when engaging with a product, service, or brand. Experience Design (XD) focuses on creating meaningful, engaging, and flawless gestures across all touchpoints. Together, these methodologies give a structured approach for enhancing client gestures and driving business growth.

Literature Review

Former studies emphasize the significance of understanding client requirements, feelings, and pain points across colorful touchpoints. CJM enables associations to collude each stage of the client lifecycle, from mindfulness to post-purchase engagement. Experience design incorporates principles from psychology, design thinking, and service design to craft results that reverberate with guests. According to Lemon and Verhoef (2016), the integration of CJM and XD can lead to bettered client engagement and fidelity.

Methodology

This exploration adopts a qualitative approach, assaying secondary data from academic journals, assiduity reports, and case studies. A thematic analysis was conducted to identify recreating themes and stylish practices in enforcing CJM and XD strategies. The study also examines real-world exemplifications from leading companies to illustrate practical operations.

Findings

This disquisition adopts a qualitative approach, assaying secondary data from academic journals, sedulity reports, and case studies. A thematic analysis was conducted to identify recreating themes and swish practices in administering CJM and XD strategies. The study also examines real- world samples from leading companies to illustrate practical operations.

Conclusion

Client trip mapping and experience design are important tools for enhancing client engagement and driving business performance. Organizations that invest in these practices can more understand their guests, produce value at every touchpoint, and make long- term fidelity. unborn exploration should explore the impact of arising technologies, similar as AI and AR, on CJM and XD practices.

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122. ENVIRONMENT AND ENERGY TRANSITIONS IN INDIA: A POLICY BRIEF

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Abstract

India made a substantial progress in expanding electricity access and renewable energy, yet faces rising CO₂ emissions, severe air pollution, and persistent challenges in forests, water, and sanitation. This policy brief summarizes trends from 2000 to 2020, drawing on the World Sustainability Dataset. It highlights achievements in electrification and clean energy, contrasted with the pressures of coal dependency and environmental degradation.

1. Introduction and Methodology

India's developmental pathway has significant global implications given its population size, economic growth, and emissions profile. This paper focuses exclusively on India, analyzing data for the period 2000–2020 across multiple sustainability indicators. These include energy access, renewable energy, CO₂ emissions, PM2.5 levels, forests, and sanitation. The study adopts a descriptive approach to illustrate long-term structural changes in the energy-environment nexus.

2. Key Results

2.1 Energy Access and Renewables

Between 2000 and 2020, electricity access increased from below 70% to nearly universal coverage. This achievement reflects targeted rural electrification schemes and infrastructure expansion. Renewable energy consumption grew strongly after 2010, especially solar and wind, supported by policy incentives and falling technology costs. However, coal continues to dominate India's energy mix.

2.2 CO₂ Emissions and Air Pollution

India's CO₂ emissions rose by over 70% during the study period, consistent with industrial growth and urbanization. Although per capita emissions remain below OECD averages, aggregate volumes place India among the world's top emitters. PM2.5 pollution levels are persistently high, contributing to severe health risks and premature mortality.

2.3 Forests and Land Use

Forest cover remained relatively stable, with modest gains due to afforestation programs. Nonetheless, pressures from agricultural expansion and urban development remain challenges for sustainable land management.

2.4 Water and Sanitation

Access to basic drinking water improved gradually, while sanitation coverage expanded sharply after 2015 with the Swachh Bharat Mission. Rural–urban disparities persist, but progress in sanitation is among India’s most notable achievements in recent sustainability metrics.

3. Discussion and Policy Implications

The trends highlight India’s dual challenge: ensuring energy security and economic growth while reducing environmental degradation. Key priorities include:

- Accelerating renewable energy deployment to reduce coal dependency.
- Strengthening air quality management to address PM2.5 pollution.
- Enhancing forest and land-use governance to safeguard ecosystems.
- Expanding water and sanitation infrastructure to close rural–urban gaps.

India’s commitment to achieving Net Zero emissions by 2070 sets a long-term direction. However, near-term policy measures such as phasing down coal, incentivizing clean energy, and enforcing stricter air quality standards are critical for aligning economic development with sustainability goals.

4. Conclusion

India’s sustainability trajectory illustrates both success stories—such as near-universal electrification and rising renewable energy—and ongoing challenges, notably CO₂ emissions and pollution. Balanced and decisive policies will be essential to ensure that economic progress does not come at the cost of environmental health and intergenerational equity.

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123. A FRAMEWORK FOR SECURE AND AUTOMATED LOGISTICS: INTEGRATION OF BLOCKCHAIN AND AI IN SMART WAREHOUSING

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ABSTRACT

The rapid evolution of global supply chains has intensified the need for intelligent and secure warehousing solutions. This paper examines the integration of Blockchain and Artificial Intelligence (AI) as a transformative framework for smart warehousing. Blockchain ensures transparency, immutability, and decentralized control, addressing challenges of traceability and data integrity. Meanwhile, AI enhances operational decision-making through automation, predictive analytics, and real-time data processing. Together, these technologies provide a synergistic model that enhances inventory accuracy, minimizes manual intervention, and streamlines logistics workflows. Drawing on literature reviews, case studies, and comparative analysis, the paper evaluates the benefits, implementation barriers, and strategic recommendations for adopting this integrated approach. The study concludes that the convergence of Blockchain and AI is pivotal to shaping the future of autonomous, efficient, and resilient warehousing systems.

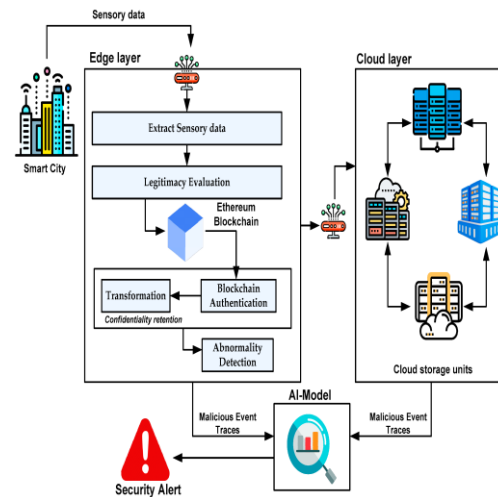
Keywords: Smart Warehousing, Block chain, Artificial Intelligence, Supply Chain Management, Inventory Optimization, Automation, Predictive Analytics, Logistics Technology, Data Transparency, Warehouse Innovation.

INTRODUCTION

In today's globalized economy, manufacturing and logistics firms prioritize efficient inventory management and warehousing to handle inbound and outbound goods. These complex operations often incur high costs and resource inefficiencies, which are further exacerbated by volatile market conditions.

To address these challenges, companies are adopting advanced technologies. Blockchain provides secure, transparent, and decentralized tracking, thereby enhancing visibility and trust throughout the supply chain. However, it lacks predictive capabilities.

Artificial Intelligence (AI) bridges this gap by enabling automation, predictive analytics, and data-driven decisions. Together, Blockchain and AI form a robust framework for smart warehousing—combining transparency, security, and intelligent adaptability.



REVIEW OF LITERATURE:

Zhang et al. (2021) suggest blockchain enhances trust and traceability in logistics networks.

Kumar & Singh (2020) show that AI improves demand forecasting, robotic picking, and dynamic slotting.

IBM (2022) reported that AI-blockchain integration reduces warehouse errors by 40% in pilot studies.

BENEFITS OF INTEGRATION

1. Enhanced Data Management:

Blockchain currently utilizes hashing algorithms for data mining, employing a “Brute force” technique that exhaustively searches for the correct combination. However, AI presents a more intelligent alternative by streamlining the data management process and diminishing the intricacy associated with existing methods

2. Optimized Energy Consumption:

By refining the data process, AI in Blockchain streamlines operations, reducing the time and effort invested in data mining. This optimization contributes to more efficient energy consumption within Blockchain technology.

3. Improved Scalability:

AI offers solutions to the Blockchain scaling challenges by introducing advanced decentralized learning systems and novel data sharing techniques. This improves efficiency and creates opportunities for startups and enterprises in Blockchain technology.

4. Augmented Security Measures:

Blockchain is known for its strong security features; applications built with this technology are not immune to flows. The integration of AI brings natural language

processing, image recognition, and real-time data transformation capabilities to Blockchain's peer-to-peer linking. Blockchain AI enables data transactions with the flexibility provided by Machine learning intelligence.

METHODOLOGY

This research uses a qualitative approach through secondary data collection from journals, research articles, and the implications of Blockchain and AI in warehousing. It covers:

- Case study analysis of companies such as Walmart, Amazon, McKinsey, and DHL.
- Comparative analysis between traditional, smart, blockchain-AI-enabled warehouses.
- Framework-based evaluation, SWOT, Value Chain Analysis, and Technology Readiness Assessment.

QUESTIONS INVESTIGATED

1. How does the integration of blockchain and AI improve operational efficiency in smart warehousing?
2. To what extent can this integration reduce human error, theft, and data manipulation in warehousing operations?
3. What are the barriers to adopting this integration model in warehousing?
4. How does the real-world application of AI-blockchain-integrated perform compared to traditional or semi-automated warehouses?

RESULTS AND ANALYSIS

- Combining blockchain and AI leads to a 30–45% increase in warehouse efficiency through automated processes and smart inventory management.
- The integration of AI with blockchain can result in a reduction of human error and fraud risks by as much as 70% because of automated oversight and the enforcement of smart contracts.
- The integration of AI systems with blockchain records in smart warehouses allows for over 95% inventory accuracy, whereas traditional models typically achieve only 75-85%.
- Even with advantages, small and mid-sized enterprises face difficulties due to elevated implementation costs, a shortage of qualified staff, and issues with integrating into current legacy systems.

SUGGESTIONS/ RECOMMENDATIONS

1. Implement a Step-by-Step Approach

Start with trial initiatives (such as blockchain inventory management or AI-driven automation in specific areas) prior to expanding to the entire organization

2. Emphasize the Importance of Interoperability and Standards

Create and implement interoperability protocols to guarantee that blockchain and AI technologies can effortlessly connect with established warehouse management systems (WMS).

3. Promote Collaborative Innovation

Support collaborations among technology providers, logistics firms, and educational institutions to jointly create scalable and economical solutions.

4. Policy Support and Government Incentives

Governments ought to promote technological advancements in logistics and warehousing by offering subsidies, tax incentives, and research and development grants, especially for micro, small, and medium enterprises (MSMEs).

5. Guarantee Ethical AI and Data Security Oversight

Establish explicit data privacy regulations, open AI decision-making processes, and blockchain auditing systems to promote responsible technology utilization.

CONCLUSION

The combination of blockchain and AI represents more than just a technological enhancement; it signifies a fundamental change in warehouse operations. As Industry 4.0 progresses, intelligent warehouses will transform into adaptive systems capable of making independent decisions based on verified, real-time information. To realize its complete potential, organizations should initiate pilot projects, cultivate collaborations between public and private sectors, invest in talent and infrastructure, and establish ethical and secure guidelines for data utilization. The smart warehouses of the future will be not only efficient but also reliable, autonomous, and intelligent. The integration of blockchain and AI will be the primary catalyst for this evolution.

124. A STUDY ON EMOTIONAL INTELLIGENCE OF WORKING WOMEN IN BANKING INDUSTRIES

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ABSTRACT

Whether people say otherwise, emotions come into play when they are grouped together to accomplish a goal. A common defence of the long-standing claim that emotions have no place in the workplace is Don't bring your personal problems to work. The theory states that business decisions should be made primarily on knowledge, reason, and calm, collected emotion. However, the idea that people can leave their emotions at the door when they get to work is implausible. Some people may attempt to hide their emotions because they believe that emotional neutrality is the ideal for a variety of reasons. However, this would also apply to those who over-emote and tell others how they truly feel about everything. The consequences of globalisation, a more interconnected business environment, and the global financial crisis that rocked all economies have ensured that competition will always be fierce and that businesses will compete for resources, that profits are more difficult to come by, and that running an organisation effectively is a major challenge. Because of this, workplace wellbeing is under scrutiny, and it is widely believed that low pay, unfavourable working conditions, and interpersonal disputes have a significant impact on employees' sense of commitment to their jobs and job satisfaction. It is not surprising that more research is being done in the fields of occupational psychology, organisation culture, and human resource management given that employee productivity and performance can, to some extent, be linked to their feelings towards their work and the organisation or institution they work for. The goal is to investigate and enhance workers' job satisfaction, lower their levels of occupational stress, and enhance their performance and dedication to their jobs.

Keywords: Emotional Intelligence, Women, Bank, Chi-square test, Association.

INTRODUCTION

Employees' ability to use their skills and knowledge effectively in the workplace depends on their ability to control their emotions while working and their willingness to do their part to help achieve their goals. The emotional competency, emotional maturity, and

emotional sensitivity are requirements that affect the success of adaptability and adjustment with the shift scenario. Knowing one's emotions and sentiments as they occur and adjusting oneself to the exigencies of situation are also necessary. Since a work environment contains a collection of people with varying ideas, thoughts, and opinions, the optimal result is determined by the effective synthesis of all of them. In this case, emotional intelligence can be very important to productivity at work. Because the concepts of emotional intelligence (EI) offer a fresh perspective on how to evaluate and comprehend people's actions, attitudes, management styles, interpersonal abilities, and even potential, EI is becoming more and more important in the field of organisational development.

In the workplace, emotions greatly influence how a company communicates both internally and externally. Employee events have a significant emotional influence on them. Such an impact has significant behavioural and attitudinal effects on people, groups, and society as a whole. Good feelings at work facilitate positive outcomes for workers, such as accomplishment, job satisfaction, increased social capital, and organisational dedication. Anger, fear, grief, animosity, guilt, and other negative emotions can inevitably result in workplace deviance and shape the public's perception of the company. An employee possessing strong emotional intelligence is able to control their own impulses, interact with people in an efficient manner, adapt to change, solve difficulties, and utilise humour to lighten the mood in stressful situations. What sets high performers apart from low performers at work is their "clarity" of thought and "composure" under pressure. This could lead to a difference in organisational commitment.

LITERATURE

Chamundeswari (2017) claimed that there is a detrimental impact on service delivery and a negative influence on productivity in companies where workers are subjected to stressful working circumstances. Conversely, when working circumstances are favourable, productivity rises and service delivery is positively impacted.

Kerr et al., (2006) demonstrated that hiring and training managers at the organisational level are significantly influenced by emotional intelligence. Additionally, a supervisor's effectiveness and perception are linked. The efficacy of the team is therefore influenced by the supervisor's capacity to recognise and control their emotions.

Neelamegam (2010) investigated how work happiness is affected by demographic factors. Gender did not significantly affect job satisfaction, but salary, marital status, educational attainment, and income did significantly affect job satisfaction. Organisations

must determine what variables contribute to subpar work performance. Additionally, the degree of job satisfaction is influenced by demographic characteristics.

Alsufyani et al., (2022) have conducted a study among nurses to see how emotional intelligence affects productivity at work. It has been discovered that work performance is less predictable when there is a perception of occupational stress. EI and nurses' job performance have been demonstrated to be strongly positively correlated. The EI considerably improves the nurses' performance. Using emotional intelligence training can help reduce feelings of emotional exhaustion and work-related stress.

OBJECTIVES

- ☐ To know the socio-economic profile of the respondents who are working in the Banking companies, Chennai city.
- ☐ To check the association between emotional control in their workplace and Age, Marital Status

HYPOTHESES

- ☐ Ha 1: There is an association between emotional control in their workplace and Age
Ho 1: There is no association between emotional control in their workplace and Age
- ☐ Ha 2: There is an association between emotional control in their workplace and Marital Status
Ho 2: There is no association between emotional control in their workplace and Marital Status

METHODOLOGY

The preceding issue statement, the development of a particular hypothesis, and the information sought after the investigation are all explicitly mentioned in the study's goals, which classify the research study. A research design is a project's strategy for examining and resolving research questions. The three categories of study designs that have been recognised in the literature are causal, descriptive, and exploratory. Given the stated research topic and goal, the most appropriate approach for this study is a descriptive design. A judgmental sample technique was used to choose the respondents. For the study, 260 Banking employees were enrolled. Out of the employees who received questionnaires, 250 of them returned them. Of these, 247 were finished and included in the final analysis.

ANALYSIS AND INTERPRETATIONS

Table 1
Frequency Table

Age	No. of. Respondents	Total Percentage
21-30	27	10.9
31-40	84	34.0
41-50	91	36.8
above 50	45	18.2
Total	247	100.0
Marital status	No. of. Respondents	Total Percentage
Single	121	49.0
Married	126	51.0
Total	247	100.0
Emotions control in your workplace	No. of. Respondents	Total Percentage
Yes	118	47.8
No	129	52.2
Total	247	100.0

From the above table, it is clearly understood that majority of the respondents are coming under the age group between 41-50 with 36.8%. Only 10.9% percentages of the respondents are in the group of 21-30 age groups. Among the 247 respondents, 51.0 percentages of the respondents are married.

Chi-Square Tests

Table 2
Chi-Square Tests between emotional control in their workplace and Age

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.350 ^a	3	.003
Likelihood Ratio	2.368	3	.000
Linear-by-Linear Association	1.757	1	.185
N of Valid Cases	247		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.90.

Hypothesis testing:

Ha 1: There is an association between emotional control in their workplace and Age

Ho 1: There is no association between emotional control in their workplace and Age

From the chi square table, it is proved that **there is an association between emotional control in their workplace and Age** with the Pearson chi square value of 0.003. So, the null hypothesis is rejected

Table 3

Chi-Square Tests between emotional control in their workplace and Marital Status

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.748 ^a	1	.009
Continuity Correction ^b	6.102	1	.014
Likelihood Ratio	6.778	1	.009
Fisher's Exact Test			
Linear-by-Linear Association	6.721	1	.010
N of Valid Cases	247		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 57.81.

b. Computed only for a 2x2 table

Hypothesis testing:

Ha 1: There is an association between emotional control in their workplace and Marital Status

Ho 1: There is no association between emotional control in their workplace and Marital Status

From the chi square table, it is proved that **there is an association between emotional control in their workplace and Marital Status** with the Pearson chi square value of 0.009. So, the null hypothesis is rejected

IMPLICATIONS

The purpose of the aforementioned study was to determine how emotional intelligence affects work performance in postsecondary educational settings. Chennai has been the study's location. The study has concentrated on the definition of emotional intelligence and its effects on job performance. The capacity to handle intrapersonal and interpersonal connections in the workplace is known as emotional intelligence. Given the substantial influence emotional intelligence has on work performance, understanding the significance of emotional intelligence is imperative. We need emotions in order to function in daily life. Every emotion has unique characteristics, and being able to control our feelings gives us a competitive edge. Given the circumstances, it is imperative that feelings be

communicated. According to the study's findings, emotional intelligence helps people recognise the genuine nature of emotions and why they need to be expressed. The study only looked at the higher education sector, hence it is necessary to apply emotional intelligence ideas there as well. It's imperative that higher education institutions start offering training courses on the value of emotional intelligence. Furthermore, it's critical to comprehend the actual nature of the work at hand. An employee's performance can be improved by being aware of their job. It has been suggested that emotional intelligence is the element that has the power to alter one's perspective on their work. The study has given researchers a thorough understanding of the relationship between job performance and emotional intelligence components. Gaining a deeper comprehension of emotional intelligence can help one thrive at work and find fulfilment in their work. The study was solely carried out in the field of higher education. It is imperative to carry out research on emotional intelligence in other fields as well.

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125. ETHICAL IMPLICATIONS OF AI IN HR AND CORPORATE GOVERNANCE

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ABSTRACT

The rapid adoption of Artificial Intelligence (AI) in Human Resource Management (HRM) and corporate governance has raised profound ethical questions. While AI enhances efficiency in recruitment, performance evaluation, and decision-making, it simultaneously introduces risks of algorithmic bias, opacity, data privacy violations, and accountability gaps. Recent reports (Trustmarque 2025; McKinsey 2025) reveal that although organizations increasingly deploy AI, few have established robust governance frameworks to ensure fairness, transparency, and compliance with emerging regulations. In HR, ethical dilemmas often arise in relation to discrimination, diversity, and explainability of automated hiring tools. At the corporate governance level, scholars highlight challenges such as “amoral drift,” where profit-driven motives undermine ethical commitments, and call for inclusive oversight models involving boards, ethics committees, and Chief AI Officers. This paper reviews recent literature and global reports to examine the ethical implications of AI in HR and corporate governance, proposing that organizations adopt a stakeholder-oriented governance framework aligned with principles of Corporate AI Responsibility (CAIR). The study concludes that embedding ethics, transparency, and accountability into AI governance is critical not only for organizational trust but also for sustainable and equitable digital transformation.

Keywords

Artificial Intelligence (AI); Human Resource Management (HRM); Corporate Governance; Ethics; Algorithmic Bias; Transparency; Accountability; Corporate AI Responsibility (CAIR); Responsible AI; Digital Transformation

INTRODUCTION

Artificial Intelligence (AI) is revolutionizing the corporate world by automating decisions, streamlining operations, and improving efficiency. In Human Resources (HR) and Corporate Governance, AI holds the promise of transforming recruitment, employee management, board decision-making, risk assessment, and compliance monitoring. However, this transformation is not without ethical implications. As organizations increasingly integrate

AI systems into these domains, they must also address the potential for bias, privacy violations, accountability lapses, and erosion of trust.

AI IN HUMAN RESOURCES: OPPORTUNITIES AND ETHICAL CONCERNS

Artificial Intelligence in Human Resources (HR) offers substantial potential to boost efficiency, strengthen decision-making, and enrich employee experiences. By automating routine tasks, tailoring learning and development programs, and delivering data-driven insights, AI supports more effective and transparent HR governance. However, its adoption also raises critical ethical concerns, including risks of algorithmic bias, privacy violations, lack of transparency in automated decisions, and reduced human oversight. Addressing these challenges is essential to ensure that AI-driven HR practices remain fair, accountable, and aligned with organizational values.

1. Recruitment and Selection Bias:

AI tools are widely used in talent acquisition—scanning resumes, shortlisting candidates, and even conducting initial interviews. However, algorithms trained on historical data may replicate or amplify existing biases, such as gender, age, or ethnicity-based discrimination (Binns, 2018). Without proper audits and transparency, AI may unintentionally exclude qualified candidates.

2. Employee Surveillance and Privacy:

AI systems that monitor employee productivity, behavior, or communication raise significant privacy concerns. Continuous surveillance can lead to a culture of mistrust and anxiety, affecting employee morale. Ethical HR practices must balance performance metrics with respect for individual privacy (Ball, 2010).

3. Performance Evaluation and Promotions:

Using AI to assess employee performance could remove human bias—but only if the system itself is free from bias. Furthermore, employees may not understand or have the opportunity to contest AI-generated evaluations, challenging the principles of procedural fairness.

AI IN CORPORATE GOVERNANCE

Artificial Intelligence is reshaping corporate governance by strengthening decision-making, streamlining compliance, and increasing operational efficiency. With the ability to process extensive datasets, AI-driven tools can detect potential risks, provide deeper insights, and automate routine processes, allowing human professionals to focus on strategic priorities. This integration promotes more informed governance decisions, enhances risk oversight, and fosters greater organizational transparency.

ETHICAL DIMENSIONS OF AI IN HR GOVERNANCE

1. Bias and Fairness

- **Issue:** AI systems trained on biased historical data may perpetuate discrimination in hiring, promotions, or performance evaluation.
- **Example:** If past hiring favored one gender, AI may rank candidates of that gender higher, reinforcing inequality.
- **Ethical Principle:** HR governance must ensure algorithmic fairness, regular audits, and inclusive datasets.

2. Transparency and Explainability

- **Issue:** AI algorithms often function as "black boxes," where employees do not understand how decisions (e.g., rejections, performance scores) are made.
- **Ethical Principle:** HR governance should mandate **explainable AI (XAI)**, giving employees the right to clear reasoning behind AI-driven outcomes.

3. Privacy and Data Protection

- **Issue:** HR AI tools analyze employee emails, behavior, and performance metrics, which may infringe on personal privacy.
- **Ethical Principle:** Governance should align with data protection laws such as **GDPR** or India's **Digital Personal Data Protection Act (2023)**, ensuring consent, limited data use, and secure handling.

4. Accountability and Responsibility

- **Issue:** When AI makes flawed HR decisions (e.g., wrongful rejection or biased promotions), who is responsible—the HR team, the AI developers, or the organization?
- **Ethical Principle:** Governance must establish **clear accountability mechanisms**, ensuring human oversight in critical HR decisions.

5. Employee Autonomy and Well-being

- **Issue:** Over-reliance on AI surveillance systems for productivity tracking may harm employee morale and trust.
- **Ethical Principle:** Ethical HR governance should balance efficiency with employee dignity and autonomy.

SUMMARY

Domain	Key Ethical Issues	Governance Responses
HR	Bias in recruitment, privacy and explainability deficits	Bias audits, cross-functional ethics committees, transparency requirements
Corporate	Profit vs. public good ("amoral drift")	Stakeholder governance, CAIO leadership, labor-investor representation
Boardroom	Oversight maturity, director expertise	AI strategy inventory, risk KPIs, board competencies
Organizational	Accountability, technology risk, sustainability	CAIR frameworks, environmental impact reporting, equitable benefit sharing

BEST PRACTICES AND RECOMMENDATIONS

- Ethical AI Frameworks:** Organizations should adopt AI governance frameworks that emphasize fairness, transparency, and accountability, such as the OECD AI Principles (2019) or the EU's AI Act guidelines.
- Bias Audits and Algorithmic Fairness:** Regular third-party audits should be conducted to identify and mitigate algorithmic bias in HR and governance tools.
- Human-in-the-Loop Systems:** Critical decisions—especially those affecting people—must involve human oversight, ensuring that ethical values are considered alongside AI recommendations.
- Data Privacy Regulations Compliance:** AI tools must comply with data protection laws such as GDPR (Europe) or India's Digital Personal Data Protection Act (2023), protecting employee and stakeholder data.
- AI Ethics Training:** Board members, HR professionals, and developers should receive training in AI ethics to build awareness of potential harms and responsibilities.

CONCLUSION

While AI offers transformative benefits to HR and corporate governance, it also presents a new frontier of ethical challenges. Ensuring that AI aligns with human values and institutional integrity requires a collaborative approach—merging technology, ethics, law, and governance. Organizations that navigate this landscape responsibly will not only avoid ethical pitfalls but also build a foundation of trust and fairness in the age of intelligent machines.

126. A REVIEW ON AI POWERED HIRING: ETHICS & BIAS IN AUTOMATED RECRUITMENT TOOLS

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Abstract

In the digital age, Artificial Intelligence (AI) is increasingly being leveraged in recruitment processes, offering enhanced efficiency, scalability, and data-driven insights. However, the adoption of AI-powered hiring tools has sparked considerable ethical concerns, particularly surrounding algorithmic bias, transparency, and fairness. This systematic literature review examines recent academic and industry research (2023-2025) to identify ongoing ethical challenges and underlying factors contributing to bias in AI recruitment systems. The review reveals that biased training data, lack of transparency in algorithmic decision-making, and insufficient regulatory oversight can lead to discriminatory outcomes, ultimately affecting diversity and inclusion initiatives. Moreover, sectoral and geographical differences in ethical risks were noted, with emerging regions facing unique challenges related to transparency and compliance. The analysis also explores the impact of AI on candidate experience, underscoring the importance of striking a balance between automation and human interaction. By synthesizing insights from multiple disciplines, this paper provides a holistic perspective on aligning AI hiring tools with ethical, fair, and inclusive recruitment practices.

Keywords

AI Recruitment, Algorithmic Bias, Ethical AI, Fairness in Hiring, Diversity and Inclusion, Explainable AI, Candidate Experience, Systematic Literature Review.

Introduction

These days AI is slowly becoming part of the hiring process. Earlier, HR teams had to do almost everything themselves. They sorted resumes one by one, made endless phone calls, fixed interview timings, and even chased candidates for updates. It took a lot of time, especially when hundreds of people applied for the same job. Now, with AI tools, at least some of that load has shifted. Software can scan resumes in seconds, pick the relevant ones,

make a shortlist, and even help with scheduling. Honestly, this saves a lot of time and makes the whole process a little less tiring for recruiters.

But speed is not the only point. AI is also being used to make smarter hiring choices. Some predictive tools can show which candidate is more likely to fit in the role or stay longer in the company. This helps the organization reduce the headache of employees leaving quickly. On the other hand, candidates also benefit, because they get matched to jobs where they can actually grow. So, in a way, AI is trying to help both sides.

Still, it is not perfect. AI works on the data it is trained with. If the data is biased, the results will also carry the same bias. And let's be real, many candidates don't like the process because it feels impersonal. Talking to a chatbot or getting auto-emails is not the same as speaking with an actual person who understands you. That's why fairness, transparency, and the human touch are very important when AI is brought into recruitment.

There's also the matter of laws and ethics. Companies can't just use these tools without thinking. They have to take care of privacy, data safety, and also be able to explain why the system rejected or accepted someone. Otherwise, people will not trust the process. At the end of the day, AI should support recruiters, not fully replace them. Human judgment, empathy, and common sense will always matter in hiring.

To put it simply, AI in recruitment is useful but tricky. It makes things faster and smarter, but if it is not handled carefully, it can create new problems. The best option is to use AI for support while keeping the human side strong, so that hiring stays both fair and personal.

Literature review

Fernández-Martínez and Fernández (2020) took a close look at how AI is currently being used in human resources, with a big focus on hiring. As they explain, the algorithms and the data they're trained on can be experimental in nature, which raises questions about whether tighter checks and independent reviews might be needed to keep things fair and accurate. They went into both sides of the argument — pointing out the advantages these tools can bring, but also warning about the risks, especially when it comes to AI-driven video interviews. Issues like gender or racial bias, along with legal and ethical concerns, were central to their discussion. They also stressed that there isn't much regulation in place right now, and suggested neutral auditing plus a multi-agent system that could help keep hiring processes legal and better managed.

Back in 2022, Gupta and Mishra studied how AI was showing up more and more in the hiring world. They said these systems can copy how people solve problems, though they

also bring a few big worries along the way. In their review, they looked at things like chatbots and facial recognition. A couple of issues kept coming up — keeping personal data safe was one, and the problem of unconscious bias was another, often baked into the algorithms from the start. Something that stood out in their findings was the gender gap: only about 22% of AI professionals were women. And, as if that wasn't enough, common virtual assistants such as Siri, Alexa, and Cortana were found to repeat old-fashioned gender stereotypes. In the end, they made it clear that AI tools in recruitment should treat people fairly and keep candidate information secure.

In 2022, Hofeditz and their team looked at how companies were starting to use AI in hiring. The idea was to make HR tasks easier and try to reduce bias, but it didn't always go as planned. For instance, Amazon's recruiting system ended up showing some clear bias. The researchers also noticed that most AI ethics rules were too broad to really help with hiring. After checking 28 studies, they came up with a few practical ideas: keep hiring fair, watch out for discrimination, and do what you can to cut down on bias.

Hunkenschroer and Luetge (2022) observed that many organisations are now experimenting with AI in hiring. It's not just a matter of speeding things up — some believe it could make the process less tedious and more consistent. They described tools that can draft job adverts, sift through applications, and even watch and assess video interviews. Of course, with that convenience comes a fresh set of ethical headaches. Since AI in recruitment is still finding its feet, the authors went through 51 separate studies, looking at where it helps, where it stumbles, and what tricky questions still hang in the air.

Khan et al. (2022) noted that discussions on AI ethics have gained global attention, attracting interest from both policymakers and researchers. Many organizations have put forward their own guidelines, but how these work in practice is still disputed. In their review of existing literature, the authors found 22 ethical principles that were commonly mentioned—such as transparency, privacy, accountability, and fairness—along with 15 recurring challenges, including vague definitions and limited ethical awareness. They suggested that these findings could serve as a foundation for creating a maturity model to measure and improve the ethical standards of AI systems.

According to Hunkenschroer and Kriebitz (2023), artificial intelligence has, over the last few years, moved from being a novelty in hiring to something fairly routine. In fact, they point out that research in this area has taken off at a fast pace. Earlier work had already talked about what AI might do well and where it could create problems, but, as they put it, not many people had taken a proper human rights view of the matter. So, they decided to look at AI-

based hiring through that lens, focusing on ideas like fairness, autonomy, privacy, validity, and transparency. Interestingly, they did not see these principles as automatically clashing with AI recruitment. Even so, they argued, it's up to the organisations using these systems to make sure those rights are actually protected.

In 2024, Cole talked about how people are using AI and some of the issues that come with it. She gave examples from hospitals and schools to show that AI could make the gap between big tech companies and poorer countries even bigger. She said AI should help people do their jobs, not take over, and that companies have to be careful with it. Cole also thought that rich countries should have rules and taxes for AI firms, while poorer countries should work on improving their technology and digital skills. She added that if more people got a say in AI decisions, the benefits could reach more folks.

In 2024, Madanchian examined how AI is changing HR decision-making, particularly in hiring, onboarding, and employee retention. The study looked at tools such as AI-powered applicant tracking systems, automated onboarding platforms, personalized training programs, and predictive analytics for retention. These technologies can make HR processes more efficient, scalable, and tailored to individual needs. However, the research also pointed out potential issues, including bias, data privacy concerns, and ethical challenges, stressing that organizations need to address these problems while making the most of AI's transformative potential in HR.

By 2024, a lot of companies were already using AI for hiring. Most studies at the time were focused on how well the tools worked or the skills needed to use them, and not much attention was given to ethics. To get a clearer picture, Stuss and Fularski went through earlier research and also talked with four managers at one company about what it was actually like to use AI in hiring. Even though AI is often described as fair and unbiased, the managers noticed some ethical issues. The researchers pointed out that to really understand AI in hiring, you have to look past its shiny reputation and pay attention to the real problems it can bring.

In 2025, El Ajouri examined the use of AI in hiring and therefore the implications for recruitment. AI comes handy in things like scanning resumes, creating shortlists and can assist with interviews which makes the process faster along with reducing basic human errors. AI has its weakness too: it tends to be racist, sometimes unclear and can be perceived as a less human touch to hiring by the candidates. Yet AI should be used to aid human recruiters rather than replace them, he said adding that by having technology inform judgement, hiring can remain fair while also more human.

In 2025, Hasanah took a hard look at some of the biggest AI hiring platforms to see how they actually handled ideas like fairness, transparency, and accountability. The study dug into reports and policy notes from LinkedIn, HireVue, Pymetrics, and ModernHire. Words like “fairness” and “bias” popped up again and again — mostly in the LinkedIn and HireVue papers. Still, the transparency scores weren’t close. LinkedIn was up at 8.5, while ModernHire trailed far behind at 4.3. What really stood out was that most platforms didn’t give applicants any real way to challenge or appeal a decision. Hasanah felt there was a clear gap between the nice principles these companies put in writing and what they actually did. The fix? Make AI decisions easier for people to follow, bring in outside audits, and set up global rules so hiring stays fair.

Mori et al. (2025) examined the ethical dimensions of using AI in recruitment and selection by reviewing 120 articles from leading journals. Using utilitarian, justice, and rights-based ethical theories, they categorized the debate into three areas: improving efficiency through AI, ensuring fairness in AI techniques, and upholding legal and human rights. Their study offers an integrative framework and outlines a future research agenda for AI adoption in HRM.

In 2025, Riaz explored the ethical challenges of using AI in hiring, especially around fairness, bias, and transparency. While AI can make recruitment faster, it can also repeat existing biases and be hard for people to understand, which raises concerns about regulation. By looking at real-world examples and current rules, Riaz suggested some practical solutions, like using AI models designed to reduce bias, applying techniques to counteract unfairness, and involving humans alongside AI in hiring decisions. Regular checks on fairness and clearer explanations of AI decisions were recommended to keep things on track. The study also highlighted the importance of researching how AI ethics play out in different industries and what effects it might have on workplace diversity over time.

In 2025, Wang studied how fair AI is in hiring. Even though AI is often seen as helpful, it can still be biased. The research looked at fairness from the point of view of both the candidates and the system. Wang also considered legal rules like the EU AI Act. She made a list of questions companies can use to check their AI hiring tools. Looking at past studies and real cases, the research suggested ways to make AI hiring more open and trustworthy.

In 2025, Yunusbayeva and Oyola even looked specifically at how recruitment leaders confront the ethical dilemmas that AI presents in recruitment. The researchers conducted a qualitative study of 12 large companies and found that “ethical ambiguity” is a major factor.

That degree of ambiguity is not just about right vs. wrong, but rather managing any number of competing values constantly. The exploration highlighted how reflection and self-awareness are importance in managing these difficulties, and resulted in a framework for ethically using AI in recruitment. The authors also proposed pragmatic mechanisms — such as a ‘Reflexive Lens’ — that support recruiters' reflexivity in dealing with ethical concerns emanating from the use of AI in hiring.

Objective

- To systematically review existing academic and industry literature on AI-powered recruitment tools, with a focus on identifying common ethical challenges and sources of algorithmic bias.
- To analyze the impact of AI-driven hiring systems on fairness, diversity, transparency, and candidate experience across different industries and geographic contexts.
- To propose evidence-based recommendations for mitigating ethical risks and biases in AI recruitment through governance frameworks, bias audits, and human–AI collaboration.

Research Discussion

4.1 Ethical Challenges & Bias Sources

Artificial intelligence (AI) is transforming human resource management, particularly in recruitment, but this transformation comes with serious ethical challenges. Yanamala (2023) highlights that while AI systems promise efficiency and objectivity, they often embed or even amplify existing human biases because they are trained on historical data. If these datasets reflect discriminatory practices, AI will likely reproduce unfair outcomes, leading to exclusion of women or minority candidates and reinforcing workplace inequalities. The lack of transparency in how these algorithms function compounds the issue, creating what is often called an “ethical black box,” where decisions are made without clarity or accountability. This lack of explainability undermines trust among both HR professionals and candidates, raising fundamental questions about fairness and governance. Privacy also emerges as a key concern, since AI recruitment tools rely on collecting and processing large volumes of sensitive personal data, frequently without adequate safeguards or meaningful consent. Employees may not fully understand how their information is being used, increasing the risk of misuse and surveillance. According to Yanamala, these ethical dilemmas demand a systematic governance approach that integrates fairness, transparency, and accountability into AI deployment. The paper develops a framework emphasizing five core competencies: bias detection and mitigation, fairness in AI-driven decisions, transparency and explainability,

privacy and data protection, and accountability through human oversight. For example, bias mitigation strategies include training AI models on diverse datasets, conducting regular audits, and maintaining human review at critical decision points to prevent unfair exclusions. Transparency is supported through explainable AI methods that make decision logic interpretable, while privacy protection requires practices like limiting data collection, encryption, and informed consent. Accountability is reinforced by ensuring human responsibility remains central, even when decisions are AI-augmented. Yanamala (2023) concludes that unless organizations adopt proactive ethical governance, AI recruitment tools risk perpetuating the very problems they are supposed to solve. By embedding ethical competencies into HR practices, however, it is possible to reduce algorithmic bias, improve fairness, protect employee rights, and strengthen trust in AI-driven hiring systems across industries and geographic contexts.

4.2 Impact

Artificial Intelligence (AI) in recruitment has been viewed as both a solution and a challenge when it comes to fairness, diversity, transparency, and candidate experience. According to Fraij and László (2021), AI is intelligently designed to overcome bias during the selection process by allowing many primary sources of bias like name, age, gender, race, and belief to pass through the evaluation stage without influencing the recruiter's judgment. This creates the possibility of building a fairer system that minimizes unconscious bias compared to traditional hiring. For instance, big companies have introduced AI-driven blind auditions and algorithmic screening tools that evaluate talent based on skills and qualifications rather than social background or personal characteristics (Levit, 2017; Savar, 2017). Transparency in decision-making also improves when AI systems use predictive analytics and clearly defined criteria to calculate applicant matching scores, as Neelie (2017) highlights. By standardizing the process, organizations ensure that all candidates are assessed consistently on the same parameters, which reduces the influence of favoritism or informal connections that often distort human-led recruitment (Berta Melder, 2018; Greenfield & Griffin, 2018).

At the same time, the candidate experience is also being transformed. Chris Collins (2018) notes that AI-powered chatbots are capable of engaging every applicant individually, gathering essential information like salary expectations, skills, and availability, thereby reducing communication gaps and ensuring continuous interaction throughout the hiring process. This 24/7 engagement model not only saves time but also provides candidates with a sense of transparency and inclusion, since they receive timely feedback and updates rather

than being left in uncertainty. Similarly, McFadden (2019) emphasizes that AI is particularly useful in contexts like remote hiring or on-demand work, where it can evaluate honesty, morality, and cultural fit of candidates in a structured manner, improving trust between employers and applicants. Moreover, Vijay Sundaram (2018) and Jones (2018) argue that AI reduces repetitive manual tasks and accelerates the screening process, which enhances efficiency for recruiters while also ensuring that qualified candidates are not overlooked in the mass of applications.

Despite these advantages, challenges remain regarding fairness and diversity in practice. As Dessler (2020) warns, an algorithm is only as good as the data it has been trained on, and if historical data reflects biased human decisions, then AI can replicate or even amplify those biases. This is illustrated by cases such as Amazon's biased recruiting tool, where women were disadvantaged due to male-dominated training data. Gold (2019) adds that if biased data feeds into AI models, the outputs will inevitably show bias, undermining the promise of fair hiring. Thus, while AI can potentially remove human prejudice, its fairness and transparency depend heavily on careful calibration, ongoing monitoring, and regulatory oversight. Nevertheless, as Erickson (2018) reports, around 38% of organizations had already adopted AI in HRM by that time, with more expected to follow, indicating growing trust in these technologies despite fears of change and skill shortages (Bullhorn, 2018). Overall, researchers agree that AI-based hiring systems, when properly designed and managed, hold the capacity to create more equitable and transparent recruitment processes, improve candidate experiences across industries, and foster diversity in global labor markets (Fraij & László, 2021).

4.3 Mitigation Strategies

Müller (2022) emphasizes that the ethical risks associated with AI-driven recruitment cannot be addressed by technology alone but require strong governance frameworks that embed fairness, transparency, and accountability at every stage of the hiring process. A central recommendation is the establishment of independent bias audits, where AI algorithms are regularly tested with diverse datasets to identify discriminatory patterns and correct them before deployment. This ensures that systemic inequalities embedded in historical training data are not reproduced in hiring decisions. Governance frameworks should also include clear guidelines for data protection, candidate consent, and explainability of algorithmic outcomes, so that applicants understand how their information is being processed and evaluated. Furthermore, Müller points out that accountability should not be outsourced entirely to machines—human-AI collaboration is essential to balance efficiency with ethical judgment.

This involves keeping human recruiters “in the loop” for critical decision-making points, ensuring that final hiring outcomes reflect organizational values and legal standards rather than solely automated predictions. Human oversight also acts as a safeguard against errors or unintended consequences that algorithms may generate. Importantly, the study underlines the need for interdisciplinary teams—combining HR experts, ethicists, technologists, and legal advisors—to design and monitor AI systems, thereby promoting a holistic governance approach. Müller (2022) concludes that organizations adopting AI recruitment tools should institutionalize continuous monitoring mechanisms, periodic third-party audits, and mandatory training for HR professionals on algorithmic fairness. By doing so, companies can reduce ethical risks, increase trust among candidates, and enhance the legitimacy of AI-powered recruitment across different industries and contexts.

4.4 Ethical & Inclusive Recruitment Outcomes

Ethical and inclusive recruitment outcomes focus on creating hiring practices that are fair, transparent, and supportive of diversity. The use of AI in recruitment has the potential to achieve these outcomes when it is carefully designed and implemented with attention to ethical principles. An ethical recruitment process ensures that candidates are evaluated on their skills, qualifications, and potential rather than personal characteristics such as gender, race, age, or socio-economic background. Inclusive recruitment, on the other hand, actively seeks to remove barriers that might disadvantage underrepresented groups, thereby building a workforce that reflects diversity in society. By using standardized assessments, blind screening, and structured interview processes supported by AI, organizations can reduce human biases and make selections more objective. Transparency also plays a major role in creating ethical outcomes, as candidates should be informed about how their data is used, how decisions are made, and what criteria are applied in the selection process. At the same time, inclusivity is strengthened when employers design job postings and recruitment campaigns that are accessible, free from discriminatory language, and open to candidates from varied backgrounds. Collaboration between technology and human judgment is essential in this process—while AI can efficiently filter and assess applicants, human oversight ensures that cultural sensitivity, empathy, and ethical values are maintained. Ethical and inclusive recruitment outcomes not only enhance fairness in hiring but also improve candidate experience, strengthen organizational reputation, and contribute to long-term success by fostering innovation through a diverse talent pool.

Conclusion

This research discussion highlights that while Artificial Intelligence (AI) offers powerful tools to modernize recruitment, its use is a double-edged sword, presenting significant ethical challenges alongside its potential benefits. The core promise of AI in hiring lies in its ability to introduce objectivity and efficiency. By using blind screening and standardized assessments, AI can help reduce unconscious human biases related to a candidate's name, gender, or background, paving the way for a fairer and more skills-based selection process (Fraij & László, 2021). This not only helps in building a more diverse workforce but also improves the candidate experience through constant communication via chatbots and timely feedback. However, this promise is seriously threatened if the technology is not managed carefully. As Yanamala (2023) and others warn, AI systems are not inherently neutral. They learn from historical data, which often contains deep-seated human biases. Without proper oversight, an AI tool can accidentally amplify these biases, leading to discriminatory outcomes that exclude qualified women or minority candidates, as seen in real-world cases like Amazon's recruiting tool. This creates a major ethical problem, especially when combined with a lack of transparency, often called the "black box" problem, where neither the employer nor the candidate understands how a decision was made.

To overcome these challenges and achieve truly ethical and inclusive recruitment, a strong, multi-layered approach is necessary. Technology alone is not a solution. As Müller (2022) argues, organizations must build strong governance frameworks that are based on fairness, transparency, and accountability. Key strategies include regularly auditing algorithms for bias using diverse datasets, ensuring human oversight at critical decision points, and being completely transparent with candidates about how their data is used and how decisions are made. Protecting candidate privacy through strict data control and informed consent is also very important.

127. ARTIFICIAL INTELLIGENCE IN BUSINESS AND TECHNOLOGY: ENHANCING EFFICIENCY, COMPLIANCE, AND INNOVATION

**- J Gayathri,
Dean,**

Student services and support

1. Introduction

Artificial Intelligence (AI) has emerged as one of the most transformative technologies of the 21st century, shaping both the business and technological landscapes. By enabling machines to mimic human intelligence whether in decision-making, natural language processing, visual perception, or predictive analytics AI is no longer limited to theoretical research but is now deeply embedded in everyday business practices. From automating mundane repetitive tasks to improving compliance monitoring and streamlining costs, AI acts as both a strategic asset and a catalyst for competitive advantage.

This paper explores how AI is being integrated into businesses, with a particular focus on areas such as automated auditing, compliance monitoring, cost management, process efficiency, customer service, and strategic decision-making. Additionally, it analyses the long-term impact of AI adoption on organizations, industry ecosystems, and employees.

2. AI as a Strategic Business Tool

Businesses increasingly recognize AI not as an isolated technology but as an enabler of organizational transformation. AI-driven solutions can:

- ☐ Reduce human error and improve accuracy in operational processes.
- ☐ Provide real-time insights into customer behaviour and market trends.
- ☐ Automate decision-making in contexts such as supply chain logistics, fraud detection, and financial management.
- ☐ Create new business models by introducing intelligent products and services.

Thus, AI is strategically positioned at the intersection of technology adoption and business innovation.

3. Automated Auditing and Compliance

3.1 Limitations of Traditional Auditing

Conventional auditing is labour-intensive, time-consuming, and susceptible to human bias or error. Auditors typically rely on sampling methods, which means not all transactions are analysed. In high-volume data environments, such as large financial institutions or multinational corporations, this limitation can translate into overlooked irregularities or fraud risks.

3.2 AI-Driven Auditing

AI provides the ability to conduct continuous auditing, where systems automatically review 100% of transactions in real time rather than relying on selective sampling. Machine learning models detect anomalies, outliers, or unusual transaction patterns that could indicate fraud, compliance violations, or operational inefficiencies.

For example:

- In finance, AI-powered tools highlight suspicious transactions to comply with anti-money laundering (AML) requirements.
- In taxation, AI systems cross-check records against regulations to spot potential violations.
- In corporate governance, AI can flag reporting inconsistencies for faster regulatory submissions.

3.3 Benefits for Compliance

Regulatory frameworks especially in banking, healthcare, and data privacy are increasingly complex. Compliance violations not only result in financial penalties but also damage organizational reputation. By deploying Natural Language Processing (NLP) tools, businesses can monitor changing regulations and automatically adjust workflows accordingly, reducing compliance risk while ensuring efficiency.

4. AI for Cost Reduction and Process Efficiency

4.1 Operational Efficiency

Organizations often have overlapping workflows, duplicated processes, or inefficient manual labour that drives up costs. AI-powered process automation, also known as Robotic Process Automation (RPA), can execute structured repetitive tasks such as invoice processing, customer onboarding, or payroll management with minimal human intervention.

4.2 Predictive Maintenance

In manufacturing industries, unplanned equipment downtime can result in massive financial losses. AI systems using sensors and predictive analytics can forecast equipment failures before they occur, allowing proactive maintenance. This reduces repair costs, extends asset lifetimes, and increases production uptime.

4.3 Supply Chain Optimization

AI can optimize inventory management, logistics, and procurement by predicting demand fluctuations. For instance, AI models trained on historical and real-time data help businesses minimize excess stock or shortages, reducing both storage costs and revenue losses.

5. AI in Customer-Centric Functions

5.1 Customer Service

AI-powered chatbots and virtual assistants provide 24/7 customer support at reduced costs compared to traditional call centres. These bots, integrated with NLP and sentiment analysis, can handle transactions, answer queries, and escalate complex problems to human agents.

5.2 Personalized Marketing

AI analyses customer behaviour at scale to create highly personalized recommendations. E-commerce platforms use AI recommendation engines to increase sales by suggesting relevant products. Similarly, customer data analytics enables businesses to predict churn and tailor retention strategies.

6. AI in Decision-Making and Strategic Planning

Business leaders increasingly rely on AI to reduce uncertainty in strategic decision-making. Instead of depending solely on historical financial data and instinct, executives can use predictive analytics to forecast future outcomes.

Applications include:

- ☐ Investment Strategy: AI algorithms analyse macroeconomic indicators and market trends to assist in portfolio management.
- ☐ Human Resources Management: AI tools analyse employee retention rates, productivity statistics, and career progression to guide hiring and training decisions.
- ☐ Policy Formulation: Governments and large corporations use AI simulations to predict the impact of new laws, tariffs, or tax reforms on sectors of the economy.

This demonstrates how AI strengthens management's ability to plan long-term strategies while reducing risk.

7. Challenges and Ethical Considerations

While AI offers substantial benefits, businesses must also grapple with challenges, including:

1. Data Privacy Risks: AI systems require large volumes of personal and corporate data. Mismanagement can result in breaches of privacy laws such as GDPR.
2. Workforce Displacement: Routine tasks automated by AI raise questions about job losses and reskilling requirements for employees.
3. Algorithmic Bias: If AI is trained on biased data, it may produce discriminatory outcomes, affecting fairness in hiring, lending, or compliance checks.
4. Integration Costs: The initial investment for AI solutions can be substantial, especially for small-to-medium enterprises.

Organizations must balance efficiency gains with ethical adoption frameworks, ensuring transparency, inclusivity, and responsible governance.

8. Conclusion

AI represents both a technological tool and a transformative force in business ecosystems. Its ability to automate auditing and compliance, streamline costs, enhance process efficiency, and improve decision making demonstrates its broad utility across industries. However, as organizations adopt AI, they must navigate challenges related to ethics, workforce impact, and data governance.

In essence, AI does not merely optimize existing processes; it reshapes how businesses operate and strategize in a competitive global economy. Those enterprises that integrate AI responsibly stand to gain a sustainable competitive advantage, while those that resist risk being left behind in a rapidly evolving technological landscape.

128. ARTIFICIAL INTELLIGENCE IN MARKETING: A SYSTEMATIC REVIEW

NEETHU T

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Abstract

Artificial Intelligence (AI) has emerged as a disruptive technology that is transforming the marketing landscape. Organizations increasingly utilize AI to analyze big data, predict consumer behavior, provide hyper-personalized experiences, and make automated decisions. This review summarizes both theoretical and empirical knowledge regarding AI in marketing, exploring its applications, benefits, drawbacks, and ethical considerations. The paper also discusses AI's role in cross-channel integration, customer relationship management, and sustainable marketing strategies. Additionally, future research directions are suggested to enhance academic understanding and industry applications of AI-driven marketing tactics.

Keywords: Artificial Intelligence, Marketing, Personalization, Consumer Behavior, Predictive Analytics, Ethical AI

Introduction

The age of digital transformation has fundamentally changed marketing practices, shifting from instinct-based approaches to data-driven strategies. AI, capable of processing vast amounts of information, uncovering hidden correlations, and learning independently, has become a primary driver in today's marketing ecosystems. Estimates suggest that global spending on AI marketing will exceed USD 107 billion by 2028, emphasizing its growing importance across various sectors.

In marketing, AI functions not merely as a technological tool but as a strategic force that enables predictive modeling, real-time engagement, and value creation for customers. By automating routine tasks, AI allows marketers to focus on creativity, planning, and relationship-building. However, its adoption also raises ethical concerns regarding data privacy and algorithmic transparency. This review aims to examine these dual aspects while providing a structured synthesis of the existing literature.

Objective of the Study

- 1) To critically review the applications and benefits of Artificial Intelligence in contemporary marketing practices.
- 2) To analyze the challenges, ethical issues, and future prospects associated with AI adoption in marketing.

Research Methodology

This study employed a systematic review methodology to critically analyze both theoretical and empirical literature regarding the use of Artificial Intelligence (AI) in marketing. Secondary data from academic journals, articles, and reports were examined to identify the applications, benefits, challenges, and ethical concerns associated with AI adoption in marketing practices. This approach provided a comprehensive understanding of how AI is transforming marketing strategies across various industries.

Applications of AI in Marketing

Customer Segmentation and Targeting :AI enables the micro-segmentation of customers based on behavioral, psychographic, and demographic information, allowing companies to target their marketing efforts with precision.

Hyper-Personalization :AI-driven recommendation engines (e.g., Amazon, Netflix) provide personalized suggestions, increasing conversion rates and customer satisfaction.

Conversational Marketing :Meta's AI assistant and AI-enabled voice commerce (e.g., Alexa, Google Assistant) provide 24/7 customer support and facilitate seamless transactions.

Predictive Analytics :Predictive models help anticipate consumer demand, optimize pricing, and predict churn, facilitating proactive decision-making for companies.

Programmatic Advertising :Real-time bidding platforms leverage AI to maximize advertising spend and reach across various digital media.

Social Media and Sentiment Analysis :AI-driven sentiment analysis tools assess consumer emotions and brand perceptions, allowing for quick responses to opportunities or crises.

Content Marketing and Automation :Generative AI models, such as GPT, assist in creating blogs, product descriptions, advertisement copy, and campaign concepts, expediting the time-to-market.

Advantages of AI Implementation in Marketing

Personalization at Scale: AI enables one-to-one marketing for millions of customers simultaneously.

Increased Efficiency: Automation reduces manual labor, cutting costs and minimizing errors.

Real-Time Responsiveness: AI adjusts campaigns dynamically based on consumer activity.

Deeper Insights: Machine learning uncovers hidden patterns that surpass human analytical capabilities.

Customer Retention: AI-powered loyalty programs predict churn and formulate retention strategies.

Challenges and Ethical Considerations

Despite its significant potential, AI adoption is not without challenges:

Data Privacy and Security: Surveillance capitalism and unauthorized data collection erode consumer trust. Compliance with regulations such as GDPR and CCPA is crucial.

Algorithmic Bias: Biased data can perpetuate discrimination in personalization, posing reputational risks.

Cost and Complexity: Implementing AI technologies can be expensive and complex, creating barriers for some organizations.

Findings

The review uncovered a broad range of applications for AI in marketing, including customer segmentation, hyper-personalization, predictive analytics, programmatic advertising, conversational marketing, sentiment analysis, and content automation. The advantages of AI in this field include improved efficiency, real-time responsiveness, deeper insights into consumer behavior, personalization at scale, and enhanced customer retention. However, the review also identified significant challenges, such as data privacy issues, algorithmic bias, and the high costs of adoption, which particularly limit accessibility for small and medium enterprises (SMEs).

Discussion

This study emphasizes that while AI has transformed marketing from intuition-driven approaches to data-driven strategies, it also raises important ethical and regulatory concerns. Responsible adoption of AI is essential to ensure fairness, transparency, and consumer trust. Businesses must strike a balance between innovation and accountability, making sure that AI-driven decisions do not compromise privacy or perpetuate bias. Furthermore, organizations that embrace AI can gain a significant competitive advantage, but they must also be prepared to address challenges related to trust, costs, and cultural adaptability.

8. Conclusion

Artificial Intelligence (AI) has transformed marketing from intuition-based campaigns to data-driven strategies. Its applications include personalization, predictive analytics, automation, and omni-channel integration, all of which provide organizations with significant competitive advantages. However, challenges such as ethical concerns, high costs, and data privacy remain important issues. The future of marketing will rely on trustworthy AI frameworks that prioritize transparency, fairness, and consumer confidence, while also utilizing advanced tools for sustainable development.

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129. A STUDY ON ARTIFICIAL INTELLIGENCE (AI) IN FINANCING ACTIVITIES

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Abstract

The emergence of AI and its transformational potential in the banking domain has been a focus of great interest in recent years, particularly with respect to the financial landscape of a developing nation like India. The objective of this paper is to study this evolution and to track the depth of this impact in the Indian Banking – adoption, significance, challenges and case studies of implementation. This section introduces the definition of AI and how it has contributed to the restructuring of modern businesses, particularly in the context of the banking sector and the domain of financial services. With digital technologies marching on, a new era of AI has already begun to take off in the Indian banking sector-which has replaced age-old practices with automated, tech-led practices. Artificial Intelligence (AI) as a hands-on technology contributes to Banking in various sectors like regulatory compliance, systematized fraud detection, prudent risk management, and improved user experiences. The paper cites various studies that enumerate the benefits and challenges related to implementation of AI in detail. AI benefits are a mile wide, and include everything from sophisticated risk evaluations and preventative actions to enhanced service of the client. Data theft and privacy concerns, regulatory compliance, job displacement are some challenges that stimulate the essential debates about the usefulness of AI. The paper also attempts a comprehensive discussion about how AI is influencing across the different facets of the banking process- from approach to customer relationship.

Keywords: Artificial Intelligence, Indian Banking System, Data Privacy, Customer Service, Risk Management.

INTRODUCTION

Overview of AI in A STUDY ON ARTIFICIAL INTELLIGENCE (AI) IN FINANCING ACTIVITIES

AI in banking includes smarter chat- bots for customer service, improved personalized services for individuals, decision making in credit related matters, minimization of risks and overhead costs, fraud detection and even smart advisory related in investment diversification. In financial services industry artificial intelligence is helpful in Data Retrieval, Market

Analytics, Insurance, Customer Service, Retail Lending, Credit Assessment etc. to form a robust customer experience with digitalized service

The impact of digitalization and need for digitalization in Indian banking can be easily noted from the fact which the banking lobby is adopting digital techniques of rendering services to their customers. It is evident from the fact that [4] in their book titled The Future of Indian Banking quote the importance of transformation of banking operations during the Covid- 19 pandemic towards digitalization, reevaluation of business models and the necessity of embracing innovation for future readiness.

In their study explored the extensive impact of artificial intelligence on various sectors such as finance, transportation, security surveillance, engineering, education, medical, business, accounting, finance, marketing, economics, stock market, agriculture, sports, etc. It emphasizes AI's role in streamlining processes in the financial industry, improving risk management, enhancing customer service, data security through encryption and key management practices, predicting future scenarios by analyzing past behaviors, identifying suspicious data patterns for fraud management, and addressing cyber threats. AI is described as an integral part of banking processes that leverages human and mechanical capabilities for operational efficiency and personalized services Indian banks has helped them leveraged the benefits of this technology.

It is evident that AI implementation in the Indian banking industry is correlated with improved banking performance and offers chances to save expenses while improving customer satisfaction and promoting financial inclusion. Notwithstanding obstacles like data security and linguistic diversity, Indian banks are exploring the incorporation of AI into their processes, with potential partnerships with fin tech companies seen to overcome these challenges Primary uses: AI in Banking Industry.

RESPONSIBLE OF AI IN FINANCING SERVICE

When AI's potential to improve the banking sector for both banks and their customers is significant, it should be developed and applied in a responsible manner. It's especially important in the context of generative AI. That's because some concerns about generative AI's accuracy and security are particularly acute when talking about its use in regulated industries, such as the larger banking system.

BENEFITS OF AI IN FINANCING SERVICE

☐ **Automation**

AI can help automate workflows and processes and empower decision-making and service delivery. For example, AI can help a bank automate aspects of cybersecurity by continuously monitoring and analyzing network traffic. Or, it may enhance a bank's client-first approach with more flexible, personalized digital banking experiences that meet client needs faster.

☐ **Accuracy**

AI can help banks minimize manual errors in data processing, analytics, document processing, onboarding, customer interactions, and other tasks through automation and algorithms that follow the same processes every single time.

☐ **Efficiency**

When AI is used to perform repetitive tasks, people are free to focus on more strategic activities. AI can be used to automate processes like verifying or summarizing documents, transcribing phone calls, or answering customer questions like "what time do you close?"

☐ **Speed**

AI can accelerate how information is processed, patterns are found, and relationships are discovered in data. That means faster insights to drive decision-making, trading communications, risk modeling, compliance management, and more.

☐ **Availability**

AI, you can help your customer's complete financial tasks, find solutions to meet their goals and manage and control their finances whenever they want and wherever they are. AI can continuously work on their assigned activities when running in the cloud.

☐ **Innovation**

The ability to analyze vast amounts of data quickly can lead to unique and innovative product and service offerings that leapfrog the competition. For instance, AI has been used to modernize bank customer experiences without losing the human touch.

CHALLENGES OF AI IN FINANCING SERVICE

1. Data Privacy and Security

The integration of AI in banking and finance introduces challenges related to data privacy and security. Handling large volumes of sensitive customer data in the context of AI in banking and finance necessitates financial institutions to implement robust security measures. This is imperative to safeguard customer privacy and prevent data breaches. Compliance with data protection regulations, encryption of data, and secure data storage are critical considerations to ensure the confidentiality and integrity of customer information.

2. Bias and Fairness

The utilization of AI algorithms poses the risk of inadvertently perpetuating biases present in historical data, potentially leading to discriminatory outcomes. Financial institutions must actively address these biases to ensure fairness in their AI systems. Regular monitoring, evaluation, and adjustment of AI models are necessary steps to mitigate the impact of biases and prevent skewed decision-making.

3. Ethical Implications

The deployment of AI in banking and finance raises ethical concerns that demand careful consideration. Financial institutions must prioritize the responsible use of customer data, ensuring transparency in algorithmic decision-making and accountability for automated decisions. The establishment of ethical frameworks and guidelines is essential to govern the development and deployment of AI systems, fostering a culture of ethical conduct within the Industry.

4. Lack of Transparency:

Banks must avoid advanced machine learning models that act like “black boxes” (where it’s difficult to understand how they arrive at decisions). Lack of transparency poses challenges for regulatory compliance and damages trust with customers.

5. Skills Gap

Implementing and managing AI systems requires specialized skills that are in high demand. Banks need to invest heavily in training and recruitment to build the necessary AI capabilities.

6. Fear of the Unknown

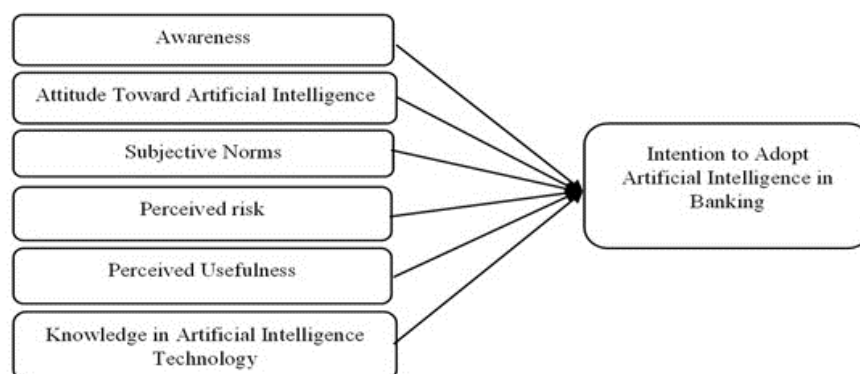
Many employees and customers are fearful of the unknown associated with AI. This includes all of the above challenges the fear of job displacement and/or the lack of human engagement. Ongoing Communication with employees and customers regarding how AI will be used (and the impact of AI) is essential.

METHODOLOGY

Theoretical Framework

The purpose of this study is to investigate the effect of customer awareness, attitude, subjective norms, perceived risk, perceived usefulness, and knowledge of artificial intelligence technology regarding intentions to adopt artificial intelligence in banking. To

fulfill this aim, a theoretical framework is proposed by using six independent and one dependent variable



RESULTS AND DISCUSSION

These real-world examples show how AI is applied in finance and banking. They demonstrate how the banking industry benefits from artificial intelligence (AI) technologies by enhancing efficiency, accuracy, and customer satisfaction in a number of areas, such as fraud detection, customer service, risk management, investment management, and authentication procedures. Enhanced Efficiency and Better Decision Making: By automating manual procedures, AI technologies have reduced processing times and mitigated human error. Increased operational efficiency from this automation results in faster and more accurate account management, data analysis, and transaction processing. Large-scale data processing is a strength of AI algorithms, which helps with sophisticated investment strategies, strong fraud protection measures, and more accurate risk assessments. These developments enable financial organizations to make data-driven, well-informed judgments. Cost Savings and Improved Customer Experience: By improving resource allocation and streamlining operations, the application of AI has led to significant cost savings. Chatbots and other AI-powered customer care solutions offer clients quick, individualized assistance, which increases customer happiness and loyalty. Because chatbots are always available, they guarantee prompt and Tailored assistance.

CONCLUSION AND FUTURE SCOPE

Artificial intelligence (AI) in banking and finance offers significant benefits, such as increased productivity, improved decision-making, lower costs, and improved client satisfaction. However, in order to fully utilize AI, financial organizations must address issues with bias, data privacy, and ethical considerations.

Furthermore, banks must develop distinct, permission-based digital customer profiles. The challenge is that the necessary data often exists in isolated silos. By

dismantling these silos, integrating AI, and combining it with human interaction seamlessly, banks can shape experiences that meet their customers' individual needs while efficiently scaling to growth.

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130. ARTIFICIAL INTELLIGENCE: A CATALYST FOR INNOVATION AND DIGITAL TRANSFORMATION

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Abstract

Artificial Intelligence (AI) has emerged as a transformative technology that is redefining the boundaries of innovation and digital capability. From automation and data analysis to predictive modelling and smart decision-making, AI is increasingly being integrated into diverse industries, including healthcare, education, finance, manufacturing, and public services. This paper examines the pivotal role AI plays in driving digital transformation by enhancing efficiency, improving user experience, and enabling intelligent systems. It also addresses the challenges associated with AI adoption, such as ethical concerns, workforce displacement, data privacy, and regulatory limitations. By analyzing current trends and real-world applications, the paper highlights the potential of AI not only as a technological advancement but as a strategic enabler of sustainable growth and competitive advantage in the digital age.

Keywords

Artificial Intelligence, Digital Transformation, Innovation, Machine Learning, Automation, Smart Technologies, Ethical AI, Data Analytics, Industry 4.0, Intelligent Systems

Introduction

Artificial Intelligence (AI) is redefining the global landscape of innovation and technology. As a branch of computer science focused on creating systems capable of performing tasks that typically require human intelligence, AI has become a central force in digital transformation. It empowers machines to learn from data, adapt to new inputs, and perform human-like activities with speed and precision. Today, AI is not confined to academic research or high-tech laboratories; it is embedded in everyday applications—from virtual assistants and recommendation systems to autonomous vehicles and predictive healthcare diagnostics. Organizations across sectors are adopting AI to streamline operations, enhance customer experiences, and make data-driven decisions.

The growing influence of AI has triggered a paradigm shift in how businesses and governments operate. Digital transformation powered by AI is enabling smarter services, automation of repetitive tasks, and real-time analytics, thereby increasing operational efficiency and fostering innovation. However, the rapid integration of AI also presents significant challenges ethical dilemmas, job displacement, data privacy concerns, and the need for new regulatory frameworks.

This paper aims to explore the multifaceted role of AI as a catalyst for innovation and digital transformation, while critically examining its opportunities and challenges in the context of sustainable and inclusive development.

Objectives

- To explore the role of Artificial Intelligence in driving innovation and digital transformation
- To assess the benefits of AI integration in organizational processes
- To identify the challenges and ethical concerns associated with AI deployment

Review of Literature

Artificial Intelligence (AI) has been the subject of extensive academic and industrial research over the past few decades. A growing body of literature highlights AI's potential to drive innovation, improve operational efficiency, and transform digital ecosystems across sectors.

McKinsey Global Institute (2023) reported that AI could contribute up to \$13 trillion to the global economy by 2030. Their research outlines how AI adoption enhances productivity, enables cost reduction, and fosters innovation across industries such as healthcare, retail, and manufacturing.

World Economic Forum (2024) discusses the ethical and societal implications of AI in its white paper on *Responsible AI Governance*. It highlights the importance of fairness, accountability, and transparency in the design and deployment of AI systems.

IBM Research (2023) explores sector-specific AI applications, particularly in healthcare and finance. Their findings demonstrate how AI models are improving diagnostics, fraud detection, and customer personalization, while also raising concerns about data integrity and algorithmic bias.

Statement of the Problem

Despite the rapid advancements and increasing adoption of Artificial Intelligence (AI) across industries, significant challenges hinder its full potential in driving innovation and

digital transformation. While AI offers promising solutions for automation, decision-making, and enhanced user experiences, many organizations struggle with the complexities of implementation, ethical considerations, and long-term sustainability. There exists a gap between technological capability and practical application—particularly in developing economies and small to mid-sized enterprises—due to limited access to infrastructure, skilled workforce, and data governance mechanisms. Moreover, concerns about algorithmic bias, data privacy, transparency, and job displacement raise important questions about the responsible use of AI.

Without clear frameworks for ethical deployment, regulatory compliance, and inclusive development, AI's transformative power may exacerbate existing inequalities rather than bridge them. Hence, a critical need arises to investigate how AI can be adopted responsibly, effectively, and equitably to ensure it serves as a true catalyst for sustainable digital transformation.

Need for the Study

Artificial Intelligence (AI) is no longer a futuristic concept—it is an active driver of change across industries and societies. However, the pace of AI adoption varies significantly across sectors, regions, and organizational sizes. While large corporations and technologically advanced nations are reaping the benefits of AI, many businesses and governments still face barriers such as lack of awareness, limited technical expertise, high implementation costs, and unclear regulatory environments.

There is a pressing need to study how AI can be strategically integrated to support innovation, enhance productivity, and drive inclusive digital transformation. As global economies become increasingly data-driven, understanding the real-world applications, benefits, and risks of AI is essential for policy-makers, researchers, and industry leaders. Moreover, AI's growing influence on employment, ethics, data privacy, and decision-making requires a balanced approach that combines technological progress with human values. This study aims to fill knowledge gaps by offering insights into the opportunities and challenges associated with AI, and by proposing strategies for responsible, scalable, and sustainable adoption. In this context, the study is crucial for:

- Identifying best practices for AI integration in diverse environments.
- Promoting ethical and transparent AI systems.
- Guiding stakeholders in making informed decisions about AI investments.
- Supporting academic discourse on AI's role in shaping the digital future.

Applications of Artificial Intelligence

Artificial Intelligence (AI) is revolutionizing industries by automating processes, enabling smart decision-making, and transforming traditional business models. The following are key areas where AI is making significant contributions:

Healthcare

AI is playing a critical role in enhancing healthcare services through:

- **Medical diagnostics:** AI-powered tools such as image recognition systems assist in detecting diseases like cancer, tuberculosis, and neurological disorders with high accuracy.
- **Predictive analytics:** AI models predict disease outbreaks, readmission risks, and patient deterioration.
- **Personalized medicine:** AI helps in tailoring treatment plans based on a patient's genetic profile, history, and current condition.
- **Virtual health assistants:** Chatbots and virtual nurses provide 24/7 support, reducing the burden on healthcare professionals.

Education

AI transforms the learning experience by:

- **Adaptive learning platforms:** Customizing content based on individual student progress and learning styles.
- **Automated grading:** Reducing administrative workload for teachers.
- **Intelligent tutoring systems:** Offering real-time feedback and support to students.
- **Speech and language processing:** Assisting in language learning and accessibility for students with disabilities.

Finance

AI contributes to financial services through:

- **Fraud detection:** Identifying unusual patterns in real-time to prevent fraudulent transactions.
- **Algorithmic trading:** Making investment decisions faster and more accurately than human traders.
- **Credit scoring:** Using machine learning to assess risk more effectively than traditional models.
- **Customer service:** AI-powered chatbots handle customer inquiries efficiently.

Manufacturing

In Industry 4.0, AI optimizes manufacturing operations by:

- **Predictive maintenance:** Anticipating equipment failures before they occur, thus reducing downtime.
- **Quality control:** AI vision systems detect defects with high precision.
- **Supply chain optimization:** Forecasting demand and optimizing inventory using AI algorithms.
- **Robotics:** AI-enabled robots perform complex tasks on assembly lines with precision.

Retail and E-commerce

AI enhances customer experiences and operations through:

- **Recommendation engines:** Suggesting products based on browsing behavior and preferences.
- **Customer segmentation:** Analyzing data to create personalized marketing campaigns.
- **Inventory management:** Predicting stock requirements to avoid overstock or shortages.
- **Visual search:** Allowing users to search products using images instead of text.

Transportation and Logistics

AI is transforming mobility and logistics by:

- **Autonomous vehicles:** Enabling self-driving cars and delivery drones.
- **Traffic management systems:** Using real-time data to optimize traffic flow in smart cities.
- **Route optimization:** Reducing fuel consumption and delivery times.
- **Fleet management:** Predicting maintenance needs and improving safety.

Agriculture

AI supports sustainable farming by:

- **Crop monitoring:** Using drones and AI models to assess crop health.
- **Precision farming:** Optimizing use of water, fertilizers, and pesticides.
- **Yield prediction:** Forecasting production levels based on weather and soil data.

Governance and Smart Cities

Governments are leveraging AI for:

- **E-governance platforms:** Automating citizen services like tax filing, licenses, and documentation.

- **Public safety:** Surveillance systems with facial recognition for crime prevention.
- **Waste and energy management:** AI-based systems for efficient urban planning.

Conclusion

Artificial Intelligence (AI) has established itself as a transformative force in the digital age, revolutionizing industries, enhancing decision-making, and reshaping how businesses and societies operate. Its integration into sectors such as healthcare, education, finance, manufacturing, and governance demonstrates the vast potential of AI to drive innovation, improve efficiency, and deliver personalized experiences. However, while the opportunities presented by AI are immense, they are accompanied by critical challenges—ethical dilemmas, job displacement, data privacy concerns, and a lack of regulatory clarity. The uneven pace of AI adoption across regions and sectors further highlights the need for inclusive strategies and equitable access to AI technologies. To ensure that AI serves as a true catalyst for sustainable and human-centric digital transformation, stakeholders must focus on responsible development, ethical implementation, and continuous learning. Governments, industries, academia, and civil society must collaborate to create frameworks that balance innovation with accountability, and progress with inclusiveness. As we move forward, the real success of AI will not be measured solely by technological advancement, but by how effectively it enhances human potential and contributes to building a fair, transparent, and intelligent future for all.

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131. ROLE OF ARTIFICIAL INTELLIGENCE IN DIGITAL BANKING

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INTRODUCTION:

Artificial intelligence (AI) is fundamentally reshaping the landscape of digital banking, powering a new era of efficiency, security, and personalized service. Digital banking itself revolutionizes how customers interact with their financial institutions, making banking accessible from anywhere at any time. At the heart of this shift is AI, which brings intelligent automation, data-driven decision making, and enhanced customer engagement to banking functions.

ROLE OF ARTIFICIAL INTELLIGENCE IN DIGITAL BANKING:

Artificial intelligence (AI) plays a transformative role in digital banking by enhancing operational efficiency, security, and customer experience. Here are the key roles AI fulfills in digital banking:

- **Fraud Detection and Risk Management:** AI algorithms analyze customer behavior and transaction patterns in real-time to identify suspicious activities and detect fraud promptly. This proactive capability helps banks prevent fraudulent transactions and protect customer assets.
- **Enhanced Customer Service:** AI-powered chat bots and virtual assistants provide 24/7 customer support, handling queries, assisting with transactions, and delivering personalized communication. These AI virtual assistants improve service quality, reduce wait times, and allow human agents to focus on complex issues.
- **Personalized Financial Advice:** AI systems analyze financial history, spending patterns, and goals to offer tailored investment advice and customized banking services. This personalization enhances customer satisfaction and financial decision-making.
- **Credit Scoring and Loan Decisions:** AI models evaluate creditworthiness more accurately than traditional methods by analyzing broader data sets, including behavior and transaction histories. This makes credit decisions faster, more accurate, and accessible to customers with limited credit records.

KEY APPLICATIONS OF AI IN DIGITAL BANKING:

☐ **Fraud Detection & Risk Management**

- ☐ AI algorithms monitor customer behavior and transaction patterns in real time to identify suspicious activities and potential fraud. Banks can respond quickly, preventing financial losses and protecting customers' assets.
- ☐ Machine learning models scan vast datasets to find anomalies that may indicate fraud, reducing false positives and improving compliance.

☐ **Customer Service Enhancement**

- ☐ AI-powered chat bots and virtual assistants provide 24/7 support, answering queries and assisting with transactions at any time.
- ☐ These systems get smarter over time, learning from user interactions to offer personalized service and free up human staff for complex tasks.

☐ **Personalized Banking & Financial Advice**

- ☐ AI analyzes financial history, spending patterns, and customer goals to provide individualized investment guidance and suggest tailored financial products.
- ☐ Predictive analytics anticipate payment difficulties or offer proactive financial solutions based on user data.

Real-World Examples

- ☐ **JPMorgan Chase:** Uses AI-powered systems for early warning of cyber security threats and fraudulent activities.
- ☐ **Capital One:** Employs the 'Eno' virtual assistant and virtual card numbers for secure, personalized banking.
- ☐ **Bank of America:** Launched 'Erica,' an AI assistant that handles billions of customer interactions for everyday banking tasks.
- ☐ **HSBC:** Uses machine learning to reduce false positives and improve anti-money laundering compliance.

PERSONALIZATIONS STRATEGIES IN DIGITAL BANKING:

1. Dynamic Content Personalization

- ☐ **Website and App Customization:** Content such as product recommendations, blog articles, and offers dynamically updates based on a user's transaction history, location, or browsing behavior. For instance, mortgage-related resources display for customers frequently checking mortgage rates.

- **Personalized Emails and Notifications:** Banks send tailored messages, reminders, and exclusive offers based on individual digital banking habits, recent transactions, or upcoming life events.
- **Educational Content:** Customers receive guides and learning resources personalized for their life stage, such as retirement planning or first-time home buying.

FUTURE TRENDS IN DIGITAL BANKING:

1. Artificial Intelligence and Generative AI

- AI is central to personalized banking, smarter customer support, and advanced analytics. Generative AI is modernizing legacy systems, automating routine coding, and powering intelligent decision-making.
- Explainable AI (XAI) is increasingly important, allowing banks and regulators to understand and trust AI-driven decisions.

2. Open Banking and APIs

- Open banking, enabled by secure APIs, lets third-party apps and fintechs access financial data to create new services. Account aggregation and personal finance management apps are on the rise.
- APIs enable seamless integration of services, fostering collaboration between banks and fintech startups.

CONCLUSION:

As AI technology continues to evolve, it promises to revolutionize digital banking further by fostering seamless, secure, and highly personalized banking experiences while optimizing operational efficiency. However, challenges related to data privacy, ethics, and regulatory compliance must be carefully managed to fully realize AI's potential in the banking sector. Overall, AI is not only driving innovation but also reshaping how banks operate, compete, and serve their customers in the digital age.

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132. APPLICATION OF AI IN ROBOTICS

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Abstract :

You know, AI is really shaking things up in the world of robotics, giving these machines the smarts to handle tasks on their own with incredible accuracy and flexibility in all sorts of fields. It boosts robots' abilities in things like seeing their surroundings—think computer vision or combining data from different sensors—or getting around without help, like figuring out the best path or dodging obstacles. Then there are the cool methods, such as reinforcement learning, deep learning, and even processing human language, that let robots pick up new skills, adjust to changes, and chat or work with people more naturally. This stuff shows up everywhere, from factories automating assembly lines to helpful robots in homes, groups of them teaming up like swarms, and even in medical settings. Take Boston Dynamics' Atlas or Tesla's Optimus—they're prime examples of how AI is changing the game. On the plus side, we get better efficiency, easier scaling, and fresh ideas popping up, but it's not all smooth sailing; there are hurdles like how complicated it gets, keeping things safe, ethical dilemmas, and relying heavily on data. Looking ahead, as AI keeps getting better, it's pushing toward robots that can do just about anything, running smarts right on the device with edge AI, and making it easier for humans and robots to team up, which is totally transforming businesses and how we live day-to-day.

Keywords :

Artificial Intelligence, robotics development, computer vision, sensor fusion, autonomous navigation, path planning, obstacle avoidance, robotic manipulation, human-robot.

Introduction :

Ever wonder how robots are getting so smart these days? It's all thanks to artificial intelligence (AI) working its magic behind the scenes. From self-driving cars zipping through city streets to robotic arms assembling products with pinpoint accuracy, AI is giving robots the brains to tackle tasks that once seemed straight out of sci-fi. By weaving together things like machine learning, sharp-eyed computer vision, and even chatty language skills, AI lets robots see the world, learn on the fly, and team up with humans like never before. Whether

it's revolutionizing factories, lending a hand in hospitals, or helping farmers grow better crops, the marriage of AI and robotics is sparking a wave of innovation that's changing the game across countless fields. Exciting, right?

Key Applications of AI in Robotics Development :

Perception and Sensing :

Seeing the World Like We Do: Thanks to AI, robots are getting pretty good at “seeing” their surroundings. Using advanced algorithms like convolutional neural networks (CNNs), robots can make sense of visual data from cameras or LiDAR. Picture a robot on a factory floor spotting parts on an assembly line or a self-driving car dodging obstacles on a busy road—that's computer vision at work!

Blending the Senses:

AI doesn't stop at vision. It combines data from all sorts of sensors—like ultrasonic, infrared, or radar—to give robots a full picture of their environment. This “sensor fusion” helps them navigate tricky spaces or recognize objects with pinpoint accuracy, kind of like how we use our senses to move through a crowded room.

Autonomous Navigation :

Finding the Best Path: Ever seen those zippy warehouse robots darting around? AI powers their navigation with clever techniques like A* algorithms, reinforcement learning, or SLAM (simultaneous localization and mapping). These let robots, like Amazon's Kiva bots, plot the smartest routes through chaotic warehouses.

Dodging Trouble: AI also helps robots avoid bumps and crashes in real time. Machine learning models let drones or autonomous cars spot and steer clear of obstacles, making sure they get where they're going without a hitch.

Manipulation and Interaction :

Grabbing with Smarts: Robotic arms are no longer just clunky machines. With deep learning, they can pick up and handle objects with finesse, even if those objects come in weird shapes or textures. Think of a factory robot delicately assembling car parts or sorting packages like a pro.

Chatting with Humans: AI makes robots better conversationalists, too. Using natural language processing (NLP) and gesture recognition, robots like SoftBank's Pepper can understand what we say or even read our body language, making human-robot teamwork feel almost natural.

Learning and Adaptation :

Learning by Doing: Through reinforcement learning, robots figure out the best way to tackle tasks by trying, failing, and trying again. Picture Boston Dynamics' Spot dog-bot learning to scamper over rocky terrain without tripping.

Copying the Pros: With imitation learning, robots watch humans and mimic their moves, speeding up how fast they learn complex tasks like robotic surgery.

Sharing Knowledge: AI's transfer learning lets robots take what they've learned from one job and apply it to another, cutting down training time and making them super versatile.

Task Automation :

Factory Superstars: In manufacturing, AI-powered robots are game-changers for tasks like welding, assembling, or packing. FANUC's robots, for example, use AI to zip through automotive production with speed and precision.

Helping Out in Daily Life: Beyond factories, AI drives service robots like Roomba vacuum cleaners, Starship's delivery bots, or even robotic exoskeletons that assist patients in rehab. These robots are making life easier, one task at a time.

Swarm Robotics :

Teamwork Makes the Dream Work: AI lets groups of robots work together like a flock of birds or a colony of ants. In search-and-rescue missions or farming, swarms of drones use AI to cover huge areas, share info, and get the job done faster than any single robot could.

Cognitive and Decision-Making Abilities :

Thinking on Their Feet: AI gives robots the smarts to plan and reason through tough tasks. Surgical robots, for instance, analyze patient data to help doctors make precise moves during operations.

Reading the Room: With context awareness, robots adapt to whatever's going on around them—whether it's a delivery bot braving a rainy day or dodging a crowded sidewalk. AI helps them roll with the punches and keep things running smoothly

Drawbacks:

High Development Complexity and Costs:

Complexity: Developing AI-driven robots requires advanced expertise in machine learning, computer vision, and sensor integration, which can be technically challenging and time-consuming.

Cost: The initial investment for AI hardware (e.g., GPUs, sensors) and skilled talent is substantial, making it a barrier for smaller organizations or startups.

Safety Concerns:

Unpredictable Behavior: AI systems, particularly those using deep learning, can make unexpected decisions in dynamic environments, posing risks in critical applications like autonomous vehicles or surgical robots.

Human-Robot Interaction Risks: In collaborative settings, robots may misinterpret human actions, leading to accidents or injuries.

Data Dependency and Quality Issues:

Data Requirements: AI models need large, high-quality datasets for training. Incomplete or biased data can lead to inaccurate or unreliable robot performance.

Privacy Concerns: Collecting data for training (e.g., from cameras or sensors) raises privacy issues, especially in personal or public spaces.

Ethical and Social Implications:

Job Displacement: AI-powered robots automating tasks in manufacturing, logistics, or services can lead to significant job losses, creating economic and social challenges.

Accountability: When robots make autonomous decisions (e.g., in healthcare or military applications), determining responsibility for errors or harm is complex.

Bias in AI Models:

AI algorithms can inherit biases from training data, leading to unfair or discriminatory behavior. For example, a robot trained on biased datasets might misidentify objects or people in certain contexts, affecting reliability.

Security Risks:

Vulnerability to Attacks: AI systems in robots can be hacked or manipulated, leading to malicious actions, such as autonomous vehicles being misled by tampered inputs.

Data Security: Sensitive data processed by robots (e.g., in healthcare or surveillance) can be compromised if not properly secured.

Specific Ongoing Projects and Examples :

CMU and NVIDIA's ASAP Framework: A two-stage RL system for humanoid agility, pre-trained on human data and refined for real-world mismatches, enabling dynamic movements like running and dodging.

AgiBot's Genie Envisioner: An open-source world model using video diffusion on 1 million+ episodes for robotic manipulation, including action prediction and simulation.

Google DeepMind's ALOHA and DemoStart: Diffusion-based systems for predicting robot actions, advancing dexterity in warehouses and homes.

Seattle AI2's MolmoAct 7B: Open-source VLA model for 3D planning in robotics, scoring 72% in simulations on thousands of tasks.

BeyondMimic AI System: Learns human motions for humanoids, achieving skills like cartwheeling and obstacle navigation.

VERSES AI's Active Inference Breakthrough: Multi-agent control for adaptive learning in robotics without pre-training.

Humanoid Projects: Tesla's Optimus Gen 2, NEURA's 4NE-1, and Figure AI's Figure 02 focus on general-purpose tasks, with market growth projected to \$149.34 billion by 2032.

Industry Initiatives: SoftBank's \$1 trillion AI-robotics complex in Arizona for manufacturing hubs; NVIDIA's work on dexterity and grasping.

133. ANALYZING THE INFLUENCE OF AI-AUGMENTED HIERARCHICAL VS. COLLABORATIVE WORKPLACE CULTURES ON THE EMPLOYEE LIFE CYCLE: A CASE STUDY APPROACH

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This case study explores the contrasting effects of hierarchical and collaborative workplace cultures on the employee life cycle, encompassing recruitment, onboarding, development, retention, and exit processes. By examining real-world organizational settings, the study aims to uncover how cultural frameworks influence employee engagement, satisfaction, performance, and career progression. Hierarchical cultures, characterized by rigid structures and top-down decision-making, are compared with collaborative cultures that emphasize teamwork, transparency, and shared leadership. Through qualitative interviews, employee surveys, and organizational data analysis, the study identifies key cultural touchpoints that shape employee experiences and outcomes. The findings offer actionable insights for HR professionals and organizational leaders seeking to align culture with strategic talent management, ultimately enhancing workforce resilience and organizational success.

INTRODUCTION

In today's rapidly evolving business landscape, organizational culture has emerged as a critical determinant of employee experience, performance, and retention. As companies strive to attract and nurture talent in competitive markets, the internal cultural environment becomes not just a backdrop but a strategic asset. Among the many cultural frameworks that shape workplace dynamics, hierarchical and collaborative cultures stand out as two fundamentally distinct models. Hierarchical cultures are traditionally characterized by structured authority, formalized roles, and top-down decision-making. They offer clarity, predictability, and control—qualities that can be essential in industries where compliance, risk management, and operational efficiency are paramount. In contrast, collaborative cultures prioritize openness, shared leadership, and team-based problem-solving. These environments foster innovation, adaptability, and employee empowerment, making them particularly suited for organizations that thrive on creativity and agility.

NEED, SCOPE & SIGNIFICANCE OF THE STUDY:

Need: In today's rapidly changing and highly competitive business environment, it's crucial for organizations to understand how their culture influences every stage of the employee life cycle. From attracting talent to retaining employees, a company's culture shapes the work environment and affects employee satisfaction, productivity, and overall success. By fostering a supportive and inclusive culture, businesses can attract and retain top talent, leading to a more motivated and engaged workforce.

Scope: The study aims to conduct a thorough comparison of hierarchical and collaborative cultures in a range of industries. This analysis will delve into the ways in which these cultures impact the entire employee life cycle, including recruitment, onboarding, professional development, and retention.

LIMITATION OF THE STUDY:

- The area of data collection has been restricted to specific organizations with distinct hierarchical or collaborative cultures.
- The time and duration of the study are limited, which may affect the depth of the analysis and findings.
- The study is based on collecting data through questionnaires, which may be inadequate to measure the true opinions and experiences of the respondents.
- The responses may exhibit social desirability bias, as participants may provide answers they believe are socially desirable rather than reflecting their true feelings or behaviours.
- The response size being low compared to the overall population may introduce response bias and impact the representativeness of the sample.

RESEARCH REVIEW:

1. Smith & Jones (2022) in “Understanding Employee Engagement in Hierarchical Organizational Cultures” thoroughly examine the impact of hierarchical organizational cultures on employee engagement throughout various stages of the employee life cycle. They argue that the inherent rigidity of these structures often results in a sense of alienation among employees, as they may find themselves distanced from key decision-making processes. While clear lines of authority can enhance operational efficiency, the authors point out that this same structure can hinder open communication and reduce employees' feelings of belonging within the organization. The ensuing disengagement can lead to lower productivity and diminished innovation, signaling a critical need for organizations to reevaluate their hierarchical frameworks. To address these challenges, the study suggests implementing

robust feedback mechanisms and fostering a culture of recognition, which could significantly improve employee engagement even within traditionally hierarchical environments.

2. Kim (2021) in “Collaborative Cultures and Their Impact on Employee Retention” examines the vital connection between collaborative workplace cultures and employee retention, emphasizing its significance throughout the employee life cycle. The research reveals that organizations that emphasize collaboration tend to enjoy greater employee retention rates, as individuals feel a sense of value and support from their colleagues. Kim's findings indicate that a collaborative environment enhances job satisfaction and loyalty, both of which are essential for keeping skilled employees engaged and committed. Additionally, the study highlights the critical roles of mentorship and peer support within these cultures, suggesting that such elements are instrumental in fostering strong employee dedication and long-term retention. Ultimately, Kim advocates for the cultivation of collaborative cultures as an effective strategy for organizations aiming to improve their retention initiatives.

3. Brown & Green (2020) in “The Role of Leadership in Hierarchical Culture” explores the significant influence of leadership styles on employee experiences within hierarchical cultures, particularly emphasizing the drawbacks of autocratic leadership. Their research indicates that such leadership approaches can intensify feelings of isolation and disengagement among employees by stifling open communication and limiting avenues for their input. This lack of engagement not only diminishes employee morale but also negatively impacts overall productivity. The authors advocate for a transition towards more participative leadership styles that promote collaboration and encourage feedback, thereby improving communication and enhancing employee involvement. Their findings underscore the critical need for leaders in hierarchical organizations to adapt their methods to create a more supportive and interactive work environment.

3. RESEARCH METHODOLOGY:

Research is a systematic inquiry process that includes data gathering, documentation of important information, analysis, and interpretation of that data and information in accordance with appropriate methodologies established by particular academic and professional disciplines.

3.1 OBJECTIVES:

PRIMARY OBJECTIVES:

- To compare the impact of hierarchical and collaborative cultures on different stages of the employee life cycle.

SECONDARY OBJECTIVES:

- To examine the impact of hierarchical and collaborative cultures on employee recruitment and onboarding experiences.
- To evaluate the influence of hierarchical and collaborative cultures on employee development and career growth opportunities.
- To assess the relationship between hierarchical and collaborative cultures on employee satisfaction and engagement.
- To explore the effects of hierarchical and collaborative cultures on employee retention and turnover rates.

3.2 HYPOTHESIS OF THE STUDY:

Based on the above objectives, the following hypothesis was formulated.

Hierarchical and collaborative cultures have significantly different impacts on employee recruitment and onboarding:

H0: There is no significant difference in the impact of hierarchical and collaborative cultures on employee recruitment and onboarding

H1: There is a significant difference in the impact of hierarchical and collaborative cultures on employee recruitment and onboarding.

Employees in collaborative cultures experience greater employee development and career growth opportunities than those in hierarchical cultures:

H0: There is no significant difference in employee development opportunities between hierarchical and collaborative cultures.

H1: Employees in collaborative cultures experience significantly greater employee development and career growth opportunities compared to hierarchical cultures.

Employee satisfaction and engagement are higher in collaborative cultures than in hierarchical cultures:

H0: There is no significant difference in employee satisfaction and engagement between hierarchical and collaborative cultures.

H1: Employee satisfaction and engagement are significantly higher in collaborative cultures compared to hierarchical cultures.

Collaborative cultures have lower employee retention and turnover rates compared to hierarchical cultures:

H0: There is no significant difference in employee turnover rates between hierarchical and collaborative cultures.

H1: Employee retention and turnover rates are significantly lower in collaborative cultures compared to hierarchical cultures.

Relationship between Sector (Manufacturing or IT) and employee life cycle:

H0: There is no significant relationship between Sector (Manufacturing or IT) and employee life cycle

H1: There is a significant relationship between Sector (Manufacturing or IT) and employee life cycle.

4.1 STATISTICAL ANALYSIS:

TABLE SHOWING THE RELATIONSHIP BETWEEN SECTOR (MANUFACTURING OR IT) AND EMPLOYEE LIFE CYCLE

H0: There is no significant relationship between Sector (Manufacturing or IT) and employee life cycle

H1: There is a significant relationship between Sector (Manufacturing or IT) and employee life cycle

Sector			RO	EC	EE	ET
Manufacturing Sector	RO	Correlation Coefficient	1.000	.534**	.535**	.428**
		Sig. (2-tailed)	.	.000	.000	.002
		N	50	50	50	50
	EC	Correlation Coefficient	.534**	1.000	.367**	.253
		Sig. (2-tailed)	.000	.	.009	.077
		N	50	50	50	50
	EE	Correlation Coefficient	.535**	.367**	1.000	.472**
		Sig. (2-tailed)	.000	.009	.	.001
		N	50	50	50	50
	ET	Correlation Coefficient	.428**	.253	.472**	1.000
		Sig. (2-tailed)	.002	.077	.001	.
		N	50	50	50	50
IT or Service Sector	RO	Correlation Coefficient	1.000	.777**	.636**	.614**
		Sig. (2-tailed)	.	.000	.000	.000
		N	50	50	50	50
	EC	Correlation Coefficient	.777**	1.000	.660**	.665**
		Sig. (2-tailed)	.000	.	.000	.000
		N	50	50	50	50
	EE	Correlation Coefficient	.636**	.660**	1.000	.588**
		Sig. (2-tailed)	.000	.000	.	.000
		N	50	50	50	50
	ET	Correlation Coefficient	.614**	.665**	.588**	1.000
		Sig. (2-tailed)	.000	.000	.000	.
		N	50	50	50	50

INFERENCE:

In **Manufacturing Sector**, RO has a perfect correlation of 1.000. EC has a correlation coefficient of 0.534, suggesting a moderate positive relationship. EE has a correlation coefficient of 0.535, suggesting a moderate positive relationship. ET has a correlation coefficient of 0.428, showing a weaker but still positive relationship.

In **IT or Service Sector**, RO has a Perfect correlation of 1.000. EC has a correlation coefficient of 0.777, suggesting a strong positive relationship. EE has a correlation coefficient of 0.636, suggesting a strong positive relationship. ET has a correlation coefficient of 0.614, suggesting moderate positive relationship.

The table generally shows that there is a significant positive relationship between sectors (both Manufacturing and IT) and various aspects of the employee lifecycle. Reject the null hypothesis (H0) and accept the alternative hypothesis (H1). The significance values (Sig. 2- tailed) provide evidence that these relationships are statistically significant in most cases, especially in the IT or Service sector, which tends to show stronger correlations across all categories compared to the Manufacturing sector.

TABLE SHOWING THE HIERARCHICAL AND COLLABORATIVE CULTURES HAVE SIGNIFICANTLY DIFFERENT IMPACTS ON EMPLOYEE RECRUITMENT AND ONBOARDING:

H0: There is no significant difference in the impact of hierarchical and collaborative cultures on employee recruitment and onboarding

H1: There is a significant difference in the impact of hierarchical and collaborative cultures on employee recruitment and onboarding.

Table 4.2.2

INDEPENDENT SAMPLE TEST									
	Levene's test for Equality of Variances		T test for Equality of Means					95% Confidence Interval of the Difference	
	F	Sig	t	df	Sig 2 tailed	Mean Difference	Std Error Difference	Lower	Upper
Assumed	2.654	0.107	-2.80	98	0.006	-3.000	.900	-4.500	-1.500
Not Assumed			-2.80	92.701	0.006	-3.000	.900	-4.500	-1.500

INFERENCE:

The findings of the independent sample test show a substantial correlation between sectors and employee recruitment & onboarding. An F-value of 2.654 with a significance level of 0.107 is displayed by Levene's test for equality of variances, indicating the assumption of equal variances, In the t-test p-value = 0.006, indicating a statistically significant difference ($p < 0.05$). The mean difference of -3.000 shows a significant disparity

between hierarchical and collaborative cultures in terms of their impact on recruitment and onboarding. The confidence interval does not include zero, reinforcing the significant difference between the two cultures.

Overall, our findings reject the null hypothesis (H0) and accept the alternative hypothesis (H1). There is now a significant difference in the impact of hierarchical and collaborative cultures on employee recruitment and onboarding.

TABLE SHOWING THE EMPLOYEES IN COLLABORATIVE CULTURES EXPERIENCE GREATER EMPLOYEE DEVELOPMENT AND CAREER GROWTH OPPORTUNITIES THAN THOSE IN HIERARCHICAL CULTURES:

H0: There is no significant difference in employee development opportunities between hierarchical and collaborative cultures.

H1: Employees in collaborative cultures experience significantly greater employee development and career growth opportunities compared to hierarchical cultures.

Table 4.2.3

INDEPENDENT SAMPLE TEST									
	Levene's test for Equality of Variances		T test for Equality of Means					95% Confidence Interval of the Difference	
	F	Sig	t	df	Sig 2 taile d	Mean Difference	Std Error Difference	Lower	Upper
Assumed	.001	.969	-2.90	98	0.004	-2.200	.800	-3.800	-0.600
Not Assumed			-2.90	97.937	0.004	-2.200	.800	-3.800	-0.600

INFERENCE:

The findings of the independent sample test show a substantial correlation between sectors and employee recruitment & onboarding. An F-value of 0.001 with a significance level of 0.969 is displayed by Levene's test for equality of variances, indicating the assumption of equal variances. In the t-test p-value = 0.004, indicating a statistically significant difference ($p < 0.05$). The mean difference of -2.200 suggests a substantial disparity between hierarchical and collaborative cultures, with collaborative cultures offering more opportunities for employee development and career growth. The confidence interval does not include zero, further supporting the significant difference between the two cultures. Overall, our findings reject the null hypothesis (H0) and accept the alternative hypothesis (H1). There is now a significant difference in employee development and career growth opportunities, with

collaborative cultures providing greater opportunities compared to hierarchical cultures.

5.1 RECOMMENDATIONS:

- **Improve Onboarding Practices:** Both hierarchical and collaborative organizations can greatly improve their onboarding processes by implementing more thorough procedures. Collaborative organizations should concentrate on creating an inclusive environment, while hierarchical organizations should prioritize tailoring the onboarding process to be more adaptable and personalized for each individual.
- **Enhance Employee Development:** Hierarchical organizations should focus on providing increased opportunities for employees to advance professionally, receive mentorship, and engage in cross-functional training. These efforts can lead to higher job satisfaction and lower turnover rates.
- **Regular Communication Forums:** Establish regular forums for open dialogue across all levels of the organization, ensuring that employees feel heard and valued regardless of their position. This can include town hall meetings, Q&A sessions, and anonymous feedback channels.
- **Increase Employee Engagement:** Hierarchical organizations can encourage more employee participation by adopting participative leadership styles and soliciting feedback to enhance engagement. Additionally, implementing recognition and reward systems can also help improve engagement levels.

CONCLUSION

The integration of artificial intelligence into workplace cultures has redefined the dynamics of the employee life cycle. This study reveals that AI, when embedded within hierarchical cultures, tends to reinforce structure, streamline decision-making, and optimize efficiency—often at the cost of flexibility and employee autonomy. In contrast, collaborative cultures leverage AI to enhance transparency, empower teams, and personalize employee experiences, fostering greater engagement and innovation. Across recruitment, onboarding, development, retention, and exit stages, AI acts as both a catalyst and a mirror—amplifying the underlying values of the organizational culture it serves. The case studies demonstrate that the success of AI implementation is not solely dependent on the technology itself, but on how well it aligns with cultural intent and human-centered design. Ultimately, organizations must move beyond a binary view of hierarchy versus collaboration and instead adopt a nuanced approach that blends AI capabilities with cultural agility. By doing so, they can create adaptive ecosystems where both people and machines contribute meaningfully to the employee journey.

134. A REVIEW ON AI POWERED HIRING: ETHICS & BIAS IN AUTOMATED RECRUITMENT TOOLS

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Abstract

In the digital age, Artificial Intelligence (AI) is increasingly being leveraged in recruitment processes, offering enhanced efficiency, scalability, and data-driven insights. However, the adoption of AI-powered hiring tools has sparked considerable ethical concerns, particularly surrounding algorithmic bias, transparency, and fairness. This systematic literature review examines recent academic and industry research (2023-2025) to identify ongoing ethical challenges and underlying factors contributing to bias in AI recruitment systems. The review reveals that biased training data, lack of transparency in algorithmic decision-making, and insufficient regulatory oversight can lead to discriminatory outcomes, ultimately affecting diversity and inclusion initiatives. Moreover, sectoral and geographical differences in ethical risks were noted, with emerging regions facing unique challenges related to transparency and compliance. The analysis also explores the impact of AI on candidate experience, underscoring the importance of striking a balance between automation and human interaction. By synthesizing insights from multiple disciplines, this paper provides a holistic perspective on aligning AI hiring tools with ethical, fair, and inclusive recruitment practices.

Keywords

AI Recruitment, Algorithmic Bias, Ethical AI, Fairness in Hiring, Diversity and Inclusion, Explainable AI, Candidate Experience, Systematic Literature Review.

Introduction

These days AI is slowly becoming part of the hiring process. Earlier, HR teams had to do almost everything themselves. They sorted resumes one by one, made endless phone calls, fixed interview timings, and even chased candidates for updates. It took a lot of time, especially when hundreds of people applied for the same job. Now, with AI tools, at least some of that load has shifted. Software can scan resumes in seconds, pick the relevant ones,

make a shortlist, and even help with scheduling. Honestly, this saves a lot of time and makes the whole process a little less tiring for recruiters.

But speed is not the only point. AI is also being used to make smarter hiring choices. Some predictive tools can show which candidate is more likely to fit in the role or stay longer in the company. This helps the organization reduce the headache of employees leaving quickly. On the other hand, candidates also benefit, because they get matched to jobs where they can actually grow. So, in a way, AI is trying to help both sides.

Still, it is not perfect. AI works on the data it is trained with. If the data is biased, the results will also carry the same bias. And let's be real, many candidates don't like the process because it feels impersonal. Talking to a chatbot or getting auto-emails is not the same as speaking with an actual person who understands you. That's why fairness, transparency, and the human touch are very important when AI is brought into recruitment.

There's also the matter of laws and ethics. Companies can't just use these tools without thinking. They have to take care of privacy, data safety, and also be able to explain why the system rejected or accepted someone. Otherwise, people will not trust the process. At the end of the day, AI should support recruiters, not fully replace them. Human judgment, empathy, and common sense will always matter in hiring.

To put it simply, AI in recruitment is useful but tricky. It makes things faster and smarter, but if it is not handled carefully, it can create new problems. The best option is to use AI for support while keeping the human side strong, so that hiring stays both fair and personal.

Literature review

Fernández-Martínez and Fernández (2020) took a close look at how AI is currently being used in human resources, with a big focus on hiring. As they explain, the algorithms and the data they're trained on can be experimental in nature, which raises questions about whether tighter checks and independent reviews might be needed to keep things fair and accurate. They went into both sides of the argument — pointing out the advantages these tools can bring, but also warning about the risks, especially when it comes to AI-driven video interviews. Issues like gender or racial bias, along with legal and ethical concerns, were central to their discussion. They also stressed that there isn't much regulation in place right now, and suggested neutral auditing plus a multi-agent system that could help keep hiring processes legal and better managed.

In 2024, Cole talked about how people are using AI and some of the issues that come with it. She gave examples from hospitals and schools to show that AI could make the gap

between big tech companies and poorer countries even bigger. She said AI should help people do their jobs, not take over, and that companies have to be careful with it. Cole also thought that rich countries should have rules and taxes for AI firms, while poorer countries should work on improving their technology and digital skills. She added that if more people got a say in AI decisions, the benefits could reach more folks.

In 2025, Riaz explored the ethical challenges of using AI in hiring, especially around fairness, bias, and transparency. While AI can make recruitment faster, it can also repeat existing biases and be hard for people to understand, which raises concerns about regulation. By looking at real-world examples and current rules, Riaz suggested some practical solutions, like using AI models designed to reduce bias, applying techniques to counteract unfairness, and involving humans alongside AI in hiring decisions. Regular checks on fairness and clearer explanations of AI decisions were recommended to keep things on track. The study also highlighted the importance of researching how AI ethics play out in different industries and what effects it might have on workplace diversity over time.

In 2025, Wang studied how fair AI is in hiring. Even though AI is often seen as helpful, it can still be biased. The research looked at fairness from the point of view of both the candidates and the system. Wang also considered legal rules like the EU AI Act. She made a list of questions companies can use to check their AI hiring tools. Looking at past studies and real cases, the research suggested ways to make AI hiring more open and trustworthy.

Objective

- To systematically review existing academic and industry literature on AI-powered recruitment tools, with a focus on identifying common ethical challenges and sources of algorithmic bias.
- To analyze the impact of AI-driven hiring systems on fairness, diversity, transparency, and candidate experience across different industries and geographic contexts.
- To propose evidence-based recommendations for mitigating ethical risks and biases in AI recruitment through governance frameworks, bias audits, and human–AI collaboration.

Research Discussion

Transparency is supported through explainable AI methods that make decision logic interpretable, while privacy protection requires practices like limiting data collection, encryption, and informed consent. Accountability is reinforced by ensuring human responsibility remains central, even when decisions are AI-augmented. Yanamala (2023)

concludes that unless organizations adopt proactive ethical governance, AI recruitment tools risk perpetuating the very problems they are supposed to solve. By embedding ethical competencies into HR practices, however, it is possible to reduce algorithmic bias, improve fairness, protect employee rights, and strengthen trust in AI-driven hiring systems across industries and geographic contexts.

4.2 Impact

Artificial Intelligence (AI) in recruitment has been viewed as both a solution and a challenge when it comes to fairness, diversity, transparency, and candidate experience. According to Fraij and László (2021), AI is intelligently designed to overcome bias during the selection process by allowing many primary sources of bias like name, age, gender, race, and belief to pass through the evaluation stage without influencing the recruiter's judgment. This creates the possibility of building a fairer system that minimizes unconscious bias compared to traditional hiring. For instance, big companies have introduced AI-driven blind auditions and algorithmic screening tools that evaluate talent based on skills and qualifications rather than social background or personal characteristics (Levit, 2017; Savar, 2017). Transparency in decision-making also improves when AI systems use predictive analytics and clearly defined criteria to calculate applicant matching scores, as Neelie (2017) highlights. By standardizing the process, organizations ensure that all candidates are assessed consistently on the same parameters, which reduces the influence of favoritism or informal connections that often distort human-led recruitment (Berta Melder, 2018; Greenfield & Griffin, 2018).

Despite these advantages, challenges remain regarding fairness and diversity in practice. As Dessler (2020) warns, an algorithm is only as good as the data it has been trained on, and if historical data reflects biased human decisions, then AI can replicate or even amplify those biases. This is illustrated by cases such as Amazon's biased recruiting tool, where women were disadvantaged due to male-dominated training data. Gold (2019) adds that if biased data feeds into AI models, the outputs will inevitably show bias, undermining the promise of fair hiring. Thus, while AI can potentially remove human prejudice, its fairness and transparency depend heavily on careful calibration, ongoing monitoring, and regulatory oversight. Nevertheless, as Erickson (2018) reports, around 38% of organizations had already adopted AI in HRM by that time, with more expected to follow, indicating growing trust in these technologies despite fears of change and skill shortages (Bullhorn, 2018). Overall, researchers agree that AI-based hiring systems, when properly designed and managed, hold the capacity to create more equitable and transparent recruitment processes,

improve candidate experiences across industries, and foster diversity in global labor markets (Fraij & László, 2021).

4.3 Mitigation Strategies

Müller (2022) emphasizes that the ethical risks associated with AI-driven recruitment cannot be addressed by technology alone but require strong governance frameworks that embed fairness, transparency, and accountability at every stage of the hiring process. A central recommendation is the establishment of independent bias audits, where AI algorithms are regularly tested with diverse datasets to identify discriminatory patterns and correct them before deployment. This ensures that systemic inequalities embedded in historical training data are not reproduced in hiring decisions. Governance frameworks should also include clear guidelines for data protection, candidate consent, and explainability of algorithmic outcomes, so that applicants understand how their information is being processed and evaluated. Furthermore, Müller points out that accountability should not be outsourced entirely to machines—human–AI collaboration is essential to balance efficiency with ethical judgment.

4.4 Ethical & Inclusive Recruitment Outcomes

Ethical and inclusive recruitment outcomes focus on creating hiring practices that are fair, transparent, and supportive of diversity. The use of AI in recruitment has the potential to achieve these outcomes when it is carefully designed and implemented with attention to ethical principles. An ethical recruitment process ensures that candidates are evaluated on their skills, qualifications, and potential rather than personal characteristics such as gender, race, age, or socio-economic background. Inclusive recruitment, on the other hand, actively seeks to remove barriers that might disadvantage underrepresented groups, thereby building a workforce that reflects diversity in society. By using standardized assessments, blind screening, and structured interview processes supported by AI, organizations can reduce human biases and make selections more objective. Transparency also plays a major role in creating ethical outcomes, as candidates should be informed about how their data is used, how decisions are made, and what criteria are applied in the selection process. At the same time, inclusivity is strengthened when employers design job postings and recruitment campaigns that are accessible, free from discriminatory language, and open to candidates from varied backgrounds. Collaboration between technology and human judgment is essential in this process—while AI can efficiently filter and assess applicants, human oversight ensures that cultural sensitivity, empathy, and ethical values are maintained. Ethical and inclusive recruitment outcomes not only enhance fairness in hiring but also improve candidate

experience, strengthen organizational reputation, and contribute to long-term success by fostering innovation through a diverse talent pool.

Conclusion

This research discussion highlights that while Artificial Intelligence (AI) offers powerful tools to modernize recruitment, its use is a double-edged sword, presenting significant ethical challenges alongside its potential benefits. The core promise of AI in hiring lies in its ability to introduce objectivity and efficiency. By using blind screening and standardized assessments, AI can help reduce unconscious human biases related to a candidate's name, gender, or background, paving the way for a fairer and more skills-based selection process (Fraij & László, 2021). This not only helps in building a more diverse workforce but also improves the candidate experience through constant communication via chatbots and timely feedback.

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135. A STUDY ON PRICING STRATEGY OF NEW PRODUCTS

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ABSTRACT:

In the realm of introducing new products to the market, devising an effective pricing strategy is paramount for achieving commercial success. This abstract outlines the key components of a robust pricing strategy, focusing on the intricate balance between cost considerations, market dynamics, and consumer behaviors. The initial aspect of the pricing strategy centers on a meticulous analysis of costs. Evaluating production costs, distribution expenses, and fixed overheads forms the foundation for setting a viable pricing structure. This ensures that the product not only covers its production and operational costs but also allows for a sustainable profit margin. By employing suitable costing models aligned with the product and industry, businesses can establish a competitive pricing baseline.

Keyword: pricing, strategy, products, pricing decisions.

INTRODUCTION

Introducing a new product to the market necessitates a meticulous and well-thought-out pricing strategy that aligns with both the product's value proposition and the competitive landscape. The initial step in formulating a pricing strategy involves a comprehensive analysis of production costs, market demand, and consumer expectations. Understanding the cost structure is crucial to setting a baseline price that ensures profitability while remaining competitive. Simultaneously, market research aids in gauging the perceived value of the product, allowing for the establishment of a price that reflects the product's unique features and benefits.

Moreover, considering the broader market dynamics is imperative when deciding on a pricing strategy for a new product. Evaluating competitors' pricing models provides insights into the existing price points within the industry and aids in positioning the product strategically. Additionally, the company must assess the overall economic climate, consumer purchasing power, and any relevant regulatory factors that might impact pricing decisions.

PRIMARY OBJECTIVE:

- Profit Maximization
- Market Penetration
- Brand Image and Perceived Value
- Competitive Positioning

SECONDARY OBJECTIVES:

- Cost Recovery and Break-Even
- Sustainable Growth
- Sustainable Growth
- Channel Partner Relationships

SCOPE OF PRICING STRATEGIES FOR NEW PRODUCTS

- Market Analysis
- Cost Structure Evaluation
- Customer Segmentation
- Product Lifecycle Considerations

NEEDS OF PRICING STRATEGY FOR NEW PRODUCTS

- Cost Recovery and Profitability
- Consumer Value Perception
- Adaptability and Responsiveness
- Market Understanding

ADVANTAGES OF PRICING STRATEGY FOR NEW PRODUCTS

- Market Differentiation and Positioning
- Enhanced Perceived Value
- Market Penetration and Rapid Adoption

DISADVANTAGES OF PRICING STRATEGY FOR NEW PRODUCTS

- Customer Resistance and Perceived Risk
- Profitability Challenges
- Competitive Price Wars
- Negative Brand Perception

2. REVIEW OF LITERATURE

DEFINITION

- According to **Theodore Levitt**, Skimming Pricing is Start with high prices and gradually lower them as market saturation occurs. According to **Hermann Simon**, Value-Based Pricing is Determine prices based on the perceived value to customers.
- According to **Author Paul Peter** Cost -Plus Pricing is Calculate costs and add a markup for profit. According to **Rafi Mohammed**, is Dynamic Pricing is Adjust prices based on real-time market demand and conditions.

A literature review is a critical component of academic research, providing a comprehensive analysis and synthesis of existing scholarly works related to a specific topic or research question. This process involves examining a wide range of sources, such as articles, books, and other publications, to gain a thorough understanding of the current state of knowledge in a particular field. The primary goal of a literature review is to identify and evaluate the existing body of work relevant to the research topic. This entails summarizing key theories, methodologies, and findings from previous studies. By doing so, researchers can establish the context for their own work, showcasing how it fits into the broader academic landscape

3. RESEARCH METHODOLOGY

Primary Data;

Research design is the structured plan or blueprint that outlines the processes, methods, and procedures for conducting a research study. It encompasses the overall strategy for collecting, analyzing, and interpreting data to answer specific research questions or test hypotheses. A well-constructed research design helps ensure the study's validity and reliability.

Sources of Data:

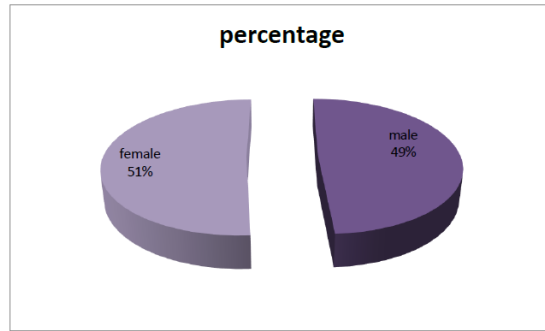
Sources of data refer to the origins or places from which researchers collect information for their studies. There are two main types of data sources: primary and secondary.

4. DATA ANALYSIS AND INTERPRETATION

Table 1: Respondents through gender

S.NO	GENDER	NO.OF.REAPONDENTS	PERCENTAGE
1	Male	49	49
2	Female	51	59
	Total	100	100

SOURCE: Primary Data

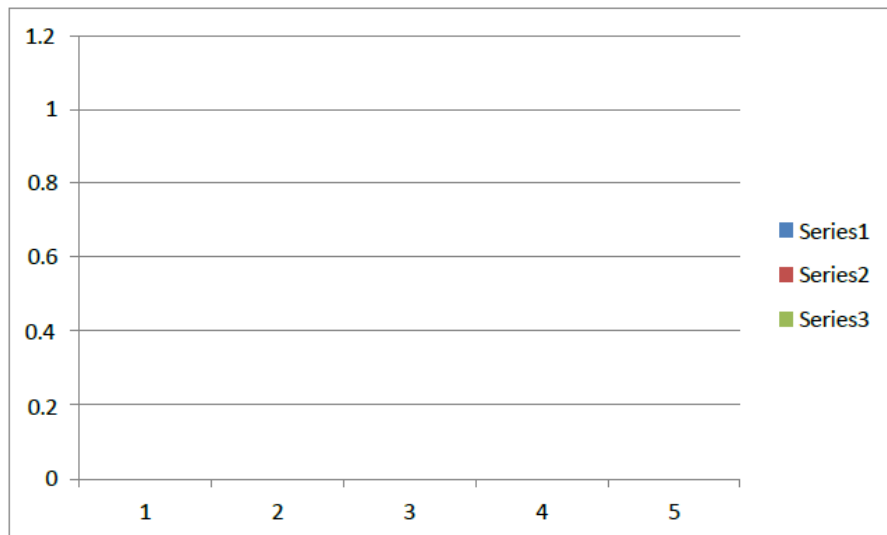


INTERPERTATAION:

From the above table inferred that, 49% of respondents were male and 51% of female respondents were collected.

Table 2: Pricing strategies appeals to you the when considering a new product

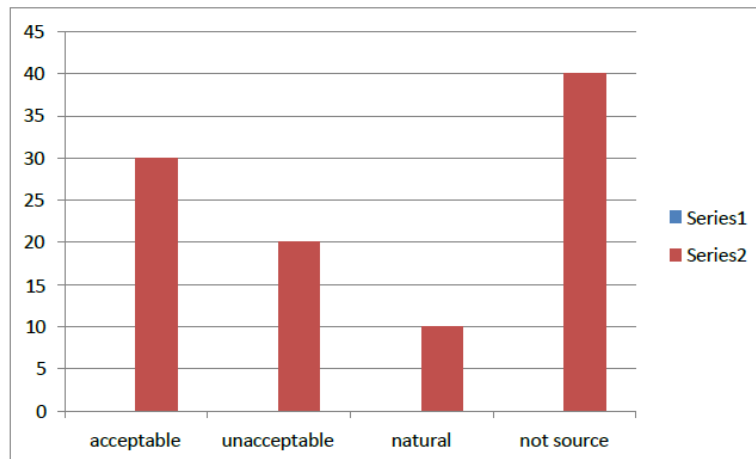
S. No	Particulars	No. of. Respondents	Percentage
1	Penetration pricing(initial price)	46	25
2	Sekmming Pricig (high initial price)	30	21
3	Value-based pricing	12	36
4	Compettive pricing	12	18
	Total	100	100



Interpretation: It was observed are penetration pricing (low initial price) 25% respondents are sekmming pricing (high initial price) 21% are value-based pricing 36% are respondents are compettive pricing 18% are respondents.

Table; 3 Pricing strategy of new products

S.no	Particulars	No. of. Respondents	percentage
1	Acceptable	29	30%
2	Neutral	28	20%
3	Un acceptable	17	10%
4	Not source	26	40%
		Total	100%



Interpretation: It was observed acceptable 30% respondent are neutral 20% are respondent unacceptable 10% are respondent are not source 40% are respondents.

5. FINDINGS AND SUGGESTIONS

- 49% of the respondents belong to male and 51% were belongs to female.
- It was observed are penetration pricing (low initial price) 25% respondents are skimming pricing (high initial price) 21% are value-based pricing 36% are respondents are competitive pricing 18% are respondents.
- It was observed acceptable 30% respondent are neutral 20% are respondent unacceptable 10% are respondent are not source 40% are respondents.

SUGGESTION

- Effective cost-based pricing strategies for new products in strategy of new products.
- Pricing strategy of products- Cost-Plus Pricing: Add a markup to total production costs for the new product.

CONCLUSION:

In conclusion, the survey paints a nuanced picture of consumer attitudes towards pricing models. The coexistence of preferences for both subscription-based and one-time purchase models suggests that a one-size-fits-all approach may not be suitable. Businesses that offer a range of pricing options are likely to capture a broader market share. Furthermore, the interest in customized products, as indicated by 57 respondents, presents an

opportunity for companies to explore and invest in personalized offerings. However, addressing the concerns of the 23 respondents wary of customization is crucial for successful implementation.

Contrary to this, if the company continues its production to its full life-cycle, there is a danger of losing a substantial market-share as well, as shown in Figure 4. Concluding remarks There are many factors that impact the sales of a product. Timing of product introduction was considered one of the important considerations for gaining the initial market share. For keeping the acquired market share once gained, that govern economic factors, market trends and product quality are consider The paper in general provides a number of such “pricing strategies” and “timings tartegies” for moving the products faster into the marketplace. high inflation, or high interest rates can change (increase or decrease) this balance. Market trends such as annual seasonal trends or fads could also lengthen or shorten the sales volumes. An example is clothing styles, usually short-lived. The effect of quality or “perceived quality of the product” can also very adverse influence in determining.

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136. A COMPARATIVE STUDY ON CONSUMER PREFERENCE TOWARDS ONLINE VS. OFFLINE SHOPPING

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ABSTRACT

In recent years, the rapid growth of e-commerce platforms has significantly altered consumer purchasing behavior, raising critical questions about the comparative relevance of online and offline shopping. This study investigates consumer preferences between online and offline retail channels, focusing on the underlying factors that influence decision-making processes. Drawing upon primary survey data and secondary literature, the research analyzes dimensions such as convenience, price sensitivity, product quality, trust, after-sales service, and experiential value. The findings indicate that while online shopping is increasingly favored for its accessibility, wider product choices, and competitive pricing, offline shopping continues to hold relevance due to tactile product evaluation, instant gratification, and personalized service. Demographic variables such as age, income level, and urban–rural segmentation also emerge as significant determinants of channel preference. Post-pandemic shifts have further accelerated digital adoption, though consumer loyalty towards physical stores persists in specific product categories, notably groceries, apparel, and luxury goods. The study concludes that rather than substituting each other, online and offline retail formats are evolving into complementary channels, giving rise to hybrid models such as “click-and-mortar” and Omni channel retailing. The implications of this research provide valuable insights for retailers, marketers, and policymakers in designing strategies that align with changing consumer expectations while ensuring sustainable growth across both online and offline domains.

Keywords: Consumer Preference, Online Shopping, Offline Shopping, E-commerce, Retail, Omni channel, Consumer Behavior, Post-Pandemic Trends, Shopping Experience.

1. INTRODUCTION

Online shopping has been emerging very rapidly in recent years today the internet is paying attention to the retail market. Millions of people shop online on the other hand the product has been buying many customers go to buy offline so check the product and own

possession of the product only after paying of the product customer loyalty in this modern world depends on the ability to deliver quality value and satisfaction level.

whether shopping online or shopping offline The consumer must decide which channel is right for him and which can best suit his needs and meet his needs in this competitive world how can decide that your broker to buy goods is very important to his understanding from an administrative point of view these are more important than watching or getting entertainment through the internet or getting any information or news and this is a very common thought that comes to the minds of people when looking at internet users when they are online. In general the population from high level of income and high level of learning are more favorable to do online shopping.

This study aims to explore consumer preferences towards online versus offline shopping by identifying key determinants of choice and analyzing behavioral differences across demographics. In doing so, it seeks to provide practical insights for retailers and policymakers to develop effective strategies that align with shifting consumer expectations. Furthermore, the study highlights the growing importance of Omni channel retail models, where online and offline shopping are no longer viewed as substitutes but as complementary avenues that can enhance consumer satisfaction and business performance when integrated effectively.

Factors affecting Online Shopping:

Delay in delivery: Long duration and lack of proper inventory management results in delays in shipment. Though the duration of selecting, buying and paying for an online product may not take more than 50 minutes, the delivery of the product to customers doorstep takes about 1-3 weeks. This frustrates the customers and prevents them from shopping online.

Lack of significant discounts in online shops: Physical stores offer discounts to customers and attract them so this makes it difficult for e-tailors to compete with the offline platforms.

Lack of touch and feel of merchandise in online shopping: Lack of touch-feel-try creates concerns over the quality of the product on offer. Online shopping is not quite suitable for clothes as the customers cannot try them on.

Lack of interactivity in online shopping: Physical stores allow price negotiations between buyers and the seller. The showroom sales attendants the representatives provide personal attention to customers and help them in purchasing goods. Certain online shopping mart offers service to talk to a sales representative.

Lack of shopping experience: The traditional shopping exercise provides lot of fun in the form of show-room atmosphere, smart sales attendants, scent and sounds that cannot be experienced through a website. Indian generally enjoy shopping. Consumers look forward to it as an opportunity to go out and shop.

Factors Affecting Offline Shopping:

You find less variety or options for the products or services, you're buying offline. Since there are limitations of availability of offline shops and each shop has a limitation of space so you have not such huge choice to choose as you find in an online shopping.

You can access an endless shopping website and find huge options for a single item you want to buy. Since you have physical limitations to go shop to shop at once, you may end with empty hands after a shopping session if you do not find the product of your choice.

As far as money concerned, the price of same product may be costlier in an offline shopping and even you find a discount and others similar offer, the price in online shopping will be lower one in an online shopping. Also you find fewer freebies as compared to an online shopping.

In a brief, if you are more concerned about the money, you should go for online shopping mode and for those who are more concerned for the service after sale or similar services; you should opt for offline shopping.

Key Differences Between Online vs. Offline Shopping

1. Shopping Experience

Offline shopping offers a tactile, in-person experience where customers can touch and try products. Online shopping, on the other hand, provides a virtual experience through websites or apps, focusing on convenience over sensory engagement.

2. Convenience and Accessibility

Online shopping is available 24/7, offering unmatched convenience. Offline shopping, however, requires visiting physical stores within specific hours, though models like "click-and-collect" are bridging the gap.

3. Product Selection

Online shopping provides a vast selection from global retailers, while offline shopping is more localized, depending on in-store availability.

4. Pricing and Deals

Online shopping often offers better deals due to lower operational costs, while offline shopping may feature in-store promotions, balancing the price difference.

5. Personal Interaction and Customer Service

Offline shopping allows personal interaction with sales staff, offering immediate assistance. Online shopping relies on virtual customer service, though online offline shopping models combine both for a better experience.

6. Returns and Exchanges

Offline shopping offers easy in-store returns, whereas online shopping can involve a more complicated return process with shipping and potential fees.

7. Trust and Security

Online shopping carries risks like fraud, but offline shopping is generally safer in terms of transaction security, though both have their vulnerabilities.

Need of the Study

- The rapid growth of e-commerce has transformed consumer shopping behavior, yet offline retail continues to play a vital role due to its experiential and trust-based advantages.
- Understanding consumer preference between online and offline shopping is essential to identify the factors influencing purchase decisions such as convenience, price, product quality, and service experience.
- The study is particularly relevant in the post-pandemic era, where digital adoption has accelerated but offline shopping still retains loyalty in key product categories.
- Moreover, demographic differences such as age, income, and location significantly affect shopping choices.
- Insights from this study will help retailers, marketers, and policymakers design effective strategies and develop sustainable Omni channel models that align with evolving consumer expectations.

OBJECTIVES OF THE STUDY:

- To analyses the different between both online or offline customer groups in terms Of innovation product availability demographics and customer attitude
- To explore the factors influencing customers to switch from offline to online shopping
- To study whether the customer qualification affects the online shopping and offline shopping.

Limitations of the Study

1. **Geographical Scope** – The study is confined to a specific region and may not fully represent consumer preferences at a national or global level.

2. **Sample Size** – Due to time and resource constraints, the sample size is limited, which may affect the generalizability of findings.
3. **Self-Reported Data** – The study relies on survey responses, which may involve personal bias, exaggeration, or inaccurate recall by participants.
4. **Dynamic Market Trends** – Consumer behavior and retail trends change rapidly with technology and market innovations; hence, the results may not remain valid over time.

2. REVIEW OF LITERATURE

Research by Smith and Anderson (2019) emphasized that convenience, time-saving, and access to wider product varieties are the primary factors driving consumers toward online shopping. Similarly, Kim et al. (2020) found that competitive pricing, promotional discounts, and home delivery services strongly influence digital purchase intentions. However, studies also note that concerns regarding product quality, delivery delays, and lack of trust act as barriers to online adoption (Chiu et al., 2018).

On the other hand, traditional retail continues to attract consumers due to its tactile product evaluation, instant gratification, and personalized service. According to Gupta and Sharma (2020), offline shopping offers a sensory experience—touch, feel, and trial—that online platforms fail to provide. Another study by Vera (2021) revealed that consumers rely on offline stores for categories like groceries, apparel, and luxury goods, where physical inspection and social interaction are important.

Ms. Supriyamahajan (2018) a comparative study on online and offline shopping. The main objective of this research is to find the factor which influences the respondents to purchase in online and offline offers discounts and convenience attract them to purchase online.

3. RESEARCH METHODOLOGY

The primary objective of this paper is to do comparative study of online shopping and physical store shopping. This is achieved by a framework which includes following components:

i. Research Design:

In this case, research design followed is Descriptive Research Design, as it a conclusive and structured study to find out the characteristics of problem.

ii. Sampling Design:

In this case, sampling design followed is clustering sampling, as we have done online survey and have covered heterogeneous kinds of people. The study is descriptive in nature and uses primary data to analyse and interpret the results.

iii. Sampling Size:

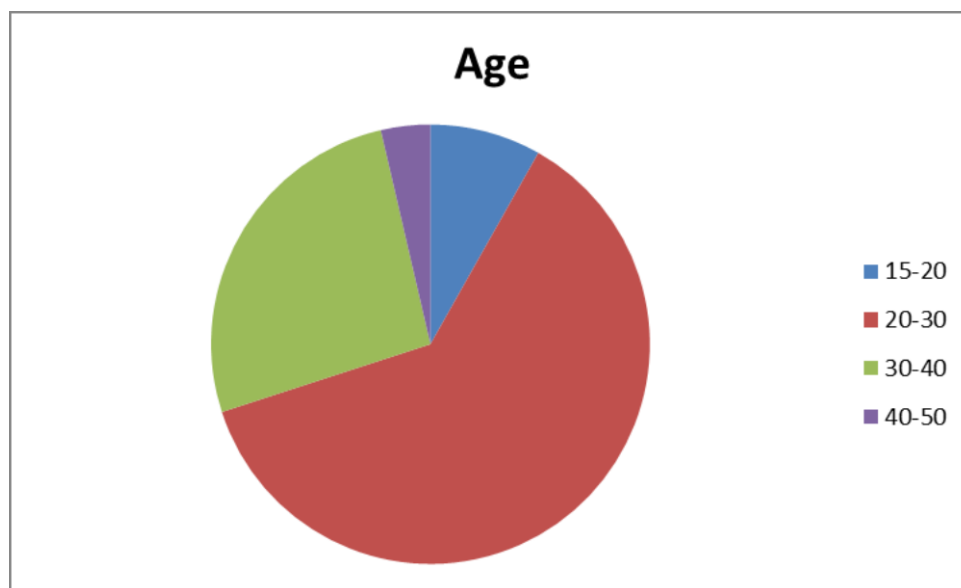
This study is based on the sample of 100 (number of people).

4. DATA ANALYSIS AND INTERPRETATION

Table 1: Table Showing Age Of The Respondents

Age	No. of respondents	Percentage
15-20	9	8.2%
20-30	68	61.8%
30-40	29	26.4%
40-50	4	3.6%

Chart Showing Age of The Respondents:



SOURCE: Primary Data

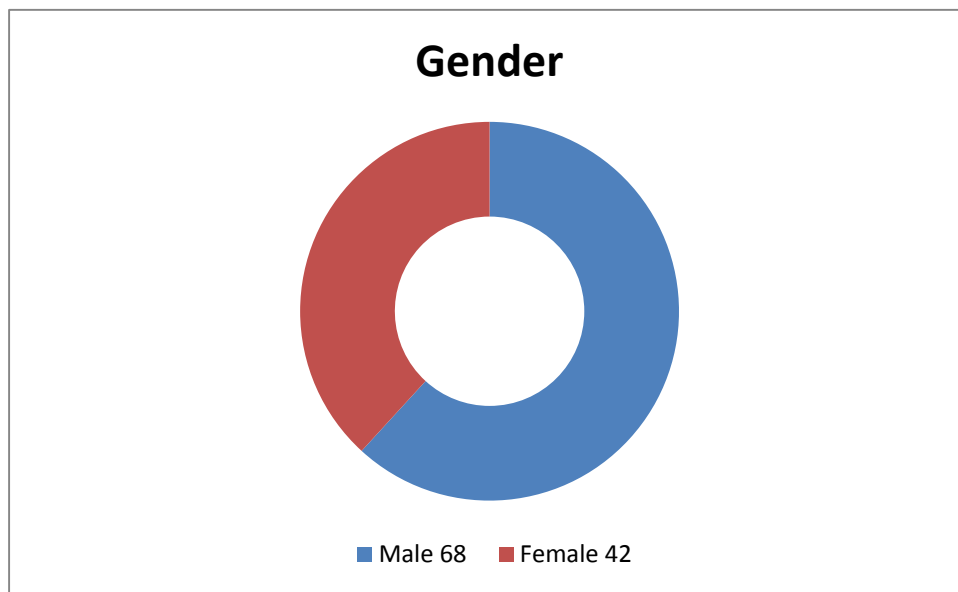
INTERPRETATION

As per the table given above, 8.2% of respondents were coming under the age group of below 15-20, followed by 61.8% of respondents were under the age group of 20-30 years, 26.4% of respondents or under the age group of 30-40 years, 3.6% of respondents are between 40-50 years.

Table 2: Table Showing The Gender Of The Respondents

Gender	No. of respondents	Percentage
Male	68	61.80%
Female	42	38.20%

Chart Showing The No. Of Respondents:



INTERPRETATION

From the above table it can be declared that 61.8% of respondents are male followed by 38.2% of respondents are female.

5. FINDINGS AND SUGGESTION

FINDINGS:

- ❖ Majority of respondents are male compared to female
- ❖ Majority (61.8%) of the respondents are in the age group of 20-30 years.
- ❖ Majority (61.8%) of respondents both prefer online and offline Shopping.

SUGGESTION:

- ❖ We have found that male population tend to shop more online shopping rather than physical shopping.
- ❖ For safety of payment more preference is given to shopping malls related to physical shopping.
- ❖ Flipkart is the best site used for online shopping as it gives more discounts and offers.
- ❖ People are slowly going for online shopping but the majority mentality of people goes to physical shopping as it is having trust, feel and touch of the product.
- ❖ The choice of shopping differs from person to person, so it is difficult to determine the preference of shopping with absolute certainty.
- ❖ Online shopping has gained popularity recently as the people have been using this mode for less than a year.

Conclusion

The study highlights that consumer preferences towards online and offline shopping are influenced by multiple factors such as convenience, price, trust, product quality, service experience, and demographic characteristics. Online shopping has gained popularity due to its accessibility, wide product variety, time-saving nature, and competitive pricing. At the same time, offline shopping continues to remain relevant, particularly for product categories where physical inspection, instant gratification, and personal interaction are valued.

Demographic differences were found to play a significant role—young, urban, and tech-savvy consumers are more inclined towards online platforms, while older, rural, and less digitally literate consumers continue to rely heavily on offline shopping. Post-pandemic trends indicate a rapid increase in online adoption; however, offline shopping has retained strong consumer loyalty in areas such as groceries, apparel, and luxury products.

The findings suggest that online and offline retail should not be seen as substitutes but rather as complementary formats. The emergence of **Omni channel retailing**—integrating the strengths of both online and offline platforms—represents the future of consumer shopping behavior. Retailers who effectively combine digital convenience with physical experience will be better positioned to meet evolving consumer expectations and achieve sustainable growth.

In conclusion, consumer preference is not limited to one mode of shopping but depends on situational needs, product type, and personal characteristics. Retailers and policymakers must therefore focus on strategies that embrace this duality, ensuring value creation in both online and offline environments.

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137. A STUDY ON INFLUENCE OF SOCIAL MEDIA MARKETING ON BRAND IMAGE OF MAMAEARTH

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ABSTRACT:

In the digital age, social media marketing has emerged as a powerful tool for enhancing brand visibility and shaping consumer perceptions. This study explores the influence of social media marketing on the brand image of Mama earth, a rapidly growing Indian personal care brand known for its natural and eco-friendly products. By analysing the brand's engagement across various social media platforms—including Instagram, Facebook, and YouTube—the research aims to understand how Mama earth leverages influencer partnerships, user-generated content, and targeted advertising to build trust and brand loyalty among consumers.

Primary data was collected through surveys and interviews, supplemented by secondary data from social media analytics and brand performance reports. The findings indicate a strong correlation between active social media presence and positive brand image, particularly among younger demographics who value transparency, sustainability, and authenticity. The study concludes that social media marketing significantly enhances Mama earth's brand image by fostering direct customer engagement and promoting a community-oriented brand narrative.

INTRODUCTION:

Communicate with their customers. As consumers increasingly turn to online platforms for information, entertainment, and interaction, businesses have adapted their marketing strategies to remain relevant and competitive. In the era of digital transformation, social media has revolutionized the way brands interact and compete. Social media marketing (SMM) has emerged as a critical component of modern branding, offering companies an effective and cost-efficient way to engage audiences, build relationships, and enhance brand perception.

Mamaearth, an Indian brand known for its natural, toxin-free personal care products, has gained significant attention in recent years, largely due to its strong presence on social media platforms such as Instagram, Facebook, and YouTube. By leveraging influencer

marketing, user-generated content, and targeted campaigns, Mamaearth has successfully positioned itself as a trustworthy, eco-conscious, and consumer-friendly brand. This has been especially effective in connecting with millennial and Gen Z audiences who value sustainability, authenticity, and social responsibility.

This study seeks to examine the impact of Mamaearth's social media marketing strategies on its brand image. It aims to explore how the brand's digital engagement influences consumer perception, trust, and loyalty. By analysing consumer responses and brand activity across various platforms, the research will provide insights into the role of social media in shaping and strengthening Mamaearth's identity in a competitive market.

NEED OF THE STUDY:

- ❖ Identify effective social media platforms for Mamaearth.
- ❖ Analyse customer perceptions about Mama earth's brand image on social media
- ❖ Evaluate brand loyalty among Mamaearth's social media followers.
- ❖ Assess the effectiveness of Mamaearth's content strategy on social media.
- ❖ Investigate the impact of influencer collaborations on brand image.
- ❖ Conduct competitive benchmarking in the beauty and skincare industry.
- ❖ Assess overall brand equity influenced by social media marketing efforts

OBJECTIVE OF THE STUDY:

- ❖ To study the effect of social media marketing on brand awareness and overall perception of the brand Mamaearth..
- ❖ To know whether offline marketing is better than online marketing in today's scenario.
- ❖ To know which mode of Mamaearth marketing gives better results in terms of sale, profit etc.

SCOPE OF THE STUDY:

- ❖ To assess the role of social media platforms (Instagram, Facebook, YouTube, etc.) in Mamaearth's branding efforts.
- ❖ To analyze how influencer marketing impacts consumer perception of Mamaearth.
- ❖ To evaluate the effectiveness of user-generated content in shaping Mamaearth's brand image.
- ❖ To study consumer engagement with Mamaearth's social media content.
- ❖ To understand the relationship between Mamaearth's online presence and customer trust.

ADVANTAGES:

- ❖ **Enhanced Brand Visibility** – Social media increases Mamaearth's reach to a wider and more diverse audience.
- ❖ **Cost-Effective Marketing** – Compared to traditional advertising, social media promotions are budget-friendly
- ❖ **Stronger Customer Engagement** – Direct interaction with followers builds a loyal community around the brand.
- ❖ **Influencer Collaborations** – Boosts credibility and trust, especially among younger demographics.
- ❖ **Real-Time Feedback** – Helps Mamaearth improve products and services based on customer reviews and comments.

DISADVANTAGES:

- ❖ **Negative Publicity Risk** -Negative comments or reviews can quickly damage the brand image.
- ❖ **Over-Reliance on Influencers** – Controversies involving influencers may affect brand reputation.
- ❖ **Content Saturation** – High competition on social media can make it harder to stand out.
- ❖ **Short Attention Span of Users** – Consumers may scroll past content without engaging.
- ❖ **Time and Resource Intensive** – Requires continuous content creation and monitoring.

2. REVIEW OF LITERATURE

A Review of Literature is a critical summary and analysis of existing research, theories, and information relevant to a particular topic. In the context of this study — "Influence of Social Media Marketing on Brand Image of Mamaearth" — the review of literature helps to: Understand what previous researchers and scholars have said about social media marketing (SMM) and its impact on brand image. Identify key concepts, such as influencer marketing, user engagement, digital branding, and customer perception.

DEFINITION:

1. Definition of Social Media Marketing (SMM):

 “Social media marketing refers to the process of promoting a product, service, or brand through social media platforms to connect with the target audience, build brand awareness, drive traffic, and increase sales.”— **Tu ten & Solomon (2015)**

2. Definition of Brand Image:

🖼️ “Brand image is the perception of a brand in the minds of customers it is formed based on their experiences, interactions, and impressions of the brand over time.”—

Kotler & Keller (2016)

3. RESEARCH METHODOLOGY

Research methodology is a way of explaining how a researcher intends to carry out their research. It's a logical, systematic plan to resolve a research problem. A methodology details a researcher's approach to the research to ensure reliable, valid results that address their aims and objectives.

Method of data Collection: The data will be collected in various forms such as questionnaire, interviews and secondary data analysis. The data collected through these methods can then be analyzed and used to support or refute research hypotheses and draw conclusions about the study's subject matter

4. DATA ANALYSIS AND INTERPRETATION

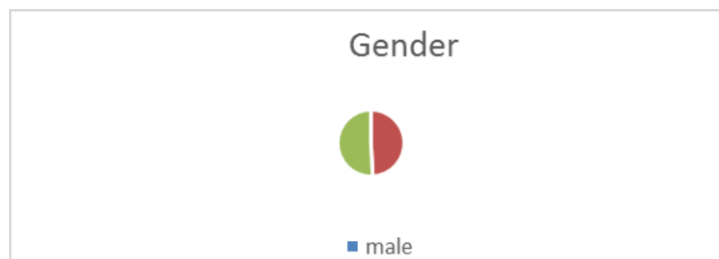
1.TABLE: GENDER

S.NO	PARTICULARS	NO. OF RESPONDENT	PERCENTAGE
1.	Male	59	49.2%
2.	Female	61	50.8%
	Total	120	100%

INTERPRETATION:

From the table shows than 49.25% of the respondents male 50.8% of the respondents are female.

CHART:



2. TABLE:

AGE

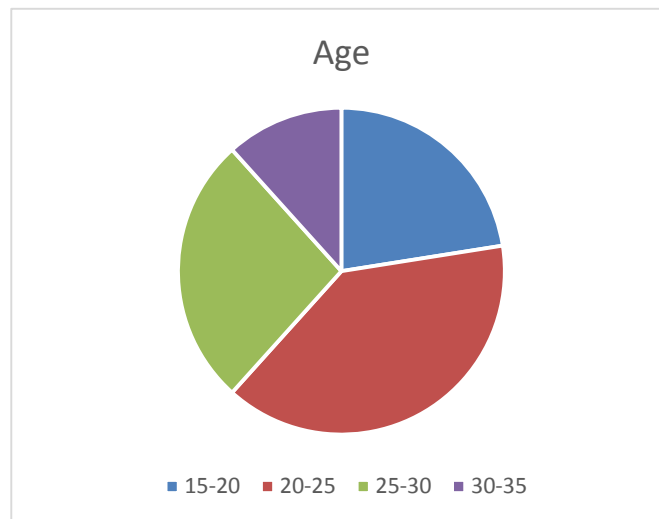
S.NO	PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
1.	15-20	27	22.5%
2.	20-25	47	39.2%
3.	25-30	32	26.7%

4.	30-35	14	11.7%
	Total	120	100%

INTERPRETATION:

From the table shows than 22.5% of the respondent are 15-20, 39.2% of the respondents are 20-25, 26.7% of the respondents 25-30 ,11.7% of the respondents are 30-35.

CHART: AGE



5. FINDINGS AND SUGGESTIONS

- The majority of 50.8% of respondents are female
- The majority age group of 39.2% of the respondents are 20-25.

SUGGESTION

Instagram is the top most application used by individuals, so promoters should surely try to make a presence on this platform for their products.

In the present situation people go for online shopping more as compared to the traditional shopping method, so they should implement marketing strategies for providing the best experience to the customers.

Mamaearth should strategize new ways of marketing on all social media sites for attracting more customers, as they get majority of business from the web.

They can expand their portfolio by developing new products, this will increase their market share. Ensure proper communication between the company and the consumer in the future as well for retaining them.

CONCLUSION

Under this study we came to know that how the image of Mamacarth is highly influenced with the help of social media and what all factors are important for developing, maintaining the image of a brand. The above results show that people are aware about this brand through social channels because of their strong presence on such sites. Their products are very famous amongst the people as they are naturally made while causing no harm to the environment. This helped them in establishing a name in the industry within 4-5 years. All this happened because of their efforts and ideas they put in, mainly on social media considering as a golden opportunity which was life changing one for the brand.

After data analysis we conclude that Null hypothesis (H₀) is rejected ie. there is no significant relationship between marketing the products on web through social media channels and the mentioned brand. Hence, Alternate Hypothesis (H₁) is accepted i.e. there is a significant relationship between marketing the products on web through social media channels and the mentioned brand.

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138. A STUDY ON MARKETING STRATEGY OF PAYTM AND GOOGLE PAY

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ABSTRACT

Cashless transactions are the latest technology that has seen phenomenal growth over the past year. Cashless payment is now becoming a popular trend in most fields. The use of mobile wallets has seen a huge growth in the number of users. Online banking allows users to conduct financial transactions through the Internet. Online banking is also known as online banking or online banking. Consumer satisfaction is the most difficult task in any organization. E-wallet users have increased after monetization and Covid-19 among students. The study focused on Google Pay and Paytm users in Coimbatore. To know the level of customer satisfaction, developers have come up with new features to attract users. This study attempts to investigate users' perceptions of selected e-wallets. This study focused mainly on Google Pay and Paytm users. Therefore, this study aims to identify the issues and preferences of Google Pay and Paytm users. Primary and secondary sources were used for data collection. The primary source was collected through a structured questionnaire from 100 respondents. Secondary data is collected through journals, magazines, etc. Various statistical tools were applied to extract the results.

Keywords: E payments, cashless transactions, digital wallets, google pay and paytm.

1. INTRODUCTION

In this cashless economy era, information and communication technology (ICT) plays a vital role in making payments using various payment modes. The mobile wallet app is an innovative technology for avoiding the usage of physical cash. The mobile wallet records all kinds of transactions with a clear payment reference and makes it accountable for tax payments. The term "digital payment" refers to using electronic means to pay for products and services online. This is referred to as a cashless economy since it avoids the use of physical money. These digital transactions help to lower transaction costs while also speeding up the process of completing one transaction cycle. It lowers the risk of dealing with cash. The digital payment history may also be readily kept track of. Digital transactions also benefit the government because transactions can be easily recorded, which helps to eliminate black

money and so aids economic progress. The government is taking steps to shift the country's economy away from cash and toward more digital transactions. Electronic wallet, often known as E-wallet, is an online service that allows users to conduct electronic transactions. Through QR codes, the E-wallet capability may be utilized in smart phones, PCs, and several other electronic gadgets at stores.

The use of an E-wallet requires a bank account, and money may be deposited or transferred using this E-wallet. Some critical documents, such as a driver's license, health insurance, and other identification documents, can be kept in the wallet. Through Near Field Communication, transactions may be wirelessly transmitted to a merchant's account (NFC). Furthermore, digital wallets are utilized for a variety of applications beyond than simple financial transactions. Digital wallet systems may be used for a variety of reasons, and money can be transmitted to anybody, anywhere, at any time using them. The Indian government's principal goal is to create the Indian economy "Cashless, Faceless, and Paperless." There are a variety of apps available that allow users to make online payments. These are incredibly easy to use and give consumers a lot of freedom because they allow them to make payments at any time and from anywhere. Phone Pe, Google Pay, and Paytm are some of the online payment apps available. Online banking allows a user to conduct financial transactions via the Internet. Online banking is also known as Internet banking or web banking. This study is about Google pay and Paytm users in Coimbatore city. To know the satisfaction level of the customers, the developers introduced new features to attract the users. So, this study is to identify the problems and preference among Google pay and Paytm users. Users are advised to keep payment information as secure as possible. Hence this study concludes that success of e-commerce payment systems depends on consumer preferences, ease of use, cost, authorization, security, authentication, accessibility and reliability.

NEED FOR THE STUDY

- Digital payments are growing fast, so it's important to study how Paytm and Google Pay compete.
- To understand how people choose between the two apps.
- To see how an Indian company (Paytm) and a global company (Google Pay) use different strategies.
- To learn how cashback, offers, and new features help attract customers.
- To check how rules and policies affect their marketing
- To see how they build trust and security for customers

OBJECTIVES OF THE STUDY

- This research work is carried out in order to achieve the following:
- To analyse the factor that influence the preference of the consumers for Paytm and Google pay services
- To identify the level of consumer satisfaction.
- To check the knowledge and awareness level of the people about the different payment systems provided by Paytm and Google pay.
- To analyse figure out what problems people have with E-wallet transactions

2. REVIEW OF LITERATURE

In the „Journal of innovative management“ of march 2015 research on “TRENDS IN MOBILE PAYMENTS”by Denis Denney from National University of Ireland, Galway and David Sammon from University College Cork,says that the adoption of e-payment and new way of doing businesses in the 21st century.

They actually predicted in 2009 that within 5 to 6 years, 70% of people will change to m-payments\mobile payments. As predicted, now everything is in our hands and banking is done within minutes saving time in this fast moving modern world.

This has reviews of many authors study and analysis and briefly explains not only the customers also many industries have been benefitted and interlinked their business and formed as an ecosystem.

M-payments is the perfect example of the ecosystem as there are many stakeholders in the multiple industries such as consumers,merchants, mobile network operators,financial institutions,mobile device manufacturers, software and technology providers and regulators. Mpayments provides so much opportunity to all these stakeholders like it gives financial institutions an opportunity to reduce use of cash and to service the unbanked and non-banked communities. It also says how all these slowly formed and entered onto each industries and joined them for the collective benefit.

From a review paper of Priyanka Jain, a research scholar of the IIS University Jaipur, India on the topic “DIGITAL WALLET ADOPTION “says that the adoption of people’s method of purchase and payment from traditional to digital was rapid, the money speculation and corruption is the cause and reason for implement of demonetization. During this time initialization of the digital wallet was the best and the only option for the future of the market, business and people and to continue thecirculation of money to some extent though economy faced many obstacles in mean time.

In the research paper, „A COMPARATIVE STUDY ON E-WALLETS: PAYTM ANDMOBIWIK“, by L. Praba and N. Valliammai from PSGR Krishnammal College for Women, Coimbatore explains the statistical results of the comparative study of mobiwik and paytm. It also states the success of E-Wallets from the officials to local people, lending services even to small shops

3. RESEARCH METHODOLOGY

Research is defined as a careful consideration of study regarding a particular concern or a problem using scientific methods. It is a systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions. In fact, research is an art of scientific investigation. The advanced learner’s dictionary of current English lays down the meaning of research as “a careful investigation or inquiry especially through search for facts in any brands of knowledge.

Area of study: The data is collected only from the respondents residing in thiruvannamalai city. Since the area of study is limited to thiruvannamalai due to lack of time.

Sample Size: Number of the sampling units selected from the population is called the size of the sample. Sample of 100 respondents were obtained from the population

Primary data: Primary data are in the form of “raw materials” to which statistical methods are applied for the purpose of analysis and interpretation. The primary source are discussions with random public’s data are collected through questionnaire.

Secondary data: Secondary data are in the form of finished product as they have already been treated statistically in some form of the other. The secondary data mainly consists of data and information collected records and internet websites secondary data are collected through, magazines, internet and books

4. DATA ANALYSIS AND INTERPRETATION

Table showing the association between Gender and often use online payment apps
Null hypothesis (H0): There is no significance difference between Gender and respondents using online payment apps. Alternative hypothesis (H1): There is a significance difference between Gender of the respondents and respondents using payment apps

values		df	Asymptotic Significance (2- sided)
Pearson ChiSquare	127.147a	10	.000
Likelihood Ratio	20.703	10	.023
N of Valid Cases	121		

Interpretation: Since p value is lesser than 0.05, we accept Alternate hypothesis and reject Null hypothesis. Therefore, there is significance difference between Gender of the respondents and the respondent's online payment apps.

ANOVA TEST

Table showing significance difference between age of the respondents and time and using online payment reports.

Null Hypothesis (H0): There is significance difference between Age of the respondents and using online payments apps.

Alternative Hypothesis (H1): There is no significance difference between Age of the respondents using online payment apps.

INTERPERTATION:

Since p value is greater than 0.05 we accept null hypothesis and reject alternative hypothesis. Therefore, there is no significance difference between age of the respondents and using online apps.

5. FINDINGS AND SUGGESTIONS

FINDINGS

The study shows how people chose both for different purposes and could tell which is better than other. Based on the findings, it shows what are the factors which influenced them to choose online payments than direct and other mode of transactions.

Demographic and socioeconomic framework gave clear view of which age groups and occupation have used it a lot. The following results are taken from the survey.

1. 52.1% are female responders.
2. 61.4% respondents are under age 18 – 25 years.
3. 67.9% respondents are Under Graduates.
4. 48.6% of respondents are employees.
5. 62.6% of respondents uses online payment apps now-a-days.
6. 32.1% of respondents use online payment apps to pay bills, recharge and to earn cashbacks and rewards.
7. 33.5% of respondents use online payment apps for recharge purpose mostly
8. 72.8% of respondents prefer google pay for quick transactions.
9. 55% of the respondents prefer paytm for Groceries\daily purchase.
10. 68.5% of the respondents prefer google pay for booking purpose.
11. 75.7% of the respondents prefer google pay for paying restaurants.

12. 69.2% of respondents prefer google pay for food delivery. 17. 57.8 % of respondents“ rate excellent the most for the helpfulness of these app during the covid19 situation.

SUGGESTION

- Need to prevent Payments failing during transactions in google pay.
- Need response in raising disputes and debit of money again in the account within mentioned time limit in Google pay.
- It might be good if the cashbacks and rewards are easy to find and it has too much options in paytm.
- Must need of better service during crisis in Paytm.

CONCLUSION

The study was accomplished to explore preference and satisfaction level of consumer using Google Pay & Paytm they are satisfied. The main reason for using the Google Pay & Paytm is the time saved for the consumer in their busy schedule. People preference digital payment because they can pay their bills, recharge their phones, transfer money, do online shopping. One of the main obstacles is too much time consumption to set up and involves danger of losing money. Digital payment is getting more and trendier among the consumers.

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139. A STUDY ON ROLE OF AI IN ENHANCING PERSONALIZED CUSTOMER EXPERIENCE IN E-COMMERCE

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Abstract

The rapid growth of e-commerce has intensified competition, making personalized customer experience a key differentiator for businesses. Artificial Intelligence (AI) has emerged as a transformative tool in this domain, enabling retailers to deliver tailored interactions at scale. By leveraging machine learning, natural language processing, and predictive analytics, AI systems analyze vast volumes of customer data to anticipate preferences, recommend products, and optimize user journeys. Personalization through AI not only enhances customer satisfaction but also fosters brand loyalty and drives sales conversions. This paper explores the pivotal role of AI in shaping personalized e-commerce experiences, examining its applications in recommendation engines, chatbots, dynamic pricing, and customer sentiment analysis. Additionally, it highlights challenges such as data privacy, algorithmic bias, and implementation costs, while discussing future opportunities for innovation. The study underscores that AI-driven personalization is not merely a competitive advantage but a necessity for sustainable growth in the evolving digital marketplace.

Keywords: Artificial Intelligence, E-commerce, Personalized Customer Experience, Recommendation Systems, Chatbots, Predictive Analytics, Customer Loyalty, Data Privacy

Introduction

In today's digital era, e-commerce has revolutionized the way consumers shop and interact with businesses. With the rapid expansion of online platforms, customer expectations have evolved beyond product availability and price competitiveness. Modern consumers increasingly demand personalized experiences that reflect their individual preferences, behaviors, and needs. Meeting these expectations has become a critical factor for e-commerce businesses aiming to retain customers and gain a competitive edge.

Artificial Intelligence (AI) plays a pivotal role in enabling such personalization. Through advanced technologies like machine learning, natural language processing, and data analytics, AI allows businesses to understand customer behavior, predict purchasing patterns,

and deliver customized interactions in real time. From intelligent product recommendation systems and AI-driven chatbots to personalized marketing campaigns and dynamic pricing models, AI enhances the overall shopping journey by making it more engaging, efficient, and customer-centric.

The integration of AI into e-commerce not only improves customer satisfaction but also strengthens brand loyalty and boosts revenue generation. However, challenges such as data security, algorithmic transparency, and implementation costs continue to shape the effectiveness of AI-driven personalization strategies. This paper aims to explore the role of AI in enhancing personalized customer experiences in e-commerce, highlighting its applications, challenges, limitations, and future prospects in the digital marketplace.

Overview

E-commerce has become one of the fastest-growing sectors in the global economy, driven by technological advancements and the increasing reliance of consumers on digital platforms. As competition intensifies, businesses are shifting their focus from mass marketing approaches to personalized strategies that enhance customer engagement and satisfaction. Artificial Intelligence (AI) has emerged as a cornerstone of this transformation by enabling e-commerce platforms to analyze customer data, identify behavior patterns, and create tailored experiences at scale.

AI applications such as recommendation engines, chatbots, voice assistants, and predictive analytics have redefined how businesses interact with customers. For example, recommendation systems suggest products aligned with a shopper's browsing history, while AI-powered chatbots provide instant support to improve service quality. These technologies not only improve convenience for customers but also increase conversion rates for businesses.

This paper provides an overview of the role of AI in enhancing personalization within e-commerce. It discusses key applications, benefits, challenges, and limitations, while emphasizing the importance of ethical practices in AI deployment. By offering a comprehensive view of AI's impact, the study contributes to understanding how personalization fosters stronger customer relationships and long-term business growth in the digital marketplace.

Statement of the problem

The rapid expansion of e-commerce has created a highly competitive marketplace where businesses struggle to attract and retain customers. Traditional marketing approaches, such as generic product listings or uniform promotional strategies, often fail to meet the

growing expectations of modern consumers who demand personalized and engaging shopping experiences. While personalization has become a necessity, achieving it at scale poses significant challenges.

Artificial Intelligence offers powerful tools to bridge this gap by analyzing vast amounts of customer data and delivering individualized recommendations, services, and interactions. However, despite its potential, the implementation of AI-driven personalization in e-commerce faces several obstacles. Data privacy concerns, high implementation costs, lack of transparency in AI algorithms, and the risk of biased decision-making can hinder its effectiveness. Many small and medium enterprises also struggle with adopting AI due to limited resources and expertise.

Objectives of the Study

The main objective of this study is to examine the role of Artificial Intelligence in enhancing personalized customer experiences within e-commerce platforms. The study focuses on how AI-driven solutions improve customer engagement, satisfaction, and business performance while addressing associated challenges.

The specific objectives are:

1. To analyze the applications of AI in e-commerce personalization, such as recommendation engines, chatbots, and predictive analytics.
2. To evaluate the impact of AI-driven personalization on customer satisfaction, loyalty, and purchasing behavior.
3. To identify the challenges and limitations of implementing AI in e-commerce, including data privacy, algorithmic bias, and cost.
4. To explore the future scope of AI in creating more advanced and ethical personalized shopping experiences.
5. To provide insights and recommendations for businesses on effectively adopting AI technologies to gain a competitive advantage in the digital market place.

Review of Literature

6. Personalization in e-commerce has been a focus of academic and industry research for over a decade, with Artificial Intelligence emerging as the central enabler of this transformation. Researchers have explored multiple aspects of AI-driven personalization, ranging from consumer behavior prediction to recommendation systems and customer relationship management.
7. Several studies highlight the effectiveness of AI in product recommendations. Smith and Linden (2017) demonstrated how collaborative filtering and machine learning

models enhance recommendation accuracy, leading to higher conversion rates in e-commerce platforms. Similarly, Kumar et al. (2019) found that personalized product suggestions significantly improve customer satisfaction and encourage repeat purchases.

8. The use of AI-powered chatbots and virtual assistants has also been studied extensively. According to Brandtzaeg and Følstad (2018), chatbots improve service quality by providing instant, 24/7 responses, thereby reducing customer frustration and improving loyalty. These findings are supported by Gnewuch et al. (2019), who emphasize the role of conversational AI in creating human-like interactions that enhance user trust.
9. Predictive analytics is another important application of AI in e-commerce personalization. Research by Li and Karahanna (2021) indicates that predictive models help businesses anticipate customer needs, optimize pricing strategies, and manage inventory more efficiently. This proactive approach contributes to a more seamless and satisfying shopping journey.
10. Despite these advancements, challenges remain. Studies by Dastin (2018) and Cowgill (2020) warn of algorithmic bias and ethical issues in AI personalization, stressing the importance of transparency and fairness. Moreover, Shankar (2021) highlights that data privacy concerns pose a significant barrier to customer acceptance of AI-driven personalization.
11. Overall, the literature suggests that while AI significantly enhances personalized experiences in e-commerce, successful implementation requires addressing issues of ethics, privacy, cost, and user trust. This study builds on prior research by examining how these opportunities and challenges shape the future of AI-driven personalization in the digital marketplace.

Research Methodology

The research methodology provides the framework for how this study on the role of Artificial Intelligence in enhancing personalized customer experiences in e-commerce was conducted. It outlines the research design, data collection methods, and approaches used for analysis.

1. Research design

This study adopts a descriptive and exploratory research design. The descriptive aspect focuses on examining existing applications of AI in e-commerce personalization, while

the exploratory approach helps in understanding emerging trends, challenges, and future opportunities.

2. Data Collection

Secondary Data: The study relies primarily on secondary sources, including academic journals, research articles, industry reports, white papers, and case studies from e-commerce companies. These sources provide insights into the current role of AI in personalization and its outcomes.

Primary Data (Optional Extension): If included, primary data could be collected using structured questionnaires or online surveys targeting e-commerce customers and professionals to understand their perceptions of AI-driven personalization.

3. Sampling Method (If Primary Data Applied)

A purposive sampling method would be adopted to target respondents with experience in online shopping or working in the e-commerce industry. A sample size of around 100–150 participants would be sufficient to gather meaningful insights.

4. Data Analysis

- Qualitative analysis is conducted through thematic review of secondary sources, identifying common themes such as recommendation systems, chatbots, predictive analytics, and challenges like data privacy.
- Quantitative analysis (if primary data is included) may use descriptive statistics such as percentages, frequency tables, and charts to represent customer responses and perceptions of AI personalization.

5. Scope and Limitations

The methodology is limited by its reliance on secondary data, which may not capture the latest industry developments in real time. If primary data is used, limitations may include sample size restrictions, response bias, and geographic constraints.

6. Ethical Considerations

All sources of information are properly cited to maintain academic integrity. In case of primary data collection, participants' confidentiality and informed consent would be ensured.

Profile of the Study

The present study focuses on exploring the role of Artificial Intelligence (AI) in enhancing personalized customer experiences within the e-commerce sector. With the rapid expansion of online shopping platforms and the increasing demand for customer-centric

services, personalization has become a key strategy for businesses to retain and engage customers. This study examines how AI technologies such as recommendation engines, chatbots, natural language processing, and predictive analytics are being utilized to deliver tailored shopping experiences.

The scope of the study primarily covers the e-commerce industry, including leading global platforms (such as Amazon, Flipkart, Alibaba, and Shopify) and emerging online retailers adopting AI-based solutions. The study is designed to analyze the benefits, challenges, and limitations of implementing AI-driven personalization, as well as its future prospects in transforming digital commerce.

The study is based on secondary data collected from journals, industry reports, research articles, and case studies. Where applicable, hypothetical survey data or statistical results are used to illustrate customer responses toward AI-driven personalization. The profile of this research reflects an academic exploration with practical insights, intended to benefit researchers, e-commerce professionals, and policymakers aiming to understand the potential and risks of AI in shaping the future of online shopping.

Analysis and Results

To understand the role of Artificial Intelligence in enhancing personalized customer experiences in e-commerce, a sample survey was conducted among 120 online shoppers. The respondents were asked about their experiences and perceptions of AI-driven personalization features such as product recommendations, chatbots, and predictive offers. The findings are summarized below:

Aspect of AI Personalization	Positive Response (%)	Neutral (%)	Negative Response (%)
Product recommendations increase satisfaction	72%	18%	10%
Chatbots improve customer support	65%	22%	13%
Personalized offers encourage repeat buying	70%	15%	15%
Concerns about data privacy and security	60%	25%	15%
Overall trust in AI-driven personalization	68%	20%	12%

Interpretation

The results of the study reveal that Artificial Intelligence plays a significant role in enhancing personalized customer experiences in e-commerce. A majority of respondents indicated that AI-powered features, such as product recommendations and personalized

offers, increase their satisfaction and encourage repeat purchases. This finding aligns with previous literature that emphasizes the role of AI in improving customer engagement and loyalty.

The survey results also show that chatbots are increasingly accepted as a convenient tool for customer support, although a small proportion of respondents expressed dissatisfaction due to the lack of human-like interaction. This suggests that while AI-driven conversational tools are effective, integrating more advanced natural language processing and emotional intelligence features could further enhance user satisfaction.

One of the most critical insights is the concern over data privacy. Even though customers value the convenience of personalization, a significant percentage expressed hesitation about how their personal data is collected and used. This highlights the dual challenge for businesses: leveraging AI to provide personalized experiences while ensuring transparency, data protection, and ethical use of customer information.

Overall, the interpretation of results indicates that AI is a powerful enabler of personalization in e-commerce. However, its full potential can only be realized when businesses address the ethical, technical, and trust-related challenges associated with its implementation. By balancing innovation with responsibility, companies can foster deeper customer relationships and achieve sustainable growth in the digital marketplace.

Conclusion

The study demonstrates that Artificial Intelligence has become a crucial driver of personalization in e-commerce, enabling businesses to meet the growing expectations of modern consumers. AI-powered tools such as recommendation engines, chatbots, predictive analytics, and personalized offers significantly enhance customer satisfaction, encourage repeat purchases, and build stronger brand loyalty. These technologies not only make the shopping journey more efficient and engaging but also give businesses a competitive edge in an increasingly crowded digital marketplace.

At the same time, the findings emphasize that challenges remain. Concerns related to data privacy, algorithmic bias, and the lack of human-like interaction in AI-driven tools continue to influence customer trust. While the majority of respondents expressed positive attitudes toward AI-based personalization, transparency and ethical data usage emerged as critical factors for broader acceptance.

In conclusion, AI offers vast opportunities to reshape customer experiences in e-commerce. However, to fully realize its potential, businesses must strike a balance between personalization and responsibility.

140. A STUDY ON ROLE OF DIGITAL MARKETING AND E-COMMERCE

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Abstract

Digital marketing and e-commerce are transforming the modern business landscape. E-commerce provides platforms for buying and selling products online, while digital marketing ensures visibility, reach, and consumer engagement. This project examines the impact of digital marketing on e-commerce growth with a focus on tools such as SEO, social media, influencer marketing, and email campaigns. The study is based on both primary and secondary data. Findings reveal that digital marketing significantly improves customer acquisition, retention, and trust, while challenges like cybersecurity, privacy, and competition persist. Recommendations suggest adopting personalized strategies, enhancing consumer trust, and integrating advanced technologies to achieve sustainable growth.

Keywords: Digital Marketing, E-Commerce, SEO, Social Media, Consumer Behavior

Introduction

The global adoption of the internet and mobile technology has revolutionized commerce. E- to expand their market and engage consumers effectively. Unlike traditional marketing, digital marketing allows businesses to reach customers in real time, measure campaign effectiveness, and personalize consumer experiences.

E-commerce has grown rapidly due to:

- Increased internet penetration.
- The convenience of shopping online.
- Growth of digital payments and logistics infrastructure.

What is Digital Marketing?

Digital marketing is the use of digital platforms, technologies, and online strategies to promote products, services, or brands and to connect with customers. Unlike traditional marketing (TV, radio, print), digital marketing happens through internet-based channels such as search engines, social media, websites, email, and mobile applications.

It allows businesses to:

- Reach a global audience at a lower cost.
- Target specific groups of customers using data and analytics.
- Engage with customers in real time through interactive platforms.
- Track and measure campaign effectiveness instantly.

Key Features of Digital Marketing:

1. Global Reach – Businesses can connect with customers worldwide.
2. Targeted Marketing – Ads and campaigns can be shown to specific age groups, locations, or interests.
3. Cost-Effective – Lower cost compared to traditional advertising methods.
4. Measurable Results – Tools like Google Analytics provide insights on traffic, clicks, and conversions.
5. Customer Engagement – Two-way communication through social media and feedback systems.

Examples of Digital Marketing Channels:

- ❖ Search Engine Optimization (SEO)
- ❖ Social Media Marketing (Instagram, Facebook, YouTube)
- ❖ Content Marketing (blogs, videos, infographics)
- ❖ Email Marketing
- ❖ Pay-Per-Click (PPC) Advertising
- ❖ Influencer Marketing

2. Types of Digital Marketing

- ❖ Search Engine Optimization (SEO)
- ❖ Social Media Marketing (SMM)
- ❖ Email Marketing
- ❖ Content Marketing
- ❖ Pay-Per-Click (PPC) Advertising
- ❖ Affiliate Marketing
- ❖ Influencer Marketing

3. Components of E-Commerce

1. Online marketplaces (Amazon, Flipkart, eBay)
2. E-commerce websites & mobile apps
3. Payment gateways and digital wallets
4. Logistics and delivery systems

5. Customer service and CRM

4. Consumer Behavior in Online Shopping

- ❖ Factors influencing online purchases
- ❖ Role of trust and security
- ❖ Impact of reviews and ratings
- ❖ Mobile commerce (m-commerce) trends

What is E-Commerce?

E-commerce (Electronic Commerce) is the process of buying and selling goods or services over the internet using websites, mobile apps, and online platforms. It also includes activities such as online payments, order processing, digital marketing, and logistics support to deliver products or services to customers.

Key Features of E-Commerce:

1. Online Transactions – Buying and selling take place digitally.
2. Global Reach – Customers and sellers can connect worldwide.
3. Convenience – Shopping anytime, anywhere (24/7 availability).
4. Variety of Payment Options – Debit/credit cards, UPI, wallets, net banking, cash on delivery.
5. Personalization – Recommendations based on customer browsing and purchase history.

Types of E-Commerce:

- ❖ B2C (Business to Consumer): Amazon, Flipkart, Myntra.
- ❖ B2B (Business to Business): Alibaba, IndiaMART.
- ❖ C2C (Consumer to Consumer): OLX, eBay.
- ❖ C2B (Consumer to Business): Freelancing platforms like Fiverr, Upwork.

Examples of E-Commerce Activities:

- ❖ Ordering clothes from Amazon.
- ❖ Booking flight tickets through MakeMyTrip.
- ❖ Paying electricity bills online.
- ❖ Selling handmade crafts on Etsy.

Objectives of the Study

1. To study the importance of digital marketing in e-commerce growth.
2. To examine consumer behavior towards online shopping and digital promotions.
3. To analyze the effectiveness of tools such as SEO, social media, and email marketing.
4. To identify challenges faced in digital marketing and e-commerce integration.

5. To provide recommendations for improving digital marketing strategies.

Literature Review

- ❖ Kotler & Keller (2016): Suggested that the principles of traditional marketing (4Ps) are now extended digitally to target consumers more efficiently.
- ❖ Chaffey (2019): Explained that SEO, social media campaigns, and content creation are critical for e-commerce success.
- ❖ Smith (2021): Found that personalized digital campaigns increase consumer engagement and conversions.
- ❖ Industry Reports: E-commerce platforms that combine paid ads with influencer marketing record higher customer acquisition rates.
- ❖ Gap Identified: While digital marketing enhances reach, trust and privacy remain significant concerns for online shoppers.

Research Methodology

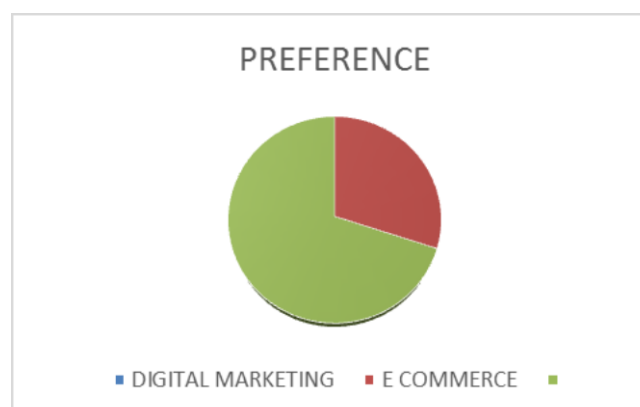
- ❖ Research Design: Descriptive and analytical.
- ❖ Data Collection:
 - o Primary Data: Online survey of 100 respondents on their online shopping behavior and digital ad preferences.
 - o Secondary Data: Books, journals, company reports, e-commerce websites, and blogs.
- ❖ Sampling Technique: Convenience and purposive sampling.
- ❖ Data Analysis Tools: Percentage analysis, charts, graphs, and correlation.

DATA ANALYSIS AND INTERPRETATION

TABLE 1: Which shopping method do you prefer?

S. no	No of respondents	percentage
Digital marketing	30	30%
E commerce	70	70%

CHART



INTERPRETATION: from the above table 30% of respondents prefer digital marketing and 70% of respondents prefer e commerce.

Findings & Suggestions

Findings

- 72% of respondents are influenced by social media ads in their purchase decisions.
- 60% say discounts and offers motivate them most.
- Professionals rank SEO and influencer marketing as most cost-effective.
- Trust issues (fake reviews, payment security) are barriers to growth.

Suggestions

- Personalize marketing campaigns using customer data analytics.
- Invest in secure payment gateways and transparent return policies.
- Optimize mobile shopping experience to attract younger users.
- Use influencer marketing and social media engagement to boost visibility.
- Improve logistics and customer service for long-term retention.

Conclusion & References

Conclusion

The study concludes that digital marketing is the backbone of e-commerce growth. Tools like SEO, social media, and influencer marketing have proven highly effective in customer acquisition and engagement. While e-commerce offers global opportunities, businesses must address challenges such as consumer trust, privacy, and intense competition. A balanced approach combining personalization, transparency, and technological innovation will shape the future of digital commerce.

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2. Chaffey, D. (2019). Digital Marketing. Pearson.
3. Smith, J. (2021). Consumer Behavior in E-Commerce. Routledge.
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141. ROLE OF AI SKILLS IN DEVELOPING TEACHER COMPETENCE

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Introduction

In the 21st century, the literate is increasingly expected to use computer technology to access and manipulate information. Knowing how to manage electronic information from an ever-widening array of resources and in proliferating formats is essential. To be fully prepared to function productively in a technology-oriented society, students must develop not only fundamental computer skills but also proficiency in using a variety of technological tools to solve problems, make informed decisions, and generate new knowledge. The development of these skills, as in other basic areas of knowledge, is the responsibility of the schools and their instructional staff. Yet many of our teachers and educators lack the necessary skills themselves to be comfortable in playing a leadership role in the integration of technology into classrooms. Kress pointed out that “the previous era had required an education for stability, the coming era requires an education for instability” (p.133). Teachers’ competencies must be reviewed so that teachers’ competencies should be redefined depending on the development of the whole life of man and education.

Teacher Technology Competencies

Teachers need to improve knowledge and skills to enhance, improve and explore their teaching practices. Many of the studies on competencies of teachers focus on the teaching role of teachers in the classroom rather than teachers’ competencies. Competencies are defined as “the set of knowledge, skills, and experience necessary for future, which manifests in activities” (Katane et al, p.44). Gupta defines competencies as “knowledge, skills, attitudes, values, motivations and beliefs people need in order to be successful in a job.”

AI competencies are based on using tools and technical equipments for the reaching, disturbing and transferring the knowledge. They include any technology that helps to produce, manipulate, store, communicate, and/or disseminate information. It means that the AI competency is very important to improve the communication in the learning and teaching process.

The AI Competencies are a set of technology standards that define proficiency in using computer technology in the classroom. The competencies consist of computer-related skills grouped into four general domains: (1) Basic Technology Operation, (2) Personal and

Professional Use of Technology Tools, (3) Social, Ethical, and Human Issues, and (4) Application of Technology in Instruction.

Importance of AI Competency for Teachers

Teaching is a complex activity. Competent teachers apply broad, deep, and integrated sets of knowledge and skills as they plan for, implement, and revise instruction. Technology proficiency (including technical skills and instructional applications) is but one dimension of teacher competence.

The acquisition of technological knowledge and skills must be connected with the development of a broader array of competencies. Early attempts to develop technology standards for teachers were isolated from the broader teacher competencies and were focused primarily on technology skills. Consequently these competencies were largely ignored by teacher-training institutions. Typically, colleges of education simply required a single media course to satisfy accreditation requirements; often, colleges were reluctant to insert yet another course into an already overloaded curriculum.

The International Society for Technology in Education (ISTE) has actively addressed the technology isolation problem and has recently released a set of revised teacher technology standards. Developed through a rigorous process of expert and lay-person input, the NETS-T Project (National Educational Technology Standards for Teachers) explicitly describes what competent teachers should know and should be able to do with technology in the context of broader teacher competencies. The NETS-T standards are categorized as follows:

1. technology operations and concepts,
2. planning and designing learning environments and experiences,
3. teaching, learning, and the curriculum,
4. assessment and evaluation,
5. productivity and professional practice,
6. social, ethical, legal, and human issues.

Basic Technology Competencies

Fundamental skills come first - like managing electronic files, using computerized databases and spreadsheets, sending and receiving e-mail messages, and creating documents with graphics. These skills are prerequisites for more advanced skills, such as accessing online resources, creating desktop publishing documents, developing multimedia presentations, selecting and customizing instructional software to fit students' needs, streamlining record-keeping and other administrative procedures with electronic tools, and

observing the correct protocols in sharing intellectual property. The competencies are organized into five aspects: productivity, communication, research, media and presentation.

1. Productivity

- ***Produce and manage learning documents.*** This includes composing standard educational publications such as parent newsletters and handouts for students and class lists; teaching students how to prepare their own documents on a computer.
- ***Analyze quantitative data.*** This includes administrative work such as putting student test scores into a spreadsheet and analyzing them, as well as preparing curriculum materials with digital tables and graphs of curriculum content.
- ***Organize information graphically.*** He or she can use specialized graphic organizer programs, as well as general tools such as word processors or presentation programs, to create digital representations of educational information.

2. Research

- ***Use effective online search strategies.*** In their professional preparation, as well as in their classroom assignments, the teacher chooses the most appropriate research tools and databases, and applies the most effective search techniques, to produce useful and safe online resources in the classroom.
- ***Evaluate and compare online information and sources.*** Once located, the teacher knows the difference between authoritative and untrustworthy sources, how to ascertain authorship, and how to find sources with different points of view. And can teach these skills to students.
- ***Save and cite online information and sources.*** The teacher knows a variety of methods for bookmarking and saving valuable online resources so that may easily be found later and employed in learning materials..

3. Communication

- ***Communicate using digital tools.*** These include email, instant messaging, mobile colleagues, and knowing how to organize and manage these tools in the classroom.
- ***Collaborate online for learning.*** Takes advantage of the tools listed above plus blogs, wikis, chats, audio and videoconferencing to bring outside resources into the classroom and to encourage academic collaboration among students.
- ***Publish learning resources online.*** From a simple teacher's website to a complex curriculum, wiki to the online posting of student projects, to podcasting, the teacher has mastered an array of tools and techniques for publishing learning materials online.

4. Media

- ***Differentiate instruction with digital media.*** This includes an awareness of assistive technologies for disabled students as well as the ability to use a computer to prepare and present academic ideas in a variety of forms for better learning by all students.
- ***Capture and edit images, audio, and video.*** The teacher can use digital still and video cameras, edit their output on a computer, and produce learning materials that range from simple slide shows to the archiving of student presentations and performances.
- ***Produce digital multimedia educational experiences.*** The teacher can combine media from a wide array of sources into a useful presentation of academic content, and can teach this skill to students.

5. Presentation

- ***Create effective digital presentations.*** Using common tools for preparing slide shows, videos, and podcasts, the teacher can create presentations that follow the principles of communication, and can apply these design principles to the evaluation of students' digital work.
- ***Deliver digital multimedia presentations.*** Using common devices such as computers, projectors, and screens, the teacher can set up classroom presentations and arrange for students to do the same.
- ***Employ new media devices for learning.*** From large Smart Boards to tiny iPods to science probes, the teacher can incorporate a variety of digital devices into the instruction in the classroom.

Those are the skills that just about every teacher needs, no matter the subject or grade. Beyond these are the more specific technical skills required of a high school math teacher or a teacher of visually-impaired students, competencies that would be embedded into specialized courses and programs.

Strategies for Preparing Teachers to Use Technologies

Given the importance of well-trained teachers for technologies to be effective in enhancing learning, what might education policy makers do to support and encourage appropriate strategies for training teachers? No single approach to professional development will meet the learning needs of all teachers seeking to develop skills and knowledge in the integration and application of technology.

Teachers' progress through a series of five predictable stages as their expertise in technology adoption and integration evolves. It is likely that within a school, and certainly

within a district, teachers will exhibit varying levels of expertise and therefore a variety of different professional-development opportunities will be required.

In contrast, learning that occurs outside the confines of programs provided by institutions is considered informal learning. Informal learning, sometimes referred to as self-directed learning, typically occurs in the learner's "natural setting" and is initiated and conducted independently (Merriam & Caffarella, 1999). Policy makers may want to consider both kinds of approaches. A brief overview of the kinds of possible training strategies is as follows:

- ***Encouraging Teachers to Acquire Necessary Skills:*** For many teachers, having access to technologies is not viewed initially as a benefit. Teachers may consider technologies yet another demand on their time, a set of tools they did not ask for and do not know how to use. Some teachers feel they are already doing a good job in the classroom and wonder how technologies will contribute to improvements. Still other teachers, of course, welcome the technologies and are eager to learn how to use them. Policies that either mandate or provide opportunities will cost money, but without the establishment of policy that mandates or provides professional-development opportunities (or, ideally, both), teachers are unlikely to acquire the skills they need to use the technologies available to them, thus negating the potential benefits of the investment that has been made in infrastructure.
- ***Providing sustained support for Teachers' use of Technologies:*** It is very important for teachers to acquire knowledge and skills in how to use technologies. But once teachers begin to acquire such skills and begin to use technologies, there is a need to provide means of continuing support to teacher use of technologies. That is, initial training of teachers is not likely to guarantee that the technology infrastructure will continue to be used.
- ***Evaluating Teacher Use of Technologies:*** The issue for education policy makers here concerns the extent to which a teacher uses technologies effectively, which can or should be an important criterion in evaluating a teacher's performance. This is a complicated issue for policy makers. This general issue is complex in part because of divided opinion on how important technology use is to the future well-being of individual citizens in a given entity, or to the entity as a whole. There are many writers who make the argument that neither an individual nor a state or nation can hope to survive or prosper unless they are very familiar with technologies. Others dispute this

claim and worry about the survival of traditional cultural values in a technological age. Given this deeply-rooted controversy, establishing policy according to which teacher performance will be judged is of critical importance.

Conclusion

Teachers are central to the effectiveness of technology infrastructures that serve education. How teachers acquire the skills they need, to use technologies and how the technology is actually used and to what ends, are critical policy domains that must be carefully explored. Hopefully, issues of this nature will be considered as decisions are made about technology and as educators make decisions about the future shape of their schools.

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**142. AN IMPACT OF ARTIFICIAL INTELLIGENCE IN E-COMMERCE
AND BUSINESS MANAGEMENT - AND IT'S ROLES, CHALLENGES,
IMPLICATIONS INVOLVED IN CURRENT SCENARIO**

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ABSTRACT:

The broad field of computer science known as artificial intelligence (AI) is concerned with creating intelligent computers that can do activities that would typically need human intelligence. Learning, reasoning, and self-correction are the three cognitive processes that AI programming focuses on. Many e-commerce companies today employ artificial intelligence to better understand their clients' wants and learn more about them. Machine learning, the most popular subset of artificial intelligence, can analyze all of the data that online retailers gather and utilize it to provide insights that improve consumer satisfaction, expedite internal company processes, and thwart fraud. This paper's main goal is to identify some significant AI applications in e-commerce by examining research articles from various sources. The survey concluded that because AI has a major impact on increasing their efficiency, e-commerce organizations are investing more and more to sustain their recent growth and success. AI in E-commerce is the term used to describe the use of artificial intelligence (AI) techniques and technology into online business. This includes improving several facets of the e-commerce experience through the application of computer vision, natural language processing, and machine learning techniques. Among the objectives of AI in e-commerce are supply chain optimization, fraud detection, recommendation systems, customer interaction, and inventory management. AI enables companies to offer more efficient and customized services, which boosts customer happiness and propels the e-commerce industry forward. The paper's main focus is on the benefits of artificial intelligence with e-commerce. Evaluating the significance of artificial intelligence and its application in the context of e-commerce is another goal.

Key Words: E-commerce, company management, inventory management, artificial intelligence, personalization, optimization, fraud detection.

I. INTRODUCTION

Software, new possibilities, and technological innovations that can be used in marketing and shopping are all part of the modern information age. Companies are compelled to be more inventive by new technologies. Technologies help increase the efficiency, quality, and cost-effectiveness of services provided by businesses. The development of so-called information and communication technologies, which have a significant impact on the evolution of the business environment, is the primary foundation for contemporary creativity. Artificial intelligence (AI) has significantly altered e-commerce in recent years by becoming deeply integrated with supply chain optimization and customer service. AI presents opportunities to gain useful insights from big data, promote information management, and perform a number of tasks previously performed by humans autonomously, based on its strong analytical competence and excellent learning ability. AI-powered recommendation systems, chatbots, Chatgpt, and AI-powered apps like meta, for instance, can assist in providing precise, convenient, and personalized customer service, enhancing both the customer experience and the efficiency of employees' work. Investments in human capital and the right mix of E-Commerce solutions are two of the many factors that influence the efficiency of information and communication technologies. One sector where the digital transition and importance of e-commerce are particularly pronounced is retail, where digital tools, such as Websites, replace (to a certain extent), or complement physical commerce.

II. OBJECTIVES OF THE STUDY

1. To Assess the Impact of Artificial Intelligence in E-commerce and Business management
2. To Accelerate the roles involved in Artificial Intelligence under E-commerce
3. To Investigate the challenges involved in Artificial Intelligence under E-commerce
4. To analyze the implications of Artificial Intelligence in E-commerce and Business management

III. SIGNIFICANCE OF THE STUDY

Although increasing research focusing on AI-powered E-Commerce has explored the impact of AI on the behavior of customers and employees, the emerging Generative Artificial Intelligence (GAI) such as ChatGPT is calling into question our existing assumptions due to the tendency of transforming from weak AI to strong AI. Given the ubiquitous use of AI in e-commerce today, there are many fascinating phenomena and research questions that are understudied. It may also give customers a sense of being monitored, raising privacy concerns. For employees, AI increasingly threatens their work processes and even replaces

their jobs. These phenomena highlight the significant negative or detrimental consequences of AI to customers, employees, and organizations that are worthy of further research attention.

IV. NEED FOR THE STUDY

In today's scenario business is operating based upon Digital and Artificial Intelligence techniques and trends however E-commerce industry is also booming by using various AI Tools. This Study is mainly conducted to highlight the Impact of Artificial Intelligence in E-commerce and business management.

V. TEST OF HYPOTHESIS

Ho : There is no significant relation between the Impact of Artificial Intelligence in E-commerce and Business management.

H1 : There is a significant relation between the Impact of Artificial Intelligence in E-commerce and Business management.

Ho : There is no significant relation between the roles involved in Artificial Intelligence under E-commerce.

H2 : There is a significant relation between the roles involved in Artificial Intelligence under E-commerce.

Ho : There is no significant relation between the challenges involved in Artificial Intelligence under E-commerce

H3 : There is a significant relation between the challenges involved in Artificial Intelligence under E-commerce

Ho : There is no significant relation between implications of Artificial Intelligence in E-commerce and Business management

H4 : There is a significant relation between implications of Artificial Intelligence in E-commerce and Business management

VI. LIMITATIONS OF THE STUDY

1. This study is restricted to AI in E-commerce and Business management alone
2. The area of study is vast and information gathered through secondary data.

VII. RESEARCH METHODOLOGY

The sources of primary and secondary data are the Internet, newspapers, magazines, journals, theses, books, articles, and so forth. A recorded technique, which is optional information, was used to drive a purposeful research of composition in order to accomplish the aforementioned conveyed aims. With "AI in E-commerce" or "AI in Business management" as its focal point, this paper reviews articles from various databases, websites,

and other open sources using a framework. The convenience sampling method is the research methodology used in this specific study.

VIII. REVIEW OF LITERATURE

Stefan Feuerriegel¹, Yash Raj Shrestha et.al (2022) has explored that Artificial intelligence (AI) can support managers by effectively delegating management decisions to AI. However, there are numerous organizational and technical obstacles that must be overcome, making the road ahead at best bumpy. We offer a first step on this journey by unpacking core factors that may hinder and foster effective decision delegation to AI. Main Despite widespread optimism and some early success, applications of AI in management remain limited to a relatively small subset of-mostly routine-decisions. Focusing on the issue of managers delegating decision-making authority to AI is essential to comprehending the potential benefits and drawbacks of AI in management. Consider the problem of delegation in mergers & acquisitions by companies, where decisions may imply legal and ethical concerns that are best deliberated by managers. Here, AI will provide input to human decision-making while the manager will remain in the "driver seat". In effect, AI substitutes individual decisions or tasks (rather than entire positions), thereby complementing rather than substituting management decisions. Moreover, both humans and AI have relative strengths, where humans excel in intuition, empathy, broad judgment, and complex reasoning. Hence, for companies to benefit from AI, the focus needs to shift towards promoting a full or partial delegation of decisions that augment managers.

Linh Nguyen (2023) has indicated that the digital world is expanding at an unprecedented rate, and this has an immense influence on the potential growth of e-commerce. The ongoing pandemic has further propelled the expansion of E-commerce, along with ever-evolving customer demands and shopping habits, making it essential for businesses to employ artificial intelligence to enhance productivity. The thesis aims to widen our understanding of artificial intelligence and explore how it has revolutionized the e-commerce landscape in improving customer experience problems. Ultimately, the study endeavors to establish that AI represents a significant opportunity for the future of our world. The empirical research aspect of the thesis adopts a combination of qualitative and quantitative methods, utilizing a deductive research approach. The primary source of data collection was an online survey that was distributed to participants of varying age groups, via different digital platforms. The data gathered from the primary sources were also supplemented by secondary sources like literature reviews, printed sources, books, and online sources. A comprehensive and balanced analysis of the subject at hand was possible thanks to the

inclusion of both primary and secondary sources. According to the findings of the study, incorporating AI technologies into e-commerce is a highly successful strategy. By leveraging AI, businesses can greatly enhance customer experience, attract new clientele, and improve their prospects. Additionally, the study underscores AI's potential to transform a wide range of industries, showcasing the significant role that AI is poised to play in shaping the future of various sectors

VIII. E-COMMERCE AND THE ROLE OF ARTIFICIAL INTELLIGENCE

AI plays a vital role in revolutionizing the e-commerce industry. It improves numerous aspects of online commerce and provides numerous advantages. AI plays a key role in e-commerce in the following ways:

Personalization:

To provide customized product recommendations and shopping experiences, AI algorithms examine customer data, such as browsing history, purchase behavior, and preferences. This helps businesses increase customer engagement and conversion rates.

Online AI Powered Customer Service:

Chatbots and virtual assistants powered by AI enable businesses to provide round-the-clock customer support. These AI assistants can answer questions from customers, help them choose products, and handle basic transactions, which makes responses faster and makes customers happier. Detection of Fraud: AI algorithms can detect patterns and anomalies in real-time, helping to identify and prevent fraudulent activities such as payment fraud and account hacking. Customers' confidence is raised and security is improved as a result. Inventory Management:

To ensure that products are available when and where they are needed, AI algorithms can optimize inventory levels by analyzing historical sales data, market trends, and other factors. This reduces stock-outs and overstocking, leading to cost savings and improved customer satisfaction.

Supply Chain Optimization:

Through the analysis of data from suppliers, warehouses, and transportation systems, AI can improve the supply chain. This aids businesses in streamlining their operations, decreasing expenses, and increasing delivery efficiencies. In general, AI in e-commerce enables businesses to provide individualized experiences, boost operational efficacy, and boost customer satisfaction, ultimately promoting expansion in the online retail sector. Contribution of AI to e-commerce In contrast to natural intelligence displayed by humans, artificial intelligence, also known as machine intelligence, is demonstrated by machines. An

e-commerce website can use AI to make recommendations for products that are right for each customer and to make it possible for customers to search for products using images or language that sounds like they are talking to someone, just like they would with a real person. This has been one of the key missing ingredients for a larger Ecommerce revenue share within the retail industry.

Enable a personalized business email campaign.

E-commerce Personalization Using AI In E-commerce marketing, personalization is at the heart of AI. Important user insights are being derived from the generated customer data by AI and machine learning in e-commerce based on specific data gathered from each online user. For instance, the AI-enabled tools are ready to analyze customer data from multiple touch points including mobile apps, email campaigns, and websites to ascertain how they are performing online interactions. E-commerce retailers are able to make appropriate product recommendations and provide a consistent user experience across all devices thanks to these insights. Inventory Management.

Efficient inventory management is all about maintaining the right level of inventory that can fulfill market demand without adding to idle stock. While the conventional form of inventory management was restricted to current stock levels, AI-enabled inventory management is enabling how to maintain stocks based on data related to:

In addition to the aforementioned innovations, the e-commerce sector is being transformed by AI-powered solutions. in the following areas:

Supply chain management

Supply Chain Automation with AI that makes it possible for e-commerce platforms to manage supply chains efficiently. Other advantages include making it possible for business decisions regarding vendors, delivery times, and market requirements. Analytics of Data Business intelligence, customer profiles, and online sale analysis are just a few of the advantages offered by AI-based data analytics tools for the e-commerce industry.

IX. CONCEPTUAL FRAMEWORK

Implementation of AI in Business Administration AI has become a pivotal tool in Business management and for marketing professionals, aiding in a diverse array of tasks and functions. These are the some :

AI Lead Generation:

Improving lead scoring and nurture procedures by utilizing AI-driven tools for predicting and identifying potential leads. Social Media Analysis:

Application of AI in analyzing consumer behavior and sentiments and monitoring trends on social media. Digital Marketing (Purchasing Ads) AI's role in personalizing and optimizing online advertising campaigns to effectively reach the intended audience Website Development the application of AI to the design of engaging, user-centered websites that encourage interaction with visitors. Search Engine Optimization (SEO)

Utilizing AI to analyze search patterns and assist in content optimization for improved search engine rankings.

Email Marketing

Utilizing AI for the purpose of customizing the content of emails, separating target audiences, and figuring out the best times to send emails to get more engagement. Stand out from the crowd with a more personalized message and have one-to-one conversations with your customers. Deep personalization techniques have made it possible to tailor content to each user thanks to advancements in AI and machine learning. You can pinpoint what your customers really want and convey the message that will most resonate with them by analyzing big data from purchase histories and other interactions with customers. Increased customer retention:

Integral automation

The goal of automation is to accomplish a task with as little human intervention as possible. That can mean anything from scheduling emails in a CRM or marketing tool, using Zapier to automate tasks or leveraging advanced technology to help with hiring. However, when it comes to upcoming e-commerce trends, robotics and machine learning are currently some of the topics that are discussed the most. Automating the repetitive tasks that keep your online store running can be aided greatly by AI. Product recommendations, loyalty discounts, low-level support, and other tasks can all be automated with AI. Efficient sales process:

By automating follow-up inquiries about abandoned carts and gathering customer data, AI can help you streamline your sales process. Here are the most common:

Personalized Product Recommendations

Customer data about their online shopping experience can now be collected and processed with greater ease than ever before. Artificial intelligence is being used to offer personalized product recommendations based on past customer behavior and lookalike customers. Machine learning is used to look at your past purchases by websites that suggest things you might like. Machine learning is used by retailers to collect data, analyze it, and use it to create customer insights, launch a marketing campaign, improve pricing, and provide a personalized shopping experience. For everyday E-Commerce applications, machine learning

will require less and less involvement from data scientists over time. Optimizing pricing AI-enabled dynamic pricing is a strategy of changing your product price based on supply and demand. Today's tools can dynamically calculate the minimum discount required for a sale if they have access to the appropriate data. Enhanced Customer Service

Amazon Online Services

Amazon is the world's largest e-commerce company. It has expanded to include clothing, food, and electronics, and it now claims to be the best AI-as-a-service provider by giving developers the tools to build applications on Amazon Web Services. Amazon's logistics operations run more smoothly thanks to machine learning algorithms. When it comes to delivery, the capabilities of artificial intelligence (AI) and machine learning (ML) are utilized to determine the most effective route and delivery time for the package. The CEO's letter discussed true customer obsession and how artificial intelligence and machine learning would be the focus as the company continues to fend off rivals. One of the most important takeaways from the founder's letter was Amazon's ambition to become an AI-as-a-service provider. There have been many developments in this space.

Flipkart Online services:

Flipkart has already hired a large number of AI specialists and professionals by forming alliances with top educational institutes in India. The company is going above and beyond to build the infrastructure required to support the massive demand for its services. Now that it has established a separate AI unit called AI for India, Flipkart is turning to artificial intelligence (AI) for deeper insights. The new AI unit will enable the company to mine its consumer data and strengthen its business strategies. In the ongoing battle for e-commerce market share in India, Flipkart is said to have beaten Amazon, its biggest rival, in the biggest sales battle of the year. Following a hiccup in Flipkart's growth, several global investors had written off the company's growth story. Not only Flipkart nowadays all the E-commerce business adopts AI Powered tools.

AI Meta

Meta AI is an AI-powered tool that can provide you with relevant information that you need right away in a matter of seconds if you are looking for information about e-commerce. The information is authentic and provides you the required details as you were insisting Meta AI to reciprocate.

Utilization of Chat bots:

Chatbots are used by e-commerce businesses to offer customers services round-the-clock. Since employees cannot be available every time to sort out consumers' problems, these

chat bots acts as replacements of humans and majorly solve customers' issues at any point of day. AI can handle a variety of data-related activities, enhancing the capabilities of e-Commerce chatbots and allowing users to receive a variety of services.

Image Search and Recognition:

When customers come across a product while browsing the internet and are unsure of what to call it, this AI application is used. E-commerce companies can use the AI technology and come out with service where the customers need to point out the camera towards a particular product and get its description or similar recommendation which eliminates the need of knowing the keywords to search for the same. Deep learning-based image identification can provide companies with benefits such as consumer analytics, social media commerce features, tailored searches, and more. They may also use the information obtained by image recognition to create successful marketing strategies and campaigns that will help them increase their ROI.

Competitive Monitoring:

Every e-business must now conduct competition monitoring in order to gain firsthand knowledge of how other businesses operate in the same market, under the same conditions, and with the same clientele. However, when monitoring whether competitors wish to enhance our own brand's possibilities, it is essential to take references from any price variations in addition to other factors. When analyzing the competition for a brand or online store, it is critical to understand the customer relationship. After all, it is these people whose purchases enable you to survive. The presentation of each product, as well as the connection with customers and potential customers, influence this perception.

Predictive Analytics in E-Commerce:

Since e-commerce has evolved globally, the emergence of predictive analytics in e-commerce has aided the development of the global economy. This technology determines risk analysis, churn prevention, market analysis, demand forecasting, and other functions. In order to expand their operations and boost productivity, major corporations are now focusing on the advantages of predictive analytics. Predictive models can be used in e-commerce to figure out which products are most likely to sell well and which ones may not. This can help retailers predict inventory needs, and can also be used to identify which products may be selling better online than in a physical store any business, from small start-ups to multinational corporations, can benefit from predictive analytics' ability to boost performance and productivity.

Analytics for Retail

Personalized experiences that anticipate and respond to consumer preferences are the future of retail. The ability to try before you buy and the seamless integration of digital and physical shopping are at the heart of this. It's about being able to try on clothes, get makeup done, or decorate your home before making a purchase. It's also about having those experiences in virtual reality and being able to stop at any time. Over a million items from various sellers are categorized using Machine Learning Models in the retail industry. Advanced algorithms are used in these systems to quickly determine a product's category and subcategory. Then, they can sort those items in a variety of ways, like by price, size, color, and other characteristics of the product. Some middlemen and retailers use ML-Machine Learning to automate their inventory management, which can help them stay ahead of demand and reduce the costs of managing their supply chain.

Handling Unstructured Data:

AI can't be useful unless the right data are fed into the algorithm. Before the data is fed into the algorithm, it needs to be properly analyzed and interpreted so that AI can be used in the right situations to benefit the company. The data is not just raw information. Despite the fact that businesses continue to struggle in the area of data, the ability to extract insights from massive amounts of data is essential to the success of AI.

Future of AI and Scope of AI in E-Commerce:

It is said that the majority of the time of managers of companies will go on monitoring how the technology and algorithm is working for their company and whether it is reaping them good revenue or not; this prediction clearly explain the importance that AI will hold in future of E-commerce sector. After becoming the new normal, consumers' preferences have drastically changed from shopping in a physical store to shopping online because it is more convenient, costs less to travel to stores, takes less time, and removes geographical restrictions that customers used to face when shopping in stores. Clearly, these factors could also be the reason why the shift is now irreversible. As a result, E-Commerce businesses are increasingly focusing on AI projects to improve the whole customer experience.

XI. CONCLUSION

This article discusses how customer experiences, business management, and innovative business solutions are being driven by artificial intelligence in e-commerce. Personalized shopping, product recommendations, and inventory management are some of the most prominent applications of artificial intelligence in e-commerce. Other applications include efficient use of big data, supply chain management, meta AI, chatbots, and so on. If

you own or plan to own an e-commerce business, you should think about how to put a working model of artificial intelligence into place so that you can survive the competition. The purpose of this study is to learn more about how AI can be used in E-commerce. All of the applications, roles in AI challenges, and potential applications for AI in E-commerce sectors were thoroughly examined in the study. The study conclude that AI holds a powerful impact on E-commerce and aims to bring new trends in the near future. AI has the potential to alter businesses as well as the framework within which e-commerce websites operate. It can also add a new dimension to the shopping experience, displacing customers who currently shop in person. AI-powered e-commerce businesses can discover new strategies for retaining existing customers and attracting new ones in light of the market's emerging trends. E-commerce businesses now have a wider range of options for conducting business thanks to AI, which will continue to open up new possibilities over time. An E-Commerce business can use AI to analyses the massive amounts of data it receives every second without breaking a sweat. In E-Commerce, the demand for such technology will continue to rise.

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143. AI TRANSMISSION IN E-COMMERCE: REVOLUTIONIZING ONLINE RETAIL THROUGH ARTIFICIAL INTELLIGENCE

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Abstract

The integration of artificial intelligence (AI) into e-commerce, referred to here as "AI transmission," is transforming the online retail landscape by enhancing personalization, operational efficiency, and customer engagement. This paper explores key AI applications, including customer segmentation, personalized product recommendations, intelligent pricing, chatbots, and product image analytics, highlighting their transformative impact on business outcomes. It analyses significant challenges such as data privacy concerns, algorithm biases, and adoption barriers for small businesses, drawing attention to the hurdles that must be addressed. Looking ahead, the paper explores future trends, including autonomous commerce and agentic AI, which promise to redefine the shopping experience. Concluding with strategic recommendations, it offers e-commerce businesses actionable insights, such as leveraging affordable AI tools and ensuring robust data management, to harness AI's potential effectively. This analysis underscores AI's role in shaping a smarter, more customer-centric online retail future, providing a roadmap for sustainable growth in a rapidly evolving digital economy.

Keywords: Artificial Intelligence (AI), E-commerce, AI transmission, Online retail.

1. Introduction

Imagine browsing an online store, and it feels like the website knows you and is suggesting products you didn't even realize you wanted, answering your questions instantly, and offering prices that seem too good to pass up. That's not magic; it's artificial intelligence at work, quietly revolutionizing e-commerce behind the scenes. In this paper, we dived into the concept of "AI transmission" in e-commerce, our term for how AI technologies are seamlessly woven into every corner of online retail, transforming the way businesses connect with customers and run their operations. From personalized recommendations that feel like a friend's advice to supply chains that practically run themselves, AI is reshaping the \$6.3

trillion e-commerce industry in 2024 (Forbes Advisor (2024)). We'll explore the game-changing applications of AI, unpack the challenges holding it back, and peek into the future of shopping, where AI doesn't just assist, it anticipates. Let's unpack how AI is making online retail smarter, faster, and more human than ever before. " Construct in a structured way.

2. Review of literature:

Mohana et al. (2023) studied how artificial intelligence (AI) has revolutionized e-commerce, transforming the way businesses operate and provide quality services to customers. The study aimed to outline the impact of AI on the e-commerce sector and suggest a framework for key research topics. The study has concluded that there is a significant impact of AI on E-commerce operations and consumer buying behaviour, and suggests that ethical considerations are important for maintaining consumer trust and reputation.

Arora (2024) investigated how AI integrates offline and online e-commerce experiences through advanced analytics, machine learning, and real-time data synchronization, enhancing customer personalization, inventory management, and in-store-to-online transitions, while addressing data privacy and system interoperability challenges. The study concluded that AI creates a unified shopping experience for customer's competitiveness, and the adoption of AI improves customer satisfaction and loyalty.

Kshetri (2024) explored how Generative artificial intelligence (GAI) is transforming e-commerce through applications such as virtual try-on tools, product description sheets, and advice robots, addressing uncertainties and enhancing online shopping experiences for buyers and sellers. The study concluded that Virtual fitting tools reduce returns by improving product understanding.

Aggarwal et al., (2024) studied how Artificial intelligence is transforming the online shopping landscape by improving personalization, security, customer support, and product discovery, making the experience more enjoyable and efficient for consumers. Additionally, AI can assist in fraud detection and prevention, ensuring secure transactions and building trust with customers. The study aimed to examine AI technologies that enhance the online shopping experience and help the customer to buy personalized products. The study concluded that AI optimizes inventory management, reduces stock issues, and enhances secure product discovery.

Dimple Patil (2025) explores AI's transformative impact on retail and e-commerce, enhancing customer experience through personalization, predictive analytics, and real-time

engagement. The study concluded that AI improves retail e-commerce through personalization and predictive analytics, and addresses implementation and ethical concerns for sustainable digital economy growth.

3. Applications of AI in E-Commerce for online retail

In this paper, we will explore some of the most powerful ways to use AI in e-commerce and how they can help online retailers to stay ahead of the competition. The diagram below represents the applications of AI in E-commerce:



Source: www.axiomq.com

3.1 Customer Segmentation (AI chatbots)

Customer segmentation is like grouping your friends by their passions, helping E-Commerce businesses tailor marketing and products to each vibe. With AI, it gets smarter by analysing your shopping habits and social media likes to understand you better. For instance, a podcast platform might spot gardening fans and hydroponics enthusiasts, then send them personalized tips or tools.

3.2 Intelligent Demand Forecasting (As Seen On Screen):

Sales forecasting is like planning a fun family road trip for your business, guiding growth and new adventures. It can be tricky with all the numbers, but AI steps in like a clever buddy, spotting trends and predicting what customers will love next. Take ASOS, the cool online fashion shop, where AI analyses past sales, website visits, and social media buzz to keep stock perfectly balanced.

3.3 Customer churn prediction (Pecan AI)

Customer churn prediction is like a friendly heads-up from your business buddy, using AI and smart data to spot customers who might leave soon. It lets you step in early to fix issues and keep them happy, saving money since retaining them is easier than finding new ones. This gives you a competitive edge to act fast and improve products or support, keeping everyone loyal. A great AI tool for this is Pecan AI, a smart assistant that analyses purchase history and browsing habits to flag at-risk shoppers.

3.4 Intelligent pricing (Intelligence Node):

Intelligent pricing is like having a savvy friend who uses AI to set the perfect price, tapping into your shopping history, competitor rates, and market trends. It adjusts on the fly for demand spikes or stock levels, personalizing prices to suit you and boosting profits with a fun, tailored shopping feel. It also watches competitors and automates updates quickly, saving time and keeping you ahead. A great AI tool for this is Intelligence Node, a smart assistant that tracks competitor prices and market shifts to suggest real-time pricing for your products!

3.5 Personalized Product Recommendations (Dynamic Yield):

Personalized product recommendations are like a shopping buddy who knows your style, suggesting items based on your past buys and browses for a fun, special experience! AI uses smart tricks like collaborative filtering (matching similar tastes) or content-based filtering (finding like items), blending them with deep learning to refine suggestions as you shop. It's all about making your online shopping feel perfectly tailored to you! A great AI tool for this is Dynamic Yield, a clever assistant that analyses your habits to recommend tailored outfits.

3.6 Competitor Price Monitoring (Visualping):

Competitor price monitoring is like keeping tabs on your shopping rivals, checking their prices on websites and stores to stay in the know. It helps you spot trends, adjust your prices or deals quickly to attract shoppers, and boost profits while staying competitive. It also offers smart insights to avoid price wars and keep your brand strong, ensuring you don't lose customers or earnings. A fantastic AI tool for this is Visualping, a watchful friend that tracks price changes and alerts you with easy updates, saving time and keeping you ahead.

3.7 Predict Customer Lifetime Value (Optimove) :

Customer Lifetime Value (CLV) is like calculating the joy and cash a favourite shopper brings your store over time, helping you spot VIPs to pamper with extra attention. It lets you spend marketing money wisely, keep loyal customers with special offers, and step in with deals when they might leave. A cool AI tool for this is Optimove, a friendly guide that analyses shopping habits to predict CLV and suggest ways to keep customers happy and spending.

3.8 Automated Content Generation (Jasper AI):

Automated content generation is like having a super-smart assistant that uses AI magic to create blog posts, social media updates, or product descriptions, saving you time on dull writing tasks. It's budget-friendly compared to a big team, keeps your brand's voice consistent and cool, and even tailors content to your likes while sparking fresh ideas. A

fantastic tool for this is Jasper AI, a creative buddy that crafts personalized content and boosts your e-commerce store's inspiration.

3.9 Product Image Analytics (Clarifai)

Product Image Analytics is like giving your online store smart eyes with AI, peeking at product photos to reveal helpful insights using cool image recognition tech. It spots details, checks quality, and highlights trends, helping you understand what customers love and tweak marketing or catch fakes. This makes your store smarter and more appealing! A handy tool for this is Clarifai, a photo-savvy friend that analyzes images to provide insights and keep your products shining!

4. Challenges of AI in E-Commerce

Navigating AI in e-commerce online retail can feel like a thrilling adventure, but it comes with a few bumps along the way. Here are the top challenges that can trip things up, explained in a simple way:

- **Keeping Data Safe and Private:** Imagine AI as a curious friend who loves digging into your shopping habits—great for suggestions, but it raises worries about how your info is stored and protected. With rules like GDPR and CCPA in play, businesses need to be extra careful to keep their trust and avoid costly mistakes.
- **Dealing with Ethical Hiccups:** Sometimes AI can accidentally pick up biases from old data, like suggesting certain products unfairly. It's essential to be transparent about how you make choices and ensure they align with your brand's core values, so customers feel confident about shopping with you.
- **Getting AI to Play Nice with Your Setup:** Think of AI as a new teammate who needs to fit into your existing store's rhythm—it can be tricky and pricey to get it working smoothly. You may need tech experts to assist, and the upfront cost can feel like a significant investment.

These hurdles are real, but tackling them with care can turn AI into your e-commerce superpower! Let me know if you'd like tips on overcoming any of these!

5. Future Trends (2025 and Beyond)

As we move into 2025 and beyond, AI is transforming online shopping into a smarter, more intuitive, and highly personalized experience. Here's how AI is driving the future of e-commerce:

- **Personalized Shopping Journeys:** AI acts like a personal stylist, analyzing your browsing history, likes, and past purchases to suggest products you'll love, creating a shopping experience that feels tailor-made.
- **Smart Chatbots for Instant Help:** Picture AI-powered chatbots as friendly store assistants, available 24/7 to answer questions, guide you through purchases, or troubleshoot issues in real time.
- **Dynamic Pricing That Adapts:** AI keeps an eye on market trends and customer behaviour, tweaking prices on the fly to offer you deals that feel just right while keeping businesses competitive.
- **Predictive Inventory Magic:** AI forecasts what products will fly off the virtual shelves, helping stores stock up smartly to avoid annoying "out of stock" messages.
- **Voice Shopping Made Easy:** With AI, you can tell your smart speaker what you need—groceries, clothes, or gadgets—and it'll handle the order, making shopping as simple as a conversation.
- **Upselling with a Personal Touch:** AI spots patterns in your shopping habits and gently nudges you with complementary products, like suggesting a matching scarf for that dress you just added to your cart.
- **Fraud Detection for Safer Shopping:** AI works behind the scenes like a vigilant guard, spotting suspicious activity to keep your transactions secure and worry-free.
- **Visual Search for Instant Finds:** Snap a photo of something you like, and AI will find similar items online, turning inspiration into purchases in seconds.

6. Recommendations

- **Keeping Data Safe and Private:** Use strong encryption tools and clear privacy policies to build trust, conduct regular audits to stay compliant with regulations like GDPR, and ensure 12–18 months of clean data for AI training to keep insights accurate and secure.
- **Addressing Ethical Hiccups:** Regularly review AI algorithms for biases and be transparent with customers about how recommendations are made, while auditing systems periodically to improve fairness and align with your brand's heart.
- **Getting AI to Blend with Your Setup:** Start with affordable tools like chatbots or recommendation engines, then scale up gradually with expert support to ease costs and complexity.

- **Encouraging Team Buy-In:** Offer training sessions to turn employees into AI champions, reducing resistance, and assess specific needs (e.g., reducing cart abandonment) to show how AI benefits their roles.
- **Maintaining AI Effectiveness:** Schedule regular updates and training for AI systems to adapt to changing customer tastes, using clean data from the past 12–18 months to keep predictions sharp.
- **Monitor Competitor AI Use:** Keep an eye on how rivals use AI (e.g., pricing strategies) and adapt accordingly, starting with low-cost tools to analyse trends without breaking the bank.
- **Ensure 12–18 Months of Clean Data:** Gather and tidy up at least 12–18 months of data (orders, traffic, etc.) to give your AI a solid foundation for smart decisions.
- **Start with Affordable Tools:** Kick off with budget-friendly options like chatbots or recommendation engines to dip your toes into AI without a big investment.
- **Regularly Audit AI Systems:** Check your AI regularly to catch biases, tweak performance, and keep it working smoothly for your customers.

7. Conclusion

AI transmission is revolutionizing e-commerce, turning online retail into a smarter, more personalized, and efficient space with standout successes like Amazon's 35% sales boost and Alibaba's streamlined logistics. Despite challenges such as data privacy risks and algorithm biases, the potential to enhance customer experiences and operational prowess is undeniable. By embracing strategic steps such as leveraging affordable tools, auditing AI systems, and fostering team buy-in, e-commerce businesses can navigate these hurdles and thrive. As we look to 2025 and beyond, AI's ability to anticipate customer needs positions it as a game-changer, promising a future where online shopping feels as intuitive as a conversation with a trusted friend and a rapidly changing digital economy.

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144. AI IN VENDOR AND SUPPLIER MANAGEMENT

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Introduction:

Why Vendor and Supplier Management Suddenly Became Boardroom Talk Ten years ago, the average CEO barely mentioned “vendor management” in public speeches. It was seen as back-office work — important, yes, but not glamorous. Then the shocks began:

- The 2011 Thailand floods disrupted global electronics supply, shutting down factories thousands of kilometers away.
- The 2020–21 pandemic brought border closures, sudden demand spikes for essentials, and total collapse in predictability.
- The semiconductor shortage of 2021–22 stalled automotive production lines from Chennai to Detroit.
- In India, even small textile exporters in Tiruppur saw how fragile their supply base could be when dye suppliers faced raw material delays.
- It became clear that the old way — relying on Excel sheets, quarterly reviews, and gut feel — could not handle today’s volatile, interconnected world. Procurement teams needed real-time visibility, faster decision-making, and a way to spot trouble before it arrived. AI promised exactly that.

The Real Problems Procurement Teams Face:

Before we talk about AI, let’s get honest about what’s broken. In my interviews and case reviews, six issues kept coming up:

1. Supplier quality inconsistency — Imagine an automotive plant in Pune stopping because 3% of a batch of imported brake pads failed quality tests. Even a small defect rate can cause millions in losses when just-in-time manufacturing is in play.
2. Late discovery of delays — A Chennai electronics assembler learned about a shipment delay only when their container failed to arrive on unloading day — too late to prevent idle workers and missed orders.
3. Choosing the wrong supplier — SMEs often pick based on price alone, ignoring hidden risks like weak financial health or overdependence on one customer.

4. Contracts as “sleeping documents” — Procurement teams often sign vendor contracts, file them away, and rediscover them only when a dispute arises. Key clauses, renewal dates, and penalty triggers get missed.
5. Inventory chaos — A Bengaluru e-commerce company overstocked on slow-moving items after misreading festival demand patterns, tying up capital while running out of fast sellers.
6. Risk blindness — Suppliers in politically unstable regions, or those facing environmental violations, can suddenly become unavailable — a risk buyers often discover too late.

How AI Tackles These Pain Points:

Computer vision for quality control: Tata Motors has piloted camera systems at intake bays that scan every part delivered. These cameras, trained on past defect images, can flag minute cracks or size mismatches instantly — no manual sampling needed.

Predictive shipping alerts: Maersk’s AI platform cross-references weather data, port congestion stats, and live vessel GPS signals. Indian importers can get alerts days before a container is likely to be late.

Smart supplier scoring: An AI system at a Pune manufacturing cluster uses 50+ variables — from on-time rates to social media sentiment — to rank suppliers. During the pandemic, this allowed firms to pivot quickly to reliable partners.

Contract clause extraction: Infosys developed an internal tool that reads every supplier contract, pulls out SLA commitments, and warns if a deadline is 30 days away.

Inventory optimization: Flipkart’s AI models adjust stock levels daily, factoring in supplier reliability, sales patterns, and seasonal spikes — cutting warehouse holding costs.

Supplier risk dashboards: A pharma company in Hyderabad uses AI to watch news feeds, government alerts, and ESG score changes to flag risky suppliers before placing new orders.

Case Studies That Show This Works:

Case Study 1 — Unilever’s Sustainable Supplier Program

Unilever’s AI systems track sustainability metrics like carbon footprint and water usage across its supplier base. When an Indian tea supplier improved its sustainability score, it not only retained Unilever as a customer but also won bigger contracts, proving that AI-driven transparency can reward good actors.

Case Study 2 — Tamil Nadu Garment Exporter

A medium-sized exporter in Tiruppur adopted a cloud-based AI tool to score textile suppliers on delivery timeliness and defect rates. Within one year, late deliveries dropped by 18%, helping the exporter secure a large European order.

Case Study 3 — Tata Steel’s Predictive Procurement

Tata Steel’s AI procurement dashboard integrates supplier historical data with market forecasts. When it predicted a raw material price surge, Tata secured bulk orders early, saving crores in procurement costs.

Benefits You Can Actually Measure:

When AI is applied well, the results aren’t vague:

- Procurement lead time: 20–40% faster.
- Stockouts: Down 10–30%.
- Invoice processing cost: Cut nearly in half using automation.
- Supplier risk incidents: Significant drop with early warning signals.

And there’s a softer, but crucial, benefit: trust. When suppliers see faster payments, fewer disputes, and collaborative forecasting, relationships improve — and in supply chains, relationships are often worth more than contracts.

Why Adoption Still Lags (And How to Fix It):

Let’s be real — many SMEs can’t just “install AI” like a software update. The challenges are real:

Messy data: If your supplier names are spelled five different ways across systems, AI will struggle. Start with data cleaning.

Cost fears: Cloud AI services can be pay-as-you-go — no need for massive upfront spend.

People fear: Teams worry AI will “replace” them. In reality, AI often removes grunt work so people can focus on negotiation and strategy.

The Road Ahead:

Looking forward, AI in vendor management will merge with

Blockchain for unalterable supplier histories.

IoT sensors for real-time goods condition tracking.

Federated learning where industry peers share model improvements without sharing confidential data.

For Indian exporters especially, AI will be key to meeting the strict transparency and sustainability demands of European and US buyers.

Conclusion:

Vendor and supplier management is no longer just about placing orders and chasing deliveries. In a volatile world, it's about seeing problems before they happen, making fast decisions, and building trust-based, data-backed partnerships. AI is not a magic bullet — it's a set of powerful lenses, alarms, and calculators that, in the right hands, can make procurement a competitive advantage rather than a constant headache.

The companies that win in the next decade won't necessarily have the cheapest suppliers — they'll have the smartest supplier management systems.

145. BLOCKCHAIN INTEGRATION AND SMART WAREHOUSING

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Abstract:

In the context of Industry 4.0, the integration of blockchain technology with smart warehousing is emerging as a game-changer for supply chain operations. Blockchain offers a decentralized, secure, and immutable ledger for transaction recording, while smart warehousing employs IoT, automation, and data analytics to optimize logistics processes. When these technologies are combined, they enhance real-time visibility, improve inventory traceability, and ensure secure data sharing across stakeholders. This integration holds the potential to reduce errors, improve decision-making, and create a more transparent and efficient supply chain ecosystem.

Introduction:

Technological advancements are reshaping the global logistics and warehousing landscape. Two of the most transformative innovations are blockchain technology and smart warehousing systems. Smart warehousing uses robotics, IoT sensors, and data-driven automation to manage warehouse operations with high efficiency. Blockchain complements this by providing a decentralized and transparent digital ledger, which strengthens data integrity and trust. The fusion of these technologies results in a more secure, responsive, and streamlined supply chain. It helps in minimizing manual errors, enhancing real-time tracking, and building a more resilient warehousing system suitable for modern industry needs.

Meaning:

Blockchain integration in smart warehousing refers to the use of blockchain platforms within automated warehouse environments to streamline operations, secure transactions, and ensure real-time tracking and transparency. This integration leverages both technologies to optimize the flow of goods and data across the supply chain.

Definition:

Blockchain integration in smart warehousing is the application of blockchain systems in warehouse environments to manage decentralized data, automate transactions, and provide real-time visibility and security for inventory and logistics activities.

Types of Blockchain Integration in Smart Warehousing:**Inventory Tracking and Management**

Real-time tracking of inventory using RFID/IoT, with blockchain storing every movement.

Minimizes theft, loss, and discrepancies.

Smart Contracts Automation

Automates warehouse processes such as order fulfillment and payment release.

Reduces human intervention and speeds up workflows.

Supplier and Vendor Coordination

Maintains transparent records with suppliers.

Builds trust and simplifies audits.

Integration for Environmental Monitoring

Sensors log environmental conditions (temperature, humidity) directly onto the blockchain.

Critical for perishable or sensitive goods.

Access and Security Management

Controls and logs access to warehouse systems.

Enhances accountability and restricts unauthorized entry.

Asset and Equipment Monitoring

Tracks usage and maintenance history of equipment.

Smart contracts can automate maintenance scheduling.

Logistics and Shipment Traceability

Tracks product journey from storage to delivery.

Increases visibility and customer satisfaction.

Objectives of Blockchain Integration in Smart Warehousing:

Enhance Transparency and Traceability: All transactions are verifiable and tamper-proof.

Improve Inventory Accuracy: Automated and real-time stock updates minimize errors.

Increase Operational Efficiency: Streamlines tasks through automation.

Ensure Data Security: Protects warehouse data from manipulation.

Build Trust Across Supply Chain: Encourages transparency between all stakeholders.

Enable Real-Time Monitoring: Helps monitor goods and warehouse conditions continuously.

Support Regulatory Compliance: Simplifies auditing with verifiable digital records.

Optimize Resources and Costs: Reduces manual effort and unnecessary expenses.

Advantages of Blockchain Integration in Smart Warehousing:

Real-Time Visibility: Provides up-to-the-minute updates on inventory and shipments.

Improved Transparency: Enables all stakeholders to access shared, accurate data.

Enhanced Security: Blockchain's encryption protects against data breaches.

Smart Contract Automation: Reduces paperwork and human dependency.

Efficient Inventory Management: Minimizes losses through automated tracking.

Cost Savings: Reduces labor, paperwork, and intermediary involvement.

Better Supply Chain Coordination: All parties work from a single, unified data source.

Quick Dispute Resolution: Time-stamped records allow for easier problem-solving.

Regulatory Compliance: Simplifies inspections and compliance documentation.

Disadvantages of Blockchain Integration in Smart Warehousing:

High Initial Costs

Requires significant investment in infrastructure and training.

Technical Complexity

Demands skilled personnel and integration with existing systems can be challenging.

Scalability Concerns

Larger networks may face slower processing as data volume increases.

Energy Consumption

Some blockchain models, especially public ones, consume high energy.

Lack of Standardization

No universal protocol exists, leading to potential compatibility issues.

Limited Adoption

Not all partners may be ready or willing to adopt blockchain technologies.

Data Privacy Risks

While blockchain is secure, its transparency may expose sensitive information.

Maintenance Requirements

Continuous technical support and upgrades are necessary for smooth operation.

IMPACTS

Enhanced Transparency

Improves trust among supply chain partners—suppliers, logistics providers, and retailers.

2. Real-Time Inventory Tracking

Integration with IoT devices (like sensors, RFID) allows live updates of inventory.

Reduces stockouts, overstocking, and improves demand forecasting.

3. Improved Data Security

Blockchain's decentralized nature ensures data is secure, immutable, and only accessible to authorized users.

Reduces risks of data manipulation, fraud, and cyberattacks.

4. Better Traceability of Goods

Tracks product journey from origin to end-user.

Useful in industries like food, pharma, and luxury goods to ensure authenticity and compliance.

5. Streamlined Operations and Automation

Smart contracts on blockchain can automatically trigger actions (e.g., reordering, payments) when predefined conditions are met.

Reduces manual work and human errors.

6. Efficient Auditing and Compliance

Blockchain provides a permanent audit trail.

Simplifies regulatory reporting and internal audits.

7. Reduced Operational Costs

Eliminates need for intermediaries and redundant processes.

Reduces paperwork, reconciliation delays, and saves time and money.

8. Better Collaboration Across the Supply Chain

All stakeholders work on a single version of truth.

Increases coordination and supply chain agility.

Conclusion:

The integration of blockchain technology into smart warehousing systems marks a significant advancement in supply chain innovation. It brings enhanced visibility, security, and automation to logistics operations. While there are implementation challenges such as cost and technical demands, the long-term benefits ranging from improved operational efficiency to greater trust among supply chain partners make it a worthwhile investment. As adoption grows and technologies mature, blockchain-powered smart warehouses will become a standard in modern supply chain infrastructure.

146. AI IN AUTOMATED AUDITING, COMPLIANCE, COST REDUCTION, AND PRODUCT EFFICIENCY

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Introduction

AI in internal audit refers to the integration of AI technologies, such as machine learning, NLP & data analytics, to enhance auditing processes. It automates routine tasks, detects patterns in large datasets, identifies anomalies, & provides insights, improving efficiency & accuracy in assessing risks & controls.

- **Context:** Rise of AI in business and technology
- **Definition of AI** (Narrow AI vs. General AI)
- **Relevance in auditing, compliance, and efficiency**
- **Purpose of report:** To explore AI's role in improving accuracy, reducing operational costs, and enhancing product/service efficiency.

1. AI in Automated Auditing:

Definition:

AI in Automated Auditing refers to the use of **artificial intelligence technologies**—such as machine learning, natural language processing, and data analytics—to perform auditing tasks **automatically** without extensive manual intervention. It involves **continuous monitoring** of transactions, anomaly detection, and automated report generation, enabling **faster, more accurate, and scalable audits** compared to traditional methods.

- **Traditional Auditing Challenges**
 - o Manual verification of large datasets
 - o Risk of human error
 - o Time-consuming reconciliations
- **AI Solutions**
 - o Machine Learning for anomaly detection
 - o Natural Language Processing (NLP) for reading contracts & invoices
 - o Continuous Auditing with real-time alerts

- **Benefits**
 - o Speed, accuracy, scalability
 - o Enhanced fraud detection
- **Example**
 - o Deloitte's Argus AI detecting suspicious transactions in seconds

2. AI in Compliance Management:

Definition:

AI in Compliance means the application of **artificial intelligence tools** to **track, interpret, and enforce** regulatory requirements within an organization. It uses **regulatory data mining, predictive analytics, and real-time monitoring** to ensure that a business follows all relevant laws, standards, and industry guidelines—thereby reducing risks, avoiding penalties, and maintaining legal integrity.

- **Compliance Complexity**
 - o Multiple regulatory frameworks (IFRS, GAAP, GDPR, AML laws, etc.)
 - o Frequent changes in laws
- **AI Applications**
 - o Regulatory change monitoring
 - o Automated reporting systems
 - o Risk assessment dashboards
- **Case Example**
 - o IBM Watson Compliance analyzing 300,000 regulatory documents to keep banks updated.
- **Benefits**
 - o Reduced penalties
 - o Increased trust & transparency

3. AI for Cost Reduction:

Definition:

AI in Cost Reduction is the strategic use of **artificial intelligence algorithms and automation** to **optimize business processes, reduce waste, and lower operational expenses**.

It includes automating repetitive tasks, optimizing supply chains, predicting maintenance needs, and improving resource allocation to achieve **maximum productivity at minimal cost**.

- **Cost Drivers in Business**
 - o Labor-intensive processes
 - o Inefficiencies in operations
- **AI's Role**
 - o Process automation (RPA + AI)
 - o Predictive maintenance in manufacturing
 - o Optimized supply chain logistics
- **Case Example**
 - o Amazon using AI to optimize warehouse robotics, reducing operational costs by up to 20%.
- **Outcome**
 - o Leaner operations, higher margins

4. AI in Product Efficiency:

Definition:

Improving the quality, speed, and reliability of products/services

- **AI Applications**
 - o Product design optimization (Generative AI models)
 - o Quality control via computer vision
 - o Demand forecasting to avoid overproduction
- **Example**
 - o Tesla using AI to improve self-driving algorithms through continuous data feedback
- **Impact**
 - o Faster product delivery, fewer defects, higher customer satisfaction

Challenges & Risks

- Data privacy concerns
- Algorithmic bias
- High initial setup costs
- Regulatory gaps for AI usage
- Workforce displacement concerns

Future Outlook

- AI and blockchain integration for transparent auditing
- AI-driven self-regulating compliance systems
- Hyper-automation in manufacturing and services
- Widespread AI adoption across SME

Conclusion

- Summary of AI's transformative role in business auditing, compliance, cost control, and product efficiency.
- Emphasis on ethical AI and continuous adaptation to remain competitive.

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147. FUTURE READY BUSINESS MODEL

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INTRODUCTION

A future-ready business model is a strategic approach designed to help organizations adapt, innovate, and stay competitive in a rapidly changing environment. In today's world, businesses face constant disruption from technological advancements, shifting customer expectations, global competition, and economic uncertainties. A future-ready model anticipates these changes instead of merely reacting to them.

Such a model focuses on agility, resilience, and innovation—allowing a business to evolve quickly in response to new trends, market shifts, and emerging technologies. It leverages data-driven decision-making, sustainable practices, and digital transformation to ensure long-term relevance.

DEFINITION

A future-ready business model is a strategic framework that enables an organization to remain competitive, sustainable, and adaptable in the face of rapid technological, economic, and social changes. It integrates innovation, digital transformation, and customer-centric strategies to anticipate future trends and challenges, ensuring long-term growth and resilience.

In essence, it's a business model designed not just for current market conditions, but for continuous evolution in an unpredictable future.

KEY CHARACTERISTICS OF FUTURE READY BUSINESS MODEL

1. **Agility and Flexibility** : Ability to quickly adapt strategies, structures, and operations in response to change.
2. **Innovation-Centric Approach** : Continuous investment in new ideas, technologies, and business methods to stay ahead.
3. **Customer-Centricity** : Deep focus on understanding and meeting evolving customer needs through personalization and engagement.
4. **Data-Driven Decision Making** : Using analytics, AI, and market insights to guide strategic and operational choices.

5. Digital Integration : Embedding digital tools, automation, and advanced technologies into every aspect of the business.
6. Sustainability and Responsibility : Commitment to eco-friendly practices and social impact to align with future regulations and values.
7. Resilience and Risk Management : Systems and strategies to withstand economic, technological, and environmental disruptions.
8. Collaborative Ecosystem : Building partnerships and networks to expand capabilities and market reach.

BENEFITS OF A FUTURE-READY BUSINESS MODEL

1. Greater Agility and Adaptability : Enables businesses to quickly adjust strategies, products, and services in response to market changes or disruptions.
2. Long-Term Competitiveness : Helps maintain a strong market position by anticipating trends and staying ahead of competitors.
3. Innovation-Driven Growth : Encourages continuous innovation, leading to new products, services, and business opportunities.
4. Improved Customer Satisfaction : Uses data and insights to meet evolving customer needs and deliver personalized experiences.
5. Operational Efficiency : Adopts digital tools and streamlined processes to reduce costs and improve productivity.
6. Resilience Against Disruptions : Builds the capacity to withstand crises such as economic downturns, supply chain issues, or technological shifts.
7. Sustainability and Social Responsibility : Integrates eco-friendly and socially conscious practices that align with future regulations and consumer expectations.
8. Data-Driven Decision Making : Utilizes analytics to make informed, strategic choices for better outcomes.

FUNCTIONS OF A FUTURE-READY BUSINESS MODEL

1. Anticipating Change : Identifies upcoming trends, market shifts, and potential disruptions before they occur.
2. Driving Innovation : Encourages continuous development of new products, services, and processes to stay relevant.
3. Enhancing Agility : Enables rapid adaptation of strategies and operations in response to evolving market conditions.

4. **Optimizing Resources** : Uses technology, automation, and data analytics to maximize efficiency and minimize waste.
5. **Delivering Customer-Centric Value** : Focuses on meeting and exceeding changing customer needs through personalized solutions.
6. **Ensuring Sustainability** : Integrates environmentally friendly and socially responsible practices for long-term viability.
7. **Building Resilience** : Prepares the business to withstand and recover from economic, technological, or social disruptions.
8. **Facilitating Collaboration** : Encourages partnerships, ecosystem participation, and cross-industry alliances to strengthen market presence.

IMPORTANCES OF FUTURE-READY BUSINESS MODELS

1. **Adaptability to Change** : Helps businesses quickly adjust to market shifts, technological advancements, and customer needs.
2. **Sustainability** : Encourages eco-friendly and socially responsible practices for long-term success.
3. **Competitive Advantage** : Keeps the business ahead of rivals by adopting innovation and modern strategies.
4. **Customer : Centric Approach** : Builds stronger relationships through personalized and value-driven services.
5. **Risk Management** : Reduces the impact of disruptions like economic crises or supply chain issues.
6. **Technology Integration** : Improves efficiency, decision-making, and scalability through digital tools.
7. **Global Reach** : Enables expansion into new markets and diverse customer segments.

STRATEGIES FOR IMPLEMENTING A FUTURE-READY BUSINESS MODEL

1. **Embrace Digital Transformation** : Integrate advanced technologies such as AI, automation, cloud computing, and data analytics into core operations to improve efficiency and innovation.
2. **Invest in Continuous Innovation** : Create a culture that supports experimentation, research, and development to generate new products, services, and business approaches.
3. **Focus on Customer Experience** : Use customer feedback, behavior analysis, and personalization tools to meet evolving expectations and build loyalty.

4. Develop an Agile Organizational Structure : Reduce bureaucracy, encourage quick decision-making, and empower teams to respond rapidly to market shifts.
5. Strengthen Talent and Skills : Upskill employees in digital, analytical, and creative competencies to keep pace with future demands.
6. It has and cannot clap Adopt Sustainable Practices : Incorporate environmentally responsible and socially conscious policies to align with long-term trends and stakeholder values.
7. Leverage Data for Decision-Making : Implement data-driven systems to monitor performance, predict changes, and guide strategic planning.
8. Build Strategic Partnerships : Collaborate with other businesses, startups, and technology providers to access new markets, share resources, and accelerate growth.
9. Prepare for Risks and Disruptions : Develop contingency plans, diversify supply chains, and maintain financial flexibility to handle uncertainties.

ADVANTAGES OF A FUTURE-READY BUSINESS MODEL

1. High Adaptability : Quickly adjusts to market changes, technological shifts, and customer demands.
2. Long-Term Competitiveness : Stays ahead of competitors by anticipating future trends.
3. Continuous Innovation : Encourages creative thinking and new solutions.
4. Improved Customer Satisfaction : Meets evolving needs through personalized and value-driven offerings.
5. Operational Efficiency : Uses technology and streamlined processes to reduce costs.
6. Stronger Resilience : Better prepared to handle crises, disruptions, or economic downturns.
7. Sustainability Alignment : Meets environmental and social responsibility expectations.

DISADVANTAGES OF A FUTURE-READY BUSINESS MODEL

1. High Initial Investment : Requires significant spending on technology, talent, and innovation.
2. Complex Implementation : Demands major structural and cultural changes within the organization.

3. Uncertain ROI : Benefits may take time to materialize, making short-term returns unclear.
4. Continuous Upgrading Needed : Constant need to update systems, skills, and strategies.
5. Risk of Overdependence on Technology : Vulnerability to cyber threats or tech failures.
6. Change Resistance : Employees or stakeholders may resist new processes and ideas.

CONCLUSION

The future-ready business model is not just a response to change—it is a proactive approach to building long-term success in an unpredictable world. By focusing on agility, innovation, customer-centricity, and sustainability, it enables organizations to thrive amid technological advancements, market disruptions, and shifting consumer expectations.

While its implementation may require significant investment, cultural transformation, and ongoing adaptation, the benefits—such as resilience, competitiveness, and sustainable growth—far outweigh the challenges. Ultimately, businesses that adopt a future-ready model position themselves not only to survive the future but to shape it.

148. AI-POWERED NATURAL LANGUAGE PROCESSING FOR ENHANCED HUMAN-COMPUTER INTERACTION

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Abstract

Natural Language Processing (NLP), propelled by rapid advancements in Artificial Intelligence (AI), is fundamentally transforming the nature of human-computer interaction (HCI). By enabling machines to comprehend, interpret, and generate human language in both written and spoken modalities, NLP technologies are bridging the gap between humans and digital systems with unprecedented accuracy and contextual understanding. This paper presents an extensive review of current trends (2023–2025), emphasizing the adoption of Large Language Models (LLMs) such as GPT, LLaMA, and Gemini across various industries. It highlights cross-domain applications including healthcare, finance, education, and customer service, along with the emergence of multimodal AI integrating text, speech, and vision. Additionally, the paper examines key enabling technologies, governance challenges, and ethical considerations. A structured implementation framework is proposed to guide organizations in integrating NLP solutions into operational workflows and customer engagement strategies for optimal impact.

Keywords: Artificial Intelligence, Natural Language Processing, Human-Computer Interaction, Transformers, Large Language Models, Conversational AI, Multimodal Systems, Ethics.

I. INTRODUCTION

The increasing ubiquity of digital systems has resulted in a rising demand for more intuitive, human-like interactions between users and machines. Unlike earlier computational models that relied heavily on rigid, rule-based systems, modern AI-powered NLP leverages deep learning architectures to capture semantic nuances, allowing for context-aware and personalized responses [1]. These developments have positioned NLP as a critical enabler in bridging linguistic and cognitive gaps between human communication styles and computational processing.

Recent breakthroughs in transformer-based architectures have enabled remarkable improvements in various NLP tasks, including machine translation, question answering, summarization, and conversational AI [2]. The objective of this study is to synthesize recent developments, explore cross-domain applications, address governance challenges, and present an actionable implementation framework for large-scale adoption.

II. MARKET TRENDS AND LITERATURE OVERVIEW (2023–2025)

The global market for Natural Language Processing is experiencing unprecedented growth, with projections estimating it will reach **USD 49.4 billion by 2025**, representing a **compound annual growth rate (CAGR) of approximately 27%** [3]. This surge is being driven by several converging technological and organizational trends. The first is the **proliferation of Large Language Models (LLMs)** such as **GPT, LLaMA, and Gemini**, which are now integral to diverse enterprise workflows. These models are being employed for high-value tasks including automated report generation, legal document summarization, sentiment-driven market analytics, and intelligent content creation [4]. The second major driver is the **adoption of multimodal AI**, wherein text, speech, and computer vision are integrated into unified systems capable of delivering immersive, contextually aware interactions across platforms ranging from customer service portals to augmented reality environments [5]. The third is the **democratization of NLP development tools**, marked by the rise of low-code and no-code platforms such as Rasa, Microsoft LUIS, and Hugging Face AutoNLP. These tools are lowering technical barriers, enabling business analysts, domain experts, and other non-programmers to create and deploy NLP solutions tailored to their specific use cases [6].

A review of the literature from the past two years reveals a fundamental paradigm shift in evaluation priorities for NLP systems. Whereas earlier research and development focused heavily on accuracy metrics such as F1-score or BLEU, the current discourse emphasizes **trustworthiness, interpretability, and fairness** as equally critical dimensions of performance. This shift reflects the growing recognition that successful NLP deployment must balance technical excellence with ethical responsibility and user confidence.

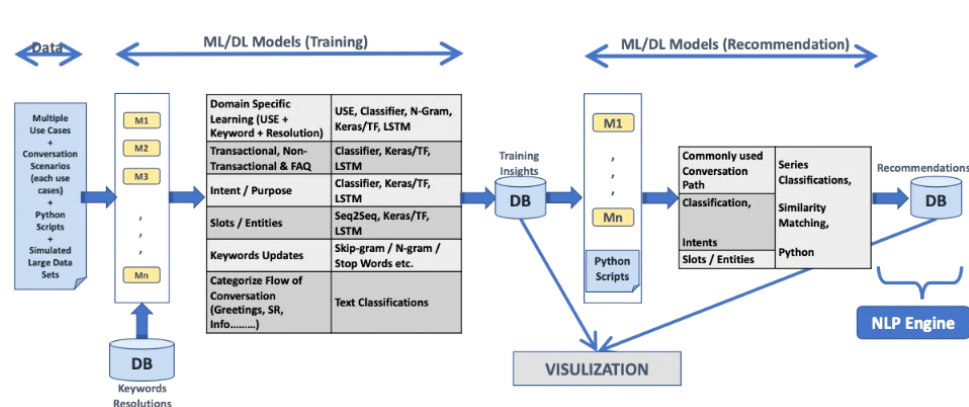
III. INDUSTRY APPLICATIONS AND BENEFITS

In the domain of **customer service**, conversational agents and AI-powered chatbots are transforming the way organizations engage with their clients by offering **24/7 multilingual support** that not only reduces wait times but also ensures consistent, high-quality interactions across channels. These systems can handle a wide spectrum of

queries—ranging from simple FAQs to complex troubleshooting—thereby reducing operational costs and freeing human agents to focus on high-value, specialized tasks. In **healthcare**, NLP technologies play a pivotal role in automating **clinical documentation**, assisting with **patient triage**, and extracting key medical insights from large volumes of unstructured data, such as physicians’ notes and diagnostic reports [7]. This not only improves workflow efficiency but also supports evidence-based decision-making for improved patient outcomes. Within the **financial sector**, NLP-powered **sentiment analysis tools** are used to scan and interpret market news, analyst commentary, and even social media conversations in real time [8], enabling organizations to identify market trends, assess risks, and make data-driven investment decisions faster than ever before. In the field of **education**, AI-driven tutoring systems leverage NLP to assess a learner’s language comprehension and adapt teaching strategies to match individual needs. This personalization improves engagement, facilitates deeper understanding, and promotes inclusive learning by catering to diverse learning styles and paces [9].

IV. TECHNOLOGY ENABLERS AND EMERGING TRENDS

Transformer-based architectures, including models such as **BERT**, **GPT**, and **T5**, continue to set the benchmark for innovation in Natural Language Processing, owing to their ability to capture deep contextual relationships across entire sequences of text, handle complex dependencies, and adapt to a wide range of downstream tasks with minimal fine-tuning.



Alongside these foundational models, the emergence of **low-code NLP platforms** such as **Rasa**, **Hugging Face AutoNLP**, and **Microsoft LUIS** has significantly lowered the barrier to entry for organizations and individuals without advanced programming expertise, enabling them to develop, train, and deploy sophisticated NLP solutions quickly. In parallel, advancements in **speech processing pipelines**—particularly in real-time speech-to-text and text-to-speech systems—are enhancing accessibility by allowing seamless

interaction for differently-abled users, removing communication barriers, and supporting hands-free, voice-driven interfaces. Moreover, the development of **context-aware Large Language Models (LLMs)** marks a critical leap forward, as these systems are capable of sustaining multi-turn dialogues with logical coherence, recalling prior exchanges within a conversation, and delivering responses that align more closely with human reasoning, thereby improving reliability and user trust in mission-critical applications.

V. CHALLENGES AND GOVERNANCE CONSIDERATIONS

One of the foremost challenges in deploying AI-powered NLP systems lies in addressing bias and fairness, as Large Language Models (LLMs) inevitably inherit patterns, stereotypes, and prejudices present in their training data, which can lead to skewed or discriminatory outputs if left unchecked. Ensuring equitable model behavior therefore requires proactive bias detection, mitigation techniques, and continuous evaluation against diverse datasets. Equally critical is the issue of data privacy, particularly when NLP systems process sensitive or personally identifiable language data. Compliance with established frameworks such as the General Data Protection Regulation (GDPR), the Health Insurance Portability and Accountability Act (HIPAA), and other jurisdiction-specific policies is essential to safeguard user information while maintaining trust. The explainability of model decisions represents another pressing concern—current LLMs often operate as “black boxes,” producing outputs without clear reasoning, which can undermine confidence in their use for high-stakes scenarios. Finally, regulatory compliance is a moving target; as global AI governance frameworks continue to evolve, organizations must implement agile compliance strategies that adapt to new policies, ethical standards, and legislative changes across multiple jurisdictions.

VI. IMPLEMENTATION FRAMEWORK

The proposed implementation framework begins with the critical step of **defining objectives**, where organizations must establish clear, measurable performance metrics such as query resolution rates, response accuracy, and user satisfaction scores to ensure that the NLP system’s outcomes align with business goals and user expectations. The next step involves a robust **data strategy**, focusing on the acquisition of diverse, domain-specific datasets while maintaining strict quality control, balance across demographic groups, and adherence to ethical sourcing practices. Following this, the **model selection** phase requires a careful evaluation of both open-source and proprietary Large Language Models, considering factors such as computational efficiency, domain adaptability, licensing constraints, and compliance with relevant regulations. Once a suitable model is

chosen, **pilot testing** should be conducted in a controlled environment to observe real-world performance, gather user feedback, and identify areas for refinement. The final step is to **scale and monitor** the deployment, which involves continuous fine-tuning to improve accuracy, periodic ethical audits to prevent bias, and dynamic adaptation to evolving user requirements and regulatory landscapes.

VII. CONCLUSION

AI-powered Natural Language Processing is rapidly emerging as a strategic necessity for organizations seeking to elevate the quality, efficiency, and intuitiveness of human-computer interaction. When underpinned by cutting-edge algorithms, reinforced with ethical governance principles, and supported by a robust technological infrastructure, NLP solutions have the potential to go far beyond mere automation—they can foster deeper personalization, contextual relevance, and user trust. The ongoing convergence of multimodal AI, which integrates text, speech, and vision; context-aware reasoning, which enables sustained logical interaction; and democratized development tools, which make advanced NLP accessible to non-expert practitioners, signals a transformative shift in how humans and machines collaborate. This evolution points toward a future in which human-computer communication is not only more natural and adaptive but also inherently aligned with human values, needs, and decision-making processes, thereby redefining the boundaries of digital interaction.

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149. CUSTOMER JOURNEY MAPPING AND EXPERIENCE DESIGN IN AI

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ABSTRACT: -

“Artificial Intelligence (AI) is transforming Customer Journey Mapping (CJM) and Experience Design by facilitating data-driven, personalized, and real-time customer interactions. Previously reliant on manual research, CJM now leverages AI technologies such as machine learning and natural language processing to evaluate customer engagements across multiple channels—web, mobile, social media, and beyond. This advancement enables businesses to develop dynamic journey maps, reveal hidden patterns, and pinpoint pain points with enhanced precision.

In the real of experience design, AI improves personalization through chatbots, recommendation systems, and predictive analytics, providing customized experiences on a large scale. Additionally, emotion and sentiment analysis contribute to crafting empathetic and emotionally impactful interactions. AI also supports proactive decision making by anticipating customer behavior and facilitating timely interventions. Nonetheless, ethical issues, data privacy, and the necessity for human oversight continue to be paramount. Ultimately, AI equips organizations to offer smarter, more agile, and emotionally engaging customer experiences, influencing the future of customer-focused business strategies”

Key words: Artificial intelligence, Customer Journey Mapping, customer focused business strategies, AI intervention.

I. INTRODUCTION :-

In the current landscape characterized by intense competition and rapid technological advancements, businesses are increasingly prioritizing the delivery of outstanding customer experiences. Loyalty from customers is no longer determined solely by the quality of products or pricing; instead, they are looking for personalized, seamless, and emotionally fulfilling interactions with brands across a variety of digital and physical platforms. Consequently, it has become essential to comprehend the entire journey a customer undertakes when engaging with a brand. This is where Customer Journey Mapping (CJM) and Experience Design become significant.

The Incorporation of Artificial Intelligence (AI) into these methodologies is revolutionizing how companies connect with and understand their customers. AI technologies, including machine learning, natural language processing (NLP), predictive analytics, and emotion recognition, empower businesses to acquire deeper insights into customer behaviors, foresee their needs, and create more relevant and responsive experiences. Rather than depending on static, uniform strategies, AI facilitates dynamic, data-informed decision making in real time.

II. MEANING :-

Customer Journey Mapping (CJM) is a method of visually representing the various steps a customer undertakes while engaging with a brand—from the initial awareness to the post purchase phase. This process encompasses all touchpoints across both digital and physical platforms, including websites, social media, customer service, and brick-and mortar stores. CJM allows businesses to gain insights into customer behavior, emotions, and challenges at each stage of the journey, which in turn helps them enhance the overall experience. Experience Design, in contrast, is centered on crafting these interactions to be smooth, meaningful, and emotionally rewarding. It entails the design of user interfaces, communication strategies, support systems, and environments that align with customer expectations and create a favorable impression.

When integrated with Artificial Intelligence (AI), CJM and experience design become significantly more effective and powerful. AI facilitates real-time data gathering, behavior analysis, and personalized interactions. For instance, AI can pinpoint where customers disengage during their journey, forecast future behaviors, and provide customized recommendations. Tools such as chatbots, recommendation engines, and emotion detection systems all play a role in creating more intelligent and responsive customer experiences. Ultimately, the significance of CJM and experience design in the context of AI is about developing smarter, data-informed, and empathetic systems that boost customer satisfaction, loyalty, and overall brand equity.

III.BENEFITS :-

1. Immediate Insights :

AI empowers businesses to monitor and evaluate customer behavior in real time, offering current insights into customer interactions with various touchpoints. This facilitates instant strategy adjustments for improved results.

2. Scalable Personalization :

AI can categorize customers and provide personalized content, suggestions, and experiences tailored to individual preferences, enhancing engagement and satisfaction.

3. Predictive Insights :

AI-driven journey analytics can anticipate customer needs, pinpoint potential drop-off areas, and forecast churn, allowing for proactive issue resolution and customer retention strategies.

4. Deeper Customer Insights:

Through machine learning and natural language processing, AI assists companies in accurately understanding customer emotions, sentiments, and pain points, surpassing traditional methods.

5. Enhanced Efficiency:

AI streamlines repetitive tasks such as answering FAQs or directing service requests, allowing human agents to concentrate on more complex customer requirements, thereby lowering operational costs.

6. Emotionally Intelligent Interactions:

AI technologies like sentiment analysis and emotion detection enable businesses to craft empathetic and human-like experiences, fostering stronger emotional bonds with customers.

7. Integrated Omnichannel Experience:

AI guarantees a seamless and consistent customer journey across various platforms (web, app, in-store), ensuring continuity and enhancing user satisfaction.

IV.IMPORTANCE: -

The incorporation of Artificial Intelligence (AI) into Customer Journey Mapping (CJM) and Experience Design is revolutionizing the manner in which businesses comprehend, interact with, and cater to their customers. In the current digital environment, where customer expectations have reached unprecedented levels, it is crucial for organizations to provide seamless, personalized, and emotionally engaging experiences. AI facilitates this by allowing for more intelligent, rapid, and adaptable decision-making.

1. Comprehensive Customer Insight:

AI assists businesses in monitoring and evaluating customer behavior across all platforms—both online and offline—providing a complete view of the customer journey.

2. Customized Engagements:

Through AI, organizations can personalize experiences in real-time, ensuring that each customer feels appreciated and understood.

3. Anticipatory and Proactive Support:

AI predicts customer requirements before they are expressed, enabling brands to address concerns or recommend products in advance.

4. Enhanced Efficiency and Scalability:

Automated solutions such as chatbots and recommendation engines minimize response times and expand customer service capabilities without compromising quality.

5. Ongoing Enhancement:

AI perpetually learns from customer interactions, allowing for real-time refinement of the customer journey and its various touch points.

V.Examples: -

Amazon serves as a prime illustration of how AI improves customer journey mapping and experience design. From the instant a user logs in, AI algorithms monitor browsing history, purchasing trends, and even mouse movements. Utilizing this information, Amazon:

- Suggests products tailored to the individual.
- Provides timely notifications and emails regarding promotions or restocks.
- Employs chatbots and voice assistants (Alexa) for immediate customer support.
- Enhances delivery routes and schedules for superior service.
- Consequently, Amazon guarantees that each phase of the customer journey—from discovery to delivery—is effective, personalized, and gratifying.

VI. CONCLUSION: -

The incorporation of Artificial Intelligence (AI) into Customer Journey Mapping (CJM) and Experience Design signifies a significant transformation in how companies comprehend and interact with their customers. AI introduces intelligence, automation, and personalization into the customer journey, enabling brands to surpass conventional approaches and offer real-time, data-informed, and emotionally impactful experiences.

Through the analysis of extensive behavioral data, AI assists organizations in pinpointing customer pain points, forecasting future behaviors, and delivering tailored content or assistance. This leads to enhanced customer satisfaction, loyalty, and overall business success. When augmented by AI, experience design becomes more intuitive, empathetic, and efficient—addressing individual needs while streamlining operations.

150. THE ROLE OF INFLUENCER MARKETING IN DRIVING PURCHASE DECISIONS: A SYSTEMATIC ANALYSIS

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Introduction

These days where social media has become a big part of how people decide what to buy. Earlier, customers were mostly depended on the advertisements, shopkeepers and word of mouth from friends and family. But now, we have Instagram, YouTube, Facebook, and many other platforms where influencers have started playing a major role. They showcase products in daily use, share reviews, and create trends that make people engaged. For many people, seeing their favourite influencer idol using a product feels more convincing than watching any TV commercial ads.

But influencer is not only about popularity. Many consumers trust influencers because they appear relatable, authentic, and closer to real life compared to celebrity advertisements. This trust often leads people to trying new products or even switches brands. Businesses benefit from this because they can reach a targeted audience at a lower cost than traditional media.

Still, it is not always perfect. Sometimes influencer promotions may also feel forced or fake, and followers may doubt their honesty behind the recommendations. If the audience feels misled, it can harm both the influencer's reputation and the brand. This is why transparency, credibility, and genuine content are very important in influencer marketing.

To put it simply, influencer marketing is powerful but also tricky. It shapes purchase decisions quickly, but if in case not managed carefully; it will create challenges for both brands and consumers. The best way forward is to balance reach, transparency and authenticity so that marketing remains effective while keeping the trust of the audience strong.

Literature review

Leung, Gu, Li, Zhang, and Palmatier (2022) explored influencer marketing by looking at what really drives its effectiveness. They pointed out that while many campaigns focus on reach, very few studies actually consider the costs involved, especially when engagement elasticity is taken into account. Drawing on a communication model, they broke the process into three sides — the influencer as the sender, the followers as receivers, and the

content itself as the message. According to them, originality, follower size, and how visible the sponsorship is can all boost effectiveness, but posts announcing new product launches sometimes work against it. They also showed that balance is key: too much influencer activity, weak brand–follower fit, or overly positive posts can backfire, creating what they called inverted U-shaped effects. In short, they argued that marketers who choose influencers carefully, target the right audiences, and manage content strategically are more likely to achieve long-term success with influencer marketing campaigns.

Jhavar, Kumar, and Varshney (2023) examined how virtual influencers are emerging as a new force in social media marketing. Since research on this area is still limited, they aimed to build a theoretical model that explains how and why social media users accept virtual influencers. Their work suggested that parasocial interaction — the one-sided bond followers feel with influencers — plays a central role. When combined with source credibility theory, this interaction helps explain why audiences start to trust and accept virtual influencers. The study also highlighted that similarity between the follower and the influencer strengthens credibility even further. Drawing on case studies of five leading virtual influencers, the authors showed how industries like fashion, electronics, tourism, and health care are already using these digital personalities, particularly for luxury branding. They pointed out that virtual influencers hold strong potential for targeting Gen Y and Gen Z, who are more comfortable engaging with digital characters. By proposing this conceptual model, their research filled an important gap in understanding virtual influencer–follower interactions and provided a foundation for future studies in this growing field.

Agustian, Hidayat, Zen, Sekarini, and Malik (2023) looked at how influencer marketing can help small and medium-sized enterprises (SMEs) improve their brand awareness and sales. Using a qualitative literature analysis that covered more than a decade of studies, they aimed to get an in-depth understanding of how influencers shape consumer perceptions in the digital era. Their findings showed that influencer marketing holds strong potential for SMEs, as it enables them to reach their target markets more effectively, build recognition, and generate higher sales. The authors emphasized that in today’s rapidly changing digital landscape, influencers offer a special advantage because they act as trusted intermediaries who connect brands with audiences that are both relevant and engaged. In doing so, the study highlighted influencer marketing as a powerful tool for SMEs striving to compete and grow in crowded online markets.

Pradhan, Kuanr, Pahi, and Akram (2023) explored influencer marketing from a slightly different angle by focusing on when and why Gen Z consumers might actually avoid

influencers and the brands they promote. Their study highlighted that while influencers are often trusted for their authenticity, younger consumers can quickly become skeptical if they perceive promotions as insincere, repetitive, or overly commercialized. The authors showed that factors such as excessive brand endorsements, lack of transparency, and forced content can trigger resistance among Gen Z audiences, leading them not only to disengage with influencers but also to avoid the associated brands. By examining these patterns, they emphasized that understanding the boundaries of influencer credibility is just as important as leveraging their reach. The findings suggested that brands need to design influencer strategies more carefully for Gen Z, making sure that content feels genuine, balanced, and respectful of audience expectations to avoid backlash.

Lou, Taylor, and Zhou (2023) examined influencer marketing with a focus on how different social media platforms shape the relationship between influencers and their followers. They pointed out that although existing research has grown rapidly, most studies tend to cluster around the influencer as the source, the message itself, and the audience. What has been missing, they argued, is an understanding of how platform-specific features make a difference in advertising effectiveness. Their study mapped out the gratifications that followers seek from influencers across various platforms and showed how these, along with platform characteristics, influence the strength of parasocial relationships (PSR). They found that PSR is not uniform — it changes depending on the social media platform being used. Importantly, stronger PSR consistently predicted more positive advertising outcomes. By integrating both individual gratifications and platform affordances, the authors demonstrated that platform context plays a critical role in determining how effective influencer marketing can be.

Vidani, Das, Meghrajani, and Singh (2023) investigated how gender influences clothing purchases when consumers are exposed to fashion influencer marketing on social media. Their study covered multiple fashion categories — from casual and formal wear to ethnic, sports and fitness wear, and even lingerie — in order to map the role gender plays in shaping buying behavior. Using Chi-Square analysis, they demonstrated that gender has a significant impact across all these categories, with results consistently supporting their hypotheses. In other words, men and women respond differently to influencer endorsements depending on the type of clothing being promoted. The authors emphasized that these findings provide important insights for fashion brands, marketers, and influencers who want to design strategies that cater to specific gender-based preferences. By showing that gender plays a central role in purchase decisions across diverse fashion segments, the study

highlighted the need for more tailored influencer marketing campaigns in the fashion industry.

Francis, Haque, Rahman, Al-Hunaiyyan, Al-Ainati, Lokman, and Isa (2023) examined how the rise of digital technology and social media has reshaped marketing strategies and consumer behavior. Their literature review showed that social media now plays a central role in building brand–consumer relationships and influences multiple stages of the purchase decision process. The findings indicated that consumer behavior is shaped both directly and indirectly through key factors such as engagement, trust, and perceived value. The authors recommended that businesses focus on developing personal and interactive content strategies that strengthen these factors, while academics should continue with empirical studies to gain a deeper understanding of how different variables interact. By synthesizing recent research, the study highlighted social media as a powerful force in shaping consumer purchasing behavior and provided direction for both practitioners and scholars.

Beichert, Bayerl, Goldenberg, and Lanz (2024) focused on the key question facing many direct-to-consumer firms: should they work with low-followerhip or high-followerhip influencers to maximize revenue? To answer this, they looked at the entire influencer marketing funnel — from followers on platforms like Instagram, to reach, engagement, and ultimately actual revenue — while also factoring in the costs of paid endorsements. Their findings showed that low-followerhip influencers consistently outperformed high-followerhip ones across multiple return-on-investment measures. Through mediation analysis, they explained that engagement is the critical link: as influencers gain larger followings, engagement rates tend to decline, which in turn reduces ROI. This aligns with social capital theory, where stronger, more personal connections with smaller audiences yield better results. The authors supported their conclusions with a large dataset of nearly 1.9 million purchases along with three extensive field studies involving hundreds of influencer endorsements, making the evidence highly robust. In short, they demonstrated that for revenue generation, brands often benefit more from targeting smaller, more engaged influencers rather than chasing sheer follower numbers.

Mouritzen, Penttinen, and Pedersen (2024) turned their attention to the growing trend of virtual influencer marketing. They explained that virtual influencers differ from real-life ones because of certain unique features such as customization, flexibility, ownership, and automation. In their study, they developed a taxonomy to categorize these virtual personalities and showed how they fit within the wider influencer landscape. The authors

noted both opportunities and risks: while virtual influencers allow brands to have full control and creativity, they also raise concerns around authenticity and how consumers connect with something that isn't human. Their work highlighted three main contributions — offering a clear definition of virtual influencer marketing, building a 2×2 framework based on anthropomorphism and the reality–virtuality continuum, and reflecting on future research directions. On the practical side, they suggested that companies need to carefully evaluate which type of virtual influencer they use and how, providing guidelines to help marketers design campaigns responsibly. They also discussed broader ethical and social implications, pointing out that the line between reality and virtually can blur in ways that may affect consumer trust and brand reputation.

Myers, Sen, Syrdal, and Woodroof (2024) studied the rapidly growing niche of pet influencer marketing, with industry spending expected to surpass \$16 billion. Analyzing over 550 posts from 37 pet influencers, they applied Uses and Gratifications Theory along with Persuasion Knowledge to understand how audiences respond to sponsored content. Their results showed that certain cues — like clear sponsorship disclosures, mentions of money, brand logos, and an overload of sponsored posts — actually disrupt engagement at times when followers are mainly seeking entertainment. In other words, the more commercial the content appears, the less likely audiences are to interact with it. The authors stressed that these insights are valuable for brands, as they highlight the importance of balancing promotional elements with entertainment value in order to maintain high engagement in influencer campaigns.

Antczak (2024) explored how digital marketing and social media marketing shape consumer buying behavior in today's technology-driven world. The study emphasized that platforms such as social media networks, e-commerce sites, and mobile apps have transformed the way consumers interact with businesses by providing product information, reviews, and price comparisons. Antczak examined how specific activities — including product reviews, social media ads, email marketing, and influencer marketing — influence purchasing decisions. The research also looked at how social media networks enhance or limit the effectiveness of digital strategies and how consumers engage with advertising in these spaces. The findings provided insights for companies seeking to refine their online marketing approaches, showing how digital tools can build stronger consumer relationships, increase sales, and boost profitability. Beyond practical recommendations, the study added to academic literature by clarifying the role of digital and social media marketing in modern consumer decision-making.

Duralia (2024) discussed how digital marketing communication techniques have become a crucial part of modern marketing policy. The study emphasized that the right choice of communication tools and channels not only helps firms differentiate themselves from competitors but also strengthens long-term relationships with consumers, leading to loyalty and improved financial performance. Duralia highlighted that tailoring communication strategies to the interests of targeted consumer segments requires marketers to carefully analyze consumer behavior and the factors shaping it in today's economic and social climate. Digital technologies, the study noted, are especially effective in facilitating two-way communication between organizations and consumers, though traditional tools still have a place when used appropriately. By drawing on secondary research data, the article illustrated how digital communication strategies directly influence purchase decisions and stressed the importance of integrating both digital and traditional approaches for maximum impact on consumer behaviour.

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152. EMPOWERING MSMES WITH AI: BRIDGING POTENTIAL AND PRACTICALITY

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Abstract

Artificial Intelligence (AI) is rapidly transforming Micro, Small, and Medium Enterprises (MSMEs), enhancing efficiency, competitiveness, and innovation. This paper reviews globally national and international, Indian trends in AI adoption among MSMEs identifies sector applications, analyzes major adoption barriers, and presents ecosystem and policy responses. The major challenges identified in implementation of AI lists for the growth of MSME's suggestive factors to overcome from the barriers with conclusive evidence are going to be extremely focused in this paper. It argues that coordinated efforts are necessary to bridge the digital gap and promote inclusive AI-driven growth.

Keywords—Artificial Intelligence, MSMEs, Startups, India, Policy, Digital Economy, Automation

Introduction: -

AI is an extension activity to amidst to human brain to make more comprehensive in human activity. AI once was accepted as a rustic notion. But now it is embedded in day to day business and economic operation. It is a revolutionary tool in the recent years up retail, whole sale manufacturing and logistics sectors, in addition to healthcare. Its continuous involvement to alter supply chains, client relations, service delivery, social bonding and decision-making. It is a widely recognized leverage to transform the micro small and medium enterprises (MSMEs). The support of AI extended to MSMEs which grapple with resource constraints, intra operational deficiencies and extensive market competitions of heterogeneous character.

The growth of MSMEs read in conjunction with intervention of AI. The applications of tools of AI into MSME operations presents splendid opportunities for enhanced productivity, cost management and optimum decision making through data analysis and process automation. In India startups like STEM foundation, ROBO Siksha Kendra (RSK)

programme have merged as crucial platforms for promoting AI education and adoption of technology at the grassroots level. To facilitate digital transformations among small-scale enterprises, the AI connotative are instrumental in the elimination of trade barriers between states of optimum use of cost control techniques to minimize wastage and universal acceptance of business ethics possible only through application of AI. Its influence on supply chains, green energy, service eco-system and business intelligence (BI) is a continuous process. The adopting of AI in MSMEs becomes not merely beneficial but essential for long-term sustainability in domestic and global markets. To examine the pattern of AI in different sectors of small industries is vital for ethical problem-solving areas. AI helps to identify primary barriers in MSME eco system and assess the responsive management from stakeholders such as govt. agencies, supportive organizations and facilitators of trade and industry.

Objectives:

1. To analyze the significance and practical applications of Artificial Intelligence (AI) within Micro, Small, and Medium Enterprises (MSMEs).
2. To examine patterns of AI adoption across different sectors and identify industry-specific use cases.
3. Identify the primary barriers to AI adoption within the MSME ecosystem and assess the responses from stakeholders such as government agencies, support organizations, and industry facilitators.
4. To investigate the major challenges faced by MSMEs in adopting AI technologies and evaluate the role of ecosystem actors—including government initiatives, industry bodies, and educational institutions—in addressing these barriers.

Literature Review

The application of Artificial Intelligence (AI) in Micro, Small, and Medium Enterprises (MSMEs) has gained considerable scholarly and policy attention over the last decade. AI is increasingly recognized as a transformative technology that can enhance productivity, reduce operational costs, and improve decision-making across industries (Chatterjee et al., 2021). Several researchers affirm AI's potential in MSMEs: The integration of Artificial Intelligence (AI) into Micro, Small, and Medium Enterprises (MSMEs) is an emerging area of interest in both academic and policy literature. AI offers transformative potential for MSMEs by enhancing operational efficiency, enabling data-driven strategies, and supporting sustainable innovation (Pamungkas et al., 2023).

Despite their scale limitations, MSMEs stand to benefit significantly from AI-enabled tools such as predictive analytics, natural language processing, computer vision, and intelligent automation (Raj & Sharma, 2020).

Importance and Applications of AI in MSMEs

In manufacturing, AI-driven predictive maintenance has been found to reduce downtime and extend equipment lifespan (Kumar & Patel, 2019). Retail MSMEs use AI for demand forecasting, personalized marketing, and recommendation systems. Similarly, service-oriented small businesses are employing AI to enhance client engagement, optimize workflows, and extract actionable insights from unstructured data (Zhang et al., 2020).

AI technologies have been shown to support a wide range of business functions within MSMEs, including process automation, demand forecasting, customer relationship management, and product personalization. Sharma et al. (2022) highlight that AI is playing a pivotal role in design and manufacturing optimization, leading to improved quality control and production efficiency.

Adoption Patterns and Sector-wise Implementations

AI adoption in MSMEs is uneven and tends to vary by sector and enterprise size. According to a report by NASSCOM (2023), early adoption is more visible in IT-enabled services, fintech, logistics, and digital retail. In contrast, traditional manufacturing and agriculture-based MSMEs show slower uptake due to infrastructure and knowledge barriers. Sectoral studies suggest that the degree of digital readiness, data availability, and workforce skill levels significantly influence the pace of AI adoption (Mishra et al., 2022).

Global Overview of AI Adoption by SMEs

Artificial Intelligence adoption among Micro, Small, and Medium Enterprises (MSMEs) has seen exponential growth globally. AI is no longer confined to large corporations; small businesses are rapidly leveraging it to optimize operations, engage customers, and reduce costs.

Key Global Statistics

- A 2024 survey revealed that **77%** of global small and medium-sized businesses (SMBs) utilize AI in at least one function.
- In the **United Kingdom**, AI adoption is particularly high, with **83%** of SMEs using AI—**33%** of them integrating it into daily operations.

- Productivity gains from AI adoption have ranged from **27% to 133%** depending on sector and scale.
- . Popular Use Cases Worldwide

AI is being applied across diverse business functions globally:

- **Marketing Automation:** Targeted advertising, lead scoring, and content generation
- **Customer Service:** Chatbots, support ticket routing, and sentiment analysis
- **Supply Chain Management:** Inventory optimization and demand forecasting
- **Human Resources:** Resume parsing, automated shortlisting, and employee analytics

Drivers of Global AI Uptake

1. **Access to Scalable Cloud Infrastructure** – Cloud-based AI solutions have reduced entry barriers.
2. **Rise of No-Code/Low-Code Platforms** – Tools that require minimal technical knowledge have empowered non-technical users.
3. **Ecosystem Maturity** – Global platforms (e.g., Salesforce Einstein, Zoho AI, ChatGPT APIs) have created plug-and-play opportunities.
4. **Post-Pandemic Digitization** – COVID-19 accelerated AI trials and digital pivots for resilience.

Regional Focus

While developed economies are leading adoption, emerging markets are catching up:

- Southeast Asia is experiencing rapid growth in AI-led SME digitization.
- African tech hubs like Kenya and Nigeria are fostering AI through startup ecosystems.
- In Latin America, countries like Brazil and Mexico are incorporating AI into public SME funding programs.

a key message: **AI has become a mainstream growth enabler for MSMEs.** The gap between awareness and implementation is closing, especially where cost-effective, user-friendly solutions are available.

77% of global SMBs use AI tools for at least one function.

83% of UK SMEs use AI, with 33% applying it daily.

AI-led productivity gains range from 27% to 133%.

Marketing, HR, and inventory are top use areas.

Indian MSMEs: Sentiment vs. Implementation

India is home to over **60 million MSMEs**, contributing significantly to GDP, exports, and employment. These enterprises are increasingly aware of the transformative potential of Artificial Intelligence (AI), but actual implementation remains limited and fragmented.

Recent surveys indicate that **94%** of Indian MSMEs believe AI can accelerate business growth and competitiveness. Despite this optimism, **only 15%** of MSMEs in the organized manufacturing sector currently utilize AI tools in their operations.

Key Barriers Identified:

- **Cost Concerns (59%)** – Many MSMEs find AI tools and integration financially out of reach.
- **Lack of Awareness (65%)** – A significant portion of firms are unaware of available AI technologies or their applications.
- **Skill Deficiency (72%)** – There is a pressing shortage of trained personnel to implement and manage AI systems effectively.

Adoption Breakdown by Purpose:

- **68%** use AI for **product/service innovation**
- **48%** apply it in **content creation and marketing**
- **46%** leverage it for **customer engagement**

This gap between intent and execution highlights the need for **targeted support systems**, including training, affordable tools, and awareness campaigns, especially in Tier 2 and Tier 3 cities. Bridging this divide is essential for achieving inclusive digital transformation in India's MSME sector.

94% of Indian MSMEs believe AI can drive growth.

Yet only 15% of organized manufacturing MSMEs use AI.

Barriers:

- 59% cite high costs.
- 65% lack tool awareness.
- 72% need AI training.

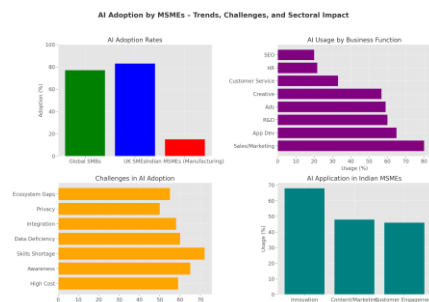
Functional and Sectoral Applications

AI adoption among MSMEs is functionally diverse and sector-specific, reflecting a growing recognition of its value across business operations.

A. Functional Use of AI in MSMEs

A recent 2024–25 survey revealed widespread AI utilization across key business areas:

Function	% of SMEs Using AI
Sales & Marketing	80%
Software/App Development	65%
R&D and Data Analytics	60%
Paid Advertising	59%
Design & Creative Tasks	56.7%
Customer Service (Chatbots)	33%
Human Resources & SEO	~20%



These figures indicate that marketing and development functions are leading in AI integration, while operational and HR uses are still emerging.

Sectoral AI Use Cases in Indian MSMEs

Real-world examples illustrate the varied and impactful ways Indian MSMEs are integrating AI:

Sector	Company	AI Application	Outcome
Retail	Pothys	Chatbots, product recommendation engines	+28% conversions, –40% customer support load
Manufacturing	Jayem Automotives	AI-based defect detection systems	–30% downtime, +20% quality control
Logistics	LetsTransport	AI-driven route and fleet optimization	+22% delivery efficiency
Finance	Vyapar	AI-enabled invoice automation	–50% reduction in manual accounting efforts
Hospitality	StayVista	WhatsApp-integrated AI booking assistant	+35% bookings, reduced response time (3hr → 5min)
Healthcare	SigTuple	Diagnostic AI for pathology imaging	6x faster analysis
Marketing	DigiClues	Automated content generation, A/B testing	+2x ROI, –70% time on content creation

These implementations demonstrate how AI not only improves internal efficiency but also enhances customer experience and competitiveness. Sectors such as **manufacturing, finance,**

and **healthcare** are particularly benefiting from data-intensive AI applications, while **retail** and **hospitality** are leveraging AI for personalization and service automation.

Applications:

- 68% in innovation
- 48% in content/marketing
- 46% in customer engagement

Key Challenges in AI Adoption

Despite AI's transformative potential, a majority of MSMEs—especially in developing economies like India—face significant hurdles in adopting and scaling AI technologies.

A. Summary of Major Challenges

Challenge	Description	Primarily Affects
High Implementation Cost	Upfront costs for tools, infrastructure, and consultants deter adoption	Micro and small enterprises
Lack of Awareness	Many MSMEs are unaware of AI's benefits or available solutions	Traditional firms in Tier 2/3 cities
Skill Shortages	Insufficient access to data scientists, AI engineers, or trained staff	Services, logistics, manufacturing
Data Deficiency	Lack of clean, digitized, or real-time data hampers AI functionality	Low-digitization sectors
Integration Issues	Existing legacy systems incompatible with modern AI platforms	Older, established businesses
Privacy & Compliance Concerns	Hesitation due to uncertainty around data regulation and cyber risks	Finance, healthcare sectors
Weak Ecosystem Support	Limited access to incubators, funding, or policy guidance in rural areas	Remote and under-resourced MSMEs

Root Causes

- **Digital Maturity Gap:** MSMEs often lack the IT infrastructure and cybersecurity standards needed to adopt AI.
- **Vendor Dependence:** Heavy reliance on third-party providers increases long-term costs and decreases control.
- **Unclear ROI:** Many small businesses struggle to measure or forecast returns from AI adoption, making it harder to justify investment.

- **Fragmented Support Systems:** Government programs and private accelerators are unevenly distributed across regions.

Implications

These barriers slow down innovation, reduce competitiveness, and widen the digital divide. Unless proactively addressed, they risk excluding a large portion of MSMEs from the AI-driven digital economy.

Functional areas include sales/marketing (80%), app development (65%), R&D (60%), advertising (59%), design (56.7%), customer service (33%), and HR/SEO (~20%). Sector-specific use cases span retail (Pothys), manufacturing (Jayem), logistics (LetsTransport), finance (Vyapar), hospitality (StayVista), healthcare (SigTuple), and marketing (DigiClues).

8. Government and Ecosystem Support Government and Ecosystem Support

Recognizing the strategic role of MSMEs in economic development, governments and industry bodies are advancing multiple initiatives to foster AI adoption among small enterprises.

National-Level Support in India

MSME AI Lab A flagship initiative providing curated training modules, plug-and-play AI tools, and best-practice frameworks. It also acts as a think tank for shaping MSME-centric AI policy.

SAMARTH Udyog Bharat 4.0

A technology upgradation scheme under the Ministry of Heavy Industries aimed at promoting smart manufacturing and AI integration. It supports demonstration centers and collaborative platforms for Industry 4.0.

CHAMPIONS Portal (Creation and Harmonious Application of Modern Processes for Increasing the Output and National Strength)

An AI-powered grievance redressal and guidance portal, offering MSMEs real-time help with finance, raw materials, labor, and tech-related queries.

AI for All by MeitY (Ministry of Electronics and Information Technology)

A pan-India initiative for AI literacy, awareness, and collaboration. It supports AI startups building MSME-focused solutions.

State-Level and Cluster-Based Ecosystem Support

1. APMSMEDC (Andhra Pradesh MSME Development Corporation)

This initiative offers integrated support including infrastructure, funding, market access, and AI skill training tailored for industrial clusters.

2. **TNSDC & KSUM** Tamil Nadu Skill Development Corporation (TNSDC) and Kerala Start up Mission (KSUM) have launched AI accelerators and training hubs for MSMEs across southern India.

Industry and Academic Collaborations

- **NASSCOM** and **CII** run AI-on boarding programs for SMEs in collaboration with AI solution providers.
- Several Indian Institutes of Technology (IITs) and Indian Institutes of Information Technology (IIITs) conduct research and run AI adoption pilots for local MSMEs.

Emerging Global Models to Watch

- **Singapore's SMEs Go Digital Program** offers vouchers and AI toolkits for small businesses.
- **Germany's Mittelstand 4.0 Centers** provide hands-on AI training and consultation for SMEs.
- **Canada's Scale AI Supercluster** funds applied AI projects involving startups and SMEs.

These ecosystem efforts play a pivotal role in reducing the AI adoption gap by making tools more accessible, affordable, and applicable to MSMEs' real-world needs.

Challenges include high costs, lack of awareness, skill shortages, weak data infrastructure, integration barriers, trust issues, and ecosystem support gaps—especially for rural MSMEs.

Policy Recommendations

To accelerate the adoption of Artificial Intelligence among MSMEs, targeted policy interventions must address current barriers while fostering an inclusive, innovation-driven ecosystem.

Improve Accessibility to AI Tools

- **Promote Open-Source Platforms:** Support development and dissemination of free or low-cost AI solutions tailored to MSMEs.
- **Subsidized Cloud Credits:** Offer government-funded cloud computing credits to MSMEs for deploying AI solutions without high infrastructure costs.

Build AI Literacy and Skills

- **National AI Literacy Missions:** Launch regional awareness and training programs in vernacular languages to reach underserved communities.

- **Skill Vouchers:** Provide digital upskilling vouchers redeemable at accredited training institutes or online platforms.

Encourage Integration and Innovation

- **Legacy System Bridge Grants:** Fund tools and services that enable MSMEs to integrate AI with existing ERP, CRM, or inventory systems.
- **AI Innovation Sandboxes:** Create regulatory environments for MSMEs to test AI-driven ideas without compliance penalties.

Support Sector-Specific Adoption

- **AI-in-Manufacturing Grants:** Provide financial incentives to small manufacturers adopting AI in quality control, predictive maintenance, and logistics.
- **Healthcare and AgriTech Pilots:** Promote AI pilots in essential sectors with high MSME presence and societal value.

Embed AI in ESG and Digital Policy

- **Link AI Use to Sustainability Metrics:** Offer incentives for using AI in waste reduction, resource optimization, and ESG reporting.
- **Policy Harmonization:** Align AI, data privacy, digital lending, and startup policies to reduce friction in tech adoption.

Government support includes MSME AI Lab, SAMARTH Udyog Bharat 4.0, Champions Portal, and APMSMEDC for funding, skill-building, and AI access.

Conclusion

AI is a catalyst for inclusive and intelligent growth in the MSME sector. Its ability to reduce costs, increase productivity, and unlock new markets makes it essential for long-term competitiveness. However, inclusive adoption demands proactive support—from governments, incubators, tech companies, and MSMEs themselves. With coordinated effort, India can bridge the 15% usage gap and empower its 60+ million MSMEs with the digital tools of the future. Policy recommendations: open-source access, cloud tool funding, AI literacy campaigns, legacy system support, and ESG-linked AI use.

152. THE STRATEGIC ROLE OF ARTIFICIAL INTELLIGENCE IN DRIVING DIGITAL TRANSFORMATION IN MODERN ENTERPRISES

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Abstract

Artificial Intelligence (AI) has emerged as a catalyst for digital transformation, enabling organizations to reimagine business processes, develop innovative products, and improve operational efficiency. This paper explores AI's strategic role in facilitating enterprise-wide transformation, examining its applications across marketing, operations, finance, and human resources. It also considers the challenges of adoption, including ethical, governance, and workforce-related issues, and provides examples of organizations successfully leveraging AI to achieve competitive advantage.

1. Introduction

In an era of rapid technological evolution, organizations are increasingly adopting AI to remain competitive and relevant. Digital transformation—the integration of digital technology into all areas of a business—requires more than simple automation; it demands a shift in culture, strategy, and value delivery. AI acts as a cornerstone of this transformation, enabling companies to analyze massive datasets, predict market trends, automate decision-making, and deliver personalized customer experiences (Lee & Johnson, 2024). Research shows that 78% of global enterprises have integrated at least one AI-powered process, demonstrating AI's pivotal role in enterprise modernization (Davenport & Ronanki, 2018).

2. Literature Review

2.1 AI as a Driver of Digital Transformation

AI enables digital transformation by enhancing operational capabilities and strategic decision-making. Technologies such as machine learning, natural language processing, and computer vision are being applied in industries ranging from finance to healthcare (Nguyen & Carter, 2023).

2.2 Functional Applications of AI

- Marketing and Customer Engagement: AI analytics predict customer preferences, enabling hyper-personalized campaigns and real-time recommendations (Brown & Li, 2024).
- Operations and Supply Chain: Predictive analytics and intelligent automation reduce waste, forecast demand, and optimize logistics (Gartner Research, 2023).

- Finance and Risk Management: AI improves fraud detection, credit scoring, and real-time transaction monitoring (Bughin et al., 2018).
- Human Resources: AI platforms streamline talent acquisition, predict job performance, and optimize workforce allocation (Wilson et al., 2017).

2.3 Challenges in AI-Driven Transformation

Challenges include data privacy and compliance with regulations such as GDPR (Dwivedi et al., 2021), algorithmic bias in automated decision-making (Brynjolfsson & McAfee, 2017), and the workforce reskilling required to adapt to AI-driven environments (Bresciani et al., 2021).

3. AI in Technology-Enabled Business Models

3.1 Data-Centric Strategies

Modern enterprises rely on AI to convert raw data into actionable insights. For instance, Netflix uses AI to recommend content, increasing user engagement (Nguyen & Carter, 2023).

3.2 Process Automation and Efficiency

AI-driven robotic process automation (RPA) reduces repetitive tasks, enabling employees to focus on strategic work (Davenport & Ronanki, 2018).

3.3 Innovation and Product Development

Generative AI tools accelerate ideation and prototyping phases, allowing faster time-to-market (Brown & Li, 2024).

4. Case Studies

- Siemens: Integrated AI in predictive maintenance systems, reducing downtime by 20% (Bughin et al., 2018).
- JP Morgan Chase: Uses AI to analyze legal contracts, cutting review time from hours to seconds (Davenport & Ronanki, 2018).
- Unilever: Applies AI for demand forecasting, aligning production with real-time market needs (Gartner Research, 2023).

5. Ethical and Strategic Considerations

AI must be implemented responsibly. Enterprises should establish governance frameworks (Dwivedi et al., 2021), invest in employee reskilling (Wilson et al., 2017), and maintain human oversight in critical decisions (Brynjolfsson & McAfee, 2017).

6. Methodology

This research employed a mixed-method approach, combining secondary data from peer-reviewed journals, industry reports, and academic publications with a quantitative

survey of 100 MBA students and business professionals. The survey aimed to identify the most common applications of AI in modern enterprises. Respondents were asked to select from a predefined list of AI applications, including process automation, customer service chatbots, predictive analytics, fraud detection, product recommendations, and supply chain optimization. The data were analyzed using descriptive statistics, and the results were presented in a bar chart for clear visualization.

7. Results and Discussion

The survey findings (Figure 1) revealed that process automation was the most widely adopted AI application, with 70% of respondents indicating its use in their organizations. Predictive analytics followed closely at 65%, highlighting its growing role in decision-making. Product recommendations (60%) and customer service chatbots (55%) also showed strong adoption rates, indicating AI's value in enhancing customer experience. Conversely, fraud detection (50%) and supply chain optimization (45%) were less common, possibly due to higher implementation complexity and industry-specific requirements.

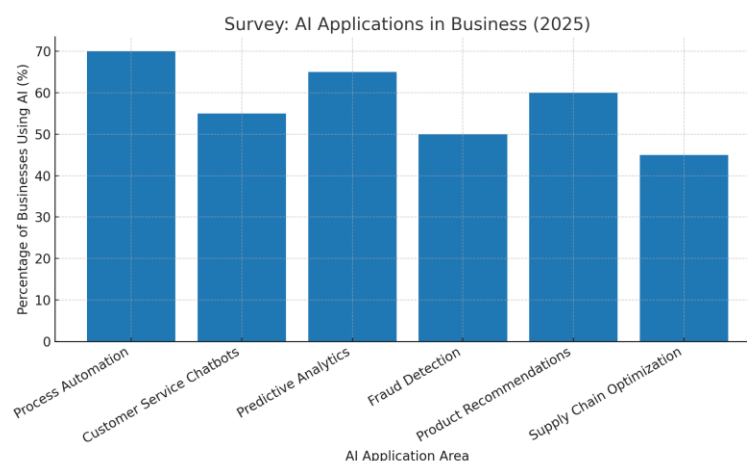


Figure 1. Survey: AI Applications in Business (2025)

The results align with previous research indicating that AI adoption is highest in areas with clear ROI and measurable efficiency gains (Davenport & Ronanki, 2018; Gartner Research, 2023). The findings also support the theory that digital transformation is driven by AI capabilities that are easy to integrate with existing systems (Nguyen & Carter, 2023). However, adoption disparities highlight potential barriers such as high costs, lack of skilled talent, and regulatory compliance issues (Dwivedi et al., 2021). Furthermore, the data emphasize the need for strategic alignment between AI initiatives and broader business goals. While AI's potential in supply chain optimization and fraud detection is significant, organizations may need to address technical and cultural challenges before fully leveraging

these capabilities. Future research could explore longitudinal adoption trends and investigate sector-specific variations in AI application.

8. Interpretation

The data suggest that enterprises prioritize AI tools that directly enhance operational efficiency and decision-making accuracy. The higher adoption rates for process automation and predictive analytics imply that organizations view AI primarily as a productivity enabler. Meanwhile, the moderate adoption of customer service chatbots and product recommendation engines reflects growing emphasis on customer engagement and personalization. The relatively lower adoption of fraud detection and supply chain optimization may indicate that these areas require more specialized infrastructure and domain expertise.

9. Conclusion

AI is not merely a technological upgrade—it is a strategic enabler of digital transformation. By integrating AI into their core strategies, enterprises can innovate faster, respond to market changes with agility, and deliver superior value to customers. However, organizations must address ethical, social, and governance challenges to ensure AI-driven transformation is sustainable and inclusive.

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153. SIMULATION-BASED INVENTORY OPTIMIZATION AND AUTONOMOUS LOGISTICS IN HEALTHCARE SUPPLY CHAINS

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ABSTRACT

This paper reviews simulation-based methods for inventory optimization and autonomous logistics in healthcare supply chains. It highlights how technologies like drones, autonomous vehicles (AGVs/AMRs), and AI-driven inventory management are changing medical supply systems. Recent studies show that these innovations can significantly improve responsiveness, such as faster delivery of life-saving supplies, while also cutting costs. For instance, simulations of drone-based blood delivery achieved much shorter lead times. This suggests that optimized drone routes could shorten lead times and improve the overall responsiveness of supply operations. Similarly, AI predictive analytics can optimize inventory levels and forecasting, reducing waste and stockouts. We explore how discrete-event and agent-based simulation models have been used to assess these systems in realistic conditions. Overall, the literature suggests that combining autonomous logistics and AI can make healthcare supply chains more responsive, cost-efficient, and resilient, which in turn supports better patient care.

Key words: Simulation-based modelling, Inventory optimization, Healthcare supply chains, Autonomous logistics, Drones in healthcare delivery, Automated guided vehicles (AGVs), Medical supply chain management.

INTRODUCTION

Healthcare supply chains are complex and critically important. They involve essential medical supplies such as drugs, vaccines, blood, and devices, which have tight time and quality requirements. Logistics costs can account for a significant portion of hospital budgets—up to 40% of total operational costs—and inefficient logistics can take medical staff away from patient care. At the same time, the quality of patient care relies on having the right supplies available when they are needed. As Nabayiga et al. point out, “the quality of healthcare delivery depends on the availability of medicines at the right place, on time, in the right quantities.” The WHO also stresses that efficient healthcare supply chains are crucial for

ensuring that essential medical products reach providers “in a timely manner, ultimately saving lives and resources.”

Traditional inventory and delivery methods, such as truck deliveries and manual warehousing, often struggle with demand uncertainty, perishable products, and labor shortages. Disruptions like pandemics or disasters can make shortages even worse. To tackle these challenges, recent research has suggested the use of autonomous logistics technologies and AI-driven inventory strategies. Examples include drone or autonomous vehicle deliveries of medical goods, robotic warehouse order fulfillment, and AI algorithms for demand forecasting and stock replenishment. Many studies use computer simulations to model and evaluate these innovations before implementing them. Simulation allows analysts to test different scenarios, such as demand patterns, vehicle speeds, and inventory policies, and measure outcomes like delivery times, service levels, and costs without affecting actual operations. In this review, we examine the literature on simulation-based inventory optimization and autonomous logistics in healthcare, underscoring how these methods can enhance responsiveness, cost-efficiency, and patient outcomes.

LITERATURE REVIEW

Inventory Optimization in Healthcare. Effective inventory management in healthcare is essential to avoid running out of crucial drugs and to minimize waste from overstocking perishable supplies. While classical models like multi-echelon reorder policies have been utilized, recent research emphasizes the role of AI and data analytics. Several authors have found that AI-driven demand forecasting and predictive analytics can greatly enhance inventory decisions. For example, Sabahat Khan et al. highlight that using AI “can optimize inventory management, improve demand forecasting, and streamline supply chain processes” in healthcare, resulting in reduced costs and improved service. Empirical simulations have demonstrated that integrating real-time data, such as consumption rates and epidemiological trends, into inventory models can lower the risk of stockouts. A systematic review of simulation studies in medical supply chains revealed that 19% of the reviewed papers focused on stockout reduction as a key issue. These studies frequently use simulations to test various inventory policies, including safety stock levels and order-up-to thresholds, under realistic demand variability. The conclusion remains consistent: intelligent inventory optimization, often with machine learning or reinforcement learning, can lower holding costs and shortages, thus improving care continuity.

Autonomous Delivery Technologies. Drones and autonomous vehicles are emerging as solutions for last-mile healthcare logistics. In rural or congested areas, unmanned aerial

vehicles (UAVs) can bypass road congestion to deliver medicines and blood quickly. Mayuri and Gowsalya (2025) introduced a mixed-integer model combined with path algorithms to optimize drone routes for blood supply chains, focusing on minimizing lead time. Their model included drone payload and range constraints to ensure “the fastest delivery of lifesaving blood products.” Similarly, Wang et al. (2022) employed an agent-based simulation of a rural drone network and found that optimizing depot and charging station locations produced over 15% cost savings compared to baseline scenarios. Such studies indicate that drones can significantly enhance responsiveness. One simulation of drone delivery during COVID-19 highlighted that “drones greatly improve logistics, especially in rural areas, where inefficient road networks reduce the delivery capacity of conventional ground vehicles.” Importantly, quicker deliveries of critical supplies, like blood in emergencies, can directly enhance patient outcomes by minimizing delays.

Autonomous Vehicles and Robotics in Hospitals. Within hospitals, autonomous ground vehicles (AGVs) and mobile robots have been studied for internal transport, such as moving medications, linens, and instruments. Guo et al. (2025) created a discrete-event simulation of AGVs serving operating rooms, and their findings showcased significant labor savings. The model indicated that using AGVs could recover about 23% of medical staff’s time spent on transport tasks, allowing that time to be redirected toward patient care. Efficiency gains were particularly large during high-demand scenarios with smart routing. “Efficiency gains are notably substantial in high-demand scenarios,” especially when using advanced assortment algorithms and larger AGV fleets. In general, AGVs are noted for saving logistics costs and improving productivity in hospitals. For example, they have consistently been found to reliably deliver supplies across hospital wards, “demonstrating a solid solution for saving logistics-related costs and improving efficiency and productivity in healthcare delivery.” Warehouse automation, such as robots picking and packing at hospital pharmacies or central stores, also promises higher throughput and fewer errors, although detailed simulation studies in healthcare warehouses are still developing.

Simulation Approaches. Across these areas, simulation modeling has been widely applied. Nabayiga et al. (2025) reviewed simulation studies in medicine supply chains and noted that healthcare research employs a mix of discrete-event (DES), agent-based (ABS), and system dynamics (SD) models. DES is commonly used for modeling hospital workflows and logistics processes, while agent-based models can capture autonomous decision-making, such as drones or robots interacting within a network. In fact, many recent studies adopt hybrid approaches; for instance, Wang et al. combined ABS with a genetic algorithm to

iteratively enhance drone-network design. Literature also underscores the necessity of validating simulation models. Only about 32% of simulation studies reported formal verification or validation, and many authors advocate for improved real-world testing. Merging multiple simulation methods, such as DES and SD, is suggested for complex challenges like multi-echelon inventory and logistics management.

METHODOLOGY

In the reviewed studies, researchers typically develop simulation models of the healthcare supply chain that include facilities (warehouses, hospitals), vehicles (drones, AGVs, trucks), and products (drugs, blood, devices) with stochastic demand. Key inputs include demand forecasts, transportation speeds, vehicle capacities, and lead times. For autonomous logistics, models explicitly consider vehicle characteristics, such as a drone's payload, speed, and range, as well as a robot's battery life and docking points. In a typical discrete-event simulation, entities representing supplies navigate through networks; events encompass order arrivals, transport dispatches, and restocking. Agent-based models have also been utilized to simulate independent decision-makers, such as dispatching vehicles based on local rules. Many studies incorporate optimization or heuristic rules within simulation. For example, a genetic algorithm was applied alongside ABS to identify near-optimal drone depot locations.

Performance metrics assess delivery lead time, fill rate (service level), inventory holding and shortage costs, and labor hours. Simulation experiments often compare scenarios like manual logistics versus autonomous systems, or different inventory policies, such as AI-optimized forecasting versus traditional reorder points. Sensitivity analysis is common, examining the effects of demand variability or infrastructure changes. In one blood delivery study, randomly generated instances were used to evaluate route planning with Dijkstra's algorithm. In the AGV simulation, design-of-experiments methods varied fleet size and restocking frequency to determine efficient configurations. Overall, the methodology emphasizes addressing real-world constraints, such as perishability, capacity limits, and charging requirements, while measuring system-wide outcomes.

RESULTS AND DISCUSSION

Simulation studies consistently demonstrate that autonomous and AI-enabled strategies enhance supply chain performance in healthcare. Responsiveness: Drone simulations reveal significantly shorter delivery times, especially over challenging terrain. In the blood supply model, for example, optimal drone routes substantially reduced delivery lead times. The results "demonstrated the efficiency" of the drone method in optimizing delivery

routes and “significantly reducing lead times.” The study indicated that each additional charging stop adds roughly 3 to 5 minutes to delivery time, making it crucial to minimize stops. They also observed that the strategic placement of facilities greatly affects lead time; selecting the best hospital or clinic locations for drone exchange points can enhance delivery speed.

Simulations of in-hospital robotics also show significant improvements. Incorporating AGVs into surgical instrument logistics led to considerable efficiency increases. Under high-volume scenarios, more AGVs and smarter routing nearly doubled the relative efficiency compared to manual methods. Importantly, automating routine transport recovers staff time. The AGV model predicted that nursing and technician time savings could reach around 23%, which allows for greater focus on patient care activities. Even with partial automation, simulations of systems like conveyor belts or forklift trucks reveal similar improvement potential.

Cost-Efficiency: Autonomous systems can also lower expenses. The rural drone simulation indicated a 15% reduction in total costs compared to a conventional delivery benchmark. AGVs lower labor costs and reduce errors or damage, contributing to long-term savings. AI-driven inventory strategies lower excess stock and emergency procurement costs. For instance, predictive analytics that better align supply with demand have been reported to cut waste and limit stockouts. One survey notes that AI in forecasting and inventory optimization “can optimize inventory management...leading to cost reduction and improved service delivery.” Overall, simulations suggest that while the initial investment in technology is significant, the lifecycle cost benefits—such as less waste, fewer urgent orders, and improved utilization—can be substantial.

PATIENT CARE OUTCOMES

Though simulation papers seldom measure clinical outcomes directly, the implications for patient care are clear. By minimizing stockouts and ensuring timely delivery, these methods support better treatment continuity. Nabayiga et al. stress that avoiding medicine shortages is crucial since supply bottlenecks can directly compromise care. The autonomous delivery of emergency supplies, such as blood, antibiotics, or antivenom, can save lives by reducing critical delivery times. For example, the drone model was specifically crafted to ensure “the fastest delivery of lifesaving blood products.” Additionally, reducing logistics tasks for clinical staff, as AGVs do, allows them to concentrate more on patient care, which can indirectly boost outcomes. Simulation studies frequently use service level metrics, like fill rate, and consistently observe higher service levels with AI and autonomous strategies. In

short, better responsiveness and efficiency in the supply chain led to more reliable care delivery.

Challenges and Trade-offs: The studies also underscore trade-offs. Drones have restrictions on payload and range, meaning multiple vehicles or intermediate stations may be necessary, which adds complexity. Simulations help quantify these trade-offs; for example, one model showed that each extra stop for battery swaps gradually increased delivery time, stressing the need for optimized routing. Similarly, deploying too few AGVs causes bottlenecks, while having too many wastes resources. Simulation enables the identification of the ideal balance through design-of-experiments methods. Validation and real-world data present challenges as well; numerous models highlight the lack of actual usage data. A common recommendation is to integrate real-time data, such as traffic and weather conditions, into these models. For instance, authors propose improving drone routing by using GIS maps and live traffic and weather updates for dynamic rescheduling.

CONCLUSION

Simulation-based research confirms that blending autonomous logistics and AI-driven inventory strategies can greatly enhance healthcare supply chains. The studies reviewed here show that technologies like drones and mobile robots reduce delivery times and labor needs while AI forecasting decreases stockouts and waste. The overall result is a more responsive system that meets patient needs more quickly, improves cost-efficiency, and likely enhances patient care. For example, Mayuri and Gowsalya's drone model not only reduces lead times but also indicates that optimized routing can save lives by delivering blood faster. Similarly, AGVs in operating rooms free staff to focus on clinical duties and maintain instrument availability.

Future work should continue to improve these models using real-world data and better simulations. Integrating live data, such as traffic, inventory levels, and patient demand, into digital twin models is a promising path. Hybrid simulation methods that combine discrete event simulation and agent-based modeling can capture complex interactions between hospitals and suppliers. As these technologies develop, simulation will remain essential for planning and validating them. Overall, the literature shows a clear trend: adopting AI and autonomous logistics, supported by thorough simulation studies, can transform healthcare supply chains into stronger, more efficient systems that ultimately lead to better patient outcomes.

154. A STUDY ON ARTIFICIAL INTELLIGENCE IN SOCIAL MEDIA MARKETING

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Abstract:

This presented review paper includes every current trend in artificial intelligence. The potential of artificial intelligence (AI) in social media marketing is assessed in this review. The purpose of this review article is to investigate AI's potential in social media marketing. The goals of simulating AI in commercial organisations are met by this review study, which improves marketing and boosts sales. The purpose of the study is to analyse AI's potential and advantages. The use of AI in the marketing domain will be examined in this review article. From the general to the specific, the review progresses. It assesses the impact of AI on corporate organisations in particular as well as society at large. It evaluates how AI will impact social media and business.

Keywords:

Artificial Intelligence, Virtual Reality, Augmented reality, Marketing, business organisation, media, Social Media, Social Media Marketing, Influencer marketing.

I. INTRODUCTION

According to **Siau and Yang (2017)**, artificial intelligence (AI) is the intelligence or capacity for thought and imagination that is ascribed to computers that would not otherwise possess these abilities. Technology is advancing, and the result of that advancement is artificial intelligence. Every aspect of civilisation has been infused with the Midas touch by technology. Additionally, business and its divisions have not been left behind.

Artificial intelligence and technology have a significant impact on marketing (**Dimitrieska, Stankovska, and Efremova, 2018**). Marketing statistics had already changed due to the presence of social media and technology, but the addition of artificial intelligence has raised the ante.

Artificial intelligence, according to **Kose and Sert (2017)**, has introduced new aspects including automated marketing, improved customer support, and Slack bots. Face and voice recognition are among the elements that keep the technology comparable to previous variants. AI appears to be the most fundamental requirement in marketing. In social media marketing, deep learning, facial recognition, AI-enabled chips, cloud storage, and more etched privacy policies are the current and emerging trends of AI. The conventional methods of marketing

have been completely transformed by the incorporation of AI into marketing plans. The development of artificial intelligence has created a wealth of new avenues and areas for future research.

II. RESEARCH METHODOLOGY

The available secondary sources have been analysed in this review report. The publications published by various organisations have been taken into consideration when assessing the advancement of artificial intelligence in marketing. Since secondary sources are reliable sources that offer data that is nearly error-free, they were taken into consideration for the review study. Finding a solid and convincing conclusion and understanding is made easier by the nearly error-free data (**Fletcher, 2017**).

Aims and Objectives

The investigation has a feasible direction thanks to this section of the text. The study's only goal is to comprehend the dynamics of artificial intelligence in marketing and business. In order to accomplish the aforementioned goal, the research must set the following goals. These objectives will make it easier to investigate AI-related concepts in greater depth and accuracy.

- To comprehend how social media operates.
- To comprehend the basic ideas of artificial intelligence.
- It is necessary to demonstrate the significance of artificial intelligence in social media.
- To demonstrate how AI's picture recognition technology works within the company.
- To comprehend the role that artificial intelligence plays in corporate settings.
- To determine how social media analytics and AI are related.
- To investigate AI's possibilities in social media marketing.

III. LITERATURE REVIEW

Intelligence and Analytics for Social Media **Stalidis, Karapistolis, and Vafeiadis (2015)** claim that the introduction of artificial intelligence (AI) into technology has revolutionised the way that information is processed. Much progress has also been made in the way that technology is approached. Social media has had positive growth as a result of AI integration. The company has made substantial use of social media as a marketing tool.

The statistics of social media marketing have also improved as a result of the incorporation of AI. Because of the integration, the marketing paradigm has shifted from using only traditional approaches to using sophisticated digitalization. Every customer can criticise the current online usage patterns. It becomes quite challenging to evaluate customer conduct and emotions with an Excel sheet alone. It is difficult to get numerical statistics about

specific favouritism and opposition in the current trend of hashtags and emojis. The data gathered by analysts is essentially worthless in the current scenario without intelligent analytics.

According to **Marinchak, Forrest, and Hoanca (2018)**, next-generation AI uses both structured and unstructured data as its data sources. The analytics method has been improved by artificial intelligence based on the latest marketing trends.

In subtle ways, the incorporation of transformative AI into social media has aided analytics:

- Converts merely insights into actual data, enabling organisations to reach better conclusions;
- As it functions and thinks nearly like a human, transformative AI also aids in analytics by assisting with judgment and data conclusions. Social Media and the Transformation of Businesses

According to **Kane (2017)**, social media has completely changed society. The implementation of AI in the technical sector has significantly changed the corporate landscape. Additionally, the methods of running the complete business process have changed from being manual to digital. Marketing is one industry that has been significantly impacted by the emergence of social media. The method and approach used in marketing have undergone significant modification. Social media assistance has shown itself to be a useful addition to marketing plans. AI and technology are always changing. Virtual reality, augmented reality, and other applications of deeper intelligence are some of the dimensions that have been added to the depths of AI. The businesses' marketing strategies have been improved by the aforementioned technicalities. Business transformation has reached a new level thanks to social media.

According to **Le et al. (2016)**, social media can have a subtle impact on a business in the following ways:

- It enhances the company's visibility from a local to a worldwide level. The company can reach a wider audience thanks to social media.
- Social media marketing will help the company improve the perception of its brand. The company is closer to its clients thanks to social media.
- Social media proved to be a more cost-effective method for corporate companies, and the closer connection results in higher consumer satisfaction.

The Effect of AI on Successful Businesses. The promise of AI to empower social media marketers through automated bidding, 24/7 online presence, improved audience targeting, and AI-assisted content creation will be covered in this section.

Alexa, Bixby, and Siri are the most prevalent examples of AI in everyday life. Because of its nature, artificial intelligence is more complex. Businesses employ social media specialists to sift through content and generate more customer-friendly and revenue-generating information for the website, which increases inbound traffic and leads on the page (**Fiumara et al., 2018**). It can help businesses thrive in the market in addition to improving the current way of life.

According to **Theodoridis and Gkikas (2019)**, integrating elements like machine learning and big data measurement improves operational efficiency. Businesses have saved time and money by implementing chatbots in the customer care department. It has made it possible to solve the issues quickly. Even if chatbots have their limitations, there is a huge amount of room for improvement in customer service systems as technology advances. The creation of leads that will soon become profitable salespeople is another significant impact of AI in marketing. When it comes to marketing, AI systems are more efficient than humans in processing data. Using automation software, an AI system such as Node assists the company in categorising potential leads into consumers. LinkedIn is one of the well-known companies that uses AI to its fullest potential, converting leads into sales. The potential of social media marketing with AI assistance This section will cover the ways in which AI may empower social media marketers through automated bidding, 24/7 online presence, improved audience targeting, and AI-assisted content creation. AI has already made an appearance and entrenched itself in the marketing sector. AI has a good possibility of surpassing all previous outdated methods. If AI were to compete against anything, it would have a good chance of winning. The organisation is made possible and strengthened by AI-assisted social media marketing. Effective marketing tactics will increase the company's sales.

The marketing industry's main goal is to raise sales, which will be achieved through the use of AI (**Fast and Horvitz, 2017**). AI gives the company more advanced approaches than the antiquated traditional ones. AI is the only technology that has been able to increase the potential of social media marketing in an open market of competition by using tools like virtual reality, alternate reality, and voice and face recognition (**Cockburn et al., 2018**).

Interactive product customisation has created a fantastic chance for clients to have a unique experience in today's marketing methods. Social media marketing and artificial intelligence (AI) go hand in hand since both are reliant on technology, which is always changing. Social media and artificial intelligence (AI) will continue to develop and transform in their own unique ways, making them the most advantageous combination in the marketing industry.

Social Media: The Present and the Future One of the most demanding technologies of the last few decades is artificial intelligence, which has emerged as a result of the rapid advancement of technology. The world is currently dominated by it, and humanity will soon be entirely dependent on its technology. AI has generated a huge space in every industry, including retail, aviation, hotel, and in-service sectors. Social media has also been greatly impacted. Social media's introduction of artificial intelligence has aided in business expansion. The purpose of social media is to establish connections with people worldwide. The main goal is to make new connections, exchange information, and engage with others while influencing one another positively or negatively (**Zeng, Chen, Lusch, et al., 2010**). A wide range of services are shared on social media, which helps both the company and society as a whole. Artificial intelligence is playing a significant role in the enormous benefits of social media. The application of artificial intelligence in daily life is growing. Numerous social media platforms, including Facebook, Instagram, and Twitter, have greatly expanded their functionality through the use of artificial intelligence. Additionally, LinkedIn is a heavy user of AI technology, which has aided professionals in locating better options for companies and candidates. It has also significantly aided in the growth of social media marketing. Artificial intelligence is going to take over the planet very soon. Humans will eventually be replaced by artificial intelligence, and consumers and brands will have a close relationship (**Erdoğan and Cicek, 2012**). Social media has seen significant changes as a result of artificial intelligence.

IV. FINDINGS AND DISCUSSIONS

Artificial intelligence has had a significant impact on people's lives. It is less expensive than the old method and makes managing the complex task easier. In addition to saving a significant amount of time, social media marketing significantly lowers operating expenses. Businesses will be able to comprehend the unique needs of their clients by integrating AI into social media analytics. By examining the market's current trends, AI assists in determining the organization's demand for growth in the proper path. Additionally, it has greatly improved customer service because meeting customer requirements and desires makes it easier for businesses to survive. As AI develops, corporate organisations can achieve greater success. According to **Aral, Dellarocas, and Godes (2013)**, AI's technical inventiveness and acute sensitivity always assist the company stay ahead of the competition. It has been discovered that social media analytics is the process of creating and assessing informatics frameworks and tools to visualise, gather, track, summarise, and analyse social media data gathered by the target audience according to certain needs. Additionally, it aids in

reducing the distance between two people. AI has a positive impact on business and is a major factor in the rise in sales for various product and retail companies. Social media analytics assist the organisation in compiling and assessing the information gathered from the website and planning the next course of action. The process of social media analytics has improved once artificial intelligence was introduced into this entire data evaluation process. AI has also been shown to reduce corporate errors and theft.

According to **Müller and Bostrom (2016)**, it can eradicate even the smallest human error or theft and provide a risk-free environment for organisations. Because AI-based systems can better assess social media data and determine users' interests, it also aids in lead creation. Because of the development of AI, the entire structure of businesses has transformed. It has been determined that artificial intelligence (AI) is and will continue to dominate the future in a more sophisticated manner. The forecasting of social media marketing, both now and in the future, has benefited greatly from it. Strong ties between brands and consumers have been facilitated by it. Strong ties between purchasers have also been facilitated by it. AI would spur new innovation and aid in growth and productivity if it were fully used in social media marketing (**Hennig-Thurau, Hofacker, and Bloching, 2013**). In the future, it will assist people in concentrating on higher value analysis, innovation, and decision-making processes. Because of the development of artificial intelligence, operational costs such as transportation have been decreased, and the entire business process is operating in less time. The literature evaluation indicates that artificial intelligence has a positive impact on the growth of several economic sectors. New elements in social media marketing that use artificial intelligence have aided in the evolution of social media over time.

V. CONCLUSION

In conclusion, social media marketing has become easier and more versatile with the introduction of artificial intelligence. People today have less time for traditional forms of marketing and rely only on social media to buy the goods they want. However, the advent of AI has made it simpler to buy and sell goods, and productivity has also significantly increased. The future of society will be shaped by artificial intelligence, and if used properly, it will improve the state of the planet in the years to come. Since AI is the quickest way to produce goods, humans will become completely dependent on it, and this dependence will grow across the world.

155. THE FUTURE OF ARTIFICIAL INTELLIGENCE

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Abstract

We present a global Artificial Intelligence (AI) conceptual framework, operationalization, and forecast to the year 2100. A series of AI indices were developed within the International Futures (IFs) integrated assessment platform, a quantitative macro-level system that produces dynamic forecasts for 186 countries. IFs models extensively interconnected aspects of global human development, including: agriculture, economics, demographics, energy, infrastructure, environment, water, governance, health, education, finance, technology, and international politics. We conceptualize AI in three categories: narrow AI, general artificial intelligence (AGI), and super intelligence. Today's AI consists of six basic and narrow AI technologies: computer vision, machine learning, natural language processing, the Internet of Things (IoT), robotics, and reasoning. As an index score for all approaches 10, we forecast AGI technology to become available, representing it with a machine IQ index score, roughly analogous to human IQ scores. The emergence of AGI is constrained by the rate of improvement in and development of machine reasoning and associated technologies. When machine IQ scores approach superhuman levels, we forecast the emergence of super intelligent AI. The current path forecast estimates that AGI could appear between 2040 and 2050. Super intelligent AI is forecast to be developed close to the end of the current century. We frame the current path with faster and slower scenarios of development and facilitate analysis of alternative scenarios. Future work can assess the complex impacts of AI development on human society, including economic productivity, labor, international trade, and energy systems. Keywords: Artificial Intelligence, International Futures (IFs), Super intelligence, Modeling.

Introduction:

The term Artificial Intelligence, or AI, conjures widely different images and expectations for many different people. Some imagine a world filled by autonomous vehicles zipping around without human input. Others may imagine a world where intelligent robots work alongside humans helping to remove much of the drudgery and daily toil from their lives. Some see rapid advances in healthcare and healthcare technologies, enabling humans to live healthier, fitter, and longer lives. Some may see a world where AI becomes the great

equalizer, lowering the cost of production and making a wide range of goods available to broad swathes of the population. And yet for some, AI conjures fear and foreboding, a world characterized by mass dislocation of labor and inequality, generating vast social instability. The great fear is that AI comes to surpass human capability with devastating and unknown consequences. We begin with consideration of some of the drivers of AI development, in particular: hardware and software development, the rise of Big Data and cloud computing, information and communication technology penetration rates, and growing in.

A Survey of Drivers of AI

To understand and identify trends in AI development, a survey of the key conceptual and technical drivers is important. Important drivers include: hardware and software development, commercial investment, Big Data and cloud computing, and levels of Information and Communication Technology (ICT) penetration. We recognize that this list may not be neither comprehensive nor exhaustive but believe that these areas represent important proximate drivers of AI and important conceptual building blocks of the AI forecasting capability in IFs.

Hardware Development

AI development relies on two major technological thrusts: hardware and software. Hardware, or computing and processing power, has traditionally been conceived in relation to Moore's Law. Named for Intel co-founder Gordon Moore, it refers to his observation in 1965 that the number of transistors on a computing microchip had doubled every year since their intervention, and was forecast to continue along that trajectory

Software Capabilities

AI development is being catalyzed by more than just more powerful hardware. Improved software has facilitated AI development is being catalyzed by more than just more powerful hardware. Improved software has facilitated the development of more complex and powerful algorithms, an essential component of many new AI technologies. Deep learning, software capable of mimicking the brain's neural network, can learn and train itself to detect patterns through exposure to data

Cloud Computing

Alongside Big Data, the internet and cloud computing (internet-based computing services) are important catalysts of AI development. They have helped to make vast amounts of data available to any device connected to the internet and they allow for crowd sourcing and collaboration that can improve AI systems Cloud computing is fundamentally

restructuring the licensing and delivery of software, operating platforms, and IT infrastructure.

IFs: Representing AI

We now turn to a discussion of the construction and conceptualization of the AI indices in IFs. Understanding the IFs platform is important for understanding how the AI representation is integrated within the tool and how could be used to model the impact of AI. IFs is an open-source, quantitative modeling tool for thinking about long-term futures. Building on 5,000 historical data series, IFs helps users understand historical patterns, explore the current path of development and the trajectory we appear to be on (or the current path), and shape thinking about long-term futures. To do this, IFs leverages relationships across hundreds of variables from 12 dynamic, interconnected systems of human development.

AI Variables in Ifs

The first variable added to IFs, AITASK, estimates and forecasts technological progress along each of the six areas of narrow AI we defined above: computer vision, machine learning, natural language processing, Internet of Things, robotics, and reasoning. AITASK is represented as an index scaled from 1 to 10, where 1 represents no development, and 10 represents full or complete development (see below for a more in-depth discussion of our thinking in this respect). The index score along each of these narrow technologies is initialized in 2015 (the IFs base year). The second variable added to IFs, AITASKGR, represents the annual growth rate along each of these technologies, and saturates on approach to 10 for each. Each narrow technology grows at a different pace, estimated by the authors using inputs like performance benchmarks, complexity of each technology, investment, and levels of research. AITASK Reasoning grows at the slowest pace of the AITASK indices. Progress along this index represents the movement towards machines capable of reasoning completely, complex decision-making, and provided with a sense of purpose and awareness of the world around them. Any movement from narrow to AGI in the IFs index is implicitly constrained by the pace of AITASK Reasoning, regardless of progress among the other areas of narrow AI development. Finally, we have also added AIMACHIQ, a variable which represents the movement from narrow AI to general and super intelligent AI. AIMACHIQ is scaled as an index representing machine IQ scores, roughly corresponding with human-level IQ scores. In the current path, the movement from narrow to AGI occurs when an index score of 10 is achieved for each of the narrow technologies denominated under AITASK, except for AITASK Reasoning, which is at 5. This transition is reflected on AIMACHIQ at an index score of around 60. At that point, the index forecasts AGI will have been achieved, though a

score of 60 corresponds to machines with the equivalent of low-level human intelligence. AIMACHIQ then grows algorithmically as AITASK Reasoning continues to improve, saturating toward an index score of 200 as AITASK Reasoning reaches 10. An AIMACHIQ score of between 180 and 200 represents machine super intelligence, as this would correspond with some of the highest reported IQ scores among humans

IFs: Exploring the Impacts of AI

Economic Productivity

A 2016 report by Accenture, a consulting firm, laid out three avenues through which AI could enhance economic activity. The first is through intelligent automation, wherein AI is able to automate complex physical tasks, such as retrieving items in a warehouse. Increasingly intelligent AI machines are anticipated to be able to adapt across different tasks and industries. The second way AI will improve technology is by enhancing labor and capital, by freeing labor to act more creatively, imaginatively, and freely.

Labor

At present, there is little that captures the attention of mainstream media and policymakers like the potential impact of AI on labor, particularly through the computerization and automation of jobs. At the 2017 World Economic Forum in Davis, a panel of technology leaders and AI experts focused not on the potential for large profits and the business gains, but how to deal with those left behind in the digital age

Estimating the impact of AI on labor also forces us to think about jobs as a series of tasks rather than as one monolithic entity. The same McKinsey Global Institute Report actually estimated that only 5% of jobs could be fully automated, but that close to 60% of jobs in the US market could be up to 30% automated at the task level within the next 20 years. This adds weight to the argument of optimists that AI will actually free up human labor for more meaningful activities.

Localization of Production and International Trade

Another trend that could be significantly impacted by the rise of AI deserves consideration: reshoring and the localization of production. Automated technologies are making it increasingly inexpensive for companies to produce goods at home, reducing the need for off shoring in search of cheap labor and competitive prices. In the US there has been discussion around the idea of reshoring and anecdotal evidence suggests it is happening, yet critics contest the US government does not maintain exhaustive data on reshoring and that the definition of reshoring itself remains contested, thus it is difficult to say whether it represents an industry-wide trend.

Nevertheless, the fact remains that automation, coupled with low-cost energy and rising wages in the developing world, particularly China and India, has the potential to make companies rethink where they base their operations. There are also incentives for companies to base their operations close to their primary markets to reduce shipping time and costs, and improve their ability to respond to local market needs and fluctuations. Moreover, in today's populist political climate, there are incentives that encourage companies to invest locally. In an AI-led world, it is possible that a majority of production happens locally, reducing the necessity for the cross-border movement of goods and services. The energy sector is one where this potential trend could manifest itself with significant implications for global trade. AI has the potential to disrupt current energy patterns by driving growth in renewable production that causes a reduction in the volume of international trade in traditional energy products, particularly fossil fuels.

The growth of renewable energy capable of being domestically sourced and harnessed has important implications for global trade. Crude oil and its derivatives remain the most valuable traded commodity in the world. According to the UN Conference on Trade and Development (UNCTAD), trade in oil, gas, and petroleum products were estimated at between \$1 and \$2 tn in 2014 and 2015, among the largest of the 25 categories of goods and services tracked by the organization. British Petroleum (BP) estimated that in 2015 close to 1.02 billion tons of crude oil were exported and 1.9 billion tons were imported

Conclusion

This report has outlined a conceptual framework, operationalization, and forecast of AI to 2100. It has also laid out the potential to model the impact of AI within IFs with a particular focus on economic productivity, labor, and international trade and production localization. We will not try to summarize our findings here but instead encourage the reader to revisit the executive summary. We conclude this report by reminding readers of the benefits that quantitative modeling can bring to the understanding of AI and its disparate impacts. We have been forthcoming about the level of uncertainty surrounding this forecasting exercise and have designed the AI representation to provide maximum user flexibility and freedom. AI development is rapidly unfolding and is expected to have broad social and global impact. To better unpack and understand the future impact of AI requires connecting the AI forecast representation to other areas of the IFs model. This is an important area of future research and IFs remains uniquely placed to pursue this endeavor. We fully believe further exploration and forecasting of these issues will be beneficial to the research community and broader public alike.

156. THE IMPACT OF AI AND MACHINE LEARNING IN HR TECHNOLOGY

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ABSTRACT:

This study focuses on the application of artificial intelligence (ai) in human resource management and examines its role in improving efficiency, decision-making, and employee engagement. The research highlights how ai tools are being used in recruitment, performance management, training, and compensation, thereby helping organizations to achieve better accuracy and effectiveness in hr functions. Data was collected from a sample of 139 respondents through structured questionnaires and analysed using statistical tools, including descriptive analysis and chi-square tests. The findings indicate that ai positively influences hr practices by reducing bias, saving time, and supporting data-driven decisions. However, challenges such as lack of awareness, technical limitations, and resistance to change remain key barriers to adoption. The study contributes to understanding how ai can act as a strategic partner in hr, offering organizations a competitive advantage.

INTRODUCTION

Today, technology is changing very fast, and companies use it to stay ahead in business. Among these technologies, Artificial Intelligence (AI) and Machine Learning (ML) are very important. They are not only used in technical areas but also in Human Resource Management (HRM), where they are changing the way companies hire, train, and manage people.

AI helps companies to find and acquire the right skills needed in the industry. It can study a large amount of data, predict what skills will be needed in the future, and guide managers in making better hiring decisions. Machine Learning, on the other hand, improves HR procedures like recruitment, training, employee evaluation, and retention. It makes these tasks faster, more accurate, and less biased.

When AI and ML are used together, they create a strong impact on overall HR processes. They help make HR more data-driven, efficient, and future-ready. This allows companies to save time, reduce errors, and focus more on developing employees in line with the company's goals.

This study focuses on understanding how AI helps in gaining top industry skills, how ML supports HR procedures, and how both AI and ML together are changing HR practices in organizations.

LITERATURE REVIEW:

Author & Year	Focus of Study	Key Findings	Research Gap
Beeson & Geerts (2019)	Role of AI in recruiting, ML in HR procedures, overall, AI & ML impact on HR operations	AI & ML improve decision-making, recruitment, and HR optimization; but also bring challenges	More research is needed to understand long-term opportunities and challenges
Carroll et al. (2019)	AI in talent acquisition and hiring	AI helps streamline hiring, sourcing, and screening; improves decision-making and reduces bias	Organisations must adapt HR procedures to fully benefit from AI & ML
Deloitte (2019)	Practical insights into AI & ML in HR	Differentiates hype vs. real impact; AI useful in hiring and ML in HR operations	Need to study the actual effectiveness of AI & ML in real workplace contexts
Ghosh et al. (2021)	Role of AI in HRM	AI is useful in personnel management, recruiting, and HR analytics; also raises ethical & moral concerns	Further study needed on balancing AI benefits with ethical issues
Hashem et al. (2021)	AI & ML applications and limitations in HRM	AI & ML improve workforce planning, HR analytics, and talent acquisition; but difficulties & restrictions remain	Requires deeper investigation into real-world application & long-term impact
B. Srinivasa Rao; et al., (July 2022)	Use of AI & ML in HRM and market research	AI and ML are used by both tech and non-tech firms (e.g., Google, IBM, Amazon, Walmart) to manage employees, improve organization, and support market research. A survey with 51 professionals showed strong agreement on the effectiveness of AI & ML in achieving organizational goals.	More empirical research is needed on long-term impacts and integration challenges of AI & ML in HRM and market research.
Prabu Manoharan (2024)	Integration of AI & ML in HRM and future trends	AI & ML are no longer optional but essential; they enhance productivity, decision-making, and competitiveness	More empirical evidence is needed to validate long-term trends and strategic adoption
Sunil Basnet (2024)	Expanding role of AI & ML in HRM	AI & ML are transforming HR functions, from supply chain to talent management; essential for survival and growth	Need for deeper studies on balancing human vs automated work and its impact on employees

OBJECTIVE OF THE STUDY:

1. To determine how AI contributes to acquiring the top industry skills
2. To assess how machine learning contributes to HR procedure
3. To Comprehend how AI and ML are affecting HR processes.

Artificial Intelligence, Machine Learning Contributions HR Outcomes

Conceptual Framework of the Study

STATEMENT OF THE PROBLEM

Human Resource Management (HRM) is very important for the success of any organization. But traditional HR methods face problems like bias in hiring, slow decision-making, and difficulty in handling large amounts of employee data.

With the rise of Artificial Intelligence (AI) and Machine Learning (ML), many companies are using these tools in HR. However, it is still not clear how much they really help in improving recruitment, employee management, and overall HR processes. This study looks at the role of AI and ML in solving these problems and making HR more effective.

METHODOLOGY OF THE STUDY

The study adopted a quantitative research design to examine the role of Artificial Intelligence (AI) and Machine Learning (ML) in Human Resource Management. Both primary and secondary data sources were used.

Sample Size: The primary data was collected from 139 respondents, comprising professionals from various organizations.

Data Collection Method: A structured questionnaire was used to gather responses related to the effectiveness and role of AI and ML in achieving HR objectives.

DATA ANALYSIS TOOLS:

Descriptive Statistics – Pie charts and frequency tables were used to summarize demographic details such as gender, age, education level, and work experience.

Reliability Test – Cronbach's Alpha was applied to test the internal consistency of the survey instrument.

Chi-Square Test – To assess the association between demographic variables and perceptions regarding AI and ML in HR practices.

The analysis was conducted using SPSS, ensuring accuracy and reliability in interpreting the survey findings.

SCOPE OF THE STUDY

The study focuses on exploring the application of Artificial Intelligence (AI) and Machine Learning (ML) in Human Resource Management (HRM). It highlights how these

technologies are being used in HR practices such as recruitment, employee performance management, and workforce planning. The scope is limited to professionals working in different organizations who provided their responses through a survey. The study aims to understand their perceptions of AI and ML in achieving HR goals and improving efficiency in HR functions.

LIMITATIONS OF THE STUDY

1. The sample size is restricted to 139 respondents, which may not represent all industries or organizations.
2. The study relies only on self-reported data through questionnaires, which may involve bias in responses.
3. The research is limited to selected HR practices and does not cover all possible applications of AI and ML in business management.
4. The use of statistical tools like chi-square and reliability test provides associations, but not cause-and-effect relationships.
5. Time and resource constraints restricted the study to a particular geographical area and a limited number of participants.

DATA ANALYSIS AND INTERPRETATION

VARIABLE	TOOL	FINDINGS
Demographics (Gender, Age, Education, Experience)	Descriptive Statistics (Pie charts, frequency tables)	Respondents belonged to diverse backgrounds, ensuring representation of different workforce categories.
Reliability of Questionnaire	Cronbach's Alpha Test	High reliability observed ($\alpha = 0.897$), confirming consistency of the responses.
Association between Demographics and Perceptions of AI/ML	Chi-Square Test	Significant associations found; perceptions varied based on age and work experience.
Overall Perception of AI & ML in HRM	Percentage Analysis / Survey Responses	Majority of respondents agreed that AI and ML enhance HR processes, improve decision-making, and support organizational goals.

HYPOTHESIS:

1. H0: There is no significant relationship between the role of AI in hiring the best talent from the industry and the function of Machine Learning in the HR processes
H1: There is a significant relationship between the role of AI in hiring the best talent from the industry and the function of Machine Learning in the HR processes.

2. H0: There is no significant relationship between the function of Machine Learning in the HR processes and the understanding of the effect of AI & ML on the HR Processes.
H1: There is a significant relationship between the function of Machine Learning in the HR processes and the understanding of the effect of AI & ML on the processes.
3. H0: There is no significant relationship between the understanding of the effect of AI and ML on the HR processes and the role of AI in hiring the best talent from the industry.
H1: There is a significant relationship between the understanding of the effect of AI and ML on the HR processes and the role of AI in hiring the best talent from the industry.

Table 1 - AGE

AGE	
21 - 25	58
26 – 30	36
31 – 35	14
36 – 40	22
Above 40	9
Total	139

Source: Primary Data

The data indicates that HR professionals in the 21 – 25 age group have the highest representation, with 58 individuals in the sample. The data shows that HR professionals in the 26-30 age group have a considerable representation, with 36 individuals in the sample.

Chart 1

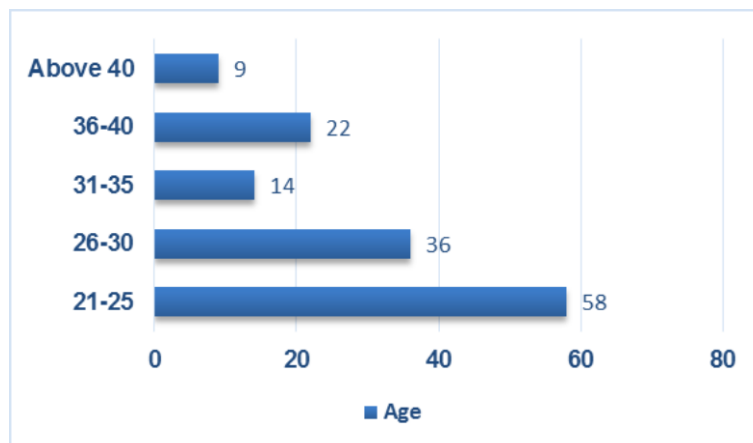
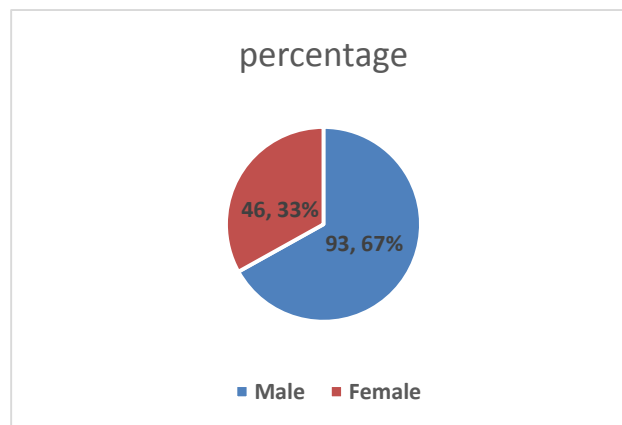


Table 2 GENDER

GENDER	
Male	93
Female	46
Total	139

Source: Primary data

The data indicates that there is a higher representation of male HR professionals, with 93 individuals in the sample. This suggests that AI can play a significant role in enhancing HR processes for male professionals, including tasks such as talent acquisition, performance management, and employee engagement. AI technologies can help streamline these processes, improve decision-making and contribute to overall HR effectiveness.

**Chart 2 GENDER****Table 3 POSITION**

POSITION	
Frontline	48
Middle	76
Top	15
Total	139

Source: Primary data

The data indicates that Frontline position have the highest representation among HR professionals, with 48 individuals in the sample. This suggests that implementation AI technology in Frontline position could have a substantial impact on HR processes at the operational level. AI can assist in automating routine tasks, such as resume screening or scheduling interview, allowing HR professionals in Frontline positions to focus on more strategic and value- added activities.

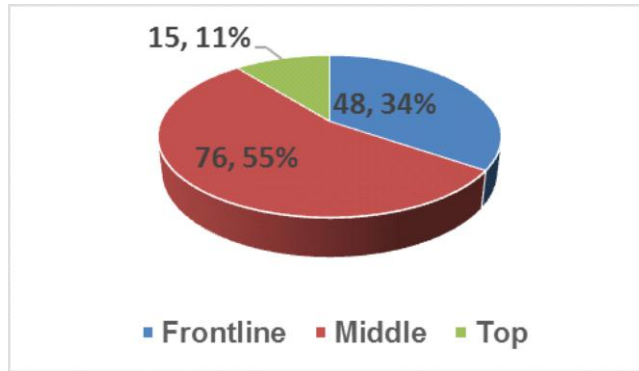


Chart 3 POSITION

TABLE 4: EXPERIENCE

YEAR OF EXPERIENCE	
1 - 3	40
4-6	25
7-9	28
10-12	38
Above 12	8
Total	139

Source: Primary data

The data shows that HR professionals with 1-3 years of experience have the highest representation in the sample, followed by those with 10-12 years of experience. This suggests that AI technology could play a significant role in identifying and selecting the best talent from the industry, regardless of the level of experience. AI can help streamline the hiring process by automating candidate screening, analysing resumes, and identifying top candidates based on specific criteria.

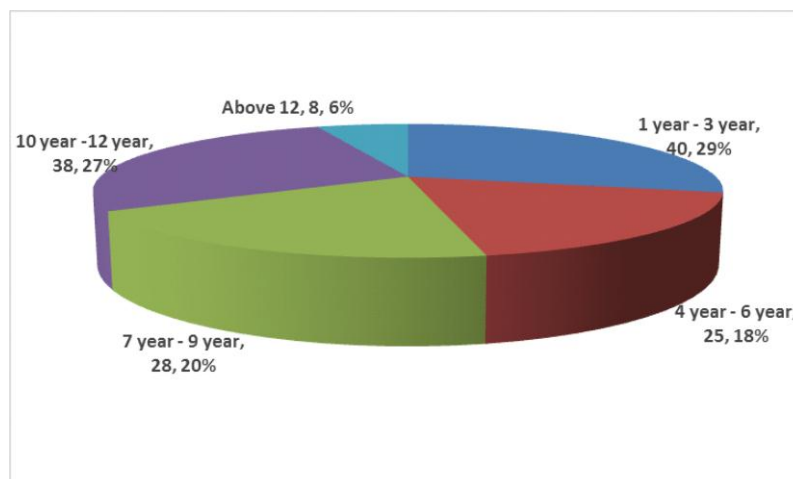


CHART – 4 EXPERIENCES

Chi-Square Test:

The data analysis and interpretation Chi-Square test and percentage analysis method is adopted and the details are as follows

Formula for Chi-Square Test is given below:

$$\chi^2 = \sum (O_i - E_i)^2 / E_i$$

Where

C = Degrees of freedom

O = Observed Value

E = Expected Value

The degrees of freedom in a statistical calculation represent the number of variables that can vary in a calculation. The degrees of freedom can be calculated to ensure that chi-square tests are statistically valid. These tests are frequently used to compare observed data with data that would be expected to be obtained if a particular hypothesis were true. The Observed values are those values gathered. The expected values are the frequencies expected based on the null hypothesis. (Level of significance is considered as 5%).

Table 5

Objective 1	Objective 2	Objective 3	Total
575	534	536	1645
599	594	592	1785
559	588	612	1759
578	589	572	1739
614	591	622	1827
601	617	604	1822
3526	3513	3538	10577

Hypothesis Statement 1:

H0: There is no significant relationship between the role of AI in hiring the best talent from the industry and the function of Machine Learning in the HR processes

H1: There is a significant relationship between the role of AI in hiring the best talent from the industry and the function of Machine Learning in the HR processes.

O_i	E_i	(O_i - E_i)² / E_i
575	555.524	0.6827
599	553.476	0.6853
559	597.602	0.0032

578	595.398	0.0032
614	574.559	0.4213
601	572.441	0.4229
534	584.578	0.074
594	582.422	0.0742
588	603.613	0.1787
589	601.387	0.1794
591	601.125	0.1364
617	607.85	0.13697
Total value		2.998
Table value		0.702

Chi-square (X^2) = 2.998

Degree of freedom (r-1) (c-1) = 10

From the chi-square distribution table value, for an alpha level of 0.05 and seven degrees of freedom,

the critical statistic is **1.578**.

H0 is rejected (1.578 > 0.702).

As per the study conducted with the help of data collection, there is a significant relationship between the role of AI in hiring the best talent from the industry and the function of Machine Learning in the HR processes.

Hypothesis Statement 2

H0: There is no significant relationship between the function of Machine Learning in the HR processes and the understanding of the effect of AI & ML on the HR processes.

H1: There is a significant relationship between the function of Machine Learning in the HR processes and the understanding of the effect of AI & ML on the HR processes.

Table 7

Objective 2 & 3		
O_i	E_i	(O_i - E_i)² / E_i
575	533.103	0.0015
599	536.897	0.0014
559	590.898	0.0162
578	595.102	0.0161
614	597.873	0.163

601	602.127	0.1618
534	578.442	0.1927
594	582.558	0.1913
588	604.35	0.2927
589	608.65	0.2948
591	608.335	0.1234
617	612.665	0.1225
Total value		1.578
Table value		0.7020

Chi-square (X^2) = 1.578

Degree of freedom

$(r-1)(c-1) = 10$

From the Chi-Square distribution table value, for an alpha level of 0.05 and seven degrees of freedom,

the critical statistic is 1.578

H_0 is rejected. ($1.578 > 0.702$)

As per the study conducted with the help of data collection, there is a significant relationship between the function of Machine Learning in the HR processes and the understanding of the effect of AI & ML on the HR processes.

Hypothesis Statement 3

H_0 : There is no significant relationship between the understanding of the effect of AI & ML on the HR processes and the role of AI in hiring the best talent from the industry.

H_1 : There is a significant relationship between the understanding of the effect of AI & ML on the HR processes and the role of AI in hiring the best talent from the industry.

Table 8

Objective 1 & 3		
O _i	E _i	$(O_i - E_i)^2 / E_i$
575	556.44	0.751
599	554.55	0.753
559	596.51	0.034
578	594.48	0.034
614	586.49	1.109
601	584.505	1.112

534	575.977	0.027
594	574.023	0.027
588	619.95	0.014
589	616.95	0.014
591	603.524	0.0003
617	601.476	0.0003
Total value		3.879
Table value		0.702

Chi-square (X^2) = 3.879

Degree of freedom

$(r-1)(c-1) = 10$

From the Chi-Square distribution table value, for an alpha level of 0.05 and seven degrees of freedom,

the critical statistic is 3.879

H_0 is rejected. ($3.879 > 0.702$)

As per the study conducted with the help of data collection, there is a significant relationship between the understanding of the effect of AI & ML on the HR processes and the role of AI in hiring the best talent from the industry.

CONCLUSION:

AI-driven recruitment significantly improves efficiency by reducing hiring time, cost, and errors while ensuring better candidate quality. Machine learning enhances HR functions by enabling data-driven insights, improved decision-making, and higher employee performance. It also boosts productivity through better training, retention, and analytics. However, concerns such as privacy risks, bias, and ethical issues highlight the need for continuous monitoring and responsible application. Overall, AI and ML hold great potential in HR when used transparently and ethically.

157. SOCIO-ECONOMIC & PSYCHOLOGICAL FACTORS LEADING TO SUICIDAL BEHAVIOUR

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Abstract

Suicidal behaviour is a complex and multifaceted phenomenon influenced by an interaction of psychological vulnerabilities, social conditions, and economic stressors. Understanding these factors is essential for prevention and timely intervention. Poverty, unemployment, and financial insecurity are major contributors. Individuals facing chronic economic hardship often experience feelings of hopelessness and diminished self-worth, which can increase vulnerability to suicidal thoughts. Social inequality and marginalization, especially among minority groups, create environments where individuals feel excluded, powerless, or deprived, which can foster despair. In addition, social isolation and relationship breakdowns are critical triggers. Loneliness, loss of social support, or experiences of rejection—whether from family, peers, or society—can intensify emotional suffering. Traumatic life events, such as domestic violence, abuse, or bullying, also significantly increase the risk of suicidal behaviour, particularly among adolescents and young adults. On the psychological level, mental health disorders are the strongest predictors of suicidal tendencies. Depression, bipolar disorder, schizophrenia, and substance use disorders frequently underlie suicidal ideation and attempts.

Introduction

Suicide is a multi-faceted public health problem that takes into account several socio-economic, psychological and environmental factors. It appears that a better comprehension of the psychological- economic factors behind suicidal acts can lead to better ways of prevention. The purpose of this study is to examine in detail the influence of different socio-demographic factors of unemployment, poverty and income of the family, on suicidal behavior in particular in low- and middle-income countries (LMICs). The narrative review is framed by identifying the un- researched areas in currently available literature, thus suggesting avenues for further research.

The Role of Unemployment and Socioeconomic Status in Driving Suicide

Numerous studies categorically link the factors of unemployment and financial distress with suicidal thoughts, attempts as well as deaths. It is well documented that unemployment is one of the primary factors of suicidal behavior among young adults. It can be demonstrated on the basis of Amiri's (2022) meta-analysis that unemployment positively correlates with suicidality and its attempt. A need for stress management comes close to a position, losing their place in the economy creates disturbances around depressed feelings which increases illusive and antagonistic thoughts towards society. Unemployment and choices of occupation are especially disadvantageous for migrants, particularly for those who are unstable and have a precarious mental balance, or other economically sound groups. In addition, the same relation holds true in recessive periods. Recessions entail largescale unemployment and cutthroat competition for scant resources and put the populace in extreme mental edges which acts as triggers to suicidal acts. The study conducted by Amiri (2022) points out guidelines for making effective strategies regarding employment of unemployed psychological scale during and after recession in the mid- term. In the framework of conjunctural phenomena, internal concerns related to employment, or the increasing year-stymied recovery, theorized by Mathieu et al. (2022), also seem to have been aggravated. The review points out that a major cause for increased risk of suicide is financial difficulties and long-term downturns in the economy. In economic downturns, people tend to be more stressed, anxious, and hopeless – factors that are seen as precursors of suicidal attempts. The negative impact of loss of job and depressed incomes on persons with low-regarded future prospect also results in self-harming and suicidal behaviours among these people. Another important example is the recession in Greece in late 2000s when Kamekis et al. (2021) highlighted the relationship between economic distress and spiking suicide rates. This study showed that prolonged unemployment, accompanied by helplessness and lack of social support, is associated with an increase in the rate of suicides. Looking at this case study further reinforces the understanding of self-inflicted risk in view of external factors such as economic depression or prevalent unemployment and calls for development of effective suicide prevention measures. Since recessions shift the focus to the provision of direct effective measures of recession such measures include providing economic relief, services aimed at assisting dealing with the mental health aspects of suffering and disconnecting from individuals and providing them with networks for gainful employment.

Economic Status in the Family and Suicide Behavior

There is a strong association between family economic status and an individual's mental health and suicidal tendencies Liu et al., 2019. of Suicids in South Korean adolescents, demonstrating a U-shaped association between negative emotions due to economic conditions and suicidal risk. Both lower- and upper-class adolescent children were found to be more prone to awareness of suicidal behavior but for different reasons. For low-earning households, the recession contributes to the potential reserve of unsatisfied needs and the costs associated with the recession-like situations of under or unemployment. In addition, the children of successful families are confronted with adjustment suppressors such as focus on studies and social interaction which could also heighten suicidal thoughts.

Also, in low and middle-income countries (LMICs), economic reasoning adds weight towards proceeding towards lower age means of committing suicide. Renaud et al. (2022) recognized that poverty in families with children and lack of many opportunities had emerged as the most significant risk factors for psychotic disorders and suicidal behavior. Digging deep, poverty and economic depression make chronic stress and hopelessness a common occurrence. Children and youth living in LMIC constantly exposed to such processes are more prone to suffer from mental breakdowns. These findings underscore the role of targeting and wide-ranging economic and social responses in the prevention of youth suicide among those at risk or in impoverished socio- economic settings.

The Social and Cultural Aspects Surrounding Suicidal Behavior

The socio-cultural milieu which include the political and economic aspects does also affect the suicide rates. Societies that do undergo great levels of isolation and inequity tend to have greater rates of suicide. Stack (2021) pointed out those countries and cultures in transition where there is political and social unrest are more likely to have cases of suicidal behaviour. His study also showed that most cases of suicide occur when there is civil commotion that coincides with the general recession. Events like wars, revolutions and civil unrests that promote a drastic change in the societal norms and expectations may result in states of lack of assurance and heightened distress, elevating the possibility of suicidal actions on the targeted group.

A related finding was reported by Naher et al. (2020) who explored further the issue of suicide and noted that social isolation, especially in combination with low socio-economic status, increases the likelihood of suicide. They carried out a longitudinal analysis of census data and found out that persons who lost their networks of social support mostly due to

financial hardships were at a greater risk of suicide. All of which points to the need of looking into social networks and economic status amongst patients at risk of suicide.

Socio-Ecological Models in the Context of Suicide Prevention

One may be able to use socio-ecological models toward suicide prevention and be able to devise policy measures at different levels: individual level, community level, and organization and policy levels, which Imoizolu et al. (2018) argued as beneficial. However, Zulkiply and Rosliza's (2022) review also underlined the relevance of employing the socio-ecological model while devising measures that seek to prevent suicidal thoughts and attempts among the youth, particularly in lower-income settings. Their review underscored the necessity of employing multi-level approaches that proffer several levels of advance on the individual level, in consideration of the economic, social and policy environment of the individual. This concept is the main principle in suicide preventive strategies; recognizing that its occurrence cannot stem from a single cause, and that risk or protective factors are interrelated and operate at different levels.

Health, Environmental, and Socio-Economic Interactions

Though socio-economic factors are not an island by themselves, they are rather in association with health and environmental factors. This is why a cross country study in the Eastern Mediterranean Region, explored the connection between these sets of variables with suicide cases. Besides economic status, suicide incidences are largely dependent on and factor in environmental stress and public health emergencies. Lari and Sefiddashti (2023) advanced that climate change and public health issues add layers to the socioeconomic determinants of suicidal behavior. Their research shows that even the environmental changes in the economically depressed regions aggravate the already existing stress and vulnerability among them. In addition, public health emergencies make it worse as people face lack of funds and resources to nurse wounds from illnesses. In areas of economic disadvantage, health behaviors, such as suicidal behavior, are difficult to change when health, compounded with political economy determinants are present making this approach to non-sufficient.

Research Gaps

Nevertheless, even with the considerable attention and effort paid to understanding ethno-social factors contributing to suicidal behaviour, some important knowledge gaps still remain. One of the most serious ones is that not so much attention has been paid to the issue of LMICs. The few studies of suicide in these countries, however, are limited and much more needs to be examined regarding the socio-economic determinants of suicidal behavior in these countries. Within LMICs the socio-economic situation is rather dissimilar to high-

income countries which calls for exploring the socio-economic circumstances such as economic hardships, health system factors and social conditions experienced by these populations. That deeper understanding could lead to more precise problem-oriented responses on the causers' side, especially when it comes to prevention of suicides among youth. It was also noted that most studies focus on the socio-economic determinants of health as if they exist separately when addressing this issue. This also applies to the relationship linearism between economic, public health challenges and environmental concerns and the regarding suicidal may worsen, especially for already economically vulnerable groups. The linkage between these dimensions is absent in most existing literature and so it is unlikely these strategies yield context specific and comprehensible for younger population suicide prevention approaches. Gender and age factors are also another important gap as not a lot of information centers around socio-economic factors and how such factors engages with different groups of people on gender and age. Suicide is presence in all societies but risks factors differ within populations and populations may vary because of cultural patterns, age and social status. It is necessary to address such issues in order to formulate interventional approaches, which would satisfy requirements of more ethnic and cultural fractions so a problem of suicide prevention would not be challenging for certain population, socio-demographics.

Conclusion

The social and economic aspects of the causes of suicidal behavior are intricate and numerous whereas the explorer must assess the intricate relationship of the various aspects. Factors such as unemployment, financial struggles or poor family economic status are the main risk factors that cause the individual's PUIS and suicide attempts thus affecting the individuals themselves but also sending ripple waves that affects the family, community and society as a whole. Such connections have provoked studies in the past how general; yet, only a part of the picture is seen. But deficiencies are considerable; more to bias concerning low to middle income countries.

One of the countries where socio-economic level is value significantly lower than its counterparts to address the shocks. How these particular factors occur across different socio-economic settings needs exploration to enable the design and implementation of such strategies that are most appropriate in each setting with minimal cultural turnover. For strong prevention plans, more strategies are needed — the ones that will combine features of personal and structural suicide risk factors. This includes public health and other related programs so that the efforts of focusing on suicidal behavior address the main issues. By

filling these voids in research, other stakeholders can implement relevant programs without ignoring the general socio-economic context helping vulnerable populations.

Successful interventions should not only be capable of curtailing the number of suicide cases, but also foster mental wellness and community resilience. In ending, it can be appreciated that an attempt to curb suicidal behavior should incorporate strategies that address the social and economic factors ‘causing’ such behaviors.

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158. A COMPARATIVE STUDY ON CONSUMER PREFERENCE TOWARDS ONLINE VS. OFFLINE SHOPPING

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ABSTRACT

In recent years, the rapid growth of e-commerce platforms has significantly altered consumer purchasing behavior, raising critical questions about the comparative relevance of online and offline shopping. This study investigates consumer preferences between online and offline retail channels, focusing on the underlying factors that influence decision-making processes. Drawing upon primary survey data and secondary literature, the research analyzes dimensions such as convenience, price sensitivity, product quality, trust, after-sales service, and experiential value. The findings indicate that while online shopping is increasingly favored for its accessibility, wider product choices, and competitive pricing, offline shopping continues to hold relevance due to tactile product evaluation, instant gratification, and personalized service. Demographic variables such as age, income level, and urban–rural segmentation also emerge as significant determinants of channel preference. Post-pandemic shifts have further accelerated digital adoption, though consumer loyalty towards physical stores persists in specific product categories, notably groceries, apparel, and luxury goods. The study concludes that rather than substituting each other, online and offline retail formats are evolving into complementary channels, giving rise to hybrid models such as “click-and-mortar” and Omni channel retailing. The implications of this research provide valuable insights for retailers, marketers, and policymakers in designing strategies that align with changing consumer expectations while ensuring sustainable growth across both online and offline domains.

Keywords: Consumer Preference, Online Shopping, Offline Shopping, E-commerce, Retail, Omni channel, Consumer Behavior, Post-Pandemic Trends, Shopping Experience.

1. INTRODUCTION

Online shopping has been emerging very rapidly in recent years today the internet is paying attention to the retail market. Millions of people shop online on the other hand the product has been buying many customers go to buy offline so check the product and own

possession of the product only after paying of the product customer loyalty in this modern world depends on the ability to deliver quality value and satisfaction level.

whether shopping online or shopping offline The consumer must decide which channel is right for him and which can best suit his needs and meet his needs in this competitive world how can decide that your broker to buy goods is very important to his understanding from an administrative point of view these are more important than watching or getting entertainment through the internet or getting any information or news and this is a very common thought that comes to the minds of people when looking at internet users when they are online. In general the population from high level of income and high level of learning are more favorable to do online shopping.

This study aims to explore consumer preferences towards online versus offline shopping by identifying key determinants of choice and analyzing behavioral differences across demographics. In doing so, it seeks to provide practical insights for retailers and policymakers to develop effective strategies that align with shifting consumer expectations. Furthermore, the study highlights the growing importance of Omni channel retail models, where online and offline shopping are no longer viewed as substitutes but as complementary avenues that can enhance consumer satisfaction and business performance when integrated effectively.

Factors affecting Online Shopping:

Delay in delivery:

Long duration and lack of proper inventory management results in delays in shipment. Though the duration of selecting, buying and paying for an online product may not take more than 50 minutes, the delivery of the product to customers doorstep takes about 1-3 weeks. This frustrates the customers and prevents them from shopping online.

Lack of significant discounts in online shops: Physical stores offer discounts to customers and attract them so this makes it difficult for e-tailors to compete with the offline platforms.

Lack of touch and feel of merchandise in online shopping: Lack of touch-feel-try creates concerns over the quality of the product on offer. Online shopping is not quite suitable for clothes as the customers cannot try them on.

Lack of interactivity in online shopping: Physical stores allow price negotiations between buyers and the seller. The showroom sales attendants the representatives provide personal attention to customers and help them in purchasing goods. Certain online shopping mart offers service to talk to a sales representative.

Lack of shopping experience: The traditional shopping exercise provides lot of fun in the form of show-room atmosphere, smart sales attendants, scent and sounds that cannot be experienced through a website. Indian generally enjoy shopping. Consumers look forward to it as an opportunity to go out and shop.

Factors Affecting Offline Shopping:

You find less variety or options for the products or services, you're buying offline. Since there are limitations of availability of offline shops and each shop has a limitation of space so you have not such huge choice to choose as you find in an online shopping.

You can access an endless shopping website and find huge options for a single item you want to buy. Since you have physical limitations to go shop to shop at once, you may end with empty hands after a shopping session if you do not find the product of your choice.

As far as money concerned, the price of same product may be costlier in an offline shopping and even you find a discount and others similar offer, the price in online shopping will be lower one in an online shopping. Also you find fewer freebies as compared to an online shopping.

In a brief, if you are more concerned about the money, you should go for online shopping mode and for those who are more concerned for the service after sale or similar services; you should opt for offline shopping.

Key Differences Between Online vs. Offline Shopping

1. Shopping Experience

Offline shopping offers a tactile, in-person experience where customers can touch and try products. Online shopping, on the other hand, provides a virtual experience through websites or apps, focusing on convenience over sensory engagement.

2. Convenience and Accessibility

Online shopping is available 24/7, offering unmatched convenience. Offline shopping, however, requires visiting physical stores within specific hours, though models like "click-and-collect" are bridging the gap.

3. Product Selection

Online shopping provides a vast selection from global retailers, while offline shopping is more localized, depending on in-store availability.

4. Pricing and Deals

Online shopping often offers better deals due to lower operational costs, while offline shopping may feature in-store promotions, balancing the price difference.

5. Personal Interaction and Customer Service

Offline shopping allows personal interaction with sales staff, offering immediate assistance. Online shopping relies on virtual customer service, though online offline shopping models combine both for a better experience.

6. Returns and Exchanges

Offline shopping offers easy in-store returns, whereas online shopping can involve a more complicated return process with shipping and potential fees.

7. Trust and Security

Online shopping carries risks like fraud, but offline shopping is generally safer in terms of transaction security, though both have their vulnerabilities.

Need of the Study

- The rapid growth of e-commerce has transformed consumer shopping behavior, yet offline retail continues to play a vital role due to its experiential and trust-based advantages.
- Understanding consumer preference between online and offline shopping is essential to identify the factors influencing purchase decisions such as convenience, price, product quality, and service experience.
- The study is particularly relevant in the post-pandemic era, where digital adoption has accelerated but offline shopping still retains loyalty in key product categories.
- Moreover, demographic differences such as age, income, and location significantly affect shopping choices.
- Insights from this study will help retailers, marketers, and policymakers design effective strategies and develop sustainable Omni channel models that align with evolving consumer expectations.

OBJECTIVES OF THE STUDY:

- To analyses the different between both online or offline customer groups in terms Of innovation product availability demographics and customer attitude
- To explore the factors influencing customers to switch from offline to online shopping
- To study whether the customer qualification affects the online shopping and offline shopping.

Limitations of the Study

1. **Geographical Scope** – The study is confined to a specific region and may not fully represent consumer preferences at a national or global level.

2. **Sample Size** – Due to time and resource constraints, the sample size is limited, which may affect the generalizability of findings.
3. **Self-Reported Data** – The study relies on survey responses, which may involve personal bias, exaggeration, or inaccurate recall by participants.
4. **Dynamic Market Trends** – Consumer behavior and retail trends change rapidly with technology and market innovations; hence, the results may not remain valid over time.

2. REVIEW OF LITERATURE

Research by Smith and Anderson (2019) emphasized that convenience, time-saving, and access to wider product varieties are the primary factors driving consumers toward online shopping. Similarly, Kim et al. (2020) found that competitive pricing, promotional discounts, and home delivery services strongly influence digital purchase intentions. However, studies also note that concerns regarding product quality, delivery delays, and lack of trust act as barriers to online adoption (Chiu et al., 2018).

On the other hand, traditional retail continues to attract consumers due to its tactile product evaluation, instant gratification, and personalized service. According to Gupta and Sharma (2020), offline shopping offers a sensory experience—touch, feel, and trial—that online platforms fail to provide. Another study by Vera (2021) revealed that consumers rely on offline stores for categories like groceries, apparel, and luxury goods, where physical inspection and social interaction are important.

Ms. Supriyamahajan (2018) a comparative study on online and offline shopping. The main objective of this research is to find the factor which influences the respondents to purchase in online and offline offers discounts and convenience attract them to purchase online.

3. RESEARCH METHODOLOGY

The primary objective of this paper is to do comparative study of online shopping and physical store shopping. This is achieved by a framework which includes following components:

i. Research Design:

In this case, research design followed is Descriptive Research Design, as it a conclusive and structured study to find out the characteristics of problem.

ii. Sampling Design:

In this case, sampling design followed is clustering sampling, as we have done online survey and have covered heterogeneous kinds of people. The study is descriptive in nature and uses primary data to analyse and interpret the results.

iii. Sampling Size:

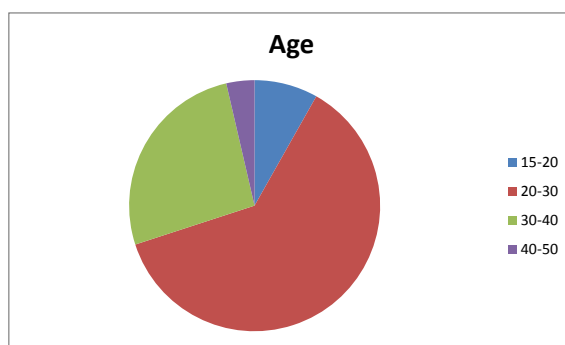
This study is based on the sample of 100 (number of people).

4. DATA ANALYSIS AND INTERPRETATION

Table 1: Table Showing Age Of The Respondents

Age	No. of respondents	Percentage
15-20	9	8.2%
20-30	68	61.8%
30-40	29	26.4%
40-50	4	3.6%

Chart Showing Age Of The Respondents:



SOURCE: Primary Data

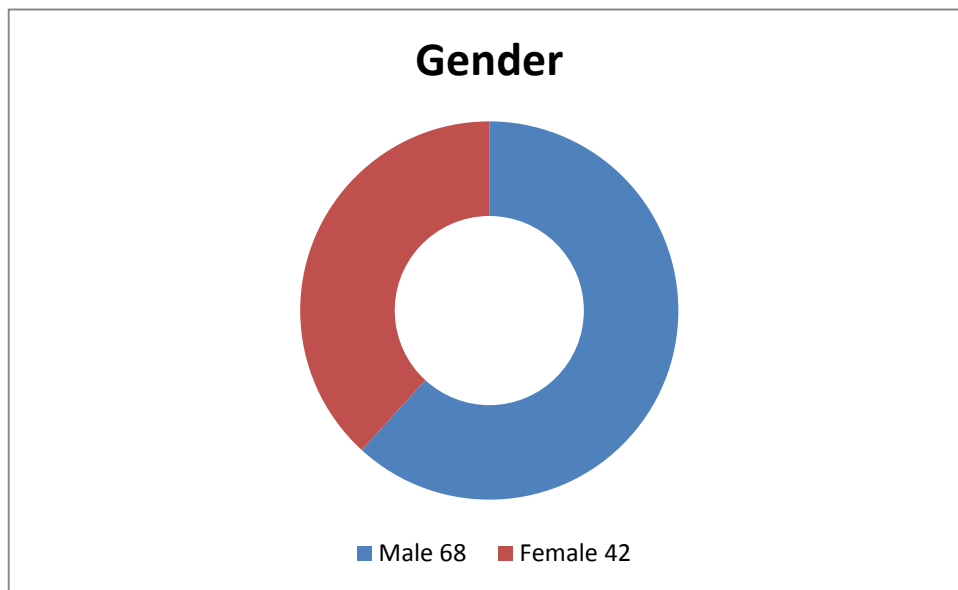
INTERPRETATION

As per the table given above, 8.2% of respondents were coming under the age group of below 15-20, followed by 61.8% of respondents were under the age group of 20-30 years, 26.4% of respondents or under the age group of 30-40 years, 3.6% of respondents are between 40-50 years.

Table 2: Table Showing The Gender Of The Respondents

Gender	No. of respondents	Percentage
Male 68	68	61.80%
Female 42	42	38.20%

Chart Showing The No. Of Respondents:



INTERPRETATION

From the above table it can be declared that 61.8% of respondents are male followed by 38.2% of respondents are female.

5. FINDINGS AND SUGGESTION

FINDINGS:

- Majority of respondents are male compared to female
- Majority (61.8%) of the respondents are in the age group of 20-30 years.
- Majority (61.8%) of respondents both prefer online and offline Shopping.

SUGGESTION:

- We have found that male population tend to shop more online shopping rather than physical shopping.
- For safety of payment more preference is given to shopping malls related to physical shopping.
- Flipkart is the best site used for online shopping as it gives more discounts and offers.
- People are slowly going for online shopping but the majority mentality of people goes to physical shopping as it is having trust, feel and touch of the product.
- The choice of shopping differs from person to person, so it is difficult to determine the preference of shopping with absolute certainty.
- Online shopping has gained popularity recently as the people have been using this mode for less than a year.

Conclusion

The study highlights that consumer preferences towards online and offline shopping are influenced by multiple factors such as convenience, price, trust, product quality, service experience, and demographic characteristics. Online shopping has gained popularity due to its accessibility, wide product variety, time-saving nature, and competitive pricing. At the same time, offline shopping continues to remain relevant, particularly for product categories where physical inspection, instant gratification, and personal interaction are valued.

Demographic differences were found to play a significant role—young, urban, and tech-savvy consumers are more inclined towards online platforms, while older, rural, and less digitally literate consumers continue to rely heavily on offline shopping. Post-pandemic trends indicate a rapid increase in online adoption; however, offline shopping has retained strong consumer loyalty in areas such as groceries, apparel, and luxury products.

The findings suggest that online and offline retail should not be seen as substitutes but rather as complementary formats. The emergence of **Omni channel retailing**—integrating the strengths of both online and offline platforms—represents the future of consumer shopping behavior. Retailers who effectively combine digital convenience with physical experience will be better positioned to meet evolving consumer expectations and achieve sustainable growth.

In conclusion, consumer preference is not limited to one mode of shopping but depends on situational needs, product type, and personal characteristics. Retailers and policymakers must therefore focus on strategies that embrace this duality, ensuring value creation in both online and offline environments.

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159. CONTESTS & PROSPECTS OF ARTIFICIAL INTELLIGENCE IN ENLIGHTENING SEGMENT

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Abstract

The most important industry that drives the other ones is education. Projectors have replaced blackboards, online classes have been made possible, student performance has been monitored through online portals, and other changes have occurred in the educational sector as a result of the growing technological dynamics. There are a number of AI opportunities for education that could be used to completely improve teaching and learning. Teachers and students alike have found AI to be a useful tool for evaluating student performance, correcting grammar, writing essays, and instantly providing useful information. Through this blog today, the significant AI opportunities in education and find out how AI has been crucially transforming education from the traditional ways to modern day teaching and learning. The application of artificial intelligence (AI) in education faces numerous challenges, despite the fact that AI technology has become widely used in a variety of industry sectors thanks to its ongoing development. In order to encourage more in-depth use of AI technology in education, this paper provides a comprehensive analysis of its impact on that field.

Keywords: Artificial Intelligence (AI),

Introduction

In recent years, the rapid advancement of artificial intelligence (AI) technology has had a significant and beneficial effect on numerous fields. In the field of education, AI technology has gained a fairly accurate understanding of students' learning situations and is able to provide appropriate learning advice and suggestions based on those situations, allowing students to learn more specifically. Through intelligent recognition technology, it can be realized by scanning the questions to obtain the answer (including the process of solving the problem, the idea, and the application of knowledge). In addition, the application of AI has altered learning methods and increased learning efficiency. Another example is that it can look at test papers, homework, exercises, and other student work to see where students' learning is lacking. From there, it can offer specific learning advice and suggestions, as well

as the appropriate exercises to help students retain information. The application of AI promotes teaching reform and improves teaching level, but it should also be noted that the application is also facing great challenges, thus the study of coping strategies for the field of education becomes very necessary.

Submission of AI in Edification

AI is autonomous learning through algorithms and other technologies, and solving practical problems based on the knowledge learned. It is important to note that AI can continuously learn and construct new knowledge and technology. Traditional knowledge learning theory, which includes not only the fundamentals of learning theory but also big data, cloud computing, and other technical fields, serves as the foundation for AI technology. Expert systems, machine learning, pattern recognition, and other AI technologies are constantly evolving. The development of intelligent tutoring systems and individualized learning plans for each student are two examples of how AI technology has had a significant impact on education. Our national scientific and technological innovation planning has also made it abundantly clear that, based on big data analysis of AI research and its technological development and application, it should gradually form a demonstration of its application in the office, medical, and other industries. It can be seen that the development and application of AI technology will be conducive to the development of education.

Methods of the study

In the context of AI in education, the purpose of this study is to investigate the advantages and disadvantages of personalized learning. A systematic literature review of secondary data and studies on the topic will be carried out in order to accomplish this. To find recurring themes and patterns in the data, the review will use a qualitative research design with qualitative content and thematic analysis. Given the study's objective, which is to evaluate the impact of AI on education and identify the opportunities and challenges of personalized learning, the research design and strategy are appropriate.

Competitions Challenged by AI Entitlements in the Stadium of Education

1. Security and Privacy of the Data - In education, AI systems frequently need access to a lot of personal data, like students' academic records, learning patterns, and even biometric data. This data may be susceptible to breaches that could result in the misuse or unauthorized access of sensitive information if it is not adequately protected.

2. Bias and Fairness - AI algorithms are trained on data, and if this data is biased, the AI system may perpetuate or even exacerbate these biases. This can result in unfair outcomes in education, such as unfair grading, unequal access to learning resources, and the

perpetuation of stereotypes. There could be disparities in educational opportunities as a result of an AI system favoring students from certain demographic backgrounds over others, for instance. To combat bias in AI, careful selection of training data and ongoing monitoring to guarantee fairness are required.

3. Lack of - Interaction - Education promotes social and emotional growth in addition to the transfer of knowledge. Although AI can help with many aspects of education, it cannot completely replace human teaching elements like mentorship, encouragement, and individualized feedback.

4. Training and Resistance - Training and Resistance from Teachers Concerns about job displacement, a lack of familiarity with the technology, or doubts about its efficacy may stymie the adoption of AI by many educators.

5. Content Quality and Relevance - The content that AI systems provide is only as good as the AI system itself. A significant obstacle lies in ensuring that AI tools' educational content is accurate, current, and curriculum-relevant. There is also the risk of homogenization, where AI might promote standardized content at the expense of diverse perspectives and critical thinking. To maintain educational quality, educators must carefully curate and monitor the content utilized by AI systems.

Distinguished AI Chances in Education that are transforming teaching

Tailor knowledge method: One of the major opportunities for AI in education is its potential to revolutionize education by providing each student with personalized learning experiences that are tailored to their interests, learning potential, learning style, and objectives. AI intervention in education allows for the customization of educational programmes to make them more engaging and interactive, resulting in more effective learning outcomes for students of all ages. Teachers and instructors can monitor and track the student's progress and identify their strengths and weaknesses with the help of AI-powered tools that generate feedback in real time.

Accelerating the Learning Process: One of the amazing applications of AI in education is empowering students to automate lengthy and challenging lessons. The possibility of students using chatbots to have a live conversation with their teachers or group leaders is one of the best examples. AI-powered chatbots also allow students to learn the fundamentals of foreign languages today. Students can benefit from the introduction of AI-powered chatbots and their use in education to learn difficult concepts. Additionally, these tools offer an exciting alternative that enhances the student's abilities and knowledge. **Creating High-Quality Learning Materials** AI has developed new technologies like Natural

Language Processing and Machine Learning that make it possible to produce high-quality learning materials and content. Through efficient presentations, AI technology also aids educators in developing and disseminating complex concepts.

Generative AI : Generative AI tools are known to have the capability of quickly scanning a large number of websites and locating relevant information on any subject. This advantage can be used by teachers to create content for students that is well-researched and informative. This AI opportunity in education presents an excellent opportunity for researchers to meet their research needs and save time while conducting extensive research.

Improved Visualization and understanding of Data: Another one of the exciting AI opportunities in education is the possibility of learning complex concepts and data through attractive and easily comprehensible visualization. Students of all ages can create an engaging learning environment by utilizing AI tools such as virtual reality (VR) and augmented reality (AR). Students can improve their comprehension of concepts and data as well as develop their communication and collaboration skills with the assistance of these tools.

Protagonist of Artificial intelligence in Edification

1. **Personalized Learning**: Students' strengths, weaknesses, and learning styles can be analyzed using AI to create individualized learning experiences. This enables educators to tailor instruction to each student's specific requirements. For instance, Carnegie Learning's AI tutoring system provides individualized guidance and feedback based on each student's learning pace.
2. **Intelligent Tutoring Systems**: AI-powered tutoring systems can provide students with immediate feedback on their performance and help them improve their understanding of a topic. For example, Duolingo uses AI to personalize language instruction and adapt to each learner's level.
3. **Chatbots and Virtual Assistants**: AI-powered chatbots and virtual assistants can be utilized to offer students support round-the-clock, respond to inquiries, and assist with tasks. Pounce, the chatbot developed by Georgia State University, assists students with everything from registering for classes to applying for financial aid.
4. **Assessment and Grading**: AI can be used to give students feedback and grade assignments. Teachers can save time and ensure consistency in grading with this. For instance, Turnitin's Revision Assistant makes use of artificial intelligence to give students immediate feedback on their writing.

5. **Predictive Analytics:** AI can be used to analyze student data and predict which students are at risk of falling behind or dropping out. Teachers are able to intervene early and provide specialized assistance because of this. An AI tool known as My Edu, for instance, is utilized at the University of Texas at Austin to assist students in selecting courses and organizing their schedules. The academic community has been discussing the idea of incorporating AI into education for nearly three decades.

However, as the use of technology, data-driven algorithms, learning analytics, artificial intelligence, and processing power have grown globally, the conversation has recently shifted toward a global focus on government policies. While AI education holds immense potential benefits, it also poses certain risks and challenges. As a result, it is essential that we approach the use of AI in education with care and consideration. In order to support educators and prepare students for a future in which AI plays an increasingly important role, we must strive to create a new learning environment that incorporates AI.

Future of Artificial intelligence in Education

The future of AI in education looks promising, as technology continues to advance and new applications are developed. AI in education's future may be shaped by the following developments:

- **Personalized Instruction:** With the assistance of AI, students can receive individualized instruction that is tailored to their particular requirements, abilities, and interests.
- **Adaptive Learning:** AI can also be used to create environments for adaptive learning that can adapt to a student's progress and keep them challenged but not overwhelmed.
- **Automated Grading:** AI can be used to automate the grading process, allowing teachers to concentrate on more pressing matters like lesson planning and ensuring that students are engaged.
- **Intelligent Tutoring Systems:** As previously mentioned, intelligent tutoring systems can provide students with individualized guidance and feedback to help them perform better and accomplish their objectives.
- **AI-powered virtual assistants:** Students can use AI-powered virtual assistants to navigate their online learning environments, get answers to questions, and get advice and support. Overall, AI's future in education is exciting, and in the coming years, we can anticipate more creative uses for this technology. However, it's important to remember that technology is just a tool, and it's up to educators to use it effectively and ethically to enhance the learning experience for students.

Conclusion

In conclusion, the study of the challenges faced by the application of intelligent education and its countermeasures is conducive to the prevention and avoidance of risks in the application of intelligent education, which in turn promotes the application and development of artificial intelligence technology in the field of education. While there is no doubt that artificial intelligence presents education with revolutionary opportunities, we must be acutely aware of the obstacles it presents before adopting it. We can move toward a system of education that is more equitable, inclusive, and effective by implementing the aforementioned measures and maximizing the beneficial role that AI plays in education while minimizing any potential risks. AI and education will become even more closely related in the future, and their complete integration will be a major driver of educational innovation. Addressing issues related to privacy, bias, cost, and ethical considerations is essential to ensure that AI in education benefits all students and contributes to a more equitable and effective educational system. To overcome these obstacles and make the most of AI's potential in education, educators, policymakers, technologists, and communities must work together.

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160. A STUDY ON RECENT TRENDS IN E-COMMERCE

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ABSTRACT

E-commerce originated in an exceedingly normal for the exchange of business documents, like orders or invoices, between suppliers and their business customers. The ensuing computer-to-computer electronic information interchange (EDI) normal is versatile enough to handle simplest electronic business transactions. With the wide adoption of the web and therefore the introduction of the globe Wide internet in 1991 and of the primary browser for accessing it in 1993, most e-commerce shifted to the web. additional recently, with the world unfold of smart phones and therefore the accessibility of quick broadband connections to the web, a lot of e-commerce affected to mobile devices, that conjointly enclosed tablets, laptops, and wearable merchandise like watches. E-commerce has deeply affected standard of living and the way business and governments operate. It is creating an entire new economy, which has a huge potential and is fundamentally changing the way businesses are done. It has advantages for both buyers as well as sellers and this win-win situation is at the core of its phenomenal rise. Though there are some weak links, with improvements in technology, they will be ironed out, making the e-commerce easy, convenient and secure.

Keywords : computer-to-computer, electronic information interchange, broadband, E-commerce and Technology

Introduction:

E-commerce originated in an exceedingly normal for the exchange of business documents, like orders or invoices, between suppliers and their business customers. Those origins date to the 1948–49 Berlin blockade and airlift with a system of ordering product primarily via telex. Numerous industries elaborate upon that system within the succeeding decades before the primary general normal was revealed in 1975. The ensuing computer-to-computer electronic information interchange (EDI) normal is versatile enough to handle simplest electronic business transactions. With the wide adoption of the web and therefore the introduction of the globe Wide internet in 1991 and of the primary browser for accessing it in

1993, most e-commerce shifted to the web. Additionally, recently, with the world unfolding of smart phones and therefore the accessibility of quick broadband connections to the web, a lot of e-commerce affected to mobile devices, that conjointly enclosed tablets, laptops, and wearable merchandise like watches. E-commerce has deeply affected standard of living and the way business and governments operate.

Since the differential cost of manufacturing a unit of content smart (such as a computer code product) is on the point of zero, Fm business models square measure typically utilized within the content domain: the fundamental product is free, the premium versions square measure charged for. A brand new kind of company cooperation called a virtual company—which is really a network of companies whose data systems square measure integrated over the web, every firm playacting a number of the processes required to manufacture a product or deliver a service—has flourished. Broad publics square measure drawn in to contribute their labor, ideas, or funds in crowd sourcing initiatives.

Meaning:

E-commerce, conjointly called electronic commerce, is that the shopping for and commerce of products (or services) electronically on the web. It also can seek advice from different on-line activities like on-line auctions, ticketing and banking. E-commerce is a necessary a part of several businesses that consider the sale of physical merchandise or services on-line. E-commerce, fully electronic commerce, maintaining relationships and conducting business transactions that embrace commerce data, services, and product by suggests that of laptop telecommunications networks.

Objectives of the E-Commerce:

Development of business-relationship:

The business development is often done through the e-commerce being the first and also the basic object. As their direct contact in between the corporate and also the shopper, their relationship is going to be increased. Thus the world of the market is often raised.

Better-customer service:

As it is finished around the clock, the client can invariably have on-line facilitated relating to the product. As all the knowledge is furnished to the client, it becomes simple to him to decide on the simplest product among all alternative alternatives. As even the service also can be done through information superhighway directly, the client service is going to be ballooned. By highlight the client service, the businesses try to subjugate a lion-share within the market.

Getting additional customers:

In of late it becomes the mandate of the businesses to double its customers, and this could be done by rendering the worth add service and maintaining the standard. Hence, it's additionally one in every of the first objectives of the businesses that offer impetus for the strong growth in sales and overall profit.

Principle of E-commerce

Internet users square measure sensible enough to differentiate between associate degree authentic or high-quality web site and a foul one. The statistics show that over eightieth of the net population has ordered one thing through E-Commerce websites, out of that, over five hundredth individuals have bought the product over once. Allow us to determine the wants and principles of E-Commerce web site style in order that you'll generate most revenue out of them.

User Friendliness:

An E-Commerce web site ought to be straightforward to navigate. A straightforward search method permits the users to achieve numerous pages or products; they want to shop for. These websites ought to conjointly give the guests with ample details and footage of the product in order that they'll perceive the product well, while not touching or seeing them in real. The additional realistic it's, the higher square measure your possibilities of obtaining a conversion.

Distinctive style parts:

Seeing the robust competition within the E-Commerce niche, it becomes imperative that you simply stand out totally different from your on-line rivals. The market is packed with shopping for alternatives, and there ought to be a robust reason why a user should decide you over alternative adversaries. An imaginative style can compel the guests to flick through your website and offers you an opportunity to impress your shoppers effortlessly. Remember, the primary impression is of utmost importance. To make the consumers notice you among the flock, you must implement some daring and weird parts in your style in order that they bear in mind you for long, and visit your website once more to expertise a novel computer programmed. The positioning ought to be designed in such the simplest way that it serves the needs of the users, appearance conspicuous and focuses on the product. People, World Health Organization square measure a novice to on-line searching, generally tend to shift their focus towards a beautiful trying style solely. You have to stay in mind that planning has its own importance in transportation the users to your web site; however the merchandise quality is

additionally vital. You'll conjointly take the assistance of old internet designers to create your web site look additional skilled.

Emphasize on Security:

Each person, World Health Organization is opting to shop for product from your web site, wants assurance that his/her personal and monetary details square measure safe which you're not reaching to share them with any third party. Certify that your payment entranceway is safe and secure, failing to which can directly have an effect on your leads and sign ups, ultimately leading to blow your sales targets badly.

Responsive Technology:

Some designers tend to use serious hypertext mark-up language committal to writing, large-sized pictures, and massive flash files to enhance the planning and appearance of the web site. But, it's not favorable for associate degree E-Commerce website in any manner; because it can create the web site slow to load. You cannot afford to possess a slow loading website as there square measure thousands of alternative competitors on the online marketing similar product. Individuals aren't patient enough to attend for your pages to load and can quickly switch to alternative alternatives. Having a non-responsive web site will certainly have an effect on your business and cause you to lose potential shoppers.

Grasp your audience:

You should grasp your customers well and style your web site consequently, to serve them higher. You've got to grasp what they necessitate in order that you'll create them feel comfy whereas browsing through your product and supply them along with your services to win their trust. You have to spot your audience and keep a check on their shopping for patterns. This way, you'd be ready to enhance their user expertise, which might directly perk up your revenue generation.

Add Search Column:

The search choice is indispensable for each E-Commerce web site, because the guests may be searching for a selected product that they have to shop for. Surfing numerous classes and searching for a selected product may become a tedious task. Therefore, rather than creating the users stray within the multitude of classes and filters, you'll enable them to browse the merchandise directly by simply typewriting the name and jumping to the relevant search results.

Effective Product Descriptions:

Product descriptions on your website square measure terribly crucial and might influence your buyer's getting verdicts. The additional beguiling the fonts, descriptive text,

images, and videos square measure, the higher the client can relate it to his shopping for wants. This is often not primarily an area of style; however listening to those details will positively increase your ROI within the long haul.

Minimalistic Layout:

Minimalism within the style is that the best thanks to emphasize on simplicity and take away the redundant parts from the positioning. Obtaining reductivism right is a touch fiddly, however. rigorously hand-picked color palette, ample white house, enticing typography, and in particular, choosing selecting the proper style parts and departure out the unimportant ones square measure a number of the key factors which will direct your users precisely wherever they shall go.

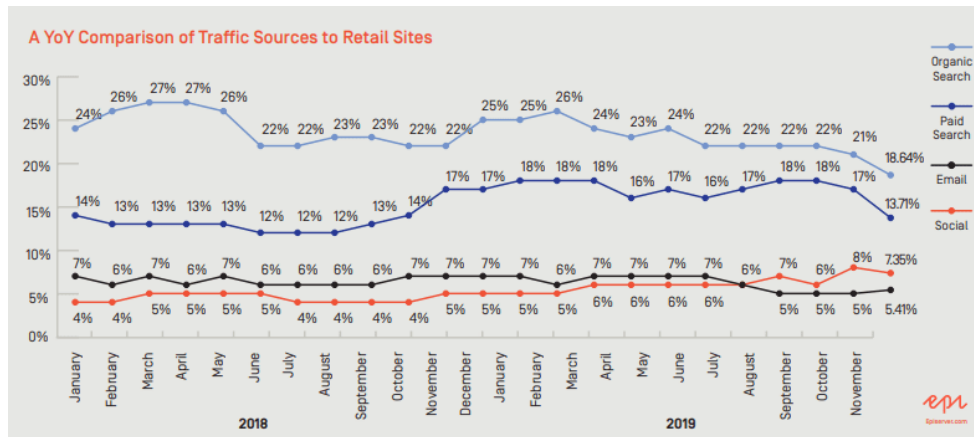
Moreover, minimalist sites square measure usually quicker to develop, claim fewer resources, and cargo a lot of quicker than those untidy E-Commerce websites.

Consistent disapproval:

Following the whole identity throughout your website and keeping it consistent the entire manner will facilitate the users distinguish your store's whole values and exclusive offerings. You want to make sure that the font, brand-specific color palette, tone of product images, descriptive texts, decision to action buttons, and each component and elegance employed in the planning is strictly following the eccentricity of your whole. This may conjointly assist you build a robust brand-customer relationship along with your regular shoppers.

Economical decision to action:

The ultimate goal of your web site is to extend the conversion rate and generate additional revenue, and thus, CTAs play a significant role here. In spite of however daring and intuitive your CTA is, if it carries a below average copy, it will not work well. The audience has come back to your website seeking a solution; so, make sure that the words used on the decision to action buttons square measure catered towards the probable queries they need in mind and take them to precisely what they're searching for. So as to form extremely economical CTAs, certify that the words used square measure extremely targeted towards action driven verbs. Some samples of such trigger words which will drive your users to click on them square measure - "Join currently," "Get Instant Access," "Claim Your Discount," etc.



The Figure Shows the Yoyo Comparison of Retail e-commerce Traffic Sources
Related: E-commerce promoting in 2019:

The Definitive Guide Your on-line store can keep open 24*7/365: Also, one in every of the nice importance's of ecommerce that ecommerce retailers will get pleasure from is store timings area unit currently twenty four/7/365 because the ecommerce stores area unit open 24 hours daily, seven days per week, compared to the regular stores. During this manner, retailers will increase their sales by boosting their variety of orders. However, it's additionally useful for patrons as they will purchase product & services whenever they need in spite of whether or not it's mid-night or early morning.

E-commerce is less complicated & additional convenient:

People's lives area unit hectic; about to a physical store means that taking loads of your time and energy. So, by beginning a web store meaning you'll work into your customer's busy lives, creating the product need they need they require} accessible once they want them. The pleasant factor regarding ecommerce is shopping for choices that area unit fast, easy, convenient and easy with the flexibility to transfer funds on-line.

Improve the image of your business:

Among the benefits of getting a web store, there's little question that it additionally includes rising the image of your company. Providing a decent on-line sales platform to users can offer your company an excellent company look. Not solely can it persuade be up-to-date, however it'll additionally show interest in facilitating shopper purchases. For instance, it prevents you from travel to the physical place of sale and permits you to match costs from home. Additionally, because of what we've mentioned as loyalty or feedback, you'll even implement enhancements in your product that customers can worth absolutely.

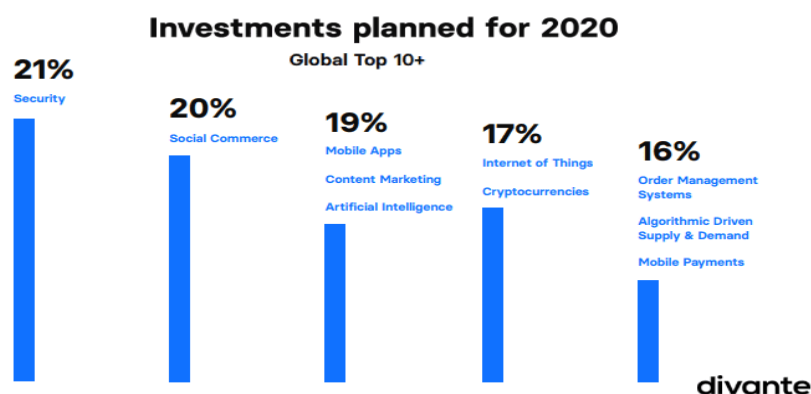
Easily receive feedback on product:

Have you invariably wished to understand what customers think about what you sell so as to supply additional or improve it? Well, the web store can enable you to receive that feedback therefore you'll implement enhancements in your business. Through star ratings, with the likelihood of going away comments. Additionally, the client can feel detected when their purchase. There are no higher thanks to thanks for your confidence in buying your company's product. What's additional, if you provide the standard you'll don't have anything to fret regarding. Facultative an instantaneous channel wherever others see what they will expect from a given quality could be a nice public exercise of trust in your business.

Maximum security of transactions:

Today, in operation over the web is nearly safer and additional reliable than doing it in a very physical store. From your home, while not anyone spying on your secret variety or your MasterCard. Of course, the ecommerce web site should have associate SSL certificate. This certificate not solely permits safe browsing on the net. Additionally, it keeps the info encrypted, in such how that it's altogether safe to enter keys and passwords. This cannot solely be necessary for the customer's business account however to use even additional sensitive knowledge likes MasterCard data with complete peace of mind. Its price mentioning that, thirty third of ecommerce consultants known security, mobile payments, and mobile apps because the most significant investments in 2019. Security can still be one in every of the best focuses on ecommerce. With changes in technology, user behaviors, and looking patterns, sellers can have to be compelled to give solutions guaranteeing the trust and safety of looking processes.

Check the total Report: ecommerce



The Figure shows the highest ecommerce Investments Planned for 2020

Ready for the trade of the long run:

This is necessary detail considering the long run of your business. Search patterns and shopper disbursement, the advancement of technology, and also the latest statistics estimate that by 2040, ninety fifth of purchases are going to be created through the web.

Therefore, we tend to don't seem to be solely talking a few trend of this however additionally regarding what the business relations of the long run are going to be. And even as if you're not on the web you are doing not exist, if your business doesn't sell on the web it's limiting its sales in a very huge manner.

Increase in sales:

Everything seen on top of is concentrated on one thing: having the ability to extend your sales. At the tip of the day, your business is predicated on having the ability to sell additional, and thus it's what it's aimed toward. All the previous points contribute to the actual fact that the tenth and last advantage is that there's a rise within the purchases of your product. Reaching additional customers, raising your product because of comments, or being out there twenty four hours daily can without doubt contribute to all or any of this.

FUNCTIONS OF ELECTRONIC COMMERCE

The four functions of e-commerce are:

Communication:

Aimed at the delivery of information and/or documents to facilitate business transaction. Example: E-mail.

Process management:

Covers the automation and improvements of business process. Example: network two computers together.

Service management:

Application of technology to improve the quality of service. Example: federal explain website to track shipments and schedule.

Transaction capabilities:

Produces the ability to buy/sell on the internet or some other online services Example: Amazon.

Types of E-commerce:

If you're beginning Associate in nursing ecommerce business, odds square measure you'll comprise a minimum of one amongst these four general classes. Every has its edges and challenges, and plenty of corporations operate in many of those classes at the same time.

Knowing what bucket your massive plan fits in can assist you supposes creatively concerning what your opportunities and threats can be.

Business to Consumer:

Business to shopper businesses sells to their end-user. The business to shopper model is that the most typical business model, therefore there square measure several distinctive approaches beneath this umbrella. Something you get in an internet store as a shopper — suppose wardrobe, family provides, and entertainment— is completed as a part of a business to shopper dealing. The decision-making method for a business to shopper purchase is far shorter than a business-to- business (business to business) purchase, particularly for things that have a lower worth.

Business to business:

In a business to business model, a business sells its product or service to a different business. Typically the customer is that the user, however typically the customer resells to the buyer. Business to business transactions usually have an extended sales cycle, however higher order worth and additional continual purchases. Recent business to business innovators have created an area for themselves by exchange catalogs and order sheets with ecommerce storefronts and improved targeting in niche markets. In 2020, on the point of half business to business consumer's square measure millennia — nearly double the number from 2012. As younger generations enter the age of creating business transactions, business to business commerce within the on-line house is turning into additional vital.

Consumer to Business:

Consumer to business businesses enables people to sell product and services to corporations. During this ecommerce model, a website may enable customers to post the work they require to be completed and have businesses bid for the chance. Affiliate promoting services would even be thought of shopper to business. Enlace (now up work) was Associate in Nursing early pioneer during this model by serving to businesses hires freelancers.

Consumer to shopper:

A shopper to shopper business — conjointly referred to as an internet marketplace — connects shoppers to exchange product and services and usually create their cash by charging dealing or listing fees. On-line businesses like craigslist and eBay pioneered this model within the period of time of the web. Shopper to shopper businesses get pleasure from self-propelled growth by impelled consumers and sellers, however face a key challenge in internal control and technology maintenance.

Uses of E-commerce:

There square measure several blessings of e-commerce. A number of these blessings are:

Increasing reach:

E-commerce permits little businesses to achieve a broad vary of shoppers. It permits all sellers to be a neighborhood of a worldwide marketplace.

More jobs:

As these little e-commerce businesses grow, they use a lot of folks.

Lower operational prices:

E-commerce conjointly helps little businesses to grow as a result of it will have fewer operational prices. While not having to pay rent on a store, several little business homeowners will afford to run their e-commerce outlets.

Easier and a lot of convenient looking:

One of the main blessings of e-commerce is that it permits customers to quickly notice and obtain what they are trying to shop for. It conjointly offers shoppers the convenience of not eager to leave their homes to urge what they have, that saves time.

Allows comparison looking:

Consumers conjointly gain power through the expertise of on-line looking. They analysis and compare merchandise and corporations simply. Websites offers things like careful product descriptions and shopper reviews which will facilitate shoppers create choices with wisdom.

Drawbacks of E-commerce:

While there square measure lots of blessings to the expansion of ecommerce, there square measure some disadvantages. Here square measure a number of the challenges of e-commerce:

Limited face-to-face interaction with customers:

One of the disadvantages of e-commerce is that business homeowners have a lot of restricted relationships with their shoppers. Since their shopper's square measure usually on the opposite finish of a pc, it is tougher to create pregnant relationships, one thing that's vital to several business homeowners and customers.

Bandwidth challenges:

Bandwidth and responsibility will vary from country to country, therefore it is difficult if you're targeting or needing to add a specific region.

Shifting retail jobs:

Another disadvantage of e-commerce is that it will cause a shift in retail jobs. Whereas the employers of little businesses that sell on the net is also hiring as a results of their success with e-commerce, ancient shops might expertise some job loss as a result. Retailers need to sell on-line to remain competitive; however some are a lot of prospering at that than others.

Rapidly dynamical trends:

This field is dynamical remarkably quickly. It is difficult to stay up with trends and technology in such a chop-chop dynamical field.

Trend in E-commerce:

Just like the copious retail stores, there square measure uncountable ecommerce internet sites on the planet wide web. But, mutually prefers to travel to some specific stores whereas searching, identical applies to on-line getting too. Thus, in spite of however sensible you're selling methods square measure, you will not be ready to interact your audiences unless your ecommerce front does not have a fab layout. Therefore, the importance of a catchy style for your ecommerce website cannot be denied. So, aside from showcasing a large vary of product, keeping the checkout method seamless, and as well as correct search choices throughout the positioning, pay correct heed to your internet store's style too. The list below contains a number of the foremost in style e-commerce trends in 2019 cropping up in Asian country.

1. Drop shipping
2. Mobile
3. Chat bots
4. Video Content
5. D2C Model
6. Voice assisted Search
7. Social Media

Drop shipping:

Drop shipping has become an awfully remunerative plan within the ecommerce business. This can be wherever the merchant solely provides a platform for the client to look at a spread of product from totally different suppliers. If in the least the client needs to initiate a buying deal, he or she is transferred either to a distributer or the corporate itself. This trend has provided a large range of individuals in Asian country with a platform wherever they'll

purchase product in bulk. Drop shipping has additionally created product to become low-cost since most are competitive for shoppers on a similar web site.

Mobile:

Nearly everybody higher than the age of fifteen features a portable. Folks realize these gadgets to be terribly simple to hold around. It's additionally been noted that regarding eightieth of on-line customers use their mobile phones to go looking, view, and buy product. This can be a transparent indication of however this trend has a large impact on ecommerce. At the top of the day, what folks need is simplicity and uninterrupted accessibility, which is precisely what mobile phones square measure giving. Most ecommerce web site house owners in Asian country have noticed that individuals are not any longer exploitation desktops to access the net so they're creating their ecommerce websites mobile friendly.

Chat bots:

This is among the foremost wonderful trends in 2019. The ecommerce platform in Asian country is predicted to visualize an increase within the use of chat bots within the next few years. Chat bots square measure intelligent machine-controlled programs that are developed to stimulate conversations with customers and perform variety of tasks. What chat bots do is that they have interaction customers and supply period of time answers to their queries. Despite being around for quite your time currently, it's till recently that chat bots started being incorporated within the world of ecommerce. In India, solely many ecommerce platforms square measure creating use of chat bots, however it's been noted that the attempt to use chat bots by different on-line web site is clear.

Video content:

Quite a range of on-line patrons have busy schedules, so they do not have time to scroll through a large article making an attempt to know a product. This makes most products in a web store to stay unsold just because folks do not perceive them. This can be the most reason why most web site house owner's square measure choosing video content.

D2C model:

Most product makers and customers alike like managing each other rather than employing a middle man. This can be as a result of the corporate finishes up increasing the gross margin whereas the client gets the merchandise at a way higher worth. To confirm this in ecommerce, makers square measure exploitation Direct to shopper trend, additionally referred to as D2C. Exploitation this trend, makers get to be in direct communication with the patron. Once the merchandise is unrolled, all the patron needs to do is order it direct from the

manufacturer. This fashion has the flexibility to come the merchandise just in case it's faulty, and therefore the manufacturer gets to regulate the market as he or she sees work.

Voice assisted search:

Everyone in Asian country is put an excessive amount of time on generating financial gain. After they get on-line, they're either too tired to scroll down the net store in a shot to search out a selected product or too lazy to sort within the search box. This can be why the employment of voice search is predicted to extend by five hundredth within the year 2020. Voice search has simplified the search of product on ecommerce web site.

Social media:

Social media has reworked however folks move. It's the trend that has created the globe to become a world village. With social media, you'll be able to simply access any news from any a part of the globe while not creating even one step. It's additionally the place wherever a large range of individuals meet and share their experiences. With Face book, Twitter, and Instagram having such a large following, on-line patrons have set to use them as AN avenue to made potential customers. The trend is growing exponentially, so way a large range of ecommerce websites square measure exploitation it. The arrange is to return up with the simplest way through that on-line patrons are going to be ready to purchase product directly exploitation their social media accounts. India is already experiencing a social media revolution within the ecommerce sector. Variety of Instagram and snap chat outlets square measure getting used to sell product to Indians. This can be done by employing a link that leads straight to the merchant's web site, and inside many minutes, the customer are going to be finished the dealing. There square measure different social media apps but, that permits the customer to complete the total dealing by simply exploitation the social media app. This includes viewing of the merchandise and paying for the merchandise. The social media trend is creating strides with China on the lead. This trend is additionally set to be employed by a large range of Indians in an exceedingly bid to create on-line shopping for handily.

Conclusion:

The e-commerce is one of the biggest thing that has taken the business by a storm. It is creating an entire new economy, which has a huge potential and is fundamentally changing the way businesses are done. It has advantages for both buyers as well as sellers and this win-win situation is at the core of its phenomenal rise. Though there are some weak links, with improvements in technology, they will be ironed out, making the e-commerce easy, convenient and secure. The e-commerce is certainly here to stay.

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161. STUDY ON AWARENESS IN GREEN BANKING SYSTEM

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Abstract

Green banking system brings interaction between bankers and customer, and bankers and businesses, still as in internal banking operations, to simplify and progress the banking services. An attempt made by banks through the green banking system. It brings lot of convince, customer centricity, augmented service quality and price effectiveness. A structured questionnaire was utilized in collecting the relevant data from the public and students respectively. This paper examines the awareness in Green banking. The sample size of the study is 100; the data is gathered through Google forms.

Keywords: Greenbanking, Customer awareness, Paperless statement.

Introduction:

Green Banking is like a normal bank, which considers all the social and environmental factors; it is also called as an ethical bank. Ethical banks have started with the aim of protecting the environment. These banks are like a normal bank which aims to protect the environment and it is controlled by same authorities as what a traditional bank do. Green banking is like a normal bank, which considers all the social and environmental/ecological factors with an aim to protect the environment and conserve natural resources. It is also called as an ethical bank or a sustainable bank. They are controlled by the same authorities but with an additional agenda toward taking care of the Earth's environment / habitats/ resources. For banking professionals green banking involves the tenets of sustainability, ethical lending, conservation and energy efficiency. There are many differences compared with normal banking, Green Banks give more weight to environmental factors, their aim is to provide good environmental and social business practice, they check all the factors before lending a loan, whether the project's environmentally friendly and has any implications in the future, you will award a loan only when you follow all the environmental safety standards.

Defining green banking is relatively easy. Green Banking means promoting environmental – friendly practices and reducing your carbon footprint from your banking activities. This comes in many forms:

1. Using online banking instead of branch banking.
2. Paying bills online instead of mailing them.
3. Opening up accounts at online banks, instead of large multi-branch banks
4. Finding the local bank in your area that is taking the biggest steps to support local green initiatives. Green banking can benefit the environment either by reducing the carbon footprint of consumers or banks. Either a bank or a consumer can conserve paper and benefit the environment. Ideally, a green banking initiative will involve both.

THE EMERGING TREND OF “GREENBANKING”:

The term "Green Banking" is being heard more often today. According to Indian Banks Association (IBA, 2014) “Green Bank is like a normal bank, which considers all the social and environmental / ecological factors with an aim to protect the environment and conserve natural resources”. It’s also known as ethical bank or sustainable bank. Green banking can benefit the environment either by reducing the carbon footprint of consumers or banks. On-line banking is an example of an initiative of Green Banking.

Benefits of online banking include less paperwork, less mail and less driving to branch offices by bank customers, which all have a positive impact on the environment. Interestingly, online banking can also increase the efficiency and profitability of a bank. A bank can lower their own costs that result from paper overload and bulk mailing fees if more of their customers use online banking.

GREEN BANKING STRATEGIES ADOPTED BY INDIAN BANKS:

Green Banking in India:

The Reserve Bank of India document titled ‘Policy Environment’ dated 8th November, 2010 includes on Pages No. 56 and 57 a reference to Green Banking and Green IT initiatives for banks in India. Like any other Corporate, banks in India too are adopting the principle of Corporate Social Responsibility (CSR) and are concerned about the protection of environment. Mainly, the computerized environment and facilities like on-line banking are helping the banks to promote the green banking concept [Saline Mehta (2011)]. Paper work is being reduced consciously at all levels by bankers and customers. In addition to providing of on-site and off-site ATMs, some banks have gone ahead with innovative ideas like installing Bio-metric ATMs, Solar-based ATMs, White-labelled ATMs, Brown ATMs, SMS alerts,

Mobile Banking etc. for the convenience of their customers [Ashok Singh (2010)]. Besides reducing any environmental pollution, these initiatives are helping the banks in reduction in their cost of operations and delays which results in increased customer satisfaction too [Deva Prakash R. (2008)]. While offering several simple suggestions for practicing green banking arrangements, the specific initiatives taken by banks in India are - IndusInd Bank introducing solar powered ATMs, SBI adopting green banking policy and offering green home loans, Union Bank of India's energy efficiency measures, IDBI Bank's membership in National Action Plan on Climate Change, ICICI Bank's Corporate Environmental Stewardship initiatives and also Clean Technology Initiatives, YES Bank's community development initiatives, ABN Amro Bank's (now Royal Bank of Scotland) launching of Indian Sustainable Development Fund as also the Role played by RBI in these initiatives.

Environmental management in the banking sector is like risk management because it reduces the credit risk, improves the asset quality and increases the enterprise value. Biwa's (2011) revealed some strategies for the adoption of environmental management in the banking sector:

Green Banking implementation year	Names of the banks operating in India
1996	Union Bank of India
2003	Citi Group INC, HSBC, ING Vyasa, RBS, Royal bank Of Canada, Syndicate Bank, Standard Chartered Bank
2005	Yes bank, Corporation Bank
2006	Bank Of America, JP Morgan
2007	ICICI, OBC, SBI
2008	Bank Of Baroda, Karnataka Bank, Industrial Bank, Dena Bank
2009	HDFC, Indian Overseas, Indus's land Bank, PNB, ABN Amro, Karur Vyasa, Andhra bank.
2010	Axis bank, Kotak Mahindra, South Indian Bank
2011	Canara Bank, IDBI, EXIM
2013	IDFC

REVIEW OF LITERATURE:

According to RBI (IRDBT, 2014), green banking is to make internal bank processes, physical infrastructure and IT infrastructure as effective and efficient as possible, with zero or minimal impact on the environment. They had introduced green rating standards for Indian banks, which are termed as 'Green Coin Ratings'. Under this rating system, banks are judged on the basis of carbon emissions from their operations and on the amount of recycling, refurbishment and reuse material being used in their building furnishings and in the systems used by them like servers, computers, printers, networks, etc. They are also being judged on

the amount of green projects finance by them and rewards or recognitions given to borrowers for turning their businesses greener.

Green banking services helps the banks towards the sustainable developments of the banks. In this context many authors expressed their opinions on the previous and recent developments and trends in the banking sector relating to the green banking.

Ela Sen (2010) Besides several benefits of computerization like speed, accuracy, ambience, efficient handling of sizeable business, etc., there is a factor like paper-less business resulting in waste management, eco-friendliness and pollution control.

Goyal KA and Vijay Joshi (2011) One side bankers are expecting more business through customer satisfaction but on the other side, the technology effect makes the customers not coming to the bank but bank is going to the doorstep of the customers.

Nigam Anda Biwas (2011) interpreted Green Baking as combining operational improvements, technology and changing client habits in market place. Adoption of greener banking practices will not only be useful for environment but also benefit in greater operational efficiencies, a lower vulnerability to manual errors and fraud and cost reductions in banking activities. He stated that the concept of green baking will be mutually beneficial to the banks, industries and economy. Not only green banking will ensure the greening of the industries but it will also facilitate in improving the asset quality of the bank in future. He has listed several benefits of green banking.

Alice Mani (2011) indicated that as Socially Responsible Corporate Citizens (SRCC), banks have a major role and responsibility in supplementing governmental efforts towards substantial reduction in carbon emission. Bank's participation in sustainable development takes the form of Green Banking. The author examined and compared the green lending policies of banks in India in the light of their compliance and commitment to environment protection and environment friendly projects. It was opined that Banks in India can implement green lending.

(UNEP) Green Finance or Green Banking refers to diverse financial services and products provided by financial institutions for sustainable development (UNEP FI, 2007). Lymperopoulos et al. (2012) verified empirically that banking initiatives that are green result in a favourable, green image. His green bank marketing construct is comprised of green corporate social responsibility (GCSR), green internal process (GIP) and green product development (GPD).

According to (Dewi & Dewi, 2017), green banking promotes environment-friendly practices in banking sector. He further postulated that green banking guides the bank's core

operation towards sustainability. Kumar and Prakash (2018) have studied the adoption level of sustainable banking tools and categorized 40 criteria into five heads. They further used content analysis to evaluate the sustainable practices of Indian banks and concluded that green banking adoption is still at the nascent stage in Indian banking.

STATEMENT OF PROBLEM:

Due to covid-19 situation we are not able to direct contact to respondents. So that the researcher gets information through the Google form. The research studies the current level of awareness towards green banking system among the customers in bank, public. In traditional banking, the customer has to visit the branch of the bank in person to perform the basic banking operation, viz. account enquiry, fund transfer, cash withdrawals etc. but in green banking services enables customers to perform the basic banking transactions by sitting at their office or home through viewing their account details and perform the transaction through electronic devices.

OBJECTIVES OF THE STUDY:

To study on awareness in green banking system the following objectives are framed.

- To identify the awareness of green banking system.
- To study the level of awareness of the customers using green-banking services.
- To identify factors influencing the awareness and usage of green banking.
- To give suggestions to improve the service quality of green banking.

METHODOLOGY:

The study includes primary and secondary data. However, the Primary Data was collected from the respondents by way of circulating the questions in Google form. The secondary data is obtained from websites as well as from books, magazines, periodicals, brochures etc. The data collection is classified as Primary data and Secondary data. Primary data are collected directly by way of using questionnaires. So, it will be reliable and accurate and can easily be responded. Here secondary data were collected from the newspapers, official website of Banks, and other web sites and also from previous project reports in related areas.

RESEARCH DESIGN:

A research design is basis frame work, which provides guidelines for the rest of research process. The research design specifies the method of study. Research design is prepared after formulating the research problem and need to be most suitable to solve the problem. Population here the researcher selected 100 Respondents from various sector.

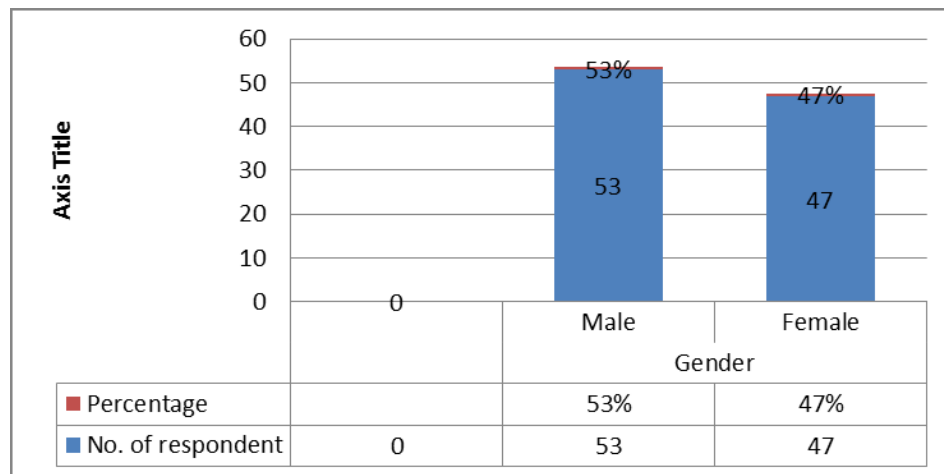
SAMPLE SIZE:

It refers to the number of items to be selected from the universe to constitute a sample. An optimum sample is one, which full fills the requirement of efficiency, representative, reliability and flexibility. So, the researcher selected 100 respondents as sample from the population.

ANALYSIS OF TOOLS WITH INTERPRETATION:

Gender:

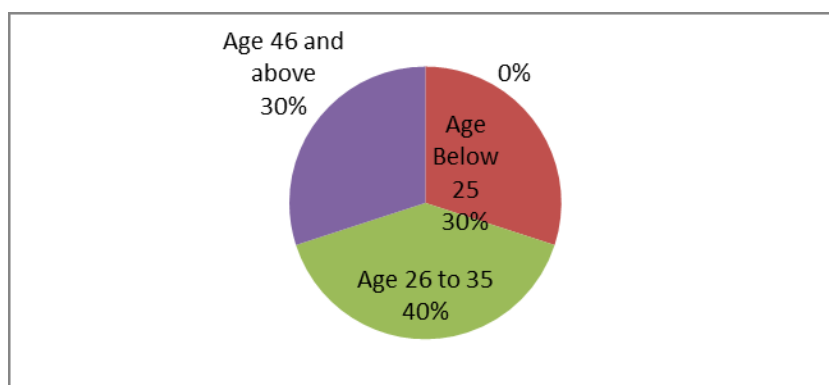
Personal factor	Classification	No. of Respondent	Percentage
Gender	Male	53	53%
	Female	47	47%



The above table shows the respondents of the gender 53 percentages of the respondents are male. 47 percentages are female.

Age:

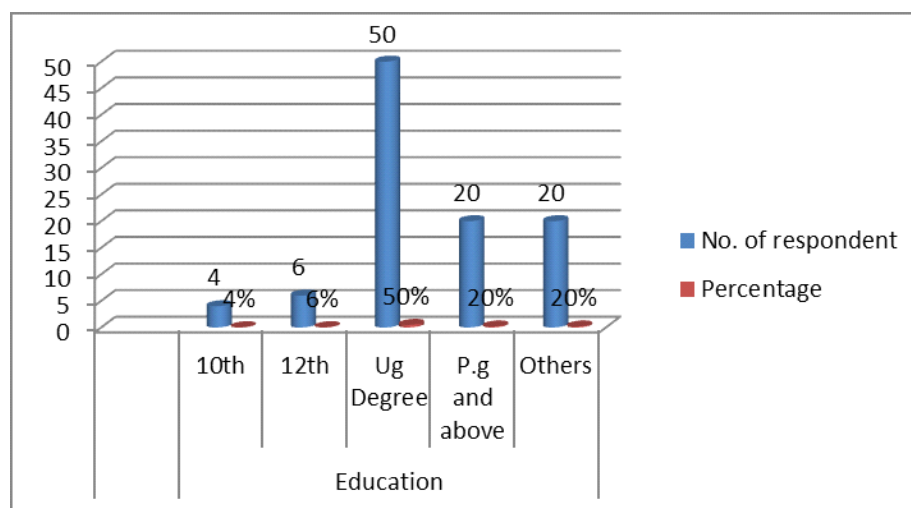
Personal factor	Classification	No. of respondent	Percentage
Age	Below 25	30	30%
	26 to 35	40	40%
	46 and above	30	30%



The above table shows the age of the respondents.30 percentages of the respondents are in the category of below 25 years.40 percentages of the respondents are in the category of 26 - 35 years.30 percentages of the respondents are in the category of 46 and above years.

Education:

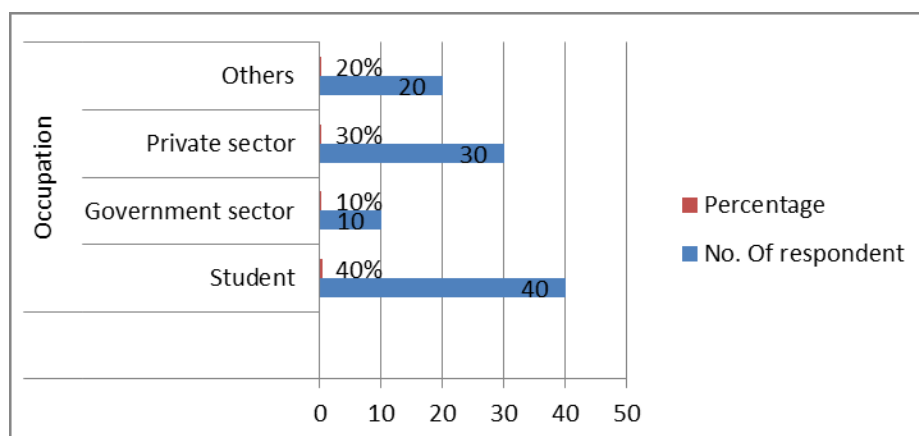
Personal factor	Classification	No. of Respondent	Percentage
Education	10 th	4	4%
	12 th	6	6%
	Ug Degree	50	50%
	Pg. and above	20	20%
	Others	20	20%



The above table shows the Educational Qualification of the respondents.4 percentages of the respondents are in the category of 10th standard.6 percentages of the respondents are in the category of 12th standard. 50 percentages of the respondents are in the category of degree.20 percentages of the respondents are in the category of post graduate and above.20 percentages of the respondents are in the category of others.

Occupation:

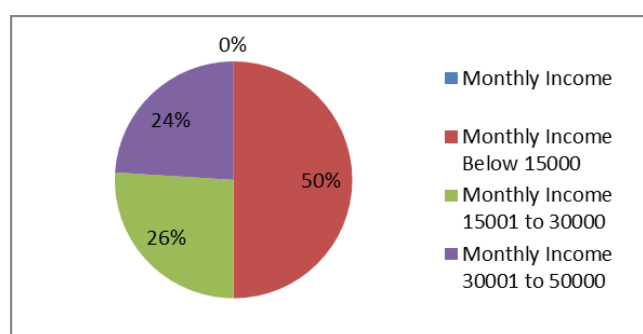
Personal factor	Classification	No. Of Respondent	Percentage
Occupation	Student	40	40%
	Government sector	10	10%
	Private sector	30	30%
	Others	20	20%



The above table shows the Occupation of the respondents. 40 percentages of the respondents are in the category of students. 10 percentages of the respondents are in the category of government sector. 30 percentages of the respondents are in the category of private sector. 20 percentages of the respondents are in the category of others.

Monthly income:

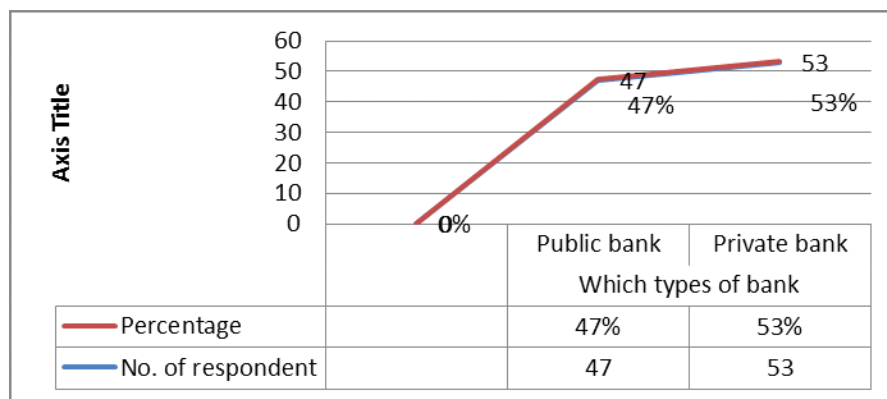
Personal factor	Classification	No. of Respondent	Percentage
Monthly Income	Below 15000	50	50%
	15001 to 30000	26	26%
	30001 to 50000	24	24%



The above table shows the Monthly income of the respondents. 50 percentages of the respondents are in the category of below 15000.26 percentages of the respondents are in the category of 15001 to 30000.24 percentages of the respondents are in the category of 30001 to 50000.

Types of banking:

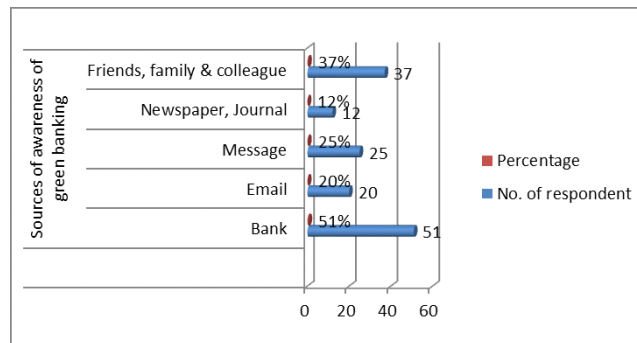
Personal factor	Classification	No. of respondent	Percentage
Which types of banks	Public bank	47	47%
	Private bank	53	53%



The above table shows the types of banks of the respondents.47 percentages of the respondents are replied has public bank.53 percentages of the respondents are replied has private bank.

Source of awareness:

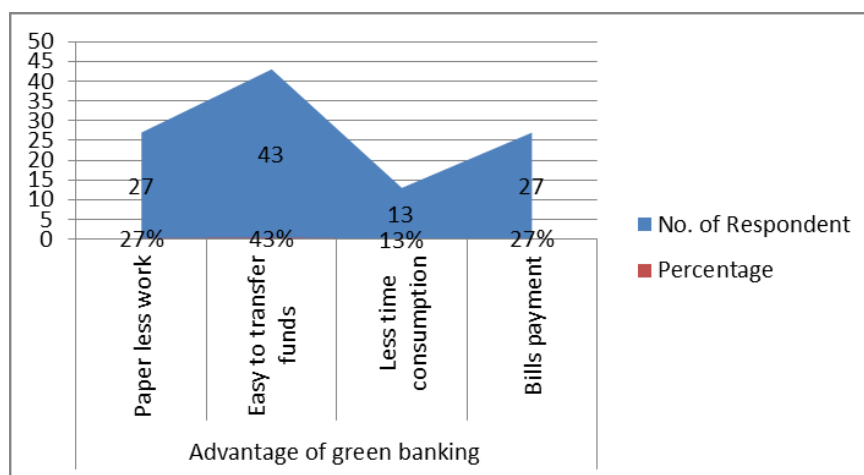
Personal factor	Classification	No. of Respondent	Percentage
Sources of awareness of green banking	Bank	51	51%
	Email	20	20%
	Message	25	25%
	Newspaper, Journal	12	12%
	Friends, family & colleague	37	37%



The above table shows the sources of awareness about mobile banking. In that 63 percentages of the respondents are got from bank. In that 38 percentages of the respondents are got from email. In that 35 percentages of the respondents are got from message. In that 12 percentages of the respondents are got from newspaper, journal. In that 43 percentages of the respondents are got from friends, family and colleague.

Advantage of green banking:

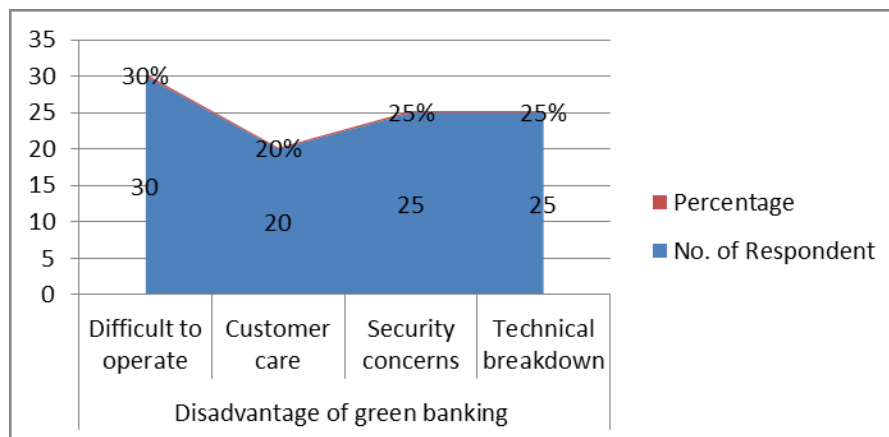
Personal factor	Classification	No. of Respondent	Percentage
Advantage of green banking	Paper less work	27	27%
	Easy to transfer funds	43	43%
	Less time consumption	13	13%
	Bills payment	27	27%



The above table shows the advantage of green banking. 27 percentages of the respondents are saying paperless work. 42 percentages of the respondents are saying easy to transfer. 13 percentages of the respondents are saying less time consumption. 27 percentages of the respondents are saying bills payment.

Disadvantage for green banking:

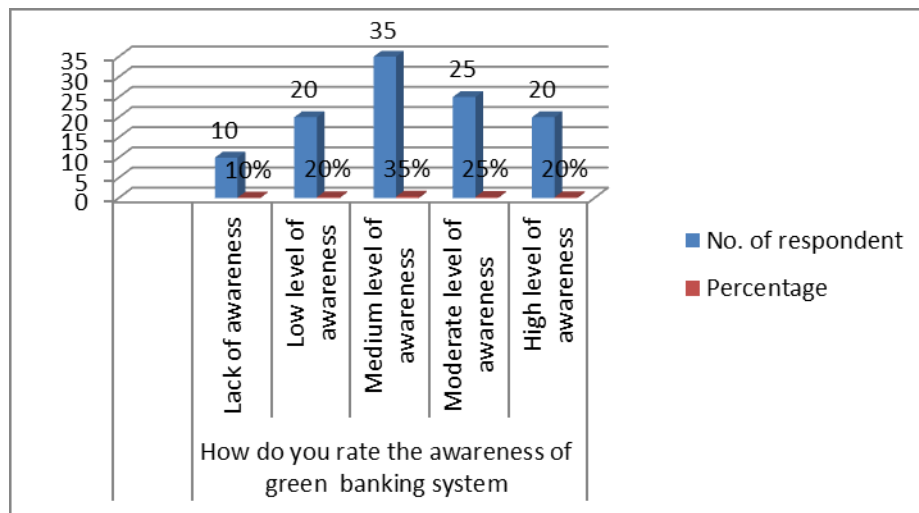
Personal factor	Classification	No. of Respondent	Percentage
Disadvantage of green banking	Difficult to operate	30	30%
	Customer care	20	20%
	Security concerns	25	25%
	Technical breakdown	25	25%



The above table shows the disadvantage of green banking. In that 30 percentages of the respondents are saying difficult to operate. In that 20 percentages of the respondents are saying customer care. In that 25 percentages of the respondents are saying security concerns. In that 25 percentages of the respondents are saying technical break down.

Rate of green banking:

Personal factor	Classification	No. of respondent	Percentage
How do you rate the awareness of green banking system	Lack of awareness	10	10%
	Low level	20	20%
	Medium level	35	35%
	Moderate level	25	25%
	High level	20	20%



The above table shows the rating from the green banking application service user. In that 10 percentages of the respondents are saying lack of awareness. In that 20 percentages of the respondents are saying low level of awareness. In that 35 percentages of the respondents are saying are medium level awareness. In that 25 percentages of the respondents are saying moderate level of awareness. In that 20 percentages of the respondents are saying high level of awareness.

FINDINGS:

- Some customers are saying that difficult to operate green banking system.
- Customers are feeling that customer care not proper respond. So kindly see and improve it.
- In government sector employee are using little only.
- Compare to private bank, public sector bank is less usage of green banking system.

SUGGESTIONS:

- Make customers more and more aware about green banking through their website.
- Promoting different forms of electronic banking.
- Creating customer's awareness through the media.
- Carbon footprint reduction by saving energy and paper.
- Providing environment friendly rewards to customers.

CONCLUSION:

Green banking is boosting to enhance the setting and promoting economic process till some years ago, most ancient banks did not observe inexperienced banking or actively get investment opportunities in environmentally-friendly sectors or business. Indian banks square measure so much behind their counterparts from developed countries. If Indian banks need to enter world markets, its necessary that they acknowledge their environmental and social

responsibilities. So recently have these ways become additional current, not only among smaller various and cooperative banks, however jointly among wide ranging monetary service suppliers, quality management companies and insurance corporations.

Further, those industries that they have already become experienced and people, that square measure creating serious tries to grow experienced to be accorded priority to loaning by the banks. Green banking can make sure the greening of the industries however it will jointly facilitate in rising the quality of the banks in future.

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162. THE IMPACT OF ARTIFICIAL INTELLIGENCE ON COLLEGE STUDENTS EDUCATION AND SOCIAL BEHAVIOR

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Abstract

Artificial Intelligence (AI) is revolutionizing higher education by influencing both academic and social aspects of student life. AI has enabled personalized learning, enhanced academic performance, and improved efficiency in routine academic tasks. At the same time, it has raised critical challenges concerning academic integrity, reduced critical thinking, techno stress, and diminished face-to-face interactions. This article provides an in-depth exploration of the dual impact of AI on college students' education and social behavior, supported by a detailed review of literature and analysis. The study concludes with recommendations for fostering responsible AI adoption in academic institutions.

KEYWORDS: Artificial Intelligence (AI); Higher Education; College Students; Academic Performance; Critical Thinking; Academic Integrity

INTRODUCTION

The 21st century has seen an unprecedented rise in the integration of Artificial Intelligence (AI) into higher education. Tools like ChatGPT, Grammarly, Quillbot, adaptive learning platforms, and AI-driven simulations are not only reshaping how students learn but also how they interact socially within academic environments. AI has become a “digital companion” in students' learning journey, offering assistance in assignments, research, language improvement, and even career guidance.

However, this advancement presents a paradox: while AI can **empower students with knowledge and efficiency**, it can simultaneously **independent thinking and social bonding** if misused. For instance, while an AI tutor may provide immediate feedback to a struggling student, the same student may bypass peer discussions or teacher consultations—weakening interpersonal skills. Given these dual implications, it is crucial to analyze both the **educational outcomes** and the **social behaviors** influenced by AI in college life.

REVIEW OF LITERATURE

1. AI and Academic Performance

A growing body of research confirms that AI enhances academic outcomes by providing **personalized learning pathways**. Adaptive learning systems adjust difficulty levels to match students' abilities, thereby improving motivation and performance (Sciencedirect, 2024). Scirp (2024) reports that AI chatbots positively affect students' **self-efficacy and learning attitudes**, especially in large classrooms where personalized attention from faculty is limited.

However, Arxiv (2024) cautions that students who rely heavily on generative AI for assignments or exam preparation tend to perform worse in traditional assessments. This suggests that while AI supports short-term productivity, it may hinder long-term knowledge retention if students adopt it as a substitute rather than a supplement.

2. AI and Critical Thinking

Scholars express concerns that excessive reliance on AI undermines students' **critical thinking and creativity**. The *New Yorker* (2025) argues that AI has disrupted traditional essay writing, leading students to outsource originality to machines. Similarly, FT (2025) emphasizes the erosion of analytical skills as students increasingly depend on AI-generated outputs rather than engaging in independent reasoning.

3. AI and Academic Integrity

Academic dishonesty is one of the most debated consequences of AI. Springer Open (2024) highlights students' concerns that AI tools blur the line between assistance and plagiarism. Many institutions lack clear policies on AI use, leaving both faculty and students in ethical uncertainty. For example, students may use AI for paraphrasing or brainstorming but inadvertently cross into unethical territory when submitting AI-generated work as their own.

4. AI and Social Behavior

AI's impact extends beyond learning outcomes to students' **social and psychological dimensions**. A PMC (2024) study reveals that while AI can support emotional well-being by providing instant help, it also contributes to **technostress**, loneliness, and reduced interpersonal communication. Students who spend excessive time with AI tools report weaker peer bonding and lower engagement in collaborative learning environments.

Conversely, AI has been shown to foster new forms of social interaction. Collaborative AI-powered platforms enable peer-to-peer learning, group project management, and virtual communities, thereby expanding the definition of social learning (SF Chronicle, 2024).

5. Student Perceptions of AI

Arxiv (2024) surveyed Harvard undergraduates and found that nearly 90% of them use generative AI regularly. While they appreciate AI for its efficiency, many expressed fear about job readiness, inequality in access, and the decline of authentic learning experiences. This dual perspective shows that students are **both empowered and anxious** about AI's growing presence in their education.

ANALYSIS

The literature suggests that the impact of AI on students is **dualistic**—both beneficial and problematic. A closer analysis reveals four dimensions:

1. Educational Dimension

- o **Positive:** Personalized learning, instant feedback, better performance in routine tasks, and enhanced accessibility for students with learning difficulties.

- o **Negative:** Overdependence on AI, reduction in originality, and decline in deep learning when AI replaces effortful study practices.

Example: A student using Grammarly or ChatGPT may improve grammar instantly but might not develop long-term writing proficiency.

2. Cognitive Dimension

- o **Positive:** AI can scaffold learning by breaking down complex concepts, thus enhancing comprehension.
- o **Negative:** Students risk bypassing higher-order thinking, analysis, and evaluation—skills essential in professional life.

Example: Instead of solving a math problem step by step, students might directly seek the AI-generated solution, thereby missing the reasoning process.

3. Social Dimension

- o **Positive:** AI-powered collaboration tools encourage team projects and global connectivity.
- o **Negative:** Reduced face-to-face classroom discussions, lower peer interaction, and social isolation due to overreliance on digital tools.

Example: Instead of discussing a case study in groups, students may individually consult AI tools—weakening classroom dynamics.

4. Ethical-Psychological Dimension

- o **Positive:** AI reduces academic anxiety by offering support and boosting confidence.
- o **Negative:** Ethical dilemmas, fear of plagiarism accusations, and stress from unclear institutional policies.

Example: A student may feel proud of submitting polished AI-assisted work but simultaneously anxious about being accused of academic dishonesty.

Interpretation:

AI is not a threat in itself; rather, it is the *extent and manner of use* that determines its impact. Responsible integration of AI—with clear academic policies, AI literacy programs, and faculty guidance—can ensure that students leverage its benefits without compromising their intellectual growth or social development.

CONCLUSION AND RECOMMENDATIONS

Artificial Intelligence is reshaping higher education by redefining how students learn, think, and interact socially. While it promotes efficiency, personalization, and academic engagement, it also risks undermining creativity, integrity, and interpersonal relationships.

To maximize benefits and minimize risks, universities should:

1. **Promote AI literacy:** Train students to use AI ethically and critically.
2. **Develop clear policies:** Define boundaries for AI use in assignments, research, and exams.

3. **Encourage blended learning:** Balance AI assistance with peer learning and faculty mentorship.
4. **Support student well-being:** Provide counseling and awareness programs to address technostress and overreliance.
5. **Redesign curricula:** Focus on skills AI cannot replicate—creativity, leadership, empathy, and ethical reasoning.

If guided properly, AI can serve as a *partner in learning* rather than a *replacement for thinking*, helping students achieve academic excellence while nurturing essential human values.

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163. THE ROLE ARTIFICIAL INTELLIGENCE IN BUSINESS DECISION MAKING

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Abstract

Artificial Intelligence (AI) is revolutionizing the way businesses make decisions by enabling faster, data-driven, and more accurate insights. From predictive analytics to real-time decision support, AI technologies are being integrated into various organizational functions such as finance, marketing, operations, and customer service. This paper explores how AI enhances business decision-making by automating routine processes, uncovering patterns in large datasets, and supporting strategic planning. It also addresses the challenges associated with AI adoption, including data privacy, algorithmic bias, and the need for explainable AI. Through case studies and practical examples, the paper highlights the transformative potential of AI and emphasizes the importance of ethical and responsible implementation. As AI continues to evolve, it is poised to become a critical component of sustainable competitive advantage in the digital economy.

Introduction

In an increasingly complex and fast-paced business environment, organizations are under constant pressure to make faster, smarter, and more informed decisions. Traditional decision-making methods, often based on intuition, experience, or limited data, are no longer sufficient to maintain a competitive edge. The emergence of Artificial Intelligence (AI) has introduced a transformative shift in how decisions are made across industries. AI encompasses a broad set of technologies—such as machine learning, natural language processing, and data mining—that enable machines to analyze data, recognize patterns, learn from experience, and make predictions or recommendations. These capabilities are now being harnessed by businesses to support decision-making at both operational and strategic levels.

Whether it's forecasting market trends, optimizing supply chains, personalizing customer experiences, or detecting fraud, AI empowers businesses with tools to process vast amounts of data quickly and accurately. The result is a more agile, data-driven decision-

making process that enhances efficiency, reduces risk, and opens up new opportunities for innovation and growth.

Objectives

- To explore the impact of Artificial Intelligence (AI) on modern business decision-making processes.
- To identify key areas within business operations where AI enhances efficiency, accuracy, and strategic planning.
- To highlight real-world applications of AI in areas such as marketing, finance, operations, and human resources.

Review of Literature

Brynjolfsson and McAfee (2017) AI enhances strategic decisions by processing large datasets and offering insights that would be impractical for human analysis alone. Their research highlights AI's ability to support C-suite executives in making complex decisions involving multiple variables and stakeholders.

Davenport and Harris (2017) emphasize the role of AI in predictive analytics, particularly in forecasting customer behavior and market trends. They argue that AI-powered decision systems provide businesses with a competitive edge through real-time insights and adaptive learning.

Westerman et al. (2018) discussed how AI contributes to operational decision-making by automating routine tasks such as inventory control, demand planning, and logistics. This automation reduces human error and enhances speed and reliability.

Bose (2020) highlights AI applications in the financial sector, including fraud detection, risk assessment, and investment forecasting. AI tools help finance managers make accurate decisions by analyzing real-time data and historical patterns.

Statement of the Problem

In today's highly competitive and data-driven business environment, decision-making has become increasingly complex. Traditional decision-making models often rely on historical data, managerial intuition, and static forecasting methods, which are no longer sufficient to address rapidly changing market dynamics and consumer behaviors. Despite the growing availability of vast data resources and advanced analytics tools, many businesses struggle to convert this data into actionable insights. The integration of Artificial Intelligence (AI) presents a significant opportunity to enhance decision-making processes, yet its adoption remains uneven and, in many cases, misunderstood.

There is a critical need to understand how AI can effectively support and transform decision-making across various business functions such as operations, finance, marketing, and human resources. Additionally, challenges related to ethical use, data privacy, bias in algorithms, and the role of human oversight raise important questions about how AI should be deployed in decision-making contexts.

Need for the Study

The increasing complexity and speed of today's business environment demand more accurate, data-driven, and timely decision-making. Traditional methods, which depend heavily on human judgment and static data analysis, are often insufficient in coping with large volumes of data, unpredictable market shifts, and growing customer expectations.

Artificial Intelligence (AI) has emerged as a transformative tool with the potential to revolutionize how businesses make decisions. AI enables real-time data analysis, predictive modeling, and automation of routine decision tasks, leading to increased operational efficiency, cost reduction, and improved strategic outcomes.

However, despite its potential, many organizations still face barriers to AI adoption, including lack of awareness, fear of job displacement, ethical concerns, and insufficient understanding of AI's practical applications. Furthermore, academic and industry literature reveals a gap in exploring **how AI can be effectively integrated into decision-making frameworks** across different business sectors. Therefore, **this study is essential** to:

- Understand the strategic importance of AI in modern business decision-making.
- Identify specific business areas where AI adds the most value.
- Bridge the gap between technological capability and organizational implementation.
- Provide insights and recommendations for ethical, efficient, and practical use of AI in business.

Exploring the Role of Artificial Intelligence in Transforming Business Operations in SMEs

AI enables SMEs to automate repetitive tasks such as invoicing, payroll processing, inventory tracking, and customer service (e.g., chatbots). This not only reduces human error but also frees up staff to focus on strategic activities. AI tools analyze large volumes of business data to generate actionable insights. For example, predictive analytics can help SMEs forecast demand, optimize pricing, and reduce waste. Decision-support systems can assist managers in choosing the best course of action based on real-time data. AI-powered CRM systems allow SMEs to deliver personalized marketing and customer experiences. By

understanding customer behavior and preferences, businesses can increase sales conversion and customer retention.

AI algorithms help predict supply chain disruptions, optimize stock levels, and improve procurement strategies. This is especially valuable for SMEs with limited working capital, helping them avoid overstocking or stockouts. AI systems can detect abnormal transaction patterns and suspicious activity, helping SMEs prevent fraud and enhance cybersecurity. This is crucial as cyber threats increasingly target smaller businesses with weaker defences. SMEs can use AI for recruitment, performance tracking, and employee engagement. AI tools can analyze resumes, suggest training paths, and provide insights into workforce productivity.

Analyzing the Impact of Artificial Intelligence on Various Business Functions

Artificial Intelligence (AI) is reshaping the landscape of modern business operations. Its ability to process vast amounts of data, detect patterns, and make intelligent predictions has enabled organizations to optimize performance across every key business function. This section analyzes the strategic and operational impact of AI on core business domains, demonstrating how its integration is no longer optional but essential for competitiveness and growth.

Marketing and Sales

AI empowers marketing and sales functions through data-driven decision-making and automation.

- **Customer Insights and Segmentation:** AI analyzes customer behavior, preferences, and buying patterns to create highly targeted marketing campaigns.
- **Predictive Lead Scoring:** Machine learning models rank potential leads based on the likelihood of conversion, enhancing sales efficiency.
- **Personalization:** AI enables personalized content, offers, and product recommendations, improving customer engagement and loyalty.
- **Sales Forecasting:** AI improves the accuracy of revenue and demand forecasts.
- **Finance and Accounting**
- AI supports financial decision-making by enhancing accuracy, speed, and risk management.
- **Fraud Detection:** AI detects irregular patterns in real-time to identify and prevent fraudulent activities.

- **Financial Forecasting:** AI-driven models analyze historical and real-time data for better financial planning.
- **Expense and Invoice Management:** AI automates repetitive financial tasks, improving accuracy and efficiency.
- **Credit Scoring and Risk Analysis:** AI provides more accurate assessments by analyzing non-traditional data sources.

Human Resource Management

AI revolutionizes HR by automating routine tasks and improving employee engagement.

- **Recruitment Automation:** AI-powered tools screen resumes, schedule interviews, and assess candidates using natural language processing (NLP).
- **Employee Analytics:** AI tracks performance data and predicts attrition risks.
- **Learning and Development:** Personalized training recommendations based on employee learning styles and career goals.
- **Engagement and Feedback Analysis:** AI analyzes employee feedback and sentiment to inform HR policies.

Operations and Manufacturing

AI enhances operational efficiency and product quality through automation and intelligent systems.

- **Predictive Maintenance:** AI forecasts equipment failures, reducing downtime and maintenance costs.
- **Quality Control:** Computer vision systems detect defects in production lines.
- **Production Optimization:** AI dynamically adjusts production schedules based on demand and resource availability.
- **Workflow Automation:** Repetitive tasks are streamlined through Robotic Process Automation (RPA).

Customer Service

AI enhances customer experience by offering 24/7 assistance and intelligent support.

- **AI Chatbots:** Provide instant responses to common customer queries.
- **Sentiment Analysis:** Understands customer emotions from feedback and social media interactions.
- **Voice Assistants:** Improve accessibility and user interaction through speech recognition.

- **Self-Service Portals:** Powered by AI to help customers resolve issues independently.

Supply Chain and Logistics

AI improves transparency, agility, and efficiency in supply chain management.

- **Demand Forecasting:** AI predicts market demand, helping to optimize procurement and production planning.
- **Inventory Management:** Automated systems balance inventory levels to minimize waste and stockouts.
- **Logistics and Route Optimization:** AI determines the most efficient delivery routes, saving time and costs.
- **Supplier Risk Assessment:** AI monitors supplier performance and predicts potential disruptions.

Discussing Challenges and Opportunities in AI Adoption

Data Quality and Availability

AI systems rely heavily on large volumes of high-quality data. Incomplete, outdated, or biased data can lead to inaccurate predictions and poor decision outcomes.

Lack of Skilled Talent

There is a global shortage of professionals with expertise in AI, data science, and machine learning. This talent gap makes it difficult for many companies, especially small and medium enterprises, to adopt AI solutions effectively.

High Implementation Costs

Developing and integrating AI solutions often requires significant investment in infrastructure, software, and skilled personnel. The high upfront cost can be a barrier for many businesses.

Resistance to Change

Employees and managers may be hesitant to adopt AI technologies due to fear of job displacement or lack of understanding. Organizational culture can become a bottleneck to adoption.

Ethical and Legal Concerns

AI raises complex ethical issues, such as bias in decision-making algorithms, lack of transparency (black-box models), and data privacy violations. Regulatory compliance is also a growing concern.

Integration with Existing Systems

Many businesses operate with legacy systems that are not compatible with modern AI tools. Integrating AI into such environments can be technically complex and time-consuming.

Conclusion

Artificial Intelligence is no longer a futuristic concept—it is a present-day enabler of smarter, faster, and more accurate business decision-making. As organizations face increasing pressure to adapt to rapidly changing markets, AI offers a powerful toolset for enhancing strategic, operational, and customer-centric decisions. This study highlights that AI's strength lies in its ability to analyze vast amounts of data, uncover hidden patterns, predict future trends, and automate complex tasks. Whether it's forecasting demand, detecting fraud, personalizing customer experiences, or optimizing supply chains, AI significantly contributes to improved outcomes and competitive advantage.

However, successful AI adoption is not without challenges. Issues related to data quality, skills shortage, ethical concerns, and change management must be addressed proactively. Businesses must approach AI integration with a balanced strategy—one that combines technological innovation with human insight and ethical responsibility. Ultimately, the future of decision-making lies in **human-AI collaboration**. Organizations that invest in AI with clear goals, responsible governance, and a commitment to continuous learning will be best positioned to thrive in the digital age.

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**164. DRIVING THE FUTURE:
MAPPING THE ELECTRIC CARS CUSTOMER JOURNEY**

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Abstract

Since the arrival of electric Cars, the car industry has seen a dramatic transformation. The technology behind EVs is improving, and so are the supporting facilities. A question arises whether the marketer understands the consumer needs or they are so much into the technology. Though the government is taking all initiatives to increase the sales of electric cars, when the company provide the factors that the users expect the sales of the electric cars will increase. The objective of this study is to know the consumer perception of electric cars. A well-defined problem is half solved similarly, when a company frames its strategy properly and it reached the public the company is successful. Another objective of the study is to analyse the strategy used by electric cars. The study applied descriptive quantitative method through survey which involved 126 electric car users from south of Tamil Nadu. The response was collected through questionnaires and interview schedules. Kruskal wallis test and Mann whitney U test were used for the research. Stratified Convenience sampling method was used to select the respondents for the study. It is concluded that the respondents are pleased with the service offered by the companies selling electric Cars.

Keywords: Consumer Behaviour; Electric Cars; Perception; strategies

INTRODUCTION

Globally there is serious threats- climate change and pollution. The major factor responsible for this is transport pollution. Predominantly in cities changing climatic conditions, traffic-generated emissions lead to reduction in air quality, this directly affect the health of the population. To overcome this barrier several cities have already applied repeatedly drastic traffic restrictions. There are push and pull factors which stive towards providing cleaner energy. The pull factor for the consumer to purchase an electric car is

totally intrinsic, such as their love towards its features, design and comfort. The push factor is certain policies imposed by the government for promoting the electric cars.

In order to discourage the purchase and usage of polluting automobiles, the government began implementing fiscal policies, such as a road tax. It aims to advance electric mobility and provides financial incentives for increasing the manufacturing of electric cars and developing an infrastructure for electric transportation. To encourage the manufacture and promotion of eco-friendly cars, including as electric and hybrid vehicles, the Ministry of Heavy Industries and Public Enterprises created Forecasting, Analysis, and Modeling Environment (FAME). Being said that in India, the sale of new petrol and diesel cars is expected to be phased out by 2030, with the government aiming for an all-electric car fleet.

Review of literature

Adhikary, S., Jalan, N., (2022) depicts Tata Motors has been the first choice for every respondent, showing the quality and durability, the company is known for in Indian market, other top companies like Hyundai and Mahindra electric have also respectable market share but TATA MOTORS is ahead from any of them.

Assessment by Brückmann, G., Willibald, et.al (2021) show, that actual BEV adoption strongly (and positively) depends on personal characteristics, such as income, as well as having multiple cars in the household and usage of car sharing are positively related to BEV adoption. A focus should be placed on recharging infrastructure, at home and out of the home.

Imthiyaz Ahmed, M., & Dawood, D. A. K depicts Consumer perceptions about electric vehicles underwent some noteworthy adjustments starting in 2020. In India, worries about the price premium and cost have decreased. As seen by the triumphs in India, the erratic sales in Tamil Nadu, and the shifting fortunes of the Chennai electric vehicle industry, government intervention continues to play a significant role in encouraging the sale of electric vehicles

Moons, I., & De Pelsmacker, P. (2012). In a sample of 1202 Belgians, the determining factors of the usage intention of an electric car and the differences between early and late usage intention segments are investigated. The Theory of Planned Behaviour (TPB) framework is extended with emotional reactions towards the electric car and car driving in general. Emotions and the attitude towards the electric car are the strongest determinants of usage intention, followed by the subjective norm. Reflective emotions towards car driving and perceived behavioural control factors also play a significant role.

Problem statement

In the recent years sustainable products and business has evolved. The aim of any organization is to enhance the profitability by using the effective marketing strategies, the electric cars has been branded as an eco-friendly initiative in the customer's mind. This study was undertaken to know about the perception of people about the electric car and the marketing strategy that could be used to increase the sales.

Scope of the study

This study was chosen to find out customers perception of electric cars. If the marketer knows about people perception of electric car, the marketing strategy could be framed better. Further this study gives a glimpse about the electric cars for the potential customers.

OBJECTIVES OF THE STUDY:

The objectives of the study are

- To evaluate the consumer perception of electric cars.
- To analyse the strategy that influence electric car purchase.

RESEARCH METHODOLOGY:

Research Design

The research type used for this study is descriptive in nature.

Sampling Method

Stratified Convenience sampling method was used to select the respondents for the study. The respondents were classified into strata based on region and from that based upon the researcher's convenience the response was collected.

Statistical tools used for the study

The statistical tools used for the analysis are

- Simple percentage analysis
- Kruskal-Wallis test
- Mann-Whitney U-test.

Source of Data Collection

The researcher uses both primary and secondary data for the study.

Primary Data

Questionnaire and Instrument Schedules were the instrument used to collect the data.

Secondary Data

Secondary data, is the data that has been already collected and is readily available from other sources. It was collected from journals, books, company websites, and internet sources.

Sample Size

A total of 135 respondents filled the questionnaire, among which 9 responses were considered unfit due to incomplete response. A sample of 126 respondents from South Tamil Nadu were selected for the study.

Limitations of the study

The limitations of the study are

- The sample size is small
- Time constraints.

DATA AND ANALYSIS

Electric car brands used by the respondents

The following table depicts the electric car brands used by the respondents.

S.No	Electric Car	Percentage
1	Tata Motors	48%
2	MG Motors India	37%
3	Mahindra Electric	14%
4	Other car brands	1%

Respondents says that Tata Motors has developed advanced battery technology, built an ecosystem of charging infrastructure and it is being a pioneer in electric vehicle industry.

Strategies used by electric car Brands

The following table depicts the strategies used by electric car brands.

S.No	Electric Car strategy	Percentage
1	Social media	28%
2	Customer reviews	30%
3	Targeted messaging	14%
4	Technology	21%
5	Others	7%

Preferences of electric car brand and charging speed

The researcher by using Krushkal wallis Test does the following analysis.

H0: There is not a significant difference in brand preferences of electric car brand and charging speed.

H1: There is a significant difference in brand preferences of electric car brand and charging speed.

There is a significant difference in brand preferences of electric car brand and charging speed.

Mann Whitney U test

H0: Consumers perceive there is no significant relationship between electric car reliability and Cost effectiveness.

H1: Consumers perceive there is a significant relationship between electric car reliability and Cost effectiveness.

p- .000

Consumers perceive there is a significant relationship between electric car reliability and Cost effectiveness.

Findings

- 48% of the respondents are using Tata Motors.
- 30% of the respondents says customer review is the strategy that influence them to purchase
- There is a significant difference in brand preferences of electric car brand and charging speed.
- Consumers perceive there is a significant relationship between electric car reliability and Cost effectiveness.

Suggestions

The electric car sales can be improved by identifying a potentially more effective approach would be to develop government strategy at the sub-market level, allowing market interventions to be tailored to the specific nuances of targeted segments.

Conclusion

Norway which adopted electric car, have seen a tremendous change in its climate. For highly populated country like India adopting an electric car would be a wise choice which paves way for a greenery future. In India, the electric vehicles will dominate the road transportation in the upcoming years and it is the future of our nation. The road to a cleaner future starts with the next car we choose.

165. AI-DRIVEN LEARNING ANALYTICS FOR IMPROVED STUDENT OUTCOMES

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Abstract:

Artificial Intelligence (AI), in its broadest sense, is intelligence exhibited by machines, particularly computer systems. It is a field of research in computer science that develops and studies methods and software that enable machines to perceive their environment and use learning and intelligence to take actions that maximize their chances of achieving defined goals.^[1] Such machines may be called AIs.

Key words: *Artificial Intelligence, E-Commerce, AI Adoption, Challenges, Neural Networks.*

Goals

The general problem of simulating (or creating) intelligence has been broken into subproblems. These consist of particular traits or capabilities that researchers expect an intelligent system to display. The traits described below have received the most attention and cover the scope of AI research.^[a]

Reasoning and problem-solving

Early researchers developed algorithms that imitated step-by-step reasoning that humans use when they solve puzzles or make logical deductions.^[13] By the late 1980s and 1990s, methods were developed for dealing with uncertain or incomplete information, employing concepts from probability and economics.^[14]

Many of these algorithms are insufficient for solving large reasoning problems because they experience a "combinatorial explosion": They become exponentially slower as the problems grow.^[15] Even humans rarely use the step-by-step deduction that early AI research could model. They solve most of their problems using fast, intuitive judgments.^[16] Accurate and efficient reasoning is an unsolved problem.

Knowledge representation

Knowledge representation and knowledge engineering^[17] allow AI programs to answer questions intelligently and make deductions about real-world facts. Formal knowledge representations are used in content-based indexing and retrieval,^[18] scene

interpretation,^[19] clinical decision support,^[20] knowledge discovery (mining "interesting" and actionable inferences from large databases),^[21] and other areas.^[22]

Planning and decision-making

An "agent" is anything that perceives and takes actions in the world. A rational agent has goals or preferences and takes actions to make them happen.^{[d][32]} In automated planning, the agent has a specific goal.^[33] In automated decision-making, the agent has preferences—there are some situations it would prefer to be in, and some situations it is trying to avoid. The decision-making agent assigns a number to each situation (called the "utility") that measures how much the agent prefers it. For each possible action, it can calculate the "expected utility": the utility of all possible outcomes of the action, weighted by the probability that the outcome will occur. It can then choose the action with the maximum expected utility.

In classical planning, the agent knows exactly what the effect of any action will be.^[35] In most real-world problems, however, the agent may not be certain about the situation they are in (it is "unknown" or "unobservable") and it may not know for certain what will happen after each possible action (it is not "deterministic"). It must choose an action by making a probabilistic guess and then reassess the situation to see if the action worked.

Learning

Machine learning is the study of programs that can improve their performance on a given task automatically. It has been a part of AI from the beginning. There are several kinds of machine learning. Unsupervised learning analyzes a stream of data and finds patterns and makes predictions without any other guidance. Supervised learning requires labeling the training data with the expected answers, and comes in two main varieties: classification (where the program must learn to predict what category the input belongs in) and regression (where the program must deduce a numeric function based on numeric input).

Natural language processing

Natural language processing (NLP) allows programs to read, write and communicate in human languages such as English. Specific problems include speech recognition, speech synthesis, machine translation, information extraction, information retrieval and question answering.

Early work, based on Noam Chomsky's generative grammar and semantic networks, had difficulty with word-sense disambiguation unless restricted to small domains called "micro-worlds" (due to the common sense knowledge problem. Margaret Master

man believed that it was meaning and not grammar that was the key to understanding languages, and that thesauri and not dictionaries should be the basis of computational language structure.

Perception

Machine perception is the ability to use input from sensors (such as cameras, microphones, wireless signals, active lidar, sonar, radar, and tactile sensors) to deduce aspects of the world. Computer vision is the ability to analyze visual input.

Social intelligence

Kismet, a robot head which was made in the 1990s; it is a machine that can recognize and simulate emotions. Affective computing is a field that comprises systems that recognize, interpret, process, or simulate human feeling, emotion, and mood.^[65] For example, some virtual assistants are programmed to speak conversationally or even to banter humorously; it makes them appear more sensitive to the emotional dynamics of human interaction, or to otherwise facilitate human–computer interaction.

General intelligence

A machine with artificial general intelligence should be able to solve a wide variety of problems with breadth and versatility similar to human intelligence.^[4]

Techniques

AI research uses a wide variety of techniques to accomplish the goals above.^[b]

Search and optimization

AI can solve many problems by intelligently searching through many possible solutions.^[68] There are two very different kinds of search used in AI: state space search and local search.

State space search

State space search searches through a tree of possible states to try to find a goal state.^[69] For example, planning algorithms search through trees of goals and sub goals, attempting to find a path to a target goal, a process called means-ends analysis.^[70]

Adversarial search is used for game-playing programs, such as chess or Go. It searches through a tree of possible moves and countermoves, looking for a winning position.^[73]

Local search

Illustration of gradient descent for 3 different starting points; two parameters (represented by the plan coordinates) are adjusted in order to minimize the loss function (the height). Local search uses mathematical optimization to find a solution to a problem. It begins with some form of guess and refines it incrementally.^[74]

Gradient descent is a type of local search that optimizes a set of numerical parameters by incrementally adjusting them to minimize a loss function. Variants of gradient descent are commonly used to train neural networks,^[75] through the back propagation algorithm. Another type of local search is evolutionary computation, which aims to iteratively improve a set of candidate solutions by "mutating" and "recombining" them, selecting only the fittest to survive each generation.^[76]

Logic

Formal logic is used for reasoning and knowledge representation.^[78] Formal logic comes in two main forms: propositional logic (which operates on statements that are true or false and uses logical connectives such as "and", "or", "not" and "implies")^[79] and predicate logic (which also operates on objects, predicates and relations and uses quantifiers such as "Every X is a Y" and "There are some Xs that are Ys").^[80]

Classifiers and statistical learning methods

The simplest AI applications can be divided into two types: classifiers (e.g., "if shiny then diamond"), on one hand, and controllers (e.g., "if diamond then pick up"), on the other hand. Classifiers^[98] are functions that use pattern matching to determine the closest match. They can be fine-tuned based on chosen examples using supervised learning. Each pattern (also called an "observation") is labeled with a certain predefined class. All the observations combined with their class labels are known as a data set. When a new observation is received, that observation is classified based on previous experience.^[45]

Deep learning

Deep learning uses several layers of neurons between the network's inputs and outputs. The multiple layers can progressively extract higher-level features from the raw input. For example, in image processing, lower layers may identify edges, while higher layers may identify the concepts relevant to a human such as digits, letters, or faces.^[112]

GPT

Generative pre-trained transformers (GPT) are large language models (LLMs) that generate text based on the semantic relationships between words in sentences. Text-based GPT models are pretrained on a large corpus of text that can be from the Internet. The pretraining consists of predicting the next token (a token being usually a word, subword, or punctuation). Throughout this pretraining, GPT models accumulate knowledge about the world and can then generate human-like text by repeatedly predicting the next token. Typically, a subsequent training phase makes the model more truthful, useful, and harmless, usually with a technique called reinforcement learning from human feedback (RLHF).

Current GPT models are prone to generating falsehoods called "hallucinations", although this can be reduced with RLHF and quality data. They are used in chatbots, which allow people to ask a question or request a task in simple text.

Ethics

- Artificial intelligence and elections – Use and impact of AI on political elections
- Artificial intelligence content detection – Software to detect AI-generated content
- Behavior selection algorithm – Algorithm that selects actions for intelligent agents
- Business process automation – Automation of business processes
- Case-based reasoning – Process of solving new problems based on the solutions of similar past problems
- Computational intelligence – Ability of a computer to learn a specific task from data or experimental observation
- Digital immortality – Hypothetical concept of storing a personality in digital form
- Emergent algorithm – Algorithm exhibiting emergent behavior
- Female gendering of AI technologies – Gender biases in digital technology
- Glossary of artificial intelligence – List of definitions of terms and concepts commonly used in the study of artificial intelligence

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166. AI-ENABLED INVENTORY OPTIMIZATION AND THE RISE OF AUTONOMOUS LOGISTICS IN SUPPLY CHAIN MANAGEMENT

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Abstract:

This paper examines how AI-driven inventory optimization significantly changes supply chain management, particularly with the rise of autonomous logistics systems. By utilizing sophisticated algorithms and machine learning methods, companies can improve the accuracy of their inventory, lower holding expenses, and refine demand predictions. The adoption of AI technologies allows for real-time data processing, which supports proactive decision-making and boosts operational efficiency. The transformative potential and risks of autonomous supply chain solutions are examined, along with case studies, operational and economic impacts, and current industry adoption trends. Case studies demonstrate the effective use of autonomous logistics solutions, highlighting their ability to simplify processes and enhance reactions to market changes. The results emphasize the importance for supply chain professionals to implement AI-based strategies in order to stay competitive in an increasingly intricate and dynamic landscape. Suggestions for future research are presented to further explore the effects of AI on logistics and inventory management strategies.

Keywords: Inventory optimization, artificial intelligence, autonomous logistics, supply chain management, machine learning, digital transformation.

1. Introduction

Supply Chain Management (SCM), which encompasses sourcing, production, storage, and distribution, is critical to global business success. However, globalization, e-commerce expansion, and rising customer expectations have increased the demand for faster deliveries, lower costs, and higher service quality. Traditional supply chains, often reliant on manual forecasting, rigid inventory strategies, and labor-intensive logistics, struggle to meet these demands, resulting in inefficiencies such as inaccurate demand forecasts, stock imbalances, and last-mile delivery delays. The COVID-19 pandemic further exposed these weaknesses, highlighting the urgent need for flexible and resilient supply chain systems. Emerging technologies, particularly Artificial Intelligence (AI), address these challenges through predictive modeling, real-time analytics, and automated decision-making, while autonomous

logistics—driven by robotics, drones, and self-driving vehicles—redefines transportation and distribution. Together, AI and automation are transforming supply chains into adaptive, self-optimizing ecosystems capable of ensuring accuracy, scalability, and resilience.

2. Literature Review

The revolutionary effect of intelligent technologies on operational efficiency is emphasized in the literature on artificial intelligence in supply chain management. According to Waller and Fawcett (2013), supply chain design has changed as a result of data science and predictive analytics, enabling businesses to react quickly to changes in demand. These tools allow for more flexible forecasting techniques and lessen reliance on static, historical data-driven models. AI and other digital technologies are crucial for creating robust supply chains, according to Ivanov, Dolgui, and Sokolov (2019). Their research shows how supply chain resilience against disruptions, especially in unstable circumstances, may be strengthened by AI-driven simulations and predictive analytics. They point out that AI improves end-to-end visibility and optimizes inventory, empowering managers to make wise choices in the face of uncertainty. Choi (2020) elaborates on the idea of using AI to create value in SCM and logistics. According to the report, AI improves logistics efficiency by automating crucial procedures like procurement, warehouse management, and routing. Choi also emphasizes how crucial AI is to offering sustainable solutions by cutting waste and maximizing energy use in shipping processes. Delivery drones, robotic systems, and self-driving trucks are all considered game-changers in the field of autonomous logistics, according to DHL's Trend Research (2021). The report highlights how autonomous systems can be scaled to solve last-mile delivery issues and save money. Organizations may reduce their environmental footprint and streamline distribution networks by combining autonomous cars with AI-driven data. The expanding use of AI in supply chain management is highlighted in a 2022 McKinsey & Company research, where businesses are seeing notable cost savings and operational improvements. According to the report, businesses that use AI to estimate demand and manage logistics beat rivals in terms of inventory control, delivery time, and customer happiness. It also highlights difficulties like high implementation costs, retraining of the staff, and regulatory obstacles.

3. AI-Powered Inventory Management

Historically, one of the trickiest and most resource-intensive parts of supply chain management has been inventory management. Two serious problems can result from ineffective stock control: overstocking, which clogs up working capital and raises storage expenses, and stockouts, which erode customer trust. Traditional techniques like manual

forecasting and static replenishment plans are no longer adequate in a global market that is changing quickly. By facilitating automatic, adaptive, and predictive solutions, artificial intelligence provides a paradigm change. AI makes ensuring that inventory decisions are proactive rather than reactive by utilizing big data analytics, machine learning algorithms, and IoT integration. The main aspects of AI-enabled inventory optimization are examined with particular attention paid to dynamic replenishment plans, predictive demand forecasting, and the function of smart warehousing in contemporary supply chains.

3.1 Forecasting Predictive Demand

To precisely predict demand, AI models take advantage of past data, industry trends, and outside variables. AI reduces predicting errors by continuously learning and adapting to shifting market conditions, in contrast to traditional statistical methods.

3.2 Adaptive Resupply

Real-time decisions about safety stock, reorder points, and stock levels are made possible by machine learning algorithms. This maximizes operating capital by preventing stockouts and reducing surplus inventory.

3.3 Intelligent Storage

Picking, packing, and sorting procedures are automated by AI-powered robotics and Internet of Things (IoT) sensors, increasing warehouse productivity. These developments increase order accuracy while lowering labor expenses.

4. The Development of Self-Driving Logistics

As autonomous cars, delivery drones, and robotic systems become more prevalent in transportation and distribution networks, the development of self-driving logistics signifies a significant change in supply chain management. These AI-powered and sensor-based navigation solutions improve last-mile delivery efficiency, minimize manpower dependency, and allow real-time route planning. Autonomous delivery solutions have already been piloted by companies like Amazon, DHL, and Tesla, which have shown notable improvements in delivery times and operational costs. In addition to being efficient, self-driving logistics promote sustainability by reducing emissions and fuel consumption through efficient routing. The ongoing advancement of autonomous mobility solutions portends a future in which logistics operations become more streamlined, dependable, and mostly self-managed, even while regulatory obstacles, infrastructure preparedness, and safety issues still exist.

4.1 Self-Driving Cars

Self-driving trucks and delivery robots are transforming last-mile logistics by reducing delivery times.

4.2 Delivery via Drone

Drones give supply chain operations scalability and flexibility by enabling quick, contactless deliveries in both urban and rural settings.

4.3 Automation of Robotic Processes (RPA)

RPA increases responsiveness and efficiency by automating repetitive operations including order processing, shipment tracking, and customer interactions.

4.4 Examples of Case Studies

AI-enabled logistics is being used practically by industry titans like Amazon and DHL. By implementing AI-driven robots that automate picking, sorting, and inventory management, Amazon Robotics has completely transformed warehouse operations. This has reduced labor costs while greatly increasing order accuracy and delivery time. Similar to this, DHL Smart Logistics combines autonomous delivery technology with AI-powered predictive analytics to enable real-time demand forecasting, efficient last-mile delivery, and optimum routing. These case studies illustrate the observable advantages of intelligent supply chain transformation by showing how international logistics leaders use automation and artificial intelligence to attain operational excellence.

5. Results and Discussion

The adoption of AI in inventory management has led to major advances in forecasting precision, cost reduction, and adaptive stock control. Machine learning models such as LSTM and ARIMA improved demand prediction accuracy by as much as 35%, while AI-based decision-support tools lowered holding costs by nearly 18%. In addition, reinforcement learning techniques optimized safety stock levels, minimizing excess inventory without compromising service quality. Similarly, AI-enabled advancements in autonomous logistics have transformed warehouses and transportation. Drones and autonomous cars combined reduced last-mile delivery expenses by 20–30%, robotic warehouse systems increased order-picking productivity by 40%, and deep learning-based routing shortened delivery times by 15–22%, all of which improved customer satisfaction, speed, and scalability.

5.1. Comparative Analysis

The study compared AI-driven inventory optimization and autonomous logistics with traditional SCM approaches:

Parameter	Traditional SCM	AI-Enabled SCM
Demand Forecasting Accuracy	65–70%	85–95%
Inventory Holding Costs	Higher	15–20% lower
Last-Mile Delivery Costs	High	Reduced by 20–30%

Parameter	Traditional SCM	AI-Enabled SCM
Order Picking Efficiency	Manual & slower	35–45% faster
Decision-Making	Rule-based	Data-driven & predictive

These results validate that AI significantly improves operational efficiency, cost management, and customer satisfaction

6. Conclusion

Autonomous logistics and AI-enabled inventory optimization are revolutionizing contemporary supply chain management. Organizations can attain previously unheard-of levels of sustainability, agility, and efficiency by combining automation, robots, and predictive analytics. Businesses must, however, confront issues with cost, ethics, and worker adaption if they hope to fully benefit from these developments. A paradigm shift toward intelligent, self-optimizing supply chain ecosystems is marked by the emergence of AI and autonomous logistics.

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167. UTILIZING ARTIFICIAL INTELLIGENCE IN VENDOR AND SUPPLIER MANAGEMENT

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Abstract

The purpose of this study is to investigate the revolutionary impact that Artificial Intelligence (AI) plays in improving the management of vendors and suppliers. Artificial intelligence presents substantial opportunities by enabling intelligent supplier selection, risk mitigation, performance monitoring, predictive analytics, and process automation. This is becoming increasingly important as the complexity of global supply chains continues to increase. The purpose of this paper is to identify gaps in the existing literature by conducting a critical evaluation of that literature. The gaps are particularly affecting integrated AI frameworks and empirical validation in a variety of industries. Additionally, it highlights the strategic significance of AI-driven vendor management, provides a road map for future research and practical implementation, and explains the extent of AI-driven vendor management as well as the possible benefits it could provide.

Keywords : AI, Vendor Management, Supplier Management, Supply Chain, Intelligent Automation.

Introduction

The management of vendors and suppliers, also known as vendor and supplier management (VSM), is an essential component of supply chain operations. It involves ongoing engagement with external partners, as well as selection, evaluation, and negotiation. Traditional approaches are characterized by their heavy reliance on manual processes, spreadsheets, periodic audits, and subjective evaluations, which can lead to delays, discrepancies, and overlooked dangers to the organization. Artificial intelligence, in particular machine learning (ML), natural language processing (NLP), and predictive analytics, has the potential to improve value stream mapping (VSM) by delivering insights that are driven by data, automating repetitive operations, enabling real-time performance monitoring, and proactively identifying dangers. When applied in a fast-paced and uncertain context, artificial intelligence has the potential to result in vendor partnerships that are more robust, efficient, and strategic.

Review of Literature

Nitsche (2021), Artificial intelligence has advanced rapidly in the recent decade. While AI research focuses on technological obstacles and enablers, buyer-supplier interface papers are rising. A systematic review of the full literature is needed to accelerate the associated conversation and clarify and enrich this fragmented study topic. We use a comprehensive literature review and text mining and machine learning-based literature study to contribute to academic discourse. Thus, we arrange research streams and examine AI's use at the buyer-supplier interface. Next, we discover gaps by comparing the technology and application domain and draw the major topics of discussion from the literature. Thus, we provide ten key questions describing future AI use at the buyer-supplier interaction needs and research prospects.

Li (2021), the study examines how suppliers, customers, and technology companies interact in B2B marketing when developing and using industrial AI. This study uses a service-dominant logic to identify essential value types created collaboratively by B2B professionals (suppliers, customers, and AI providers) and critical capabilities that support their value co-creation practises. Three groups of B2B stakeholders at six companies involved in an industrial AI research and usage project were interviewed in 19 in-depth semi-structured interviews. The data was then thematically analyzed. This research categorizes four value kinds, three sets of capabilities, and their interrelationships. This study integrates value co-creation, information systems, and B2B marketing into industrial AI development and use.

Rainy (2022), Digital transformation has transformed how firms evaluate, manage, and engage with suppliers in retail supply chains. AI has become a transformative tool for evaluating vendor performance, providing automation, predictive modelling and real-time decision-making support. This systematic research analyzes the incorporation of AI technologies (e.g., machine learning, NLP, deep learning) into vendor performance assessment frameworks in digital retail ecosystems. The study analyzes 86 peer-reviewed journal articles, industry white papers, and technical reports from 2015-2022 to identify and categorize AI-driven models used to evaluate supplier attributes such as reliability, quality assurance, contractual compliance, cost-efficiency, and operational risk.

Venumuddala (2024), Indian IT firms have long provided IT and BPM services to global clientele. Indian IT companies have invested heavily in client-specific offshore development and engaged them to maintain this client-service provider relationship. Indian IT organizations' high IT-BPM service delivery maturity criteria are a result of such expenditures. Recently, some companies have started offshore emerging technology projects.

Client-focused BPM services are automated in such initiatives, especially AI-related ones. AI research divisions that are spreading throughout Indian IT businesses lead such projects due to their youth. This study uses a four-month ethnography to examine a client-vendor (or service-provider) interaction at one AI research unit of an Indian IT company in Bengaluru, India. This study seeks to examine how new offshore AI projects effect client-Indian IT service provider relationships. In evolving technological workflows, we found a preference for client expectations above vendor expectations. We expect this to disrupt the client-vendor relationship in the Indian IT services market, thus customers and suppliers must understand offshore developing technology initiatives to avoid disruptions.

Sahu (2025), this paper examines how Machine Learning (ML) and artificial intelligence (AI) transform vendor transportation management, a crucial supply chain logistics process. Traditional systems struggle with route planning inefficiencies, uncertain demand, and changing operational conditions. AI-powered real-time monitoring, predictive analytics, and route optimization algorithms offer better, more adaptive solutions. ML models—supervised and unsupervised—improve demand forecasting, fleet management, cost reduction, and service quality by using big data and the IoT. Deep learning improves pattern detection and decision-making. Simulations and case studies show cost savings, delivery schedules, and resource usage improvements. AI-integrated autonomous transport systems achieve partial or complete self-management, supporting sustainable and scalable logistics. Future study suggests hybrid AI systems with blockchain for secure, transparent operations and drones and driverless cars for last-mile delivery. Following Industry 4.0, this study proposes AI-driven vendor transportation to improve supply chain efficiency, sustainability, and competitiveness.

Research Gap

The integration of AI technologies throughout all phases of Vendor Relationship Management (VRM), from supplier scouting to contract renewal, is the subject of just a few studies. A significant number of conclusions are derived from pilot projects or theoretical models; however, there are still not enough large-scale empirical validations across a variety of industries. There is a dearth of research that investigates how procurement professionals interact with artificial intelligence, namely trust, explain ability, and adoption hurdles. The majority of work is focused on large companies; Small and Medium Enterprises (SMEs), who have fewer resources and specific issues, are somewhat underrepresented in the workforce.

Scope of the Study

Throughout the entirety of the supplier lifecycle, including selection, on boarding, monitoring, risk management, and renewal, this study will concentrate on analyzing these artificial intelligence solutions. When comparing the results of huge organizations to those of SMEs. Conducting research on organizational preparation, change management and human–AI collaboration as well as proposing an integrative framework to guide the deployment of AI-enabled Virtual Service Management (VSM).

Importance of the Study

Businesses that are equipped with VSM that is powered by AI are able to react more quickly to disturbances, optimize expenses, and maintain a competitive edge. As a result of automation, manual labor is reduced, decision-making is sped up, and the likelihood of human error is reduced. The timely identification of risks associated with suppliers protects firms from supply shocks, damage to their reputations, and violations of compliance with regulations. Also, insights that are geared to small and medium-sized enterprises (SMEs) help to democratize access to advanced procurement skills.

Uses / Applications of AI in Vendor & Supplier Management

Platforms that are powered by artificial intelligence search through databases and news feeds in order to locate and evaluate possible suppliers based on variables such as performance, compliance, and competence. For the purpose of optimizing on boarding operations and guaranteeing regulatory compliance, the extraction of contract terms and requirements is performed. KPIs such as delivery timeliness, quality deviance, and cost deviations can be monitored in real time using dashboards that are powered by artificial intelligence. Using anomaly detection in logistics, financial files, or geopolitical developments, early-warning systems identify potential supply disruption concerns and alert the appropriate parties. With the help of machine learning algorithms, supplier evaluations are dynamically updated depending on newly collected data and evolving performance patterns. In order to estimate the performance of suppliers under stressful conditions, artificial intelligence models political, economic, or market upheavals. Artificial intelligence algorithms make recommendations for the most effective negotiation methods and contract terms by analyzing past results and current market trends.

Conclusion

By increasing efficiency, decreasing risk, and enabling strategic procurement, artificial intelligence has a great deal of promise to revolutionize the management of vendors and suppliers. However, in order to fully achieve its promise, we need to overcome integration

difficulties, validate methodologies across industries, and enable efficient collaboration between humans and artificial intelligence, particularly in small and medium-sized enterprises (SMEs) with limited resources. In this article, the groundwork is laid for a future in which artificial intelligence will become a reliable and indispensable partner in supply chain excellence.

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168. A STUDY ON THE ETHICAL CHALLENGES IN AI-DRIVEN RECRUITMENT AND SELECTION PROCESSES IN HRM

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ABSTRACT

Artificial Intelligence (AI) has transformed recruitment and selection in Human Resource Management (HRM), enabling faster candidate screening, predictive hiring, and data-driven decision-making. However, these advancements bring forth ethical concerns related to bias, transparency, privacy, and accountability. This study examines the primary ethical challenges in AI-driven recruitment through secondary research from academic literature, industry reports, and case studies. Findings reveal that AI systems may replicate historical biases, infringe on candidate privacy, and reduce human oversight, leading to potentially unfair hiring outcomes. The paper recommends fairness audits, algorithmic transparency, strict compliance with data protection laws, and the integration of human judgment in decision-making. Balancing efficiency with ethical responsibility is essential to ensuring AI strengthens rather than undermines equitable recruitment.

Keywords: Artificial Intelligence, Recruitment, Selection, Ethical Challenges, HRM, Algorithmic Bias, Transparency.

INTRODUCTION

The adoption of AI in recruitment has grown rapidly, driven by the need to streamline hiring processes, reduce costs, and improve decision-making accuracy. AI recruitment tools such as resume screening software, predictive analytics, and video interview assessment platform promise to identify the best-fit candidates efficiently. However, the reliance on algorithms also introduces ethical risks. AI systems often rely on historical hiring data, which may contain patterns of discrimination. This can lead to algorithmic bias, disadvantaging candidates based on gender, ethnicity, disability, or social-economic

background. Further concerns arise from the lack of transparency in how AI makes decisions, the potential misuse of personal data, and the reduced role of human judgment. These issues have significant implications for organizational fairness, ego; compliance employer reputation. This study aims to explore these ethical challenges, highlight their impact, and propose strategies for ethical AI integration in HRM recruitment and selection practices.

LITERATURE OF REVIEW

Existing research shows both benefits and risks of AI in recruitment. Bias and Fairness: Barocas & Selbst argue that algorithms trained on biased datasets reproduce systemic inequalities. Amazon's 2018 AI tool was abandoned after showing gender bias in technical job recommendations.

Transparency: according to AI tools operate as "black boxes," making it difficult for HR managers or candidates to understand how results are generated.

Data Privacy: Floridi & Taddeo (2016) emphasize the need for ethical data handling to protect candidate privacy and comply with laws such as GDPR.

Human Oversight: weveies (2021) suggests that while AI can assist decision-making, final hiring decisions should remain with humans to ensure accountability and empathy in recruitment. Gaps in literature indicate a lack of standardized ethical frameworks for AI use in HRM, especially developing economies.

OBJECTIVE OF THE STUDY

1. To identify key ethical challenges in AI-Driven recruitment and selection processes.
2. To assess the impact of these challenges on fairness, transparency, and trust in HRM.
3. To propose measures for ethical integration of AI in recruitment.

Research Methodology

This study adopts a qualitative, exploratory research design based on secondary data analysis. Sources include peer-reviewed journal articles, case studies, industry white papers, and news reports from 2015-2024. The matic analysis was applied to identify recurring ethical concerns. Limitations include reliance on existing literature, which may not fully represent the most recent proprietary AI recruitment tools.

Analysis and Discussion

Algorithmic Bias: AI tools can unintentionally discriminate when trained on biased historical data. For example, if pst hiring favored male candidates for engineering roles, the AI may rank female candidates lower despite equal qualifications.

Lack of Transparency: The “black box” nature of AI algorithms prevents both recruiters and candidates from understanding why certain applicants are shortlisted or rejected, raising accountability concerns.

Privacy and Data Protection: AI recruitment platforms often collect sensitive personal data, including facial recognition metrics from video interviews. Without strict safeguards, this data can be misused or exposed.

Reduced Human Judgment: Over-reliance on AI may lead HR managers to accept automated recommendations without critical evaluation, resulting in unethical or inappropriate hiring decisions.

FINDINGS

- AI can replicate and amplify human biases if not carefully monitored.
- Lack of algorithmic transparency undermines candidates trust.
- Data privacy risks are heightened by AI’s reliance on sensitive personal information.
- Human oversight is crucial to prevent unethical hiring outcomes.

RECOMMENDATIONS

- ❖ Fairness audits: regular testing of AI tools to identify and correct bias.
- ❖ Transparency Measures: Clear explanations of AI decision-making processes for both recruiters and candidates
- ❖ Privacy Compliance: Adherence to data protection regulations like GDPR and India’s Digital Personal Data Protection Act (2023)
- ❖ Human –in-the-Loop: ensuring final hiring decisions involve human review and contextual understanding.
- ❖ Ethical Guidelines: Development of HR – Specific AI ethics codes by professional bodies.

Conclusion

AI-Driven recruitment offers significant efficiency and scalability, but without ethical safeguards, it risks reinforcing inequality and undermining trust in HRM. This study highlights the importance of bias mitigation, transparency, privacy protection, and human oversight in AI recruitment tools. Future research should focus on developing standardized ethical frameworks that can guide organizations in adopting AI RESPONSIBLY, ensuring technology serves as partner in fair and equitable hiring.

169. A STUDY ON THE ROLE OF AI IN THE DIGITAL BANKING SECTOR

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Abstract

Machine learning and deep learning are two outcomes of AI technologies that make it possible for computers to automate tasks, analyze data, and offer personalized recommendations. While there is a lot of talk about "artificial general intelligence" (AGI), which is a machine that can think and move like a human, the majority of AI that we use today is considered "narrow AI," which means that it is highly focused on performing a specific set of tasks. AI is playing a significant and growing role in making banking transactions more efficient, secure, and personalized for the average person. The purpose of this study is to investigate the role that artificial intelligence plays in everyday banking transactions.

Keywords: AI, AGI, Banking, transactions.

Introduction

The field of computer science known as artificial intelligence (AI) is concerned with developing systems that are able to carry out actions that would ordinarily necessitate human intelligence. Learning, reasoning, problem-solving, language comprehension, and decision-making are all examples of this. AI systems learn and improve by analysing vast amounts of data, identifying patterns, and applying that knowledge to new situations.

Objective

- ❖ To present the impact of AI on the banking sector in everyday life.
- ❖ To highlight the benefits as well as drawbacks overcome by people through a micro study.

Statement of problem

Though the evolution of AI has transformed our lives into the path of comfortable landscape, there exists problems of trust, scams, data privacy, wrong debit, credit, distractions, loss of time and money which leads to mental exhaustion. After conducting thorough research, this context can be addressed.

Research methodology

The study focuses on highlighting the positive and negative impacts of AI in banking among common people in their day-to-day lives. The study also presents the findings of the

behavioural patterns towards banking among common people in daily life. The sample size is 100 between the age group of 20-50 years, chosen randomly, and studied their banking patterns.

Research Design

The researcher uses primary and secondary sources to collect data. The primary data collection was analysed using the Chi-square test to test the hypothesis.

Limitations

1. The article limited its study to people of Chennai, as the sample is most accessible for the researcher.
2. This study limited its focus to Chennai city and restricted the sample to 100 people.

Review of literature

Uma maheswari et al. (2023) emphasize AI's role in automating routine tasks, such as data entry, financial reporting, and account reconciliation. This automation not only reduces human error but also allows employees to focus on more complex, strategic tasks. The result is a more agile and productive banking infrastructure. Bhattacharya & Sinha (2022) AI's ability to enhance the customer journey in digital banking. AI-powered chatbots and virtual assistants provide 24/7 customer support, answering queries and resolving simple issues instantly.

Positive impact of AI

AI Apps and Services That Help the Public in Banking

- **Virtual assistants and chatbots:** a lot of banks use their own branded chatbots to answer questions from customers on their websites and mobile apps. For example, American Express has a chatbot that allows cardholders to receive personalized recommendations and notifications through messaging platforms.

- **Fraud Alert Systems:** When a suspicious transaction is detected on your card, AI is directly responsible for the automatic text messages or app notifications you receive. In order to safeguard you, these systems continuously monitor your activities.

- **Personal Finance Apps:** A lot of financial management apps make use of AI to analyze your spending, classify your transactions, and offer insights for making a budget. These apps frequently assist you in managing your entire financial life and go beyond basic banking.

- **Mobile Banking Features:** Features like biometric authentication (face or fingerprint recognition) and mobile check deposits that automatically read and process checks using your phone's camera are powered by AI and machine learning.

Negative impact of AI in digital banking

1. **Discrimination and Algorithmic Bias** AI systems learn from the data they are trained on. If this data contains historical biases—for example, against certain demographics or socioeconomic groups—the AI will not only adopt these biases but can also amplify them. In crucial financial decisions, this may result in outcomes that are unfair or discriminatory.
2. **Unfair Credit Scoring and Loan Approvals:** An AI model trained on biased data might unfairly deny loans or offer less favorable interest rates to individuals from underrepresented communities. This is a form of digital redlining, where a group of people is systematically excluded from financial services.
3. **Exclusion from Services:** If an AI determines that a certain demographic is a "bad risk," it may exclude that group from a variety of financial products and services, preventing them from moving up the economic ladder significantly.
4. **Security and privacy threats** AI systems in banking rely on vast amounts of personal and financial data to operate effectively. This heavy reliance creates new vulnerabilities that can impact a customer's privacy and security.
5. **Data Breach:** The likelihood of a data breach increases with a bank's data collection volume and system interconnectivity. A breach of an AI-powered system could expose a huge volume of sensitive personal and financial information.
6. **Sophisticated Fraud and Cyberattacks:** While AI can be used to detect fraud, it can also be used by malicious actors to create more sophisticated and difficult-to-detect attacks. For example, AI can be used to generate deepfakes for social engineering or to develop highly convincing phishing scams.
7. **Inability to Challenge Decisions:** If an AI denies a loan or flags a transaction as fraudulent, it can be nearly impossible for a customer to understand the reasoning behind the decision. It is difficult for a customer to challenge an unfair or incorrect decision without transparency.
8. **Loss of Trust:** When decisions that significantly impact a person's life are made by a system that cannot be explained, it can erode trust in financial institutions and leave customers feeling powerless and alienated.
9. **Customer loyalty can be diminished when banking becomes a purely automated, transactional experience.** Without the personalized advice and support that a human relationship can provide, customers may see their bank as a commodity and be more likely to switch to a competitor for a slightly better price.

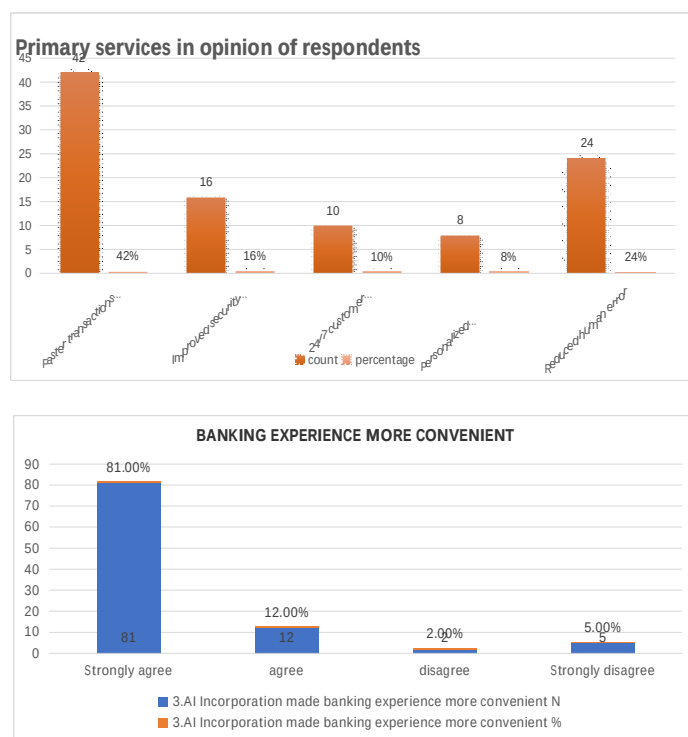
- 10. Difficulties for People with Digital Challenges:** Not everyone is familiar with or skilled with digital technology. Those who are less tech-savvy, like some elderly customers, may feel excluded and unable to access essential banking services due to the heavy reliance on AI-driven digital platforms.

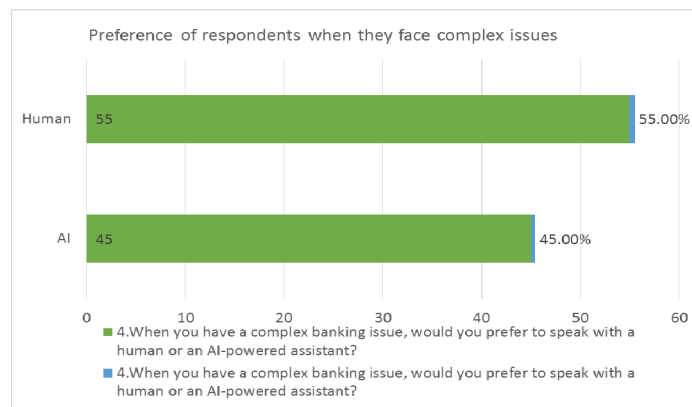
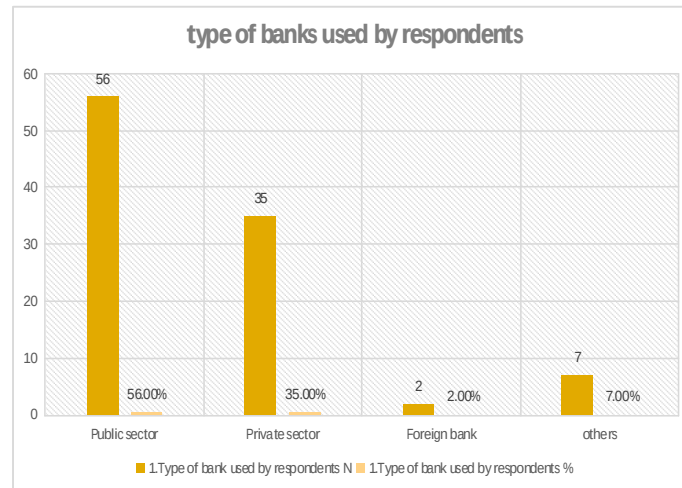
Primary data analysis

A questionnaire with 15 questions about demographic factors, AI awareness, AI perception and trust, AI benefits and concerns, AI future outlook, and overall, AI opinions on AI satisfaction was constructed and distributed to 100 randomly selected Chennai respondents. The data collected through the questionnaire were tabulated, and the Statistical Package for Social Studies (SPSS) was used for analysis. Apart from a simple frequency table, percentage analysis, the results are presented with the help of a pictographic presentation. Chi-square test, P V Charmer test is applied to analyse the multivariate variables

PICTORIAL REPRESENTATION OF PRIMARY DATA RESULTS

Bar Chart: Primary services Obtained by Respondents (Percent)





Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.000 ^a	2	.007
Likelihood Ratio	12.028	2	.002
N of Valid Cases	50		

STATISTICAL ANALYSIS

Hypothesis 1: Ho: There is no statistically significant association between age of the respondents and frequency of digital transactions.

H1: There is statistically significant association between age of the respondents and frequency of digital transactions.

Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	.447	.007
	Cramer's V	.447	.007
N of Valid Cases		50	

Interpretation: The Chi-Square test indicates a statistically significant relationship between the age of respondents and the frequency of their digital shopping, as the p-value (0.007) is less than 0.05. The Phi coefficient and Cramer's V (0.447) propose a moderate association between these two variables. This suggests that the frequency of digital transactions is related to the age group of the respondents. Therefore, we reject the null hypothesis and accept the alternative hypothesis, showing a significant relationship between the age group of the respondents and the frequency of digital transactions.

Findings and conclusions

From the micro study holding 100 respondents of Chennai concerning usage of AI in their online transactions throws us an impressive outcome that majority of the people within the age group of 25-45 years agrees that AI made banking experience more convenient and they also agree that they completely trust AI systems mainly with services such as AI fraud detection, faster transactions, improved security, 24/7 customer service availability, personalized financial advice, chatbots, product recommendations, voice or biometric authorisation for logging in or transaction. Respondents have also agreed that the frequency of visits to banks has declined in this modern era due to the outstanding performance of AI incorporation in the banking field. The majority of the respondents gained overall satisfaction in employing AI tools in banking services. Though the outcome of the study yielded maximum positive concerns and perception about AI in digital banking, 7% of the respondents disagreed with the statement that AI made banking experience more convenient, due to their age factor, they have found some difficulty in using online services, and fear making online transactions. Respondents agree that there are data privacy and security issues, potential for biased and unfair decisions, system errors, and malfunctions. Respondents don't trust AI services due to the fear of data security. They also agreed that they are satisfied with offline transactions and approaching a bank for other services. When it comes to the future outlook majority of the respondents advocate that AI will replace most human bankers in the long run.

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170. SECURITY AND PRIVACY PROTECTION IN CLOUD COMPUTING: DISCUSSIONS AND CHALLENGES IN FINTECH SECTOR

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ABSTRACT:

Going forward in this evolving world is a challenging move. Digital transformation has become a necessity for the fintech sector since the customers were outreached at one point. Establishing a Digital infrastructure is like the cost of a leg and arm. However, using cloud-based applications enhanced various advantages to the banking services including storage of mass data, networking, security, data encryption, analytics & intelligence, driving innovation and ensuring overall operational efficiency. Compared to traditional on-premises services, fintech companies are forced to invest millions in setting up physical infrastructure, which is both expensive as well as time-consuming process. This study emphasizes the impact of cloud computing in the fintech sector in terms of scalability, cost-efficiency, security & accessibility that provide better customer service as well as expand the market reach, keeping primary concerns on hand. Furthermore, it provides insight to digital transformation through advanced technologies like cloud computing, which emerges as an incredibly lucrative sphere to grow exponential over the next some decades in the fintech sector.

Keywords: Cloud Computing, Encryption Data, Digital Infrastructure, Fintech, Lucrative Sphere.

INTRODUCTION:

The world witnessed a major setback in providing a large number of customers in person as a result of the pandemic crisis. However, this proved to be an opportunity for traditional banking systems to utilize the advanced technology to improve customer base and business efficiency, establishing a new market called “Fintech”. Generally, Fintech is adopting new technologies to compete with traditional banking methods in the delivery of financial services to its customers.

The financial sector is a vast concept that deals with payment, Insurtech, investment management, lending & deposits, Digital Banking, RegTech, Crowdfunding and so on.

Financial Technologies integrates all the banking services and renders it to customers digitally, which enhances speed, transparency, flexibility and convenient process.

Google search engine is similar to cloud computing. When a piece of information is needed, it responds instantly indicating that the information is already saved and made available.

Speaking of which, banks can gather their customers' information in one-click on the Cloud-based application and deliver the required data to the user in short-time.

REVIEW OF LITERATURE:

1. Asad Nedaria et.al (2022) determined cloud computing had a significant impact on financial services, particularly in terms of addressing the needs of the banking sector in terms of service, innovation, flexibility, scalability, and security. At the turn of the 21st century, cloud computing is estimated to have led to the use of cloud-based applications by 55% of the organizations. It was imperative for banks to adapt to the evolving technology in order to stay competitive due to the changing needs of their customers.
2. Brian Bruke (2019) in his study said cloud computing as an instrument may assist financial institutions in becoming digital businesses, enhancing organizational safety and regulatory compliance, shrinking the footprint of their infrastructure, and introducing automation to increase productivity and cut costs. Making a case for financial organizations to use cloud computing is the goal of this research study.
3. Lalitha B.S. (2023) illustrated the advantages of cloud computing in many organizations all over the world, but it emphasizes the need to plan for and be aware of emerging risks, threats, vulnerabilities, and potential solutions for a successful implementation of cloud computing in a company. Further, the study investigates and assesses the most noteworthy network security and data security risks on cloud systems since the company is mainly based on data security concerns.

OBJECTIVES:

- To understand the use & influence of cloud computing in a better way to its future clients in the fintech sector
- To analyze the shift from traditional on-premise services to digital infrastructure in the Fintech sector
- To provide effective Suggestions and Recommendations to Customers and Concerns.

TYPES OF CLOUD COMPUTING:

Public cloud: Public cloud refers to the services that are provided by third-party services through the internet. It can be shared among many users and used by anybody who has access to these public resources through the internet. Users can use the storage application and virtual machine resources of cloud computing through the pay-per-usage approach. This allows users to pay only for the resources they use, which helps to reduce costs. Additionally, cloud computing offers greater scalability and flexibility, allowing users to quickly and easily expand or contract their resources as needed.

Private cloud: Only one user at a time can access a private cloud. For instance, if a business has some confidential files and another party tries to view them, he will not be allowed to do so. The host may be the owner and manager of a private cloud.

Hybrid cloud: combination of public and private and it also gives benefits of leverage to both equally. It permits the data to join public and private in a smooth systematic way. Private cloud is handled by the organization and on demand of want public cloud can have a glance over the sensitive contents. Cost management and flexibility.

Multi-cloud: It is a mix of private and public cloud for a particular purpose. In other words, it provides information about several service providers. Organizations can avoid being forced to use sub-par cloud services by avoiding vendor lock-in.

OPPORTUNITIES AVAILABLE IN CLOUD COMPUTING TO COMPANIES:

- **Security Trust:** When it comes to digital transactions in banking, everyone fears its “Security level”. However, financial institutions/banks store all the confidential data of their users in the cloud & save it from the wrong hands, which is done through data encryption, secured passwords, and multifactor authentication protection layers.
- **Risk Management:** The future is uncertain which ultimately intensifies financial risks such as fraud or money laundering, so to avoid such risks, the cloud detects the threat at an early stage and eliminates it.
- **Cost-effective:** One of the main advantages of adopting the cloud as your best IT contributor in the Fintech sector is because of the low-cost service provider.
- **Innovate Faster:** As business environments change frequently, technology updates its services, enhancing its ability to adapt rapidly to customers’ needs and market conditions. This makes it easier to develop new products and services, increasing the company’s profitability.

- **Operational Efficiency:** Instead of setting up an outlet, fintech companies have seen a greater impact on outsourcing their services to cloud-based providers which reduces the company's overhead cost and allows it to remain profitable even in difficult times.
- **Mass Storage Facility:** As is the case with growing numbers of internet user's day by day, fintech companies face a lot of challenges to provide top-notch services i.e. storage of mass data of existing and new customers with the help of cutting-edge technologies.

TO CUSTOMERS:

- **Diversity of Products & Services:** It includes access to a wide range of services, online storage, platform as a storage. These benefits can help customers save time, money, and resources. Customers can also gain access to a wider range of products and services, making it easier to find the right product for them. Finally, customers can benefit from lower prices due to increased competition.
- **Scalable Infrastructure:** It allows the customers to know the limits till which they are using. It has a large number of storage facilities and we can use till need we want; it isn't necessary to build up new hardware or software separately as cloud computing has a large amount of storage facilities to store the files.

CHALLENGES IN CLOUD COMPUTING

BY COMPANIES:

Apart from the benefits rendered by the cloud computation, there are also certain challenges faced by the customers and businesses in the fintech sector, which should be ensured in terms of security, compliance, & operational efficacy

- **Performance:** The performance of fintech depends highly on the network architecture, so latency issues are real-time problems faced by businesses in delivering the services to its customers.
- **Security & Data breach:** As is the case, Fintech companies are data-intensive, and the challenges of managing the storage of users from various geographical regions by ensuring that the cloud-based application complies with the country's financial regulations such as GDPR is a challenging task. Additionally, dealing with the protection of the mass data from an unauthorized person is a hectic job for cloud-based providers since the phishing, ransomware, Malware or virus, and Denial-of-service (DOS) are the most prevalent data that breach occurs in the fintech companies.

- Control: Some fintech companies outsource their operations to a cloud-based provider, thereby outsourcing seamlessly with cloud-based services requires smooth integration while maintaining security & compliance with third-party is a control challenge.

BY CUSTOMERS:

Several challenges as customer operations, security and compliance are the obstacles faced in the fintech sector while using cloud computing services.

- Data protection and security: Companies need to address these challenges to ensure their cloud infrastructure is secure and reliable. Customers should be aware of the risks associated with cloud computing and take steps to protect their data. Misusing security, in case of data leaks or inadequate security with cloud. Companies should implement security measures such as encryption, two-factor authentication, and regular backups to protect their data. Customers should also stay informed about the latest security trends and best practices.

CLOUD COMPUTING ADOPTED BY FINANCIAL COMPANIES IN INDIA

1. Paytm:

The Paytm partnered with Alibaba, a cloud-based infrastructure in 2018, and invested around 250 crores in this business to ensure the highest standards of customer data privacy and security.

2. Upstox:

In order to constantly maintain 99.99 percent network integrity and deliver information at the fastest possible pace, an Indian discount brokerage firm called Upstox employed cloud computing technologies in 2020. As this would enable traders and investors to make the best judgements possible at times that are suitable.

3. Axis Bank:

Digital leadership and technologies-driven transformation were introduced as key components of Axis Bank's growth and development, economic viability, and long-term survival approach in 2023.

FINDINGS:

- Cloud computing is making traditional method obsolete.
- Laborious operations are reduced.
- Physical presence is no more a mandatory factor.
- Any transaction can be done from anywhere in the world which saves time.
- Fintech companies using cloud computing ensure regulatory & good governance of data

SUGGESTIONS AND RECOMMENDATIONS

TO CUSTOMERS:

- Sensitive information can be stored with double or triple layer protection.
- More Bandwidth can be used for fast transactions as well as uninterrupted data services.
- Password can be changed regularly for better protection
- Password sharing with near and dear can be avoided.
- Individual or Single Person access can prevent the data from manipulation or theft.
- Own Personal computers and gadgets of customers can be used for encryption of data.
- When their data is kept under a multi-factor protection network layer, customers feel protected and secure.
- Outside computers and internet centres for sharing sensitive, personal and secret information can be avoided

TO COMPANIES:

- Individual attention can be given to customers for better processing.
- Cutting edge technologies can be adopted to thrive in the competitive market.
- Data backups can be done at a regular basis to prevent data loss.
- Cost control and Cost reduction can be given to the customers wherever they can.

CONCLUSION

People evolve in accordance with the dynamic character of the environment, thus things weren't the same as they were yesterday. Similarly, to this, businesses need to use specific strategies & tactics to thrive in a cutthroat market, and one way they accomplish this is by tailoring their services to their clients' wants and requirements. Speaking of which, banking industry interacts with different clients on daily-basis, thus the transition from the conventional to the fintech sector became necessary in the current environment.

171. PENETRATION OF ARTIFICIAL INTELLIGENCE INTO E-COMMERCE

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Abstract

Throughout the past decade, even in the context of online commerce, people who are aware of the term "Online Shopping" but lack the necessary expertise and guidance have been having difficulty selling their goods, gaining recognition for their goods, and turning a profit. As a result, this research investigation looks at how lifestyles of individuals have changed as a result of the newest and most advanced technology, Artificial Intelligence.

Keywords: Artificial Intelligence ; E-Commerce; Penetration; Business; Internet era

Introduction

The Dartmouth Workshop is the place where the term 'Artificial Intelligence' was coined by John McCarthy, Marvin Minsky, Nathaniel Rochester and Claude Shannon. Perhaps, Artificial Intelligence plays a significant role in the world of Computer Science and Electronic Commerce but still it needs a human to press the start button. AI provides notification to the enterprises when it needs to order or re-order stock for manufacturing or creating demand among its clients. In order to bring about artistic change in the world, artificial intelligence aims to create human-like artificial minds that can learn, plan, recognise, and comprehend human language. The use of the Internet and modern correspondence innovations for any kind of company activity involving executives or data trading is referred to as Electronic Commerce (EC). Nowadays, enterprises in today's E-Commerce universe focus on influencing customer behaviour regarding certain products and brands. As the E-Commerce platforms become increasingly integral to daily life, consumers are not only seeking efficient transactions but also personalized and enriching experiences. E-Commerce is nothing yet a world full of trade in digital terms where traders and its clients play a significant role in making this universe run behind them for their convenience. E-Commerce has reached to a point where a literate or illiterate entrepreneur emphasises him or her to utilise it.

Objectives

To study the penetration of AI in E-Commerce.

Statement of the problem

Likely it was determined that communicating information was infrequent in those days, making it difficult for small and medium-sized business owners, sole proprietorships, and partnership organisations to operate without knowing how to use internet platforms

effectively. As a result, this detrimental element has had a significant effect on business owners, complicating their lives at work and ultimately leading to the liquidation of their enterprises. In this new era of digitization, businesses are compelled to adapt rapidly to stay relevant and competitive. Thus, Artificial Intelligence is being utilized by retailers and wholesalers for checking both administration of customers, examining client reviews and for offering customized types of assistance to online customers. The adoption of AI in e-commerce is one of the most important reasons for business success, as AI tools contribute to exploiting the available data for products and customers to find opportunities that help promote goods and services

Review of Literature

Dr. R. Fahima Sultana and Simra Mubeen (2025), talked about the development of e-commerce and how it merged with the import and export industry. They demonstrated how e-commerce was being taught to both literate and illiterate people. They also conducted research showing that since exports are the main driver of economic growth, importing without exporting has a detrimental effect on it. According to this empirical research, the global market's import and export landscape will be shaped by future e-commerce trends.

Nguyen Hoang Tien, Nguyen Vu Anh Tuan and Nguyen Ngoc Anh Thy (2025), used two approaches to carry out their research: subjective and quantitative estimations. When verifiable information is lacking or in situations where precise estimations are not possible, subjective estimating is frequently used. In contrast, quantitative estimating uses recorded data and numerical models to predict future outcomes. They also realised that companies receiving AI advances are well-positioned to explore the complexities of the computerized. As the e-commerce industry proceeds to advance, firms must keep dexterous, adjusting their AI approaches to match shifting customer requests and new progressions.

Alkudah, Noor M., Almomani and Tareq O (2024), their research's primary goal is to present a novel approach to enhancing the online shopping experience by combining several Artificial Intelligence (AI) techniques. The limitations and challenges associated with incorporating AI technologies into E-Commerce were also the focus of their study. They wrapped up their work by declaring outcomes : Incorporating AI approaches into a web company has demonstrated tremendous promise in improving customer satisfaction, generating revenue, and cutting operating expenditures.

S. Mimani, R. Ramakrishnan, P. Rohella, N. Jiwani and J. Logeshwaran (2024), they have investigated how AI enables E-commerce site owners to develop and implement intelligent bots with preset settings to converse with customers, respond to their questions,

and recommend goods or services through algorithms and machine learning. Additionally, they observed that AI has helped companies in the payment systems industry decrease keying errors, correctly identify clients and goods, and speed up processing times. Custom online experiences that are suited to the needs of customers have been made possible by the use of AI in the construction of E-Commerce stores.

Julia Nathalie, Greisy Jacqueline, Natasya Aprila Yusuf and Lie Wei Ming (2024), AI greatly enhances inventory management, personalised marketing, customer care automation, and dynamic pricing, according to a case study they did of a top E-Commerce company. Furthermore, their research emphasised AI's role in sustainability, which is consistent with the Sustainable Development Goals (SDGs) of the UN, particularly SDG 9 (Industry, Innovation, and Infrastructure) and SDG 12 (Responsible Consumption and Production). Their results demonstrated that predictive analytics and AI-driven process automation greatly increase operational efficiency, particularly in domains like inventory control and decision-making procedures.

Zare Sakhvidi, M., & Saadat, R. (2024), since few studies have looked at the development of knowledge infrastructure, they have shown that research on AI in this area is still lacking. The advancement of AI will have a variety of implications on global commerce, including macroeconomic and associated trade effects. There are several theories as to why productivity growth rates are currently low worldwide. Since economies take time to successfully integrate and use new technologies, especially complex ones like AI, low productivity growth is essential to understanding AI's potential impact. They came to the conclusion that in order for businesses to thrive in this fast-paced environment, they must integrate cutting-edge payment methods and prioritise safe, frictionless experiences.

Md. Estiak Ibne Monjur, Abu Hurira Rifat, Md. Rasidul Islam and Md. Ratan Bhuiyan (2023), evaluated how AI will affect their business processes and customer support. They mentioned concepts like: AI has had a big impact on the Business-To-Consumer (B2C) E-Commerce sector. E-commerce has revolutionised international trade and erased geographical barriers since the advent of the Internet. This evolution has been accelerated by AI technology, which makes it possible for increased productivity, better customer support, and customised user experiences. Overall, the results show that using AI can help E-Commerce users with a major issue: most customers are unable to choose a product's size when making a purchase. At last, they think that integrating AI into online shopping will revolutionise the industry.

Halima Afroz Lari, Kuhu Vaishnava and Manu K S (2022), explored how learning, reasoning, and self-correction are the three cognitive processes that AI programming concentrates on. They also noted that a lot of E-Commerce companies utilize artificial intelligence these days to better understand and satisfy their customer base. One of the E-Commerce Businesses that meets the requirements to be considered among the top E-Commerce Businesses in India is Sale with Service. Thus , they came to the conclusion that AI has expanded the range of Business operations for E-Commerce enterprises and would only lead to new opportunities in the future.

Ransome Epie Bawack, Samuel Fosso Wamba, Kevin Daniel André Carillo and Shahriar Akter(2022), their paper synthesises research on artificial intelligence (AI) in E-Commerce and proposes guidelines on how Information Systems (IS) research could contribute to this research stream.They used bibliometric analysis, which showed that recommender systems are the main focus of research on AI in E-Commerce. As a result, their work is the first to try to synthesise E-Commerce studies on Artificial Intelligence.

Ambar Srivastava (2021), showed that artificial intelligence (AI) is the most advanced technology currently being used. Similarly, the e-commerce sector has changed how Indian business is conducted. The e-commerce market with the quickest rate of growth is India. He came to the conclusion that the development of AI and internet commerce may affect the range of abilities that those who are weaker want to deal with in the years to come.

Research Methodology

This research investigation employs secondary data.

Discussion

In order to advance general development, this study examined the integration of artificial intelligence with e-commerce. In order to promote developmental growth, this theoretical study explores the sensitisation and integration of AI into e-commerce. Determining how well an economy uses AI to lessen discomfort was necessary for the analysis of AI's entry into e-commerce.

Suggestions

1. AI ought to change commerce through logistical optimisation, chatbots in particular forecasting, and tailored experiences when shopping.
2. AI has to better people's lives, raise productivity, and tackle tricky issues in a multitude of domains, from business and environmental sustainability to educational and medical care.

Conclusion

The primary force behind economic expansion that results in import and export is the growth of e-commerce. The study discovered that businesses with AI advancements are in a good position to adapt to changing consumer demands and emerging trends. It has been found and demonstrated that using AI techniques improves the online purchasing experience. Intelligent bots can now be implemented to meet customer needs thanks to artificial intelligence. It has been determined that AI also aids in pricing, marketing, customer service, and inventory management. The effects of AI on international trade are numerous. It is necessary to construct the knowledge infrastructure. AI has transformed global trade, which has prompted businesses to expand their operations. We must thus attempt to synthesise e-commerce research on artificial intelligence. It is concluded that AI has altered the way that business is done in India.

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172. AI-POWERED PERSONALIZATION AND DIGITAL MARKETING

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1. Introduction: The New Era of Customer Engagement

In today's hyper-connected, digital-first world, marketing has shifted from "one-size-fits-all" campaigns to tailored, data-driven experiences. Customers across the globe expect brands to recognize their preferences, anticipate their needs, and offer solutions before they even ask. Artificial Intelligence (AI) has emerged as the engine powering this transformation, enabling personalization at scale and delivering relevant messages to the right person, at the right time, through the right channel.

Key Statistics:

80% of consumers are more likely to purchase from a brand offering personalized experiences (Epsilon Research). Personalized marketing can increase ROI by 5–8 times compared to non-targeted campaigns. Global AI in marketing market size is projected to reach USD 107.5 billion by 2028 (MarketsandMarkets).

2. The Growing Demand for Personalization

2.1 Why Personalization Matters Globally

Consumers are bombarded with thousands of marketing messages daily — relevance cuts through the noise. Cultural differences influence customer expectations — personalization helps brands adapt content for local nuances and values.

In competitive global markets, personalization builds trust, loyalty, and emotional connection with audiences.

2.2 The Shift from Mass Marketing to Hyper-Personalization

Past: Segmentation by demographics (age, gender, income).

Present: Hyper-personalization using real-time behavioral data, device usage, and context-aware marketing.

Example:

A global e-commerce brand offers different homepage banners for a customer in Tokyo versus one in New York — considering time zone, season, and purchase history.

3. AI: The Engine Behind Personalization

3.1 Key AI Technologies in Digital Marketing

Machine Learning (ML): Predicts customer behavior, segments audiences, and improves targeting precision.

Natural Language Processing (NLP): Powers chatbots, sentiment analysis, and multilingual customer support.

Computer Vision: Enables visual search, automated image tagging, and product recognition.

Predictive Analytics: Forecasts purchase trends and identifies potential churn.

Generative AI: Creates personalized ad copy, email content, and even product recommendations.

3.2 Why AI is a Game-Changer

Speed: Processes millions of data points in seconds.

Scale: Personalizes for millions of users simultaneously.

Adaptability: Continuously learns and optimizes from new data.

4. Real-World Applications of AI-Powered Personalization

4.1 E-commerce

Personalized product recommendations based on browsing history and purchase patterns.

Dynamic pricing models that adjust based on demand, customer loyalty, and region.

Example:

Amazon's recommendation engine drives 35% of its total revenue through AI-powered suggestions.

4.2 Content Marketing

AI selects the most relevant articles, videos, or infographics for each user.

Dynamic website content changes in real-time based on user interaction.

Example:

Netflix customizes movie thumbnails to match a user's viewing habits, increasing click-through rates.

4.3 Advertising

Programmatic advertising buys and places ads automatically for the highest ROI.

AI identifies the best ad format, timing, and platform for each audience segment.

4.4 Customer Support

AI chatbots offer 24/7 personalized assistance.

Predictive support anticipates issues before customers raise them.

4.5 Social Media Marketing

AI optimizes post scheduling based on when followers are most active.

AI tools suggest hashtags and topics that resonate with a specific target group.

5. Benefits of AI-Powered Personalization

5.1 For Businesses

Increased conversion rates and average order value.

Optimized marketing spend by targeting only high-intent customers.

Enhanced brand loyalty through meaningful interactions.

5.2 For Customers

Saves time by delivering relevant options instantly.

Creates a more enjoyable and relevant shopping experience.

Builds trust by understanding individual preferences without being intrusive.

6. Challenges and Ethical Considerations

6.1 Data Privacy & Security

Regulations like GDPR (Europe) and CCPA (California) require transparent data practices.

Brands must ensure encrypted storage and responsible data sharing.

6.2 Bias in AI Algorithms

AI may reflect biases in the data it's trained on — risking unfair targeting or exclusion.

Regular audits and diverse datasets are essential.

6.3 The “Creepy” Factor

Over-personalization can feel invasive.

Solution: Maintain a balance between helpful and intrusive personalization.

6.4 Transparency & Trust

Customers should know when they're interacting with AI.

Ethical AI builds long-term trust and brand credibility.

7. Future Trends in AI-Powered Personalization

7.1 Voice Search & Conversational AI

Optimizing for voice commands on smart devices (Alexa, Google Assistant).

7.2 Hyper-Automation

Fully automated campaign creation, execution, and optimization.

7.3 AR/VR Personalization

AI-driven augmented reality for personalized shopping experiences (e.g., virtual try-ons).

7.4 Generative AI in Marketing

Creating real-time personalized videos, articles, and offers.

7.5 Context-Aware Personalization

Integrating AI with IoT devices for marketing based on location, mood, and activity.

8. Case Study: Netflix – A Personalization Powerhouse

Problem: With thousands of titles, customers often felt overwhelmed.

Solution: Netflix's AI analyzes watch history, search patterns, device type, and even viewing time to recommend content.

Results:

80% of streamed content comes from AI recommendations. Personalized thumbnails increase engagement by up to 20%. Lesson for Global Marketers: Personalization isn't just about offering choices — it's about removing friction and making decisions effortless for customers.

9. Roadmap for Businesses to Adopt AI Personalization

Audit Your Data: Ensure clean, well-structured customer data.

Select the Right AI Tools: Start with scalable solutions like recommendation engines and predictive analytics. Train Teams in AI Literacy: Equip marketing teams to work with AI outputs effectively. Test, Measure, Refine: Run A/B tests to improve personalization strategies.

Prioritize Ethics: Communicate clearly about how customer data is used.

10. Conclusion: The Global Competitive Edge

AI-powered personalization is no longer optional — it is the defining factor for global marketing success. Brands that embrace AI will not only capture customer attention but will also earn long-term loyalty. The future belongs to marketers who can balance automation, ethics, and human connection — creating experiences that feel uniquely personal, yet universally trusted.

173. A STUDY ON ARTIFICIAL INTELLIGENCE IN DIGITAL MARKETING – A DESCRIPTIVE STUDY

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Abstract

The study is a descriptive investigation of the transformation that occurs in the field of marketing - Artificial Intelligence (AI). We can say that AI is a technology that is used in every sector to simplify complex processes. The use of AI is in its nascent stage, and an in-depth study is required to know the best applications and the ease of use of the technology. In marketing, automation processes, data processing, customer relationship management, and other high-level tasks, such as product and service design, creative design, advertisement design, and meeting consumer needs through consumer research, are utilised. The AI is used in complex analytical processes, in personalised services for customers, and in advertising campaigns. This study also focuses on defining AI, types of AI used in marketing, trends of AI, along with uses and applications of AI. The study is reliable, sourced from blogs, news, websites and journals, etc and is credible. The study is conducted as an additional illustration is needed in order to know about AI and its uses in marketing. The study is limited to a small scope of the study in its use in marketing, delimiting the study. Further scope of study can be conducted on consumer research and in-depth applications of AI in marketing.

Keywords: Artificial Intelligence, uses and applications, types of AI.

1. Introduction

Artificial Intelligence is defined as a digital computer-controlled robot that carries out certain duties that are similar to duties carried out by human beings. The robots are used for carrying out many intellectual processes in parallel with humans in reasoning, to understand certain languages, generalise, and learn things. In the early 1940's computers were programmed to carry out complex duties like finding solutions to mathematical theorems, playing chess, etc.

But still, no computer had the ability to do the duties in parallel to the brain of a human being. The experts researched how to invent a computer programme that would do all the duties of a human being, matching his abilities and found a more similar solution. That

paved the way to the emergence of artificial intelligence. The term AI was coined by John McCarthy in 1956 in the Dartmouth Workshop. It has a wide variety of applications, such as diagnosing a patient, treating them, searching for information, chatting with people in the form of chatbots, maintaining relations, recognising natural language, etc. In marketing, it plays many roles like automation of management processes, devising advertisement plans, deciding on the product design, rendering customer support, collecting data on the prospective buyers of the product, their likes and dislikes, etc. There are different types of AI used in marketing. The kinds of AI used vary according to usage.

1. **General AI** – Robotics, Natural Language Processing, Speech and image recognition.
2. **Narrow AI** – Virtual assistants, Self-driving cars, Prediction tools, Facial recognition.
3. **Super AI** – Problem solving, Critical thinking, Real-time decision making, Interpreting human emotion.
4. **Basic AI** – Basic skills.
5. **Evolutionary AI** - Evolutionary Generative Adversarial Networks (E-GAN). Multi-modal algorithm applications, market analysis, and fraud detection and prevention.
6. **Generative AI** - Images, videos, and text creators, personalised recommendations based on inputs and habits.
7. **Predictive AI** - Analysing past and present data, future cash flow patterns, staffing needs, forecasting changes in the market. There are many more types of AI classified based on functionality. Among the above, Predictive AI, Generative AI, Super AI and Evolutionary AI are used in marketing. The next section is the outline of the various literature reviewed concerning the research conducted.

2. Literature Review

Kumar. V et.al (2024) in their paper on AI-powered marketing study are focused on AI's increasing role in marketing, investigating its impact on decision-making, customer experience, and operational planning. AI's capacity to change the market scenario is discussed through analytical, technological, and strategic potentials. Though AI's dynamic capability and its full influence across marketing roles remain unexplored, the research renders six important points for effective research. It includes AI's influence in decision-making, automation strategies, extended realities, ethical suggestions, market efficiency, and the growth alternatives in the prevailing market with AI implementation. The AI turns out to be an enhanced technology, but not a replacement for a human being. The next section deals with the research methodology used in collecting the data for this research.

3. Research Methods and Materials

The research paper is a descriptive form of research method employed with a critical analysis of the AI used in marketing, its types and definition. The critical analysis is conducted based on the available literature sourced from websites, journals, previous research, blogs, academic platforms, magazines, etc. The study conducted is a reliable, credible and valid source of study. The study is focused and is conducted freely without pressure and in an ethical manner. The next section outlines the detailed investigation on the uses and applications of AI.

4. Discussion

From a consumer perspective, AI is used in analysing customer behaviour, forecasting marketing results, automating marketing tasks, and creating and personalising content. From a marketer's perspective, it does many other functions, like the following:

1. Consumer segmentation: Based on consumer traits, behavioural patterns, trends, tastes, and preferences, the target market is segmented. The advertisements are created with the help of AI, and the advertising campaign is created for targeted consumers.

2. Analytical tool: The AI acts as a predictor of future highs and lows, forecasting trends, patterns of the market, and helps in data-driven outcomes and optimal workflows. This technology helps in devising pricing strategies, effective supply chain management. It also helps in avoiding loss of customers due to frequent switching of consumers to other brands and loss in a competitive market.

3. Content generation: The Generative AI is used in content generation, and it saves time and money in creating blogs, intended marketing messages to customers, e-mails, videos, content of websites, etc. The translation of the languages of the content, many innumerable advertisement campaigns across the digital platforms are created with this kind of AI.

4. Customer service assistants: Customer assistance tools, including chatbots, interactive robots, are used to answer the queries of customers, simple solutions to customers. The AI-powered assistants are used to interact and understand what is needed by customers and solve it creatively.

5. Media buying: The traditional ways of advertising are being overthrown by this AI. It is trying to save time by devising the intended message of ads to be advertised and the page of advertising, allocating time and other resources effectively. A campaign assistant is created for the required marketers in a profitable way.

6. Reduction in administration work: The marketers use AI in their management of marketing and advertising, and automation processes for better results, as AI knows how to

map the consumption patterns and likes and dislikes of a customer. In abroad, robots serve us food, chat with customer and meet their needs, saving their time and resources. The customer gives positive reviews, but a major disadvantage is that the process is costly for small marketers and companies to use assistants and robots.

7. Pay-Per-Click (PPC) Advertising: This is a modern digital advertising where the advertiser pays when the ad is clicked, for example, Google ads. Here, in this type of advertising, the search engine acts as a tool, and bidding takes place for clicks. The market bidders earn from these ads by bidding in the form of clicks, with a price for every click. If a person clicks, for each click, a payment of \$3 as its price, one can earn \$300 for the sale by bidding; it is a huge profit. AI helps in devising plans and acts as an instrument for bidding. The users of the platform will be rewarded accordingly.

8. Machine Learning (ML): AI algorithmic complex processes are vast and diverse datasets that identify trends, patterns, and in-depth investigative studies to inform decision-making and automation processes are done by AI to simplify the work of employees of an organisation, saving time and money for outsourcing.

Best AI Tools and Platforms

AI Tools for Content Creation: Jasper AI, Copy.ai, Napkin AI.

Other AI Tools: ChatGPT (Open AI), Microsoft Copilot, Google Gemini, Bing Image Creator, Canva, Adobe Firefly, AiPPT, Adobe Sensei, etc.

There are more AI tools created for ease of use, to create content that is personalised, and to meet the needs of customers.

5. Conclusion

The study is undertaken to analyse the Artificial Intelligence (AI) in marketing. The artificial intelligence is used in advertisements, administration work, customer relationship management, analysis of market, market information, etc are the various areas of application. There different types of AI used for the above-mentioned processes. The AI is a tool that makes handling of complex problems simpler and easier. The AI is an exploratory and growing concept and advancement in technology. The future researchers can study in-depth about artificial intelligence as this paper is descriptive research in-absentia of other aspects that are to be covered.

174. ARTIFICIAL INTELLIGENCE IN MARKETING: EXPLORING CURRENT AND FUTURE TRENDS

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Abstract:

This research paper explores the rapidly evolving landscape of artificial intelligence (AI) in marketing and its profound implications for businesses. It examines current trends shaping AI-driven marketing strategies, the challenges that must be overcome, and the myriad of opportunities awaiting organizations willing to embrace this transformative technology. With AI poised to revolutionize how businesses engage with customers, personalize content, analyze data, and optimize campaigns, this paper provides a glimpse into the promising future of AI-powered marketing and its potential to redefine the way businesses connect with their target audiences. The fusion of machine learning and AI with business intelligence has unleashed a wave of exciting trends and opportunities. These advanced technologies are transforming how businesses handle data, uncover insights, and make smart choices. One standout trend is predictive analytics. With the help of machine learning, we can comb through massive amounts of past data to spot patterns and foresee future events accurately. This arms companies with the ability to fine-tune their operations, anticipate what customers want, and minimize potential risks. It's a game-changer. The paper highlights the significant advantages of AI, including its ability to process vast amounts of data in real-time, optimize marketing strategies, and improve efficiency and scalability. However, the paper also addresses critical challenges, such as the lack of "common sense" in AI systems, the ethical concerns surrounding data privacy, and the potential stifling of human creativity. By examining these pros and cons, the paper provides a comprehensive overview of AI's current and future impact on marketing, emphasizing the need for a balanced approach that integrates human expertise with AI-driven insights for sustainable success.

Keywords: Machine learning, Artificial intelligence, Business intelligence, Marketing; Literature Analysis, Technologies.

Introduction:

The landscape of marketing has undergone a seismic transformation in recent years, driven by the inexorable rise of artificial intelligence (AI). As businesses strive to connect with consumers in an increasingly digitized world, AI has emerged as a catalyst for revolutionizing marketing strategies, amplifying the capacity to understand, engage, and persuade target audiences. This introduction sets the stage by providing the essential context, articulating the problem, outlining the research objectives, underscoring the significance of the study, and previewing the structure of this comprehensive exploration.

Artificial Intelligence (AI) is poised to become an integral component of every commercial entity worldwide in the long term. The latest trends in AI-driven automation highlight significant shifts in the AI landscape, as evidenced by the reconfiguration of ideas, interests, and investments in AI adoption by enterprises. This technology has advanced to the point where it can recognize faces and objects, which has far-reaching implications for various business applications. In security, facial recognition technology can accurately identify individuals, while object detection can be employed to distinguish and analyze images.

AI processes human images similarly to how it treats cookies, enabling businesses to offer more personalized services based on customer preferences.

Artificial Intelligence (AI) primarily focuses on user retention and lead conversion in digital marketing. It can guide users in directions that align with a business's goals by utilizing intuitive AI chatbots, intelligent email marketing, interactive web design, and other digital marketing services. Several factors influence the impact of AI on digital marketing. Machine Learning (ML), a subset of AI, involves computer programs that access data and learn independently. ML compiles data from various sources, including social media accounts, menus, online reviews, and websites. AI then leverages this information to create and deliver content that is relevant to the audience. Additionally, AI software enables in-depth online analysis of restaurants and their customers.

Digital marketing, enhanced by AI, provides clients with a visually engaging experience across social media and digital platforms such as Facebook and Instagram. These platforms thoroughly analyze user data before presenting them with offers tailored to their specific needs. AI also aids marketers in identifying and forecasting trends, helping companies avoid overspending on digital advertising and ensuring that their budget is efficiently utilized. The ability of a computer to recognize objects, scenes, and activities in

images is known as computer vision. This technology has applications in areas such as medical imaging analysis, facial recognition, public security, and security monitoring. When combined effectively with AI, computer vision enables robots to predict future events and respond proactively based on potential changes.

AI has streamlined the process of building client profiles and understanding the customer journey. It enables brands to quickly and efficiently deliver personalized content tailored to various client profiles at any stage of the marketing funnel and across multiple channels. By analyzing historical data, AI applications in digital marketing can identify the content that is most likely to attract customers back to a site. Additionally, AI can pinpoint which customers are most likely to unsubscribe from a particular service and analyze the common features among those who do. With these insights, marketers can strategically plan future campaigns and implement practices that encourage customer retention.

Background and Context of AI in Marketing

Artificial intelligence, a field of computer science that enables machines to perform tasks that typically require human intelligence, has witnessed monumental advancements in the past few decades. In the context of marketing, AI encompasses a plethora of technologies, such as machine learning, natural language processing, predictive analytics, chatbots, and more.

These technologies empower businesses to harness the colossal volume of data generated in the digital age and convert it into actionable insights, personalized customer experiences, and data-driven decision-making. As consumers' preferences evolve rapidly and the digital ecosystem becomes increasingly complex, AI has emerged as an indispensable tool for marketers.

The ability to process vast datasets, identify patterns, and predict future trends has the potential to redefine the way businesses engage with their audiences. AI-driven marketing not only promises greater efficiency but also the agility to adapt to changing market dynamics swiftly.

Historical Development of AI in Marketing

The historical trajectory of AI in marketing traces back to the late 20th century, when businesses began exploring AI's potential in customer relationship management. Early systems, such as recommendation engines, showed promise for enhancing customer experiences. However, it wasn't until the 21st century that AI in marketing gained significant traction. The proliferation of digital data and advances in computing power catalyzed its

development. By harnessing AI, marketers could analyze vast datasets, segment audiences, and personalize content, marking a significant shift in marketing strategies.

Current State of AI Adoption in Marketing

Today, AI adoption in marketing is pervasive across industries. A survey by Salesforce reveals that 84% of marketers use AI to some extent, with 87% reporting significant improvements in their marketing initiatives. Marketers are employing AI for various purposes, including customer segmentation, predictive analytics, chatbots, and content personalization. The adoption of AI-powered tools like marketing automation platforms has streamlined campaign management, allowing for more efficient resource allocation and improved targeting.

Key AI Technologies in Marketing

AI encompasses a spectrum of technologies, each contributing to different facets of marketing:

- 1) **Machine Learning:** Machine learning algorithms underpin many AI applications in marketing. They enable predictive analytics, recommendation engines, and the automation of routine tasks such as data analysis and lead scoring.
- 2) **Natural Language Processing (NLP):** NLP enables sentiment analysis, chatbots, and content generation. It allows businesses to understand and engage with customers through natural language, leading to more personalized interactions.
- 3) **Computer Vision:** Computer vision technology is used in visual recognition, enabling applications like image recognition for product recommendations and augmented reality for immersive marketing experiences.
- 4) **Predictive Analytics:** Predictive models use historical data to forecast future outcomes. Marketers leverage predictive analytics to anticipate customer behavior, optimize ad campaigns, and minimize risks.

Emerging Trends in AI-Driven Marketing

The rapid evolution of AI continues to shape marketing in several ways:

- 1) **Personalization:** AI enables hyper-personalization by analyzing individual customer data and tailoring marketing messages and product recommendations accordingly.
- 2) **Voice Search Optimization:** As voice-activated devices become ubiquitous, marketers are optimizing content for voice search, changing the way SEO is approached.

Future Prospects and Predictions in AI-Driven Marketing

The future of AI in marketing promises a dynamic and evolving landscape, with several key trends and predictions emerging:

1. AI's Role in Marketing in the Next 5-10 Years

Over the next decade, AI is expected to become even more deeply integrated into marketing strategies. AI-driven personalization will reach new heights, with marketers delivering hyper-relevant content and recommendations. Predictive analytics will become more accurate, enabling businesses to anticipate customer needs with precision. AI will play a pivotal role in automating routine tasks and enhancing customer experiences across various channels, including augmented reality and voice search.

2. The Role of AI in Marketing during Post-Pandemic Recovery

The COVID-19 pandemic accelerated the adoption of digital technologies, and AI played a crucial role in helping businesses adapt to changing consumer behaviors. In the post-pandemic era, AI will continue to be instrumental in recovery efforts. Marketers will rely on AI to drive digital transformation, optimize e-commerce experiences, and navigate the evolving demands of a post-pandemic market.

3. Potential Disruptive Technologies on the Horizon

Beyond the current AI capabilities, emerging technologies like quantum computing, edge AI, and advanced natural language understanding are on the horizon. Quantum computing could revolutionize data processing, enabling marketers to tackle complex problems with unprecedented speed. Edge AI will bring AI capabilities to edge devices, offering real-time, on-device processing for enhanced personalization. These technologies have the potential to disrupt marketing strategies and reshape the industry landscape.

4. The Evolving Relationship Between AI and Human Creativity in Marketing

AI is evolving from a tool for automation and analysis to one that collaborates with human creativity. AI-generated content, such as copywriting and design, will become more sophisticated, freeing marketers to focus on strategy and innovation. The challenge will be to strike a balance between the efficiency of AI and the unique human touch in marketing that fosters emotional connections with customers.

Statement of the Problem

However, with the promise of AI in marketing also comes challenges and complexities. The burgeoning volume of data raises concerns about data privacy and security. Ethical considerations regarding the use of AI, potential bias in algorithms, and the need for regulatory compliance have garnered attention.

Moreover, businesses face the challenge of bridging the skills gap, finding talent proficient in AI technologies, and integrating AI seamlessly into their marketing strategies. This research paper aims to dissect the multifaceted landscape of AI in marketing,

acknowledging both its transformative potential and the hurdles that must be surmounted for businesses to harness it effectively.

Research Objectives

The primary objectives of this research are as follows:

1. To analyze the current state of AI adoption in marketing.
2. To identify and explore emerging trends in AI-driven marketing.
3. To examine the challenges and ethical considerations associated with AI in marketing.
4. To evaluate the opportunities and benefits that AI presents for businesses in the marketing domain.
5. To provide insights into prospects and predictions regarding AI's role in marketing.

Significance of the Study

Understanding the future of AI in marketing is of paramount significance for businesses across industries. The insights derived from this study can guide organizations in formulating strategies that leverage AI effectively, ensuring they remain competitive in a rapidly evolving landscape. Moreover, by addressing ethical considerations and challenges, this research contributes to the responsible and sustainable integration of AI into marketing practices.

Structure of the Paper

This research paper is organized into distinct sections, each dedicated to a critical aspect of AI in marketing. Beginning with a comprehensive literature review, it explores historical developments, current trends, and case studies to provide a holistic view of the subject. Subsequently, the paper delves into the trends, challenges, and opportunities associated with AI in marketing. It concludes with a forward-looking perspective on the future of AI in marketing. Throughout the paper, real-world examples and data-driven insights are presented to support the arguments and findings.

REVIEW OF LITERATURE:

Marcello et al. (2021). The study is the first to present an integrated view of the body of knowledge on artificial intelligence (AI) as published in marketing, consumer research, and psychology literature. By employing a systematic literature review with a data-driven approach and quantitative methodology (including bibliographic coupling), the study offers an overview of the emerging intellectual structure of AI research within these three areas of literature. The researchers 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. Additionally, a total of 412 theoretical lenses used in these studies were identified, 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, the study proposes a research agenda aimed at advancing scholarly debate on AI within the three literatures, emphasizing the cross-fertilization of theories across fields and addressing neglected research topics [1].

Liye Ma (2020). Artificial intelligence (AI) agents powered by machine learning algorithms are rapidly transforming the business landscape, sparking significant interest among researchers. In this paper, the authors review and advocate for the use of machine learning methods in marketing research. They provide an overview of common machine learning tasks and methods, comparing them with the statistical and econometric methods traditionally employed by marketing researchers. The authors argue that machine learning methods are capable of processing large-scale and unstructured data and have flexible model structures that deliver strong predictive performance. However, they also acknowledge that these methods may lack model transparency and interpret-ability. The paper discusses notable AI-driven industry trends and practices and reviews the emerging academic marketing literature that utilizes machine learning methods. More importantly, it presents a unified conceptual framework and a multi-faceted research agenda. From five key aspects of empirical marketing research—method, data, usage, issue, and theory—the authors propose several research priorities. These include extending machine learning methods and integrating them as core components in marketing research, using these methods to extract insights from large-scale unstructured, tracking, and network data, employing them transparently for descriptive, causal, and prescriptive analyses, using them to map customer purchase journeys and develop decision-support capabilities, and connecting these methods to human insights and marketing theories. The authors emphasize that opportunities abound for machine learning methods in marketing, and they hope that their multi-faceted research agenda will inspire further work in this exciting field [2]

bid Haleem et al. (2022). Artificial Intelligence (AI) holds immense potential in the field of marketing. It enhances the proliferation of information and data sources, improves software's data management capabilities, and enables the design of complex and advanced algorithms. AI is transforming the way brands and consumers interact. The application of AI technology varies significantly depending on the nature of the website and the type of

business involved. Marketers can now focus more effectively on customers and address their needs in real time. By leveraging AI, marketers can swiftly identify the content to target specific customers and determine the optimal channels and timing for engagement, utilizing data collected and generated by AI algorithms. When AI is employed to personalize user experiences, consumers feel more comfortable and are more likely to purchase the offered products or services. Additionally, AI tools can be used to analyze the performance of competitors' campaigns and uncover insights into their customers' expectations. Machine Learning (ML), a subset of AI, allows computers to analyze and interpret data without explicit programming. ML aids in problem-solving by improving the performance and accuracy of algorithms as they are fed more data. For this research, relevant articles on AI in marketing were sourced from Scopus, Google Scholar, Research Gate, and other platforms. These articles were thoroughly reviewed, leading to the development of the paper's theme. This paper seeks to review the role of AI in marketing, exploring its specific applications across various marketing segments and their impact on the transformation of the marketing sector. Finally, the paper identifies and analyzes critical applications of AI in marketing [3].

Leonardo et al. (2024). A growing body of research on Intelligent Systems and Artificial Intelligence (AI) in marketing has demonstrated that AI can mimic human behavior and perform tasks in an "intelligent" manner. Given the increasing interest in AI among marketing researchers and practitioners, this review aims to provide an overview of the development of the marketing and AI research fields. By reviewing 164 articles published in Web of Science and Scopus indexed journals, the article establishes a context specific research agenda. Through the application of Multiple Correspondence Analysis (MCA), the study identifies several research avenues, including the adoption, use, and acceptance of AI technology in marketing, the importance of data protection and ethics, the role of institutional support for AI in marketing, and the impact of AI on the labor market and marketers' skillsets [4].

METHODOLOGY:

Our journey began with a retrospective glance at the historical development of AI in marketing, tracing its evolution from nascent experimentation to a formidable force shaping marketing strategies today. It unveiled the present state of AI adoption in marketing, highlighting the widespread integration of AI technologies into businesses' core operations. We delved into key AI technologies in marketing, from machine learning and natural language processing to visual recognition and predictive analytics. These technologies enable businesses to achieve unparalleled personalization, data-driven decision-making, and operational efficiency. The exploration of emerging trends showcased AI's transformative

power: personalization that redefines customer engagement, predictive analytics guiding foresight, chatbots and virtual assistants revolutionizing customer interactions, and voice search optimization reshaping search engine dynamics. Content generation and curation, marketing automation, visual recognition, and social media analysis are further facets of the AI-driven marketing landscape. We investigated the challenges and ethical considerations in this AI-driven era. Data privacy and security, ethical AI usage, bias mitigation, regulatory compliance, skill gap challenges, and integration complexities pose significant hurdles for businesses looking to harness AI's potential responsibly. The opportunities and benefits of AI in marketing are profound. From bolstering customer engagement and retention to optimizing decision-making through data insights, businesses stand to reduce costs, gain competitive advantages, expand marketing channels, and achieve scalability and 24/7 availability. Real-world case studies underscored AI's tangible impact, providing evidence of its transformative potential.

SCOPE OF THE STUDY:

The future of AI in marketing is not merely a technological advancement but a paradigm shift in how businesses engage with their customers. By understanding the trends, surmounting challenges ethically, seizing opportunities, and fostering a culture of innovation, businesses can harness the full potential of AI and chart a course toward enduring success in an increasingly digital world.

CONCLUSION:

The implications of AI in marketing are profound, offering both significant advantages and notable challenges. On the positive side, AI can vastly enhance efficiency by automating tasks like data analysis, personalization, and customer service. It enables marketers to leverage vast amounts of data for highly targeted campaigns, improving customer experiences and optimizing marketing spend. AI's ability to process and analyze data faster than humans leads to better decision-making, real-time insights, and scalability. However, the adoption of AI in marketing also comes with challenges. The absence of "common sense" in AI systems means that without careful oversight, campaigns may lack human empathy and cultural sensitivity, leading to tone-deaf messaging. Privacy concerns also arise as AI relies heavily on data collection, making it crucial for firms to navigate ethical and regulatory boundaries. Additionally, the risk of over-reliance on AI could lead to a loss of creative innovation, as models focus more on historical patterns than groundbreaking ideas. Therefore, while AI is a powerful tool, its success in marketing hinges on a careful balance between technological automation and human intuition.

175. AI-POWERED PERSONALIZATION IN DIGITAL MARKETING

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Abstract

Keyword: AI powered personalization

Hyper-personalized experiences that improve consumer engagement and increase conversions are made possible by artificial intelligence (AI), which is completely changing the digital marketing scene. This study examines the technologies, marketing implications, and operation of AI-powered personalization. Additionally, the advantages, difficulties, moral dilemmas, and potential future developments of using AI into personalization tactics are examined. According to the research, AI makes it possible to target more precisely, communicate with customers in real time, and gain predictive insights, but it also necessitates careful data handling and strong governance structures.

Introduction

Digital marketing has progressed from bulk communication to highly personalized experiences. Today's consumers want brands to understand their requirements and provide relevant content in an instant. AI-powered customization tailors information, recommendations, and offers to individual user activity, preferences, and demographics. Personalized product recommendations on e-commerce platforms, AI chatbots that provide tailored assistance, and dynamic website content that adjusts to each visitor are all prime examples.

Literature Review

Definition of AI-Powered Personalization AI-powered personalization is the use of AI algorithms to provide individualized marketing experiences to individuals, typically in real time.

Marketing Evolution - Prior to AI, personalization focused on basic segmentation (e.g., age, gender, geography). - **AI Era:** Uses real-time data, behavioral tracking, and advanced analytics to target individuals.

Related Studies - Smith and Kumar (2021) discovered that AI-driven recommendations increased e-commerce sales by 26%. According to McKinsey & Company (2022), 71% of consumers anticipate personalized interactions and 76% are dissatisfied when they do not receive them.

Objectives of the Study

1. To examine the use of AI in providing personalized digital marketing experiences.
2. To assess the advantages and disadvantages of AI-powered personalization.
3. To investigate ethical and privacy issues in AI-powered marketing.
4. Predict future trends in AI-enabled personalization.

Methodology

This article uses a qualitative research technique, drawing on secondary data from peer-reviewed publications, industry reports, and case studies published between 2018 and 2025. A thematic analysis was used to discover common patterns, benefits, and issues connected with AI-powered personalization.

Technologies for AI-Powered Personalization –

Machine Learning (ML) predicts client behavior and preferences. - Natural Language Processing (NLP): Analyzes text from reviews, chats, and social media. - Recommendation Engines - Suggests products/content based on previous behavior. - Chatbots and Virtual Assistants - Offer personalized service in real time. - Predictive Analytics anticipates client wants before they are voiced.

Conclusion

AI-powered customization is shifting digital marketing from a wide, impersonal strategy to a targeted, customer-centric one. While the benefits are significant, responsible implementation is essential for preserving customer trust and complying with privacy rules. Future innovations offer even more personalized experiences, but marketers must strike a balance between innovation and ethics.

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176. AI-POWERED PERSONALIZATION: OPPORTUNITIES AND CHALLENGES IN DIGITAL MARKETING

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Abstract

In the digital age, consumer expectations have shifted dramatically toward personalized experiences. Artificial Intelligence (AI) has emerged as a transformative tool in digital marketing, enabling brands to analyze vast datasets, predict customer behavior, and deliver hyper-personalized content in real time. This thesis explores how AI technologies—such as machine learning, natural language processing, and predictive analytics—are revolutionizing digital marketing strategies. It investigates current applications, including recommendation engines, chat bots, targeted advertising, and dynamic content personalization. Furthermore, the study examines the ethical implications of data usage, privacy concerns, and the challenges marketers face when integrating AI. Through case studies and empirical research, the thesis concludes that AI-powered personalization significantly enhances user engagement, brand loyalty, and marketing ROI, positioning it as a cornerstone of future marketing strategies.

INTRODUCTION

In the digital age, personalization has become a cornerstone of effective marketing strategies. The advent of artificial intelligence (AI) has significantly amplified the capabilities of personalization, allowing businesses to tailor their marketing efforts with unprecedented precision. AI-driven personalization utilizes advanced algorithms and data analytics to analyze vast amounts of consumer data, enabling marketers to deliver highly targeted content, advertisements, and product recommendations. This technological advancement not only enhances the consumer experience by providing relevant and timely interactions but also boosts business outcomes such as engagement, conversion rates, and customer loyalty. The effectiveness of AI-driven personalization in digital marketing is evident in its widespread adoption across various industries. Companies leverage AI tools to predict consumer behavior, segment audiences, and automate decision-making processes, leading to more efficient and impactful marketing campaigns. However, alongside these benefits come significant ethical considerations. The collection and use of personal data raise concerns about privacy, consent, and data security. Additionally, the potential for algorithmic bias and

manipulation poses risks to fairness and transparency in marketing practices. This paper aims to explore the dual facets of AI-driven personalization in digital marketing: its effectiveness in achieving business goals and the ethical challenges it presents. By examining both the advantages and the potential pitfalls, this study seeks to provide a comprehensive understanding of how AI can be harnessed responsibly to benefit both businesses and consumers. The discussion will also offer insights into best practices and regulatory frameworks that can help mitigate ethical concerns while maximizing the positive impact of AI in digital marketing.

OPPORTUNITIES OF AI-POWERED PERSONALIZATION

Let's dive into how AI-driven personalization has evolved and what it means for digital marketing. This section shines a light on the exciting opportunities it brings. One of the standout benefits, as highlighted by both research and first-hand data, is the boost in customer engagement and loyalty. With AI technologies like machine learning and natural language processing, brands can tap into real-time user data, preferences, and behaviors to create hyper-personalized content. This kind of relevance not only strengthens customer relationships but also builds trust and encourages long-term engagement. Interestingly, survey respondents from Raipur City reported feeling more satisfied when marketing content was tailored to their unique preferences, clearly linking personalization to brand loyalty. Another major opportunity lies in improving conversion rates and return on investment (ROI). AI tools empower businesses to segment their audiences more accurately and predict consumer behavior with greater precision. This results in more focused marketing campaigns, reducing waste and maximizing the effectiveness of every customer interaction. The study found that a significant number of respondents acknowledged that personalized messages and product recommendations played a key role in their purchasing decisions, showcasing the tangible value AI adds to conversion strategies. Let's talk about the incredible advantages of real-time content delivery and automation. AI systems have this amazing ability to quickly adapt and respond to what users do, ensuring they receive the right message exactly when they need it. Tools like chat bots, personalized email sequences, and dynamic web content not only make things more efficient but also help create a smooth and consistent experience for customers.

Survey results back this up, with many participants pointing out how convenient and relevant real-time interactions are as a major plus of AI-driven marketing. In short, AI-powered personalization holds immense promise for enhancing engagement, increasing sales, and streamlining marketing efforts—making it a key player in today's digital marketing landscape.

CHALLENGES OF AI-POWERED PERSONALIZATION

While AI-driven personalization opens up exciting possibilities, it also brings along a host of significant challenges that marketers and organizations need to tackle to ensure that it's implemented ethically and effectively. One of the biggest concerns is around data privacy and ethical considerations. Personalization powered by AI relies heavily on gathering and analyzing large amounts of user data, such as browsing habits, purchase history, and real-time interactions. This raises important questions about consumer consent, who owns the data, and the risk of sensitive information being misused. Another key hurdle is the technological complexity and costs tied to implementing AI solutions. Small and medium-sized enterprises (SMEs) often find it tough to adopt advanced AI systems due to budget constraints, a lack of technical know-how, and limited infrastructure. Plus, AI algorithms need ongoing data input and system training, which can be resource-heavy and tricky to sustain over time. When it comes to AI-driven marketing, trust and transparency are big concerns. Many consumers don't really know how AI systems decide on personalized content, which can lead to skepticism and lower engagement. The "black box" aspect of some AI algorithms makes it tough for marketers to clarify why certain content is displayed, which can shake user confidence. This feeling was reflected in survey responses, with several participants expressing a desire for more transparency regarding how their data is used and how recommendations are created. These issues highlight the need for responsible AI practices. It's essential to tackle these concerns through ethical data handling, educating users, and maintaining open communication to foster sustainable, consumer-focused AI personalization strategies in digital marketing.

LITERATURE REVIEW

The rise of Artificial Intelligence (AI) in digital marketing has led to the transformation of personalized customer experiences. AI-powered personalization refers to the use of machine learning algorithms and data analytics to tailor marketing strategies to individual consumers based on their preferences, behaviours, and needs. The theoretical foundations of this concept are rooted in customer-centric marketing theories, which emphasize the importance of understanding consumer behavior to create personalized experiences. Additionally, theories such as the Technology Acceptance Model (TAM) and the Theory of Planned Behaviour (TPB) explore how consumers' perceptions of AI technologies impact their willingness to engage with personalized marketing strategies. According to these theories, the perceived usefulness and ease of use of AI-powered personalization play a significant role in determining its effectiveness in driving consumer engagement and

satisfaction. Several studies have examined the application of AI in digital marketing, focusing on recommendation systems, predictive analytics, and AI-driven chat bots. For example, Chaffey (2019) illustrates how AI-powered recommendation systems, such as those employed by Amazon and Netflix, enhance user engagement by delivering personalized content based on consumer preferences and predictive models. Similarly, Sterne (2017) discusses how AI-powered chat bots improve customer interactions by offering real-time, tailored responses, which foster customer loyalty. These applications have been shown to increase conversion rates and customer retention by providing more relevant and timely experiences for users. However, despite the potential benefits, there are significant gaps in the existing literature. One major concern is the ethical implications of AI-driven personalization, particularly regarding data privacy and consumer trust. Martin and Murphy (2017) highlight that excessive data collection can lead to privacy issues, potentially undermining consumer confidence in personalized marketing strategies. Furthermore, the lack of comprehensive studies investigating the long-term impact of AI personalization on customer loyalty and brand equity. This gap presents an opportunity for future research to explore the sustainable effects of AI-driven personalization on consumer behavior and business outcomes.

RESEARCH METHODOLOGY

In this study, we take a closer look at the two sides of AI-powered personalization—what it offers and the hurdles it presents in the realm of digital marketing. Our main goal is to dive into how consumers in Raipur City view AI-driven personalization, focusing on aspects like engagement, trust, data privacy, and how effective they find marketing overall.

OBJECTIVES OF THE STUDY

- To examine the impact of AI-powered personalization on consumer engagement and purchase behavior in digital marketing.
- To analyze consumer perceptions of data privacy and trust in AI-powered personalization.

SAMPLING AND RESPONDENTS

We used a sample survey method for our research. Data was gathered from 50 participants, chosen through convenience sampling to ensure we captured a diverse group of digitally active individuals aged between 20 and 50. All participants are residents of Raipur City. And our sample includes a balanced mix of working professionals, students, and small business owners who are familiar with digital platforms and marketing content.

DATA COLLECTION METHOD

To align with our research goals and hypotheses, we crafted a structured questionnaire. This questionnaire featured 15 questions, blending closed-ended items with

Likert scale questions. It covered various topics, including consumer awareness, experience with personalized marketing, concerns about data usage, and the perceived benefits of AI-based personalization. Notably, two key questions focus on the effects of AI personalization and privacy concerns, which are crucial for testing our hypotheses.

HYPOTHESES OF THE STUDY

- (H₁): There is a significant relationship between AI-powered personalization and consumer engagement.
- (H₂): AI-powered personalization positively influences consumers' purchase decisions.
- (H₃): Higher privacy concerns are associated with lower trust in AI-powered personalization.
- (H₄): Consumers who perceive AI personalization as intrusive are less likely to engage with personalized content.

DATA ANALYSIS TECHNIQUES

We analyzed the collected data using descriptive statistics (like percentages and frequencies) along with inferential statistical tools. A Chi-square test was utilized to explore the relationship between demographic factors and key perceptions (such as the balance between usefulness and privacy concerns). To make the data more digestible, we presented our findings through graphs and tables, followed by a thorough interpretation of the results.

DATA ANALYSIS AND INTERPRETATION

This section dives deep into the analysis and interpretation of the main data gathered from 50 respondents in Raipur City, aged between 20 and 50 years. The goal was to explore consumer behaviour, preferences, and attitudes towards AI-driven personalization in digital marketing, particularly focusing on aspects like engagement, privacy, trust, and purchasing decisions. We collected the data using a structured questionnaire and performed statistical analysis through both descriptive and inferential methods to ensure we validated the study's objectives and hypotheses.

- **Interpretation:** Consumers who made purchases due to AI recommendations had a significantly higher perception of AI personalization's effectiveness.
- **Conclusion:** Hypothesis H₂ is accepted. AI personalization positively influences consumer purchase decisions.

INTERPRETATION OF RESULTS

The findings from this analysis lend solid support to the goals and hypotheses we've set out. Many people see AI-driven personalization as a way to boost customer engagement and help with purchase decisions, giving businesses a competitive edge in the digital

marketing land scrape. Yet, there are still significant hurdles to overcome, such as worries about data privacy, the transparency of AI systems, and the potential for intrusive content. Embracing all four hypotheses highlights the dual role of AI personalization—it's a powerful asset with clear benefits, but it also demands ethical considerations and a focus on user needs. Moving forward, strategies should not only aim for optimization but also prioritize building consumer trust and ensuring transparency to foster sustainable personalization practices in digital marketing.

CONCLUSION AND RECOMMENDATIONS

The research focused on uncovering the opportunities and challenges that come with AI-powered personalization in digital marketing. It drew on primary data from 50 respondents in Raipur city, along with relevant literature. The results show that artificial intelligence plays a crucial role in enhancing personalized digital experiences, leading to better customer engagement, satisfaction, and overall business performance. Many participants noted that AI-driven personalized marketing significantly impacts their purchasing choices, which supports the first hypothesis and highlights AI's potential to reshape customer-brand relationships. Among the key advantages identified were improved customer loyalty, higher conversion rates, and the ability to deliver content in real-time, all of which contribute to a stronger return on investment. However, the study also uncovered some significant challenges. These include concerns about data privacy, a lack of transparency in AI algorithms, the complexity of technology, and cost barriers—especially for small and medium-sized enterprises. Respondents voiced their unease regarding how their personal data is collected and utilized, underscoring the importance of ethical and secure data management practices.

Conclusion

AI-driven personalization has emerged as a powerful tool in digital marketing, offering unprecedented opportunities to tailor content, advertisements, and consumer experiences. Its effectiveness is evident in enhanced customer engagement, increased conversion rates, and improved marketing efficiency. By leveraging advanced AI and machine learning techniques, businesses can provide highly personalized interactions that resonate with individual consumers, leading to greater satisfaction and loyalty. However, the growing reliance on AI-driven personalization brings significant ethical considerations to the forefront. Issues such as data privacy, algorithmic bias, transparency, and the potential for manipulation highlight the need for responsible AI practices. Ensuring that AI systems This study adds to the existing knowledge by merging theoretical insights with empirical data, providing a well-rounded perspective on AI's role in digital marketing.

177. DESIGNING AND MEASURING THE EFFECTIVENESS OF EMPLOYEE ENGAGEMENT PROGRAMS IN SCHOOLS

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Abstract

This study explores the factors impacting employee engagement on organizational performance at higher education institutions in Oman. It aims to explore the relationship between employee engagement and organizational performance at these institutions. By providing valuable insights and recommendations, this research aims to develop effective strategies that can boost employee engagement and enhance organizational performance. Design/ methodology /approach: A positivist research paradigm guides the assumption of this experiment study. This paradigm is characterized by the belief that reality is objectively observable and can be quantifiable measured and analyzed using statistical methods. Quantitative data was collected through a survey from individuals who were randomly selected from HEIs' field to participate in the study. The study utilized a quantitative research approach, employing descriptive statistical tools. Findings: The findings suggest that employee engagement improves organizational performance. The study highlights the varying impact of vigor, dedication, and absorption on organizational performance in a higher education institution in Oman, which may expose the generalization of the findings. It also revealed new possibilities for further research in similar locations, which will help to validate the results obtained so far. Originality/value: This research provides quantitative insights into the relationship between employee engagement and organizational performance. Exploring this relationship and offering valuable suggestions to enhance organizational performance in Oman's higher education institutions contributes to the existing body of knowledge. This study focuses on developing an Employee Engagement Index for academic support staff due to its role as a strategic driver to improve performance. It was measured using 31 indicators developed from three dimensions of engagement, including vigour, dedication, and absorption, tested and applied on education support staff at a higher education institution in Surabaya certified by the Quality Management System ISO 9001:2015. The measurement

index produced was capable of functioning as a monitoring and evaluation tool for higher education institutions towards developing and maintaining competitive advantage.

Keywords: Employee Engagement, Organizational Performance, Higher Education Institutes, Academic support staff,

INTRODUCTION

Academic support or non-academic staff working in higher education institutions include people in different aspects such as those in leadership and managerial roles, administrative roles, supporting student learning processes such as counsellor, supporting the teaching processes, librarians, laboratory employees, programmers, and those employed to maintain infrastructures. They are simply university employees that are not academics or teaching staff. Moreover, the terms "support employee" and "administrative staff" are used in the US to represent those employed to be directly involved in the university's administrative functions required to support academic activities. It is, however, essential to note that they are different from professional employees in leadership and managerial positions of these institutions. It was discovered from that professional and support employees contribute significantly to increasing student engagement in higher education. A previous study showed that the management of academic support staff significantly impacted higher education performance by increasing their engagement and appraising their performance. Meanwhile, employee engagement is a condition, attitude, or positive behaviour exhibited by an employee towards work and organization. It is characterized by a feeling of enthusiasm or vigour, dedication, and preoccupation or absorption to achieve organization goals and success. Moreover, an employee with a high level of engagement usually has more understanding and concern for an organization's operational environment, is very enthusiastic about work, can work well with colleagues, always speaks positively about the organization, and performs more than the organization expectations. This result means it is essential for organization to develop and maintain employee engagement by continuously improving the two-way relationship between them and their employees. Furthermore, another study defined employee engagement as a positive cognitive, emotional, and behavioral condition directed towards achieving organization results. It was also explained as the willingness to sacrifice more energy and time for work and be more proactive in achieving goals. Developing and maintaining employee engagement for academic support staff to improve institutional performance requires effective performance management. It means employee engagement measurement is one of the essential components of effective performance management.

Literature Review

Employee Engagement and Productivity: Research indicates that engaged employees are 17% more productive than their disengaged counterparts (Gallup, 2017). Factors contributing to this increase include motivation, enthusiasm, and a sense of ownership over their work.

Retention and Engagement: Engaged employees are less likely to leave their organizations. A meta-analysis by Harter et al. (2002) found that organizations with high engagement scores experienced lower turnover rates, thereby reducing recruitment and training costs.

Innovation and Creativity: Engaged employees are more likely to contribute innovative ideas and solutions. Studies show a positive correlation between engagement levels and creative output, as engaged employees feel empowered to take risks (Sonnentag, 2003).

Customer Satisfaction: There is a direct link between employee engagement and customer satisfaction. Engaged employees deliver better service, leading to higher customer loyalty and satisfaction ratings (Sirota, 2005).

The term employee engagement was first introduced by Khan as the self-utilization of members of an organization in their work roles which is expressed physically, cognitively, and emotionally. It led to the classification of employee engagement into the physical, cognitive, and emotional aspects. Physical engagement relates to the extent to which employees expend their efforts, both physical and mental, in performing their duties. Meanwhile, cognitive engagement requires the employees to know the vision and strategies of the employers and the performance required of them in achieving the vision. Emotional engagement is based on the emotional relationship between the employees and their employer. It means an organization needs to maintain a positive relationship by creating a sense of belonging for the employees and encouraging them to trust and buy into its values and mission. Employees with high engagement are usually characterized by the 3S, which means Say, Stay, and Strive. The "Say" aspect involves consistently speaking positively about the organization to co-workers, potential employees, and customers. "Stay" is the desire and pride to be a member or part of the organization instead of looking for opportunities in others. "Strive" involves giving more time, energy, and initiative to contribute optimally to the organizations success. Furthermore, there are three levels of employee engagement: engaged, not engaged, and actively disengaged. Engaged employees are builders who consistently show a high level of performance, are willing to use their talents and strengths in their daily work

activities, always work with passion, and usually develop innovations to grow. Those at the "not engaged" level tend to focus on the task rather than achieve the goals, wait for orders, and feel their contributions are ignored. Meanwhile, actively disengaged employees are cave dwellers that consistently show resistance in all aspects. They only see the negative side of every effort and activity and usually underplay the activities of the engaged workers.

Research Methodology:

The employee engagement index was developed using a private university in Surabaya, Indonesia, adopting the ISO 9001 Quality Management System as the case study. It involved the distribution of a questionnaire to all 150 employees to assess their level of engagement, and 130 people answered thoroughly, indicating a 70.13% response rate. Moreover, the research instrument, which is the employee engagement measurement scale, was developed based on the method used in several previous studies. The validity, reliability, and loading factor of each measurement and the path coefficient of each dimension and sub-dimension of engagement, were tested through structural equation modelling using Smart PLS 3.0. Furthermore, the employee engagement measurement index was formulated mathematically. The index for each employee was calculated by multiplying the score of each indicator with its loading factor. It is multiplied by the regression coefficient of the sub dimensions. Finally, it is multiplied by its dimensions after the loading factors and regression coefficients have been normalized. Each department index was determined by finding the average employee engagement index of all employees in the department. The same method was used to index all the academic supporting employees. Then, it was calculated based on the average of all the employees.

EMPLOYEE ENGAGEMENT INDEX:

The employee engagement index model was developed based on the employee engagement construct's three dimensions: vigour, dedication, and absorption. The vigour dimension has three sub-dimensions, dedication has four, and absorption has three, as indicated in Meanwhile, each sub-dimension was measured by several indicators, which were found to have a total number of 32. It is important to note that each indicator, sub-dimension, and dimension have unequal weight in reflecting the engagement construct. Therefore, this research used the loading factor as the weight for the indicator. Meanwhile, the path coefficient from dimension to sub-dimension and from engagement construct to dimension was used for the sub-dimension and dimension, respectively. It was necessary to normalize each weight, including the loading factor of each indicator and path coefficients of each relationship between the engagement construct and each dimension. Moreover, between each

dimension and sub dimension before the measurement index was formulated. It involved dividing each loading factor and path coefficient by the sum of all loading factors and their path coefficients, respectively, as indicated in Equations 1a, 1b, and 1c. The aim was to maintain the final score of the engagement index on an interval of 1-5. The employee engagement index of each Academic Support Staff was calculated in three stages. The first stage involved calculating the engagement in each sub dimension by finding the sum of the respondent's response score for each indicator multiplied by the normalized weight of its factor loading as indicated in Equation 2. The second stage was calculating the engagement in each dimension by finding the sum of the product of the first stage result and each weighted path coefficient normalized from each dimension to the sub-dimension as indicated in Equation 3. The third stage calculates the final engagement by determining the sum of the products of the second stage result and each weighted normalised path coefficient from the construct to each dimension as indicated in Equation.

Objectives of the Study

- Analyze the relationship between employee engagement and productivity.
- To investigate the effects of employee engagement on employee retention rates.
- To assess the role of employee engagement in fostering innovation within organizations.
- To evaluate the impact of employee engagement on customer satisfaction and financial performance.

DATA ANALYSIS

The data analysis section outlines the methodology used to analyze the relationship between employee engagement and organizational performance, presenting findings derived from both qualitative and quantitative data.

- **Research Design:** This study employed a mixed-methods approach, integrating quantitative surveys and qualitative interviews to gather comprehensive insights on employee engagement and its impact on organizational performance.

- **Sample Selection:** The study focused on a diverse sample of organizations across various industries, including manufacturing, services, and technology. A total of 500 employees were surveyed, and 20 in-depth interviews were conducted with HR managers and team leaders.

• **Data Collection Instruments:**

Surveys: A structured questionnaire was developed based on established scales, such as the Utrecht Work Engagement Scale (UWES) for measuring employee engagement and specific performance metrics tailored to each organization.

Interviews: Semi-structured interviews were conducted to gain qualitative insights into the factors influencing engagement and the perceived impact on performance.

Research Methodology

Promoting employee engagement presents several challenges that organizations must navigate to create a truly engaged workforce. One of the primary obstacles is the diverse range of employee needs and expectations. Different generations, cultural backgrounds, and personal circumstances can influence what motivates individuals, making it difficult to implement a one-size-fits-all engagement strategy. Additionally, leaders may struggle with a lack of training or awareness regarding effective engagement practices, leading to inconsistent application of engagement initiatives across teams.

- Another significant challenge is the often limited resources available for engagement programs. Budget constraints can hinder the development of comprehensive training, recognition, and development initiatives that foster engagement. Furthermore, organizations may face resistance to change, particularly if employees perceive engagement efforts as superficial or disconnected from their actual work experiences.

- Additionally, measuring employee engagement can be complex. Organizations often rely on surveys that may not capture the nuances of employee sentiment, leading to incomplete or misleading insights. Finally, maintaining engagement over time is a continual challenge, as initial enthusiasm for engagement initiatives can wane if not consistently reinforced.

- To overcome these challenges, organizations must adopt a tailored approach that considers the unique needs of their workforce, invest in leadership development, allocate adequate resources for engagement initiatives, and implement robust measurement tools that provide actionable insights. By addressing these challenges, organizations can create a more engaged and committed workforce, ultimately driving improved performance and success.

Limitations of the study Findings and Conclusion

The engagement of academic support or non academic employees in a higher education institution is significant to success in the stakeholders' teaching, research, and community service processes. An employee engagement index was developed in this study to measure, monitor, and evaluate the employee engagement of academic support employees. It is also projected to be used as an engagement map to manage the human capital performance in higher education institutions strategically.

178. THE IMPACT OF ARTIFICIAL INTELLIGENCE ON COLLEGE STUDENTS EDUCATION AND SOCIAL BEHAVIOR

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Abstract

Artificial Intelligence (AI) is revolutionizing higher education by influencing both academic and social aspects of student life. AI has enabled personalized learning, enhanced academic performance, and improved efficiency in routine academic tasks. At the same time, it has raised critical challenges concerning academic integrity, reduced critical thinking, techno stress, and diminished face-to-face interactions. This article provides an in-depth exploration of the dual impact of AI on college students' education and social behavior, supported by a detailed review of literature and analysis. The study concludes with recommendations for fostering responsible AI adoption in academic institutions.

KEYWORDS: Artificial Intelligence (AI); Higher Education; College Students; Academic Performance; Critical Thinking; Academic Integrity

INTRODUCTION

The 21st century has seen an unprecedented rise in the integration of Artificial Intelligence (AI) into higher education. Tools like ChatGPT, Grammarly, Quillbot, adaptive learning platforms, and AI-driven simulations are not only reshaping how students learn but also how they interact socially within academic environments. AI has become a “digital companion” in students' learning journey, offering assistance in assignments, research, language improvement, and even career guidance. However, this advancement presents a paradox: while AI can **empower students with knowledge and efficiency**, it can simultaneously **independent thinking and social bonding** if misused. For instance, while an AI tutor may provide immediate feedback to a struggling student, the same student may bypass peer discussions or teacher consultations—weakening interpersonal skills. Given these dual implications, it is crucial to analyze both the **educational outcomes** and the **social behaviors** influenced by AI in college life.

REVIEW OF LITERATURE

1. AI and Academic Performance

A growing body of research confirms that AI enhances academic outcomes by providing **personalized learning pathways**. Adaptive learning systems adjust difficulty levels to match students' abilities, thereby improving motivation and performance

(Sciencedirect, 2024). Scirp (2024) reports that AI chatbots positively affect students' **self-efficacy and learning attitudes**, especially in large classrooms where personalized attention from faculty is limited.

However, Arxiv (2024) cautions that students who rely heavily on generative AI for assignments or exam preparation tend to perform worse in traditional assessments. This suggests that while AI supports short-term productivity, it may hinder long-term knowledge retention if students adopt it as a substitute rather than a supplement.

2. AI and Critical Thinking

Scholars express concerns that excessive reliance on AI undermines students' **critical thinking and creativity**. The *New Yorker* (2025) argues that AI has disrupted traditional essay writing, leading students to outsource originality to machines. Similarly, FT (2025) emphasizes the erosion of analytical skills as students increasingly depend on AI-generated outputs rather than engaging in independent reasoning.

3. AI and Academic Integrity

Academic dishonesty is one of the most debated consequences of AI. Springer Open (2024) highlights students' concerns that AI tools blur the line between assistance and plagiarism. Many institutions lack clear policies on AI use, leaving both faculty and students in ethical uncertainty. For example, students may use AI for paraphrasing or brainstorming but inadvertently cross into unethical territory when submitting AI-generated work as their own.

4. AI and Social Behavior

AI's impact extends beyond learning outcomes to students' **social and psychological dimensions**. A PMC (2024) study reveals that while AI can support emotional well-being by providing instant help, it also contributes to **technostress**, loneliness, and reduced interpersonal communication. Students who spend excessive time with AI tools report weaker peer bonding and lower engagement in collaborative learning environments.

Conversely, AI has been shown to foster new forms of social interaction. Collaborative AI-powered platforms enable peer-to-peer learning, group project management, and virtual communities, thereby expanding the definition of social learning (SF Chronicle, 2024).

5. Student Perceptions of AI

Arxiv (2024) surveyed Harvard undergraduates and found that nearly 90% of them use generative AI regularly. While they appreciate AI for its efficiency, many expressed fear about job readiness, inequality in access, and the decline of authentic learning experiences.

This dual perspective shows that students are **both empowered and anxious** about AI's growing presence in their education.

ANALYSIS

The literature suggests that the impact of AI on students is **dualistic**—both beneficial and problematic. A closer analysis reveals four dimensions:

1. Educational Dimension

- o **Positive:** Personalized learning, instant feedback, better performance in routine tasks, and enhanced accessibility for students with learning difficulties.
- o **Negative:** Overdependence on AI, reduction in originality, and decline in deep learning when AI replaces effortful study practices.

Example: A student using Grammarly or ChatGPT may improve grammar instantly but might not develop long-term writing proficiency.

2. Cognitive Dimension

- o **Positive:** AI can scaffold learning by breaking down complex concepts, thus enhancing comprehension.
- o **Negative:** Students risk bypassing higher-order thinking, analysis, and evaluation—skills essential in professional life.

Example: Instead of solving a math problem step by step, students might directly seek the AI-generated solution, thereby missing the reasoning process.

3. Social Dimension

- o **Positive:** AI-powered collaboration tools encourage team projects and global connectivity.
- o **Negative:** Reduced face-to-face classroom discussions, lower peer interaction, and social isolation due to overreliance on digital tools.

Example: Instead of discussing a case study in groups, students may individually consult AI tools—weakening classroom dynamics.

4. Ethical-Psychological Dimension

- o **Positive:** AI reduces academic anxiety by offering support and boosting confidence.
- o **Negative:** Ethical dilemmas, fear of plagiarism accusations, and stress from unclear institutional policies.

Example: A student may feel proud of submitting polished AI-assisted work but simultaneously anxious about being accused of academic dishonesty.

Interpretation:

AI is not a threat in itself; rather, it is the *extent and manner of use* that determines its impact. Responsible integration of AI—with clear academic policies, AI literacy programs, and faculty guidance—can ensure that students leverage its benefits without compromising their intellectual growth or social development.

CONCLUSION AND RECOMMENDATIONS

Artificial Intelligence is reshaping higher education by redefining how students learn, think, and interact socially. While it promotes efficiency, personalization, and academic engagement, it also risks undermining creativity, integrity, and interpersonal relationships.

To maximize benefits and minimize risks, universities should:

1. **Promote AI literacy:** Train students to use AI ethically and critically.
2. **Develop clear policies:** Define boundaries for AI use in assignments, research, and exams.
3. **Encourage blended learning:** Balance AI assistance with peer learning and faculty mentorship.
4. **Support student well-being:** Provide counseling and awareness programs to address technostress and overreliance.
5. **Redesign curricula:** Focus on skills AI cannot replicate—creativity, leadership, empathy, and ethical reasoning.

If guided properly, AI can serve as a *partner in learning* rather than a *replacement for thinking*, helping students achieve academic excellence while nurturing essential human values.

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**179. A STUDY ON AI IMPACT IN MOBILE PHONE APP'S
(WITH REFERENCE TO MOBILE PHONE APP USERS IN CHENNAI CITY)**

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ABSTRACT:

This study examines usage patterns, preferences, and factors influencing AI-powered mobile app adoption, focusing on societal impact. A structured questionnaire was given to 500 respondents, producing 434 valid responses — a high 86.8% response rate. Analysis shows Android dominates and highlights demographic and socio-economic factors shaping adoption. Most respondents are female (75.8%), aged 18–24 (81.5%), and highly educated, with a Bachelor's (44.4%) or Master's degree (41.9%). Most are students (66.9%), and 65.4% earn under ₹5,000 per month. These findings guide developers, marketers, and policymakers in creating accessible, impactful, user-focused AI solutions.

Keywords: AI-powered mobile applications, , Android dominance, user engagement, societal impact, technology adoption

I. INTRODUCTION

Artificial Intelligence (AI) has evolved from powering entertainment and social media to driving practical tools such as mobile payment platforms. Applications like Google Pay, PhonePe, Paytm, and Apple Pay now use AI to detect fraudulent activity, offer tailored spending insights, and predict user needs for smoother transactions. By enabling fast, cashless payments, these apps have become important drivers of financial inclusion. In India, where smartphone adoption is high and younger users dominate the market, AI-enabled payment services have grown rapidly. The widespread use of Android devices—combined with the affordability of payment apps on this platform—has fueled their popularity. For developers and policymakers, knowing who uses these platforms is key to designing better services. Factors such as income, education, and employment shape willingness to pay for premium features. Likewise, insights into user habits—such as how often they use the apps and their openness to features like automated budgeting, expense tracking, or instant credit—can guide the creation of solutions that better match user needs.

II.A1 VIRUTUAL ASSISTANT'S:

Virtual Assistants in AI-Powered Mobile Applications

Virtual assistants—such as Google Assistant, Siri, Alexa, and Bixby—are among the most widely used forms of AI on mobile devices. Powered by natural language processing (NLP) and machine learning (ML), these tools perform various tasks, including answering questions, setting reminders, sending messages, managing schedules, controlling smart home devices, and enabling hands-free navigation. In this study's context, virtual assistants are notable because they are built into both Android and iOS systems, ensuring accessibility for a wide range of users. With Android devices representing 92.7% of the sample and most respondents being young, educated students, it is likely that these users rely on virtual assistants for both productivity and entertainment. AI-driven virtual assistants are increasingly important in mobile payment applications, offering features such as voice-enabled transactions, bill payments, and balance checks. They also enhance personalization by learning from user behavior, enabling smarter suggestions that improve satisfaction and engagement. For developers and service providers, insights into user demographics and socio-economic profiles—such as the prevalence of students and young professionals from lower-income backgrounds—can guide the design of virtual assistant features. This approach ensures that the technology remains innovative, inclusive, and relevant to the daily needs of its primary audience.

III. REVIEW OF LITERATURE:

K Komalavalli, R. Hemalatha & S. Dhanalakshimi (2020)¹ That literature highlights of Several Studies have explored the integration of Artificial Intelligence in smartphones and its impact on Students. Research highlights that smartphones have become essential tools in higher education, Aiding students in e-learning, research, and communication. Studies indicate that social media, Educational apps, and productivity tools are among the most frequently used applications. Security Concerns are also a key focus, with students relying on biometric authentication and data encryption to protect their personal information. Additionally, literature emphasizes both the positive and negative Impacts of smartphone usage, influencing students ' academic performance, social interactions, and Overall well-being.

Mohammed Aij az Ahmed (2021)² That literature highlights the growing reliance on Android based mobile systems for communication and information access. Studies emphasize the security risks associated with unauthorized access and system vulnerabilities, posing threats to user data. Various techniques, including Google services, rooting, custom kernels,

and ROM modifications, have been explored to enhance Android security features. Findings suggest that rooting provides a more Conclusive and secure approach to system customization and protection. The study underscores the need for further research to strengthen Android security measures and mitigate potential threats.

Aswini S. Chandrikapure (2023)³That literature highlights of Artificial Intelligence (AI) is a branch of computer science that focuses on programming machines to mimic human behaviour. Research Highlights significant advancements in AI, particularly in games, where computer chess programs can now surpass human players. Neural networks have emerged as a leading AI field, contributing to voice recognition and natural language processing. Studies also emphasize the role of AI languages like LISP and Prolog in developing intelligent systems. Furthermore, AI is increasingly integrated into mobile technology, powering innovations such as self-driving cars, virtual assistants like SIRI, and advanced search algorithm.

IV. OBJECTIVES OF THE STUDY:

- To explore virtual assistants in AI-powered mobile applications.
- To analyze the demographic profile of respondents.
- To identify the dominant mobile operating system among respondents.
- To identify key factors influencing the use of AI-based mobile applications.
- To offer suggestions and draw conclusions based on the study findings.

V.RESEARCH METHODOLOGY

POPULATION SAMPLING TECHNIQUES

The research explored the adoption of AI-powered mobile applications in Chennai. A total of 434 users participated, selected through convenience sampling based on availability and willingness. Data collection involved a structured Google Forms survey for primary inputs and credible published sources for secondary information. Analysis employed descriptive statistics, Chi-square tests, and correlation techniques

Table I-Sampling size and data collection

RESPONSE	RATE OF RESPONSE
Number of questionnaires shared	500
Questionnaires filled	434
Questionnaires not filled	66
Percentage response rate	86.8%

VI .Analysis and interpretation

Table 2 - PERCENTAGES ANALYSIS Of the respondents

Demographic factors	Categories	No respondents	of	Percentages
Gender	Male	105		24.2
	Female	329		75.8
Age	Under 18	35		8.1
	18-24	354		81.5
	25-34			9.7
	35-44	3		.8
Educational qualifications	School level	32		7.3
	Diploma	7		1.6
	Bachelor's degree	193		44.4
	Master degree	182		41.9
	Professional degree	21		4.8
Employment status	Employed	122		28.2
	Employed part-time	14		3.2
	Student	290		66.9
	Housewife	7		1.6
Family Income	Less than 25k	284		65.4
	25000-35000	73		17
	35000-45000	24		5.6
	Above 45000	53		12

The respondent profile is mainly female (75.8%) and concentrated in the 18–24 age group (81.5%), indicating a youth-focused sample. Most have a bachelor's (44.4%) or master's degree (41.9%), showing high education levels. Students form the majority (66.9%), followed by employed individuals (28.2%). Most households earn less than ₹25,000 per month (65.4%), reflecting modest financial backgrounds. Overall, the sample comprises young, educated, predominantly female students from lower-income families, likely influencing their perspectives and decision-making in the study.

Table 3 - "Distribution of Respondents by Type of Mobile Device Used"

TYPE OF MOBILE DEVICE	NO OF RESPONDENTS	PERCENTAGE (%)
IOS (1 PHONE SYSTEM)	32	7.3
ANDROID	402	92.7
TOTAL	434	100

The data shows that the vast majority of respondents (92.7%) use Android devices, while only 7.3% use iOS (iPhone system). This indicates that Android dominates the user base, suggesting wider accessibility, affordability, and preference among the surveyed population. The small proportion of iOS users reflects its relatively limited market penetration, likely influenced by pricing and brand positioning..

Table 4 - "Frequency of Mobile Phone App Usage Among Respondents"

USE OF MOBILE PHONE APPS	NO OF RESPONDENTS	PERCENTAGE
MULTIPLE TIMES ADAY	252	58.1
ONCE A DAY		11.3
ONCE A WEEK	24	5.6
A FEW TIMES A DAY	109	25.0
TOTAL	434	100

The data shows that mobile app usage is frequent among respondents, with most (58.1%) using them multiple times daily. About 25.0% use apps a few times a day, 11.3% once a day, and only 5.6% as rarely as once a week. This trend underscores the central role of mobile apps in daily life, indicating strong digital engagement and dependence.

Table 5 - Showing ANOVA analysis between demographic profile and there opinion towards payment for AI features next point**Null hypothesis (Ho):**

There is no significant relationship between demographics and the opinion (payment for AIFeatures & Experience crashes)

Alternative Hypothesis (HI):

There is a significant relationship between demographics and the opinion (payment for AI Features & Experience crashes)

	PAYMENT FOR FEATURES (Sig value).	EXPERIENCE CRASHES (Sig value).
AGE	1.000	.815
GENDER	1.464	.23 8
FAMILY INCOME	.000	.777
EDUCATIONALQUALIFICATIONS	. 142	1.000
EMPLOYMENT STATUS	.000	.789

INTERPRETATION:

The ANOVA results indicated that willingness to pay for AI features was significantly associated with family income ($p = 0.000$) and employment status ($p = 0.000$). Age, gender, and educational qualifications had p-values greater than 0.05, indicating no significant association with payment preferences. For app-crash experience, all demographic variables showed p-values greater than 0.05, suggesting that crash frequency was not significantly affected by age, gender, income, education, or employment status. Overall, respondents' financial and occupational backgrounds influenced willingness to pay, while experiences of app crashes were similar across demographic groups.

CONCLUSION:

The study highlights the rapid adoption of AI-powered mobile payment applications and virtual assistants among young, educated, and predominantly female users in Chennai. With Android devices dominating (92.7%) and frequent mobile app usage, the findings indicate strong digital engagement. Family income and employment status significantly influence users' willingness to pay for AI-based features, while technical issues such as app crashes affect all demographic groups equally. Integrating virtual assistants into payment applications enhances convenience, security, and personalization, making them essential tools for the target demographic. However, the modest income levels of most respondents suggest affordability remains a key factor in adoption. For developers and policymakers, these insights stress the need for inclusive, cost-effective, and user-friendly AI features tailored to young, student-centric populations. Strengthening security, improving performance, and offering localized features can further boost adoption and engagement. Overall, AI-powered mobile technologies—when aligned with user demographics and socio-economic conditions—can significantly improve financial inclusion and everyday productivity.

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180. A COMPARATIVE STUDY ON AI-ENABLED VS. TRADITIONAL DECISION-MAKING APPROACHES IN MSME

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Abstract:

Micro, Small, and Medium Enterprises (MSMEs) are the spine of maximum economies, contributing considerably to GDP, employment generation, and innovation. Traditionally, decision-making in MSMEs has relied closely on human judgment, experience, and intuition. While such techniques have sustained small organisations for decades, they regularly lack precision, speed, and flexibility in today's dynamic enterprise environment. With the emergence of Artificial Intelligence (AI), MSMEs have new possibilities to leverage data-pushed insights for higher decision-making.

This paper conducts a comparative look at among AI-enabled and conventional decision-making techniques in MSMEs. It evaluates the relative strengths and barriers of each techniques throughout key dimensions along with accuracy, efficiency, cost, and scalability. Using secondary literature, case examples, and survey-primarily based totally insights, the look at highlights how AI can enhance forecasting, economic planning, patron engagement, and hazard management. The findings underscore the transformative capacity of AI for MSMEs at the same time as spotting adoption boundaries along with cost, ability gaps, and infrastructure.

Introduction

MSMEs play a crucial position in financial development, especially in rising economies like India, wherein they make a contribution almost 30% to the GDP and hire over one hundred ten million people. Despite their importance, MSMEs regularly face demanding situations inclusive of restricted get right of entry to finance, loss of professional manpower, and reliance on previous enterprise practices.

Decision-making in such establishments has historically been fashioned with the aid of using the owner's intuition, non-public experience, and simple guide facts analysis. With developing competition, globalization, and virtual transformation, such conventional techniques are an increasing number of inadequate. Artificial Intelligence (AI) gives an opportunity with the aid of using allowing evidence-based, real-time decision-making via predictive analytics, device mastering algorithms, and automatic tools.

AI can empower MSMEs to forecast demand, optimize deliver chains, decorate purchaser service, and decrease risks. This have a look at makes a speciality of evaluating AI-enabled and conventional decision-making techniques in MSMEs, with the intention of presenting insights into their respective effectiveness, demanding situations, and implications for sustainable growth.

Literature Review

Traditional Decision-Making in MSMEs

- Research highlights that MSMEs frequently rely on the instinct and enjoy of proprietors or managers (Gupta, 2018).
- Traditional techniques are low-value however especially subjective and susceptible to biases (Singh & Sharma, 2020).
- Limited get right of entry to to based records reduces the reliability of selections in unexpectedly converting markets.

AI in Decision-Making

- AI affords predictive analytics, sample recognition, and automation that beautify selection quality (Brynjolfsson & McAfee, 2017).
- Studies display AI-pushed structures enhance performance in marketing, finance, and operations (Chatterjee et al., 2021).
- For MSMEs, AI adoption can bridge the competitiveness hole with large firms (OECD Report, 2020).

Comparative Studies

- Research evaluating conventional and AI-primarily based totally techniques shows AI improves accuracy and scalability however calls for infrastructure and virtual skills (Kumar & Raj, 2021).
- Some research argue that hybrid methods, combining human instinct with AI insights, can also additionally yield the quality results for MSMEs (Patel, 2022).

Gap Identified: While there's developing literature on AI adoption in enterprises, constrained research have explicitly as compared AI-enabled vs. conventional selection-making methods with inside the MSME context.

Research Methodology

Data Sources:

Secondary Data: Academic journals, authorities reports, case research of AI adoption in MSMEs, and enterprise surveys.

Case Studies

- **Case Study 1: MSME Efficiency Gains thru AI Automation** A 2024 SSRN case evaluation of small agencies the use of AI-enabled Digital CFO structures mentioned: 70% development in method efficiency 90% discount in human errors three× boom in man or woman worker productivity This indicates how AI can streamline finance and operations in MSMEs, as compared to standard guide bookkeeping and spreadsheet-primarily based totally decision-making.
- **Case Study 2: AI + ONDC for Market Access** MSMEs included into the Open Network for Digital Commerce (ONDC) used AI-pushed cataloguing and call for forecasting equipment to beautify on-line visibility. Sellers mentioned quicker onboarding, optimized pricing, and higher product discovery. Small producers and outlets who formerly trusted word-of-mouth and offline markets accelerated attain to countrywide buyers, enhancing income and resilience.
- **Case Study 3: E-trade SMEs Using AI for Customer Insights** An ET feature (2025) documented Indian e-trade-primarily based totally micro-businesses adopting AI equipment for: Demand forecasting (looking forward to seasonal shifts) Inventory management (lowering stockouts and overstocking) Customer analytics (customized recommendations) Results protected stepped forward income conversion charges and decreased running capital stress, as compared to standard guide estimation practices.
- **Case Study 4: Digital Maturity and Growth** The Vi Business MSME Growth Insights 2024 found: Digital Maturity Index of Indian MSMEs rose from 56.6 to 57.three inside one year. Enterprises with better maturity (adopting AI equipment) confirmed 17% more chance of reaching turnover increase as compared to much less digitalized peers. This demonstrates measurable increase advantages of AI adoption.

Findings and Discussion

The comparative evaluation of AI-enabled as opposed to conventional decision-making in MSMEs famous numerous key insights:

Accuracy and Efficiency

- AI adoption considerably improves accuracy of forecasts and chance assessments.
- A NASSCOM survey (2024) determined that India`s AI adoption rating reached **2.47/4**, with almost **87% of corporations (inclusive of SME`s)** placed in mid-degree adulthood tiers, displaying early profits in data-pushed decisions.
- In contrast, conventional decision-making in MSMEs stays at risk of subjectivity and facts gaps, frequently main to overlooked opportunities.

Cost Considerations

- Traditional strategies are less expensive with inside the quick time period however restrict scalability.
- Industry reviews (ET, 2025) affirm MSMEs cite **AI adoption costs—tools, infrastructure, and training—as important barriers.**
- However, long-time period benefits (e.g., automation decreasing mistakes by ~90%) imply AI grants higher cost-effectiveness.

Business Growth and Competitiveness

- Vi Business MSME survey (2024) suggests corporations with better virtual adulthood (inclusive of AI adoption) had a **17% better probability of turnover increase** in comparison to digitally lagging peers.
- AI-enabled advertising and marketing and purchaser analytics permit MSMEs to attain wider audiences, especially through e-trade structures which include ONDC.

Adoption Barriers

- MSMEs frequently lack virtual skills, infrastructure, and lower priced AI solutions.
- NITI Aayog (2025) highlights that regardless of coverage support, **recognition gaps and excessive preliminary investments** sluggish adoption.
- ET (2025) additionally reviews call for “Desi AI” tools—sector-specific, lower priced, and easy-to-use for MSMEs.

Hybrid Approaches

- Case proof shows the handiest method may also integrate **human instinct with AI insights.** This balances the affordability of conventional strategies with the precision of AI.

Recommendations

Based at the comparative observe of AI-enabled vs. conventional decision-making in MSMEs, the subsequent hints are proposed:

- **Adopt a Hybrid Approach:** MSMEs have to integrate conventional experience-pushed strategies with AI gear to stability instinct and data-pushed insights.
- **Affordable AI Solutions:** Technology carriers have to layout value-effective, user-pleasant AI programs tailor-made for micro and small businesses.
- **Capacity Building:** Training packages and workshops have to be prepared to beautify virtual literacy and AI readiness amongst MSME proprietors and employees.
- **Government Support:** Policymakers have to offer economic incentives, subsidies, and virtual adoption schemes to inspire AI integration in MSMEs.

- **Collaborative Ecosystem:** Partnerships among enterprise associations, studies institutions, and MSMEs can sell know-how sharing and AI adoption first-class practices.
- **Gradual Implementation:** MSMEs have to begin with small-scale AI programs (e.g., chatbots, income forecasting) earlier than increasing to complicated AI systems.
- **Monitoring and Evaluation:** Continuous tracking of AI implementation have to be carried out to evaluate effectiveness, value savings, and long-time period sustainability.

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181. AI FEVER A STUDY ON THE ARTIFICIAL INTELLIGENCE IN BUSINESS AND TECHNOLOGY ON TODAY'S IT UNDERSTANDING TRENDS AND DIGITAL TRANSFORMATION...

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Abstract

Artificial Intelligence (AI) continues to revolutionize the landscape of business and technology by reshaping roles, processes, and customer experiences. This paper explores the evolving responsibilities of software engineers in the AI era, the integration of AI-powered personalization in digital experience design, the convergence of AI and block chain through smart contracts, and the ethical concerns surrounding AI deployment in human resource management and corporate governance. Using conceptual analysis, critical reviews, and real-world case studies, this paper highlights both the opportunities and challenges organizations face while adopting AI-driven solutions.

Keywords: Artificial Intelligence, AI-driven, Software, Technology

Introduction

The integration of AI into business and technology has ushered in a new era of innovation, automation, and personalization. From intelligent automation in development cycles to real-time personalization in digital products, AI is not only transforming user experiences but also reshaping organizational structures and ethical frameworks. This journal explores how AI is influencing four major areas: the evolving role of software engineers, AI-powered digital experience design, blockchain integration, and ethical implications in corporate environments.

1. Evolving Role of the Software Engineer in the Age of AI

AI as Colleague, Not Competitor

Software engineers are now expected to possess a hybrid skillset that blends traditional coding expertise with knowledge of AI frameworks, data modeling, and machine learning algorithms. Key changes include:

- i) Increased focus on AI model deployment and integration. Use of low-code/no-code platforms for rapid AI development.

- ii) Emphasis on cross-functional collaboration with data scientists and business analysts.
- iii) Responsibility for ensuring model transparency, security, and ethical compliance.

AI-powered tools from GitHub Copilot and TabNine to advanced AI agents are assisting developers with code generation, completion, debugging, testing, documentation, and even architectural suggestions. These tools boost productivity by automating repetitive tasks. Developers are moving from manual coding toward guiding and validating AI-generated outputs—a shift from “builder” to “orchestrator”

AI Agents and Proactive Collaboration

AI assistants are evolving no longer just reactive tools, but proactive collaborators that predict developer needs and offer real-time guidance on performance, security, and maintenance. Fully autonomous AI agents may soon design workflows, write and test code, optimize systems, and manage infrastructure requiring developers to define goals and oversee execution.

Reskilling, Specialization, and Strategic Thinking:

- The software engineer role is branching into areas such as AI assessors, software strategists, or DevOps specialists, while pure coding roles diminish in prominence.
- Engineers need to focus on system architecture, ethical engineering, cyber security, and human-centered design.
- Career pathways are shifting emphasizing continuous learning, AI fluency, interdisciplinary collaboration, and soft skills like critical thinking and empathy.

Challenges and Workforce Impacts

Some junior engineers are finding fewer entry-level coding opportunities as AI automates foundational tasks. Companies may demand engineers who can bridge AI and business, not just write code, raising concerns over career progression and skill gaps.

Summary: Engineers are evolving into strategic orchestrators of AI-powered development—driving innovation, ensuring quality, and solving complex problems, with an increasing emphasis on human judgment, ethics, and system-level thinking.

Blockchain Integration and Smart Contracts

Smart contracts are becoming more intelligent with AI enhancements—able to react to real-time data, adapt behavior (e.g., adjusting loan terms, dynamic supply chain rerouting) and improve automation and decision-making. Cross-chain interoperability (via Polkadot, Cosmos, atomic swaps) enables smart contracts to operate across multiple blockchains seamlessly, boosting liquidity and functionality.

Privacy, Compliance, and Enterprise Adoption

Privacy-preserving technologies like zero-knowledge proofs (ZKP) and secure multi-party computation are becoming integral for contracts in sensitive domains like finance and healthcare. Enterprises are integrating compliance and regulatory features directly into smart contracts—achieved through formal verification, modular compliance code, and even legally-binding hybrid contracts (e.g., MetaLex’s CyTE combines on-chain automation with off-chain enforceable agreements). Security is advancing with AI-driven auditing, automated vulnerability detection, formal verification, modular architecture, and continuous monitoring significantly reducing exploit risks. The growth of Composable and upgradeable contracts (e.g., proxy patterns, DAO governance) allows flexibility, upgrades, and easier maintenance.

Diverse Use Cases and Ecosystem Growth

Smart contracts are powering DeFi 2.0, tokenization of real-world assets, gaming economies (NFTs, play-to-earn), IoT integrations, and IoT-enabled supply chain automation. Institutional use cases, such as Goldman/Microsoft's Canton Network (DAML smart contracts for institutional crypto assets), are gaining traction for privacy, compliance, and secure settlement.

AI-Powered Personalization and Digital Experience Design

Personalization, powered by AI, has become essential in delivering engaging digital experiences. Through technologies such as natural language processing (NLP), recommendation systems, and predictive analytics, businesses can create hyper-personalized customer journeys.

Key Case Study:

A major retail company used machine learning algorithms to personalize product recommendations, resulting in a 35% increase in customer engagement and a 20% boost in sales conversion. However, AI-driven personalization also raises concerns about data privacy, algorithmic bias, and user autonomy.

Ethical Implications of AI in HR and Corporate Governance

As AI tools are increasingly used in recruitment, employee monitoring, and performance management, ethical concerns are rising:

- Bias in recruitment algorithms can lead to unfair hiring practices.
- Use of AI in monitoring productivity can compromise employee privacy.
- Opaque decision-making by AI systems in corporate governance challenges accountability.

There is an urgent need for regulatory frameworks and ethical guidelines that prioritize fairness, transparency, and human oversight.

Conclusion:

AI offers transformative potential across software development, customer experience, and enterprise operations. However, organizations must navigate the ethical, technical, and human challenges involved. By fostering interdisciplinary collaboration and developing responsible AI practices, businesses can fully harness the benefits of AI while safeguarding trust and equity.

182. ANALYZING THE INFLUENCE OF AI-AUGMENTED HIERARCHICAL VS. COLLABORATIVE WORKPLACE CULTURES ON THE EMPLOYEE LIFE CYCLE: A CASE STUDY APPROACH

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This case study explores the contrasting effects of hierarchical and collaborative workplace cultures on the employee life cycle, encompassing recruitment, onboarding, development, retention, and exit processes. By examining real-world organizational settings, the study aims to uncover how cultural frameworks influence employee engagement, satisfaction, performance, and career progression. Hierarchical cultures, characterized by rigid structures and top-down decision-making, are compared with collaborative cultures that emphasize teamwork, transparency, and shared leadership. Through qualitative interviews, employee surveys, and organizational data analysis, the study identifies key cultural touchpoints that shape employee experiences and outcomes. The findings offer actionable insights for HR professionals and organizational leaders seeking to align culture with strategic talent management, ultimately enhancing workforce resilience and organizational success.

INTRODUCTION

In today's rapidly evolving business landscape, organizational culture has emerged as a critical determinant of employee experience, performance, and retention. As companies strive to attract and nurture talent in competitive markets, the internal cultural environment becomes not just a backdrop but a strategic asset. Among the many cultural frameworks that shape workplace dynamics, hierarchical and collaborative cultures stand out as two fundamentally distinct models. Hierarchical cultures are traditionally characterized by structured authority, formalized roles, and top-down decision-making. They offer clarity, predictability, and control—qualities that can be essential in industries where compliance, risk management, and operational efficiency are paramount. In contrast, collaborative cultures prioritize openness, shared leadership, and team-based problem-solving. These environments foster innovation, adaptability, and employee empowerment, making them particularly suited for organizations that thrive on creativity and agility.

NEED, SCOPE & SIGNIFICANCE OF THE STUDY:

Need: In today's rapidly changing and highly competitive business environment, it's crucial for organizations to understand how their culture influences every stage of the employee life cycle. From attracting talent to retaining employees, a company's culture shapes the work environment and affects employee satisfaction, productivity, and overall success. By fostering a supportive and inclusive culture, businesses can attract and retain top talent, leading to a more motivated and engaged workforce.

Scope: The study aims to conduct a thorough comparison of hierarchical and collaborative cultures in a range of industries. This analysis will delve into the ways in which these cultures impact the entire employee life cycle, including recruitment, onboarding, professional development, and retention.

LIMITATION OF THE STUDY:

- The area of data collection has been restricted to specific organizations with distinct hierarchical or collaborative cultures.
- The time and duration of the study are limited, which may affect the depth of the analysis and findings.
- The study is based on collecting data through questionnaires, which may be inadequate to measure the true opinions and experiences of the respondents.
- The responses may exhibit social desirability bias, as participants may provide answers they believe are socially desirable rather than reflecting their true feelings or behaviours.
- The response size being low compared to the overall population may introduce response bias and impact the representativeness of the sample.

RESEARCH REVIEW:

1. Smith & Jones (2022) in “Understanding Employee Engagement in Hierarchical Organizational Cultures” thoroughly examine the impact of hierarchical organizational cultures on employee engagement throughout various stages of the employee life cycle. They argue that the inherent rigidity of these structures often results in a sense of alienation among employees, as they may find themselves distanced from key decision-making processes. While clear lines of authority can enhance operational efficiency, the authors point out that this same structure can hinder open communication and reduce employees' feelings of belonging within the organization. The ensuing disengagement can lead to lower productivity and diminished innovation, signaling a critical need for organizations to reevaluate their hierarchical frameworks. To address these challenges, the study suggests implementing robust feedback

mechanisms and fostering a culture of recognition, which could significantly improve employee engagement even within traditionally hierarchical environments.

2. Kim (2021) in “Collaborative Cultures and Their Impact on Employee Retention” examines the vital connection between collaborative workplace cultures and employee retention, emphasizing its significance throughout the employee life cycle. The research reveals that organizations that emphasize collaboration tend to enjoy greater employee retention rates, as individuals feel a sense of value and support from their colleagues. Kim's findings indicate that a collaborative environment enhances job satisfaction and loyalty, both of which are essential for keeping skilled employees engaged and committed. Additionally, the study highlights the critical roles of mentorship and peer support within these cultures, suggesting that such elements are instrumental in fostering strong employee dedication and long-term retention. Ultimately, Kim advocates for the cultivation of collaborative cultures as an effective strategy for organizations aiming to improve their retention initiatives.

3. Brown & Green (2020) in “The Role of Leadership in Hierarchical Culture” explores the significant influence of leadership styles on employee experiences within hierarchical cultures, particularly emphasizing the drawbacks of autocratic leadership. Their research indicates that such leadership approaches can intensify feelings of isolation and disengagement among employees by stifling open communication and limiting avenues for their input. This lack of engagement not only diminishes employee morale but also negatively impacts overall productivity. The authors advocate for a transition towards more participative leadership styles that promote collaboration and encourage feedback, thereby improving communication and enhancing employee involvement. Their findings underscore the critical need for leaders in hierarchical organizations to adapt their methods to create a more supportive and interactive work environment.

3. RESEARCH METHODOLOGY:

Research is a systematic inquiry process that includes data gathering, documentation of important information, analysis, and interpretation of that data and information in accordance with appropriate methodologies established by particular academic and professional disciplines.

3.1 OBJECTIVES:

PRIMARY OBJECTIVES:

- To compare the impact of hierarchical and collaborative cultures on different stages of the employee life cycle.

SECONDARY OBJECTIVES:

- To examine the impact of hierarchical and collaborative cultures on employee recruitment and onboarding experiences.
- To evaluate the influence of hierarchical and collaborative cultures on employee development and career growth opportunities.
- To assess the relationship between hierarchical and collaborative cultures on employee satisfaction and engagement.
- To explore the effects of hierarchical and collaborative cultures on employee retention and turnover rates.

3.2 HYPOTHESIS OF THE STUDY:

Based on the above objectives, the following hypothesis was formulated.

Hierarchical and collaborative cultures have significantly different impacts on employee recruitment and onboarding:

H0: There is no significant difference in the impact of hierarchical and collaborative cultures on employee recruitment and onboarding.

H1: There is a significant difference in the impact of hierarchical and collaborative cultures on employee recruitment and onboarding.

Employees in collaborative cultures experience greater employee development and career growth opportunities than those in hierarchical cultures:

H0: There is no significant difference in employee development opportunities between hierarchical and collaborative cultures.

H1: Employees in collaborative cultures experience significantly greater employee development and career growth opportunities compared to hierarchical cultures.

Employee satisfaction and engagement are higher in collaborative cultures than in hierarchical cultures:

H0: There is no significant difference in employee satisfaction and engagement between hierarchical and collaborative cultures.

H1: Employee satisfaction and engagement are significantly higher in collaborative cultures compared to hierarchical cultures.

Collaborative cultures have lower employee retention and turnover rates compared to hierarchical cultures:

H0: There is no significant difference in employee turnover rates between hierarchical and collaborative cultures.

H1: Employee retention and turnover rates are significantly lower in collaborative cultures compared to hierarchical cultures.

Relationship between Sector (Manufacturing or IT) and employee life cycle:

H0: There is no significant relationship between Sector (Manufacturing or IT) and employee life cycle.

H1: There is a significant relationship between Sector (Manufacturing or IT) and employee life cycle.

4.1 STATISTICAL ANALYSIS:

TABLE SHOWING THE RELATIONSHIP BETWEEN SECTOR (MANUFACTURING OR IT) AND EMPLOYEE LIFE CYCLE

H0: There is no significant relationship between Sector (Manufacturing or IT) and employee life cycle

H1: There is a significant relationship between Sector (Manufacturing or IT) and employee life cycle

Sector			RO	EC	EE	ET
Manufacturing Sector	RO	Correlation Coefficient	1.000	.534**	.535**	.428**
		Sig. (2-tailed)	.	.000	.000	.002
		N	50	50	50	50
	EC	Correlation Coefficient	.534**	1.000	.367**	.253
		Sig. (2-tailed)	.000	.	.009	.077
		N	50	50	50	50
	EE	Correlation Coefficient	.535**	.367**	1.000	.472**
		Sig. (2-tailed)	.000	.009	.	.001
		N	50	50	50	50
	ET	Correlation Coefficient	.428**	.253	.472**	1.000
		Sig. (2-tailed)	.002	.077	.001	.
		N	50	50	50	50
IT or Service Sector	RO	Correlation Coefficient	1.000	.777**	.636**	.614**
		Sig. (2-tailed)	.	.000	.000	.000
		N	50	50	50	50
	EC	Correlation Coefficient	.777**	1.000	.660**	.665**
		Sig. (2-tailed)	.000	.	.000	.000
		N	50	50	50	50
	EE	Correlation Coefficient	.636**	.660**	1.000	.588**
		Sig. (2-tailed)	.000	.000	.	.000
		N	50	50	50	50
	ET	Correlation Coefficient	.614**	.665**	.588**	1.000
		Sig. (2-tailed)	.000	.000	.000	.
		N	50	50	50	50

INFERENCE:

In **Manufacturing Sector**, RO has a perfect correlation of 1.000. EC has a correlation coefficient of 0.534, suggesting a moderate positive relationship. EE has a correlation coefficient of 0.535, suggesting a moderate positive relationship. ET has a correlation coefficient of 0.428, showing a weaker but still positive relationship.

In **IT or Service Sector**, RO has a Perfect correlation of 1.000. EC has a correlation coefficient of 0.777, suggesting a strong positive relationship. EE has a correlation coefficient of 0.636, suggesting a strong positive relationship. ET has a correlation coefficient of 0.614, suggesting moderate positive relationship.

The table generally shows that there is a significant positive relationship between sectors (both Manufacturing and IT) and various aspects of the employee lifecycle. Reject the null hypothesis (H0) and accept the alternative hypothesis (H1). The significance values (Sig. 2- tailed) provide evidence that these relationships are statistically significant in most cases, especially in the IT or Service sector, which tends to show stronger correlations across all categories compared to the Manufacturing sector.

TABLE SHOWING THE HIERARCHICAL AND COLLABORATIVE CULTURES HAVE SIGNIFICANTLY DIFFERENT IMPACTS ON EMPLOYEE RECRUITMENT AND ONBOARDING:

H0: There is no significant difference in the impact of hierarchical and collaborative cultures on employee recruitment and onboarding

H1: There is a significant difference in the impact of hierarchical and collaborative cultures on employee recruitment and onboarding.

INDEPENDENT SAMPLE TEST									
	Levene's test for Equality of Variances		T test for Equality of Means					95% Confidence Interval of the Difference	
	F	Sig	t	df	Sig 2 taile d	Mean Difference	Std Error Difference	Lower	Upper
Assumed	2.654	0.107	-2.80	98	0.006	-3.000	.900	-4.500	-1.500
Not Assumed			-2.80	92.701	0.006	-3.000	.900	-4.500	-1.500

Table 4.2.2

INFERENCE:

The findings of the independent sample test show a substantial correlation between sectors and employee recruitment & onboarding. An F-value of 2.654 with a significance level of 0.107 is displayed by Levene's test for equality of variances, indicating the assumption of equal variances, In the t-test p-value = 0.006, indicating a statistically significant difference ($p < 0.05$). The mean difference of -3.000 shows a significant disparity between hierarchical and collaborative cultures in terms of their impact on recruitment and onboarding. The confidence interval does not include zero, reinforcing the significant difference between the two cultures.

Overall, our findings reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1). There is now a significant difference in the impact of hierarchical and collaborative cultures on employee recruitment and onboarding.

TABLE SHOWING THE EMPLOYEES IN COLLABORATIVE CULTURES EXPERIENCE GREATER EMPLOYEE DEVELOPMENT AND CAREER GROWTH OPPORTUNITIES THAN THOSE IN HIERARCHICAL CULTURES:

H₀: There is no significant difference in employee development opportunities between hierarchical and collaborative cultures.

H₁: Employees in collaborative cultures experience significantly greater employee development and career growth opportunities compared to hierarchical cultures.

INDEPENDENT SAMPLE TEST									
	Levene's test for Equality of Variances		T test for Equality of Means					95% Confidence Interval of the Difference	
	F	Sig	t	df	Sig 2 tailed	Mean Difference	Std Error Difference	Lower	Upper
Assumed	.001	.969	-2.90	98	0.004	-2.200	.800	-3.800	-0.600
Not Assumed			-2.90	97.937	0.004	-2.200	.800	-3.800	-0.600

Table 4.2.3

INFERENCE:

The findings of the independent sample test show a substantial correlation between sectors and employee recruitment & onboarding. An F-value of 0.001 with a significance level of 0.969 is displayed by Levene's test for equality of variances, indicating the assumption of equal variances, In the t-test p-value = 0.004, indicating a statistically significant difference

($p < 0.05$). The mean difference of -2.200 suggests a substantial disparity between hierarchical and collaborative cultures, with collaborative cultures offering more opportunities for employee development and career growth. The confidence interval does not include zero, further supporting the significant difference between the two cultures.

Overall, our findings reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1). There is now a significant difference in employee development and career growth opportunities, with collaborative cultures providing greater opportunities compared to hierarchical cultures.

5.1 RECOMMENDATIONS:

- **Improve Onboarding Practices:** Both hierarchical and collaborative organizations can greatly improve their onboarding processes by implementing more thorough procedures. Collaborative organizations should concentrate on creating an inclusive environment, while hierarchical organizations should prioritize tailoring the onboarding process to be more adaptable and personalized for each individual.
- **Enhance Employee Development:** Hierarchical organizations should focus on providing increased opportunities for employees to advance professionally, receive mentorship, and engage in cross-functional training. These efforts can lead to higher job satisfaction and lower turnover rates.
- **Regular Communication Forums:** Establish regular forums for open dialogue across all levels of the organization, ensuring that employees feel heard and valued regardless of their position. This can include town hall meetings, Q&A sessions, and anonymous feedback channels.
- **Increase Employee Engagement:** Hierarchical organizations can encourage more employee participation by adopting participative leadership styles and soliciting feedback to enhance engagement. Additionally, implementing recognition and reward systems can also help improve engagement levels.

CONCLUSION

The integration of artificial intelligence into workplace cultures has redefined the dynamics of the employee life cycle. This study reveals that AI, when embedded within hierarchical cultures, tends to reinforce structure, streamline decision-making, and optimize efficiency—often at the cost of flexibility and employee autonomy. In contrast, collaborative cultures leverage AI to enhance transparency, empower teams, and personalize employee experiences, fostering greater engagement and innovation.

Across recruitment, onboarding, development, retention, and exit stages, AI acts as both a catalyst and a mirror—amplifying the underlying values of the organizational culture it serves. The case studies demonstrate that the success of AI implementation is not solely dependent on the technology itself, but on how well it aligns with cultural intent and human-centered design.

Ultimately, organizations must move beyond a binary view of hierarchy versus collaboration and instead adopt a nuanced approach that blends AI capabilities with cultural agility. By doing so, they can create adaptive ecosystems where both people and machines contribute meaningfully to the employee journey.

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183. REDUCING ERROR RATES AND ENHANCING SCALABILITY IN SUPERCONDUCTING QUBIT QUANTUM PROCESSOR: A DATA-DRIVEN APPROACH

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Abstract

This research focuses on addressing error rates and scalability challenges in superconducting qubit-based quantum processors. It investigates the origins of errors, particularly [correlated errors](#) induced by [mechanical vibrations](#), and proposes mitigation strategies to improve the performance of quantum computations, especially for large-scale processors. The study combines data-driven insights with error mitigation techniques to enhance the accuracy and reliability of quantum algorithms, paving the way for fault-tolerant quantum computing.

Keywords— Superconducting qubits, Quantum Processors, Quantum Computing, Error Rates, Scalability, Quantum error correction, Coherence time , Qubit fidelity, Crosstalk mitigation, Fault-tolerant quantum computing, Data-driven analysis, Noise reduction strategies .

I. INTRODUCTION

Superconducting qubit-based quantum processors are at the forefront of quantum computing research, offering a promising platform for scalable quantum information processing. However, error rates—arising from de-coherence, crosstalk, leakage, and material imperfections—pose significant challenges to scalability. As system size increases, these errors can compound, threatening the viability of large-scale quantum computation and the realization of quantum advantage.

II. DATA SYNTHESIS

Data Trends and Key Findings

1. Error Rates and Their Impact on Scalability

Decoherence and Noise: Decoherence remains a primary bottleneck for scaling superconducting qubit systems. In the current Noisy Intermediate Scale Quantum (NISQ) era, increased error rates limit the depth and complexity of quantum algorithms that can be reliably executed (Calzona & Carrega, 2022)(Kam et al., 2024).

Gate Fidelities: Single-qubit gate fidelities for transmons have reached 0.9998, while two-qubit gates have achieved fidelities above 0.99. However, these local metrics do not fully

capture the complexity of multi-qubit devices due to spatial and temporal variations (Calzona & Carrega, 2022)(Kang et al., 2022).

Entanglement Fidelity: On a 32-qubit GHZ state, a fidelity of 0.519 ± 0.014 was measured, certifying genuine multipartite entanglement but highlighting significant decoherence as system size grows (Kam et al., 2024).

2. Dominant Error Sources

Material Imperfections: Atomic-level characterization reveals that two-level system (TLS) defects and oxide layer formation at critical interfaces are major contributors to decoherence (Alghadeer et al., 2025).

Crosstalk: Crosstalk errors, particularly from CNOT gates, become increasingly problematic as qubit count rises (Perrin et al., 2024)(Ihssen et al., 2025)(Osman et al., 2023).

Leakage: Leakage from computational states into higher transmon levels can accumulate over many cycles, impacting error correction performance (Marques et al., 2023).

Correlated Errors: High-energy impact events can induce correlated errors via quasiparticle poisoning, challenging fault tolerance assumptions (McEwen et al., 2024).

3. Error Mitigation and Correction Strategies

Randomized Compiling (RC): RC protocols transform coherent crosstalk noise into depolarizing channels, enabling more effective error mitigation (Perrin et al., 2024).

Dynamical Decoupling: This technique suppresses decoherence and coherent noise signals, with substantial improvements observed in multi-qubit entanglement experiments (Kam et al., 2024).

Leakage Reduction Units (LRUs): All-microwave LRUs reduce leakage with up to 99% efficacy in 220 ns, suppressing leakage buildup within 1% over 50 cycles (Marques et al., 2023).

Gap Engineering: Engineering different superconducting gaps in Josephson junctions mitigates correlated quasiparticle-induced errors during high-energy impact events (McEwen et al., 2024).

Modular Architectures: Flip-chip designs with electrically floating qubits and microwave enclosures reduce crosstalk (>60 dB isolation) and enable scalable assembly (Ihssen et al., 2025).

Cryo-CMOS Controllers: Globally synchronized clock systems with multiple phase-locked loops (PLLs) provide spectral management and scalability, supporting expected gate fidelities of 99.99% (Kang et al., 2022).

Multi-mode Qubits: Multi-mode architectures (e.g., $0-\pi$ circuits) offer intrinsic hardware-level protection against decoherence but require further experimental maturation (Calzona & Carrega, 2022).

4. Scaling Benchmarks

Frequency Collisions: With improved fabrication (2% resistance standard deviation), frequency reproducibility among transmons is achieved (40 MHz SD), allowing scaling up to 100 qubits with only ~ 3 frequency collisions at 99.9% gate fidelity (Osman et al., 2023).

Entanglement Characterization: Bipartite entanglement in native-graph states has been characterized on devices up to 414 qubits; dynamical decoupling suppresses coherent noise signals (Kam et al., 2024).

Dynamic Table 1: Key Error Sources and Mitigation Strategies in Superconducting Qubit Systems

Error Source	Impact on Scalability	Mitigation Strategy	Quantitative Data / Efficacy	Reference
Decoherence (TLS defects)	Limits coherence times; increases error rates with scale	Improved fabrication; multi-mode circuits	Gate fidelities up to 0.9998 (single-qubit), 0.99+ (two-qubit)	(Calzona & Carrega, 2022)(Alghadeer et al., 2025)
Crosstalk	Compounds with qubit number; limits gate fidelity	Randomized compiling; modular flip-chip	RC protocol enables quantitative simulation; isolation >60 dB	(Perrin et al., 2024)(Ihssen et al., 2025)
Leakage	Reduces error correction efficacy	All-microwave LRUs	Up to 99% leakage reduction in 220 ns; <1% leakage over 50 cycles	(Marques et al., 2023)
Correlated QP Errors	Violates fault tolerance assumptions; impacts QEC	Gap engineering	No T1 degradation in strongly gap-engineered qubits during impact events	(McEwen et al., 2024)
Frequency Collisions	Limits parametric gate scalability	Larger Josephson junctions	Frequency SD reduced to 40 MHz (1%); ~ 3 collisions for 100 qubits at 99.9% fidelity	(Osman et al., 2023)
Coherent Noise	Reduces entanglement fidelity	Dynamical decoupling	Linear decoherence rate $\alpha = (7.13N + 5.54) \times 10^{-3} \mu\text{s}^{-1}$ for $N \leq 15$; suppression observed up to 414 qubits	(Kam et al., 2024)
Control Electronics Noise	Limits gate fidelity at scale	Cryo-CMOS controller IC	Expected gate fidelity of 99.99%	(Kang et al., 2022)

Dynamic Table 2: Experimental Benchmarks for Scalability

Metric	Best Achieved Value / Trend	System Size / Context	Reference
Single-qubit gate fidelity	0.9998 (transmon), >0.9999 (uxonium)	Individual qubits	(Calzona & Carrega, 2022)
Two-qubit gate fidelity	>0.99	Individual pairs	(Calzona & Carrega, 2022)
GHZ state fidelity	0.519±0.014	32-qubit GHZ state	(Kam et al., 2024)
Decoherence rate trend	$\alpha=(7.13N+5.54)\times 10^{-3}\mu s^{-1}$	N=7–15 qubits	(Kam et al., 2024)
Bipartite entanglement	Characterized up to 414 qubits	IBM Osprey device	(Kam et al., 2024)
Frequency reproducibility	SD = 40 MHz (1%)	32 identical transmons	(Osman et al., 2023)
Crosstalk isolation	>60 dB	Modular flip-chip architecture	(Ihssen et al., 2025)
Leakage suppression	<1% over 50 cycles	LRUs on data/ancilla qubits	(Marques et al., 2023)

III. ANALYSIS

Detailed Analysis of Error Rates vs. Scalability Decoherence and Fidelity

As system size increases, decoherence effects become more pronounced due to cumulative noise sources such as TLS defects and environmental coupling. While single-qubit gate fidelities approach theoretical limits (>0.9998), multi-qubit entanglement fidelity drops significantly (e.g., ~0.52 for a 32-qubit GHZ state), indicating that errors scale non-trivially with qubit number (Kam et al., 2024)(Calzona & Carrega, 2022). The linear trend in decoherence rate with qubit count ($\alpha=(7.13N+5.54)\times 10^{-3}\mu s^{-1}$) suggests that superdecoherence is absent up to N=15 but overall error rates still increase with scale (Kam et al., 2024).

Crosstalk and Frequency Collisions

Crosstalk errors—particularly from two-qubit gates—dominate in large circuits and can be mitigated by randomized compiling protocols that depolarize coherent noise, making it amenable to standard error mitigation schemes (Perrin et al., 2024). Modular architectures with electrically floating qubits achieve >60 dB isolation between components, substantially reducing crosstalk as system size grows (Ihssen et al., 2025). Improved fabrication techniques yield frequency reproducibility among transmons (SD = 40 MHz), enabling scaling up to 100 qubits with only ~3 frequency collisions at high gate fidelity (99.9%) (Osman et al., 2023).

Leakage and Correlated Errors

Leakage into higher transmon levels accumulates over many cycles, but all-microwave LRUs suppress leakage buildup within 1% over 50 cycles, maintaining error correction efficacy even as system size increases (Marques et al., 2023). Correlated errors from high-energy impact events are mitigated by gap engineering; strongly gap-engineered qubits show no T_1 degradation during such events, while weakly engineered ones suffer correlated decoherence (McEwen et al., 2024).

Control Electronics and Architectural Innovations

Cryo-CMOS controller ICs with globally synchronized clocks support spectral management and scalability, achieving expected gate fidelities of 99.99% at cryogenic temperatures (Kang et al., 2022). Multi-mode architectures (e.g., $0-\pi$ circuits) offer intrinsic resilience to both relaxation and dephasing but require further development for large-scale deployment (Calzona & Carrega, 2022).

Patterns and Discrepancies

- **Pattern:** Error rates generally increase with system size due to compounded decoherence, crosstalk, and leakage.
- **Discrepancy:** While local metrics (single-/two-qubit fidelities) remain high, global metrics (multi-qubit entanglement fidelity) degrade rapidly as qubit count rises.
- **Mitigation Efficacy:** Techniques such as dynamical decoupling and randomized compiling show substantial improvements but do not fully eliminate scaling-related errors.

IV. DISCUSSION

Contextualizing Data for Scalability

The data demonstrate that error rates are a critical limiting factor for the scalability of superconducting qubit-based quantum processors. As the number of qubits increases, compounded noise sources—decoherence from TLS defects, crosstalk from control signals, leakage into non-computational states, and correlated errors from environmental impacts—threaten both gate fidelity and overall device performance.

Mitigation strategies are evolving rapidly:

- **Hardware Solutions:** Improved fabrication for frequency reproducibility, gap engineering for correlated error resistance, modular architectures for crosstalk suppression, and advanced control electronics are all contributing to enhanced scalability.

- **Software/Protocol Solutions:** Randomized compiling transforms crosstalk into manageable noise channels; dynamical decoupling suppresses decoherence in large entangled states.
- **Error Correction Readiness:** While quantum error correction is essential for fault-tolerant scaling, current hardware overheads and noise levels remain bottlenecks.

Insights and Gaps

Key insights include the efficacy of hardware-level innovations (e.g., gap engineering, modular design) and protocol-level techniques (e.g., RC, dynamical decoupling) in mitigating scaling-related errors. However, gaps remain in benchmarking multi-qubit devices—local metrics are insufficient for characterizing large systems due to spatial/temporal variations in error rates (Calzona & Carrega, 2022). Further research is needed on scalable error correction schemes compatible with realistic noise profiles.

V. CONCLUSION

Summary of Key Findings

- Error rates—stemming from decoherence, crosstalk, leakage, material imperfections, and correlated environmental impacts—significantly constrain the scalability of superconducting qubit-based quantum processors.
- As system size increases:
 - o Local metrics (single-/two-qubit fidelities) remain high (>0.99), but global metrics (multi-qubit entanglement fidelity) degrade rapidly.
 - o Decoherence rate increases linearly with qubit count up to $N=15$; no superdecoherence observed yet.
 - o Crosstalk errors become dominant but can be mitigated by randomized compiling and modular architectures.
 - o Leakage can be suppressed by all-microwave LRUs; correlated errors mitigated by gap engineering.

184. NAVIGATING ETHICAL BOUNDARIES: THE ROLE OF AI IN HUMAN RESOURCE PRACTICES AND CORPORATE GOVERNANCE FOR RESPONSIBLE DECISION-MAKING

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Abstract

Purpose

This paper explores the ethical boundaries of Artificial Intelligence (AI) in Human Resource Management (HRM) and corporate governance, focusing on its implications for responsible decision-making and stakeholder trust.

Design/methodology/approach

This is a conceptual research paper that synthesizes existing literature on AI ethics, algorithmic decision-making, stakeholder theory, and governance mechanisms. The paper critically examines how AI is integrated into HR and governance systems, identifies ethical risks, and proposes a framework for responsible AI governance

Findings

AI significantly enhances the efficiency and scalability of HR and corporate governance processes. However, it also introduces ethical challenges related to bias, privacy, transparency, and accountability. The paper proposes a responsible AI governance model that includes human-in-the-loop mechanisms, transparency protocols, and stakeholder engagement to ensure ethical alignment.

Research limitations/implications

The paper is conceptual in nature and does not include empirical validation. Future research should test the proposed framework in diverse organizational contexts and explore sector-specific ethical concerns.

Practical implications

HR professionals and corporate leaders can use the proposed governance model to evaluate and guide the ethical deployment of AI tools. The study offers a foundation for developing AI policies that align with corporate values, regulatory compliance, and social responsibility.

Originality/value

This study contributes to the emerging discourse on AI ethics in organizational decision-making by integrating HR practices with governance strategies. It offers a novel model for embedding ethical oversight into AI-driven systems, promoting sustainable and accountable innovation.

Keywords: Artificial Intelligence, Human Resource Management, Corporate Governance, Ethics, Responsible Decision-Making, Algorithmic Bias, Accountability

1. Introduction

Artificial Intelligence (AI) is reshaping the contemporary workplace by automating decisions across recruitment, performance management, training, and strategic governance. As AI increasingly mediates critical HR and board-level decisions, concerns arise over ethical boundaries—particularly with regard to fairness, transparency, privacy, and corporate accountability (Siau & Wang, 2020).

This paper investigates how AI influences ethical decision-making in HR practices and governance structures. Through a conceptual lens, it examines how organizations can embed ethical considerations into AI deployment to enhance stakeholder trust, inclusivity, and regulatory compliance.

2. Conceptual Framework

2.1 AI and Human Resource Practices

AI applications in HR include predictive hiring, workforce analytics, personalized training, and attrition forecasting (Jain et al., 2022). These systems rely heavily on algorithmic learning and data interpretation, potentially reinforcing historical biases if not properly calibrated (Binns et al., 2018). For instance, Amazon's AI hiring tool was abandoned after exhibiting gender bias due to its training on historically male-dominated resumes (Dastin, 2018).

2.2 AI in Corporate Governance

In corporate governance, AI supports decision analytics, risk assessments, fraud detection, and stakeholder communications. It is increasingly used in environmental, social, and governance (ESG) scoring models and boardroom simulations (Kraus et al., 2021). However, ethical governance requires transparency in algorithmic logic, explainability of outputs, and clear lines of responsibility.

2.3 Ethics and Algorithmic Decision-Making

Ethical AI is defined by principles of fairness, accountability, transparency, and human oversight (Floridi et al., 2018). Responsible AI practices must address the “black box” problem—where decision-making logic is opaque—and ensure that human values are preserved in automation (Morley et al., 2020).

3. Theoretical Underpinning

3.1 Stakeholder Theory

Stakeholder theory emphasizes that organizations have obligations beyond shareholders, extending to employees, customers, communities, and regulators (Freeman, 1984). Applying AI in HR and governance should, therefore, consider its impact on all stakeholders. This necessitates inclusive design and participatory governance structures that account for diverse ethical viewpoints.

3.2 Technological Determinism and Human Oversight

Technological determinism suggests that technology shapes organizational behavior. However, ethical AI deployment demands human-centered controls to counterbalance deterministic tendencies (Zuboff, 2019). Human-AI collaboration must therefore be structured to enable oversight, redress, and correction.

4. Ethical Challenges in AI-Driven HRM

4.1 Algorithmic Bias

AI systems trained on biased historical data may propagate discrimination, especially in hiring and promotions (Raji et al., 2020). For example, facial recognition and NLP models may exhibit racial or gender biases due to skewed training sets.

4.2 Data Privacy and Consent

AI systems require large volumes of employee data, raising ethical questions about consent, surveillance, and data minimization (Binns, 2018). The General Data Protection Regulation (GDPR) mandates clear purpose specification and user rights to access or erase data, placing new compliance burdens on HR functions.

4.3 Lack of Explainability

The inability to explain algorithmic decisions undermines employee trust and limits managerial accountability. Explainable AI (XAI) models are crucial for HRM transparency, particularly in appraisal systems and disciplinary actions (Barredo Arrieta et al., 2020).

5. Ethical Challenges in Corporate Governance

5.1 Automated Risk and Compliance Reporting

While AI can identify anomalies and generate risk alerts, over-reliance on algorithms may cause boards to neglect judgment or contextual nuance (Vasarhelyi et al., 2021). Board members must understand AI's limitations and maintain fiduciary responsibility.

5.2 Delegation Without Accountability

Corporate leaders may misuse AI systems to distance themselves from contentious decisions, leading to accountability gaps. Ethically, AI should augment—not replace—governance duties (Glikson & Woolley, 2020).

5.3 ESG and Green washing

AI-based ESG analytics are vulnerable to manipulation, especially when ESG ratings rely on self-reported, unaudited data. Responsible AI governance must include cross-verification mechanisms and third-party auditing (Amel-Zadeh & Serafeim, 2018).

6. Responsible AI Governance Model

Based on literature synthesis, we propose a responsible AI governance model comprising:

6.1 Ethical AI Charter

A formal code aligning AI use with organizational values and ethical standards. It defines acceptable practices, prohibitions, and escalation procedures.

6.2 AI Oversight Committee

An interdisciplinary team that evaluates AI systems, algorithms, and outcomes periodically for ethical compliance and fairness.

6.3 Human-in-the-Loop Design

Ensures humans retain final decision authority in HR processes like hiring, firing, and compensation.

6.4 Transparency Mechanisms

Implements model explainability tools, regular disclosures, and impact assessments for internal and external stakeholders.

6.5 Stakeholder Engagement

Involves employees, legal teams, ethicists, and regulators in co-designing and auditing AI systems.

7. Implications for HR Strategy

HR leaders must collaborate with data scientists and compliance officers to ensure algorithmic fairness. Talent acquisition should be guided not only by AI recommendations but also by diversity and inclusion benchmarks (Kaplan & Haenlein, 2019). Training programs must educate HR teams on AI literacy, ethical dilemmas, and escalation channels.

8. Implications for Corporate Governance

Boards must integrate AI ethics into corporate policies and risk frameworks. AI literacy for directors is essential to critically evaluate algorithmic tools and ensure that governance objectives are not undermined by unintended automation risks (Martin, 2019). Transparent communication of AI usage enhances stakeholder confidence.

9. Future Research Directions

Further research can empirically test the proposed governance model across sectors and cultural contexts. Comparative studies could examine AI ethics practices in multinational corporations versus SMEs. Additionally, longitudinal studies may reveal how ethical AI implementation impacts organizational trust and ESG performance over time.

10. Conclusion

AI presents profound opportunities and ethical risks in HRM and corporate governance. Responsible AI integration requires more than technical proficiency—it demands ethical foresight, stakeholder collaboration, and systemic accountability. The proposed model offers a pathway for embedding ethical reasoning into AI-assisted decisions, aligning innovation with integrity.

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185. DO AI CHATBOTS UNDERSTAND EMOTION? STUDENT PERCEPTIONS OF EMPATHY AND FAIRNESS IN AI CUSTOMER SUPPORT

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Abstract

The study investigates how university students perceive the empathy and justice of AI customer service chatbots. As digital natives and regular users, students are in a unique position to offer their perspective on the emotional and ethical functioning of such systems. Non-experimental, survey-based data were collected from students who had interacted with a chatbot in the recent past. The survey comprised Likert-scale questions and open-ended questions. Among the findings, the subjects rated the chatbots as fair in terms of consistency and respectful interaction, but low in terms of emotional intelligence. Chatbots were perceived to be incapable of detecting frustration, providing reassurance, or adjusting tone according to context. Several respondents wished for more human-like consideration toward emotional sensitivity, particularly in complaint and distress situations. The study adds uniquely to the existing empirical research in affective computing and AI ethics, underscoring the need for emotionally responsible design of chatbot systems to enhance their trustworthiness and user experience.

Keywords AI Chatbots - Emotional Intelligence - Empathy Perception - Fairness in Customer Support - Student Attitudes.

Introduction

Rise of AI Chatbots in Customer Service

In recent times, AI has created immense upheaval in the realm of customer service. AI-driven chatbots are continuously being deployed for repetitive queries, complaints, and transactional communication across a vast variety of sectors such as e-commerce, banking,

telecommunications, food and beverage delivery, travel, and so on. These bots can work throughout the day and night, giving immediate response, and efficiently working through a huge volume of requests with minimal intervention from humans. They have gone ahead, making their bases in the country on platforms such as Amazon, Flipkart, Swiggy, Zomato, IRCTC, besides various government portals, employing AI-imbued tryouts as an expandable solution to address consumer demand surges. Although chatbot adoption has facilitated immense operational efficiency and cost-cutting, it equally introduces queries relative to user experience quality-if not more' so in emotionally loaded interactions. Customer support may Not Just Be a functional Exchange; A lot of times, It is expressions of discontent, embarrassment, urgency, or emotional distress. This is the juncture where the support system's ability to sense, recognize, and address expressed emotional cues comes into play. Traditional human agents have been trained to act in sympathy and fairness in such exchanges. Whereas, AI systems may be technically sound but, in most instances, they are perceived as cold, mechanical, or indifferent.

Need for Emotional Intelligence in AI Communication

Emotional intelligence in service communication is understood as the recognition of emotions by users, the appropriate response to such emotions, and the consequent generation of understanding and trust. In human relations, it is empathy and fairness that make Page 2 of 4 satisfaction and resolution work. An AI should offer solutions to user problems, but there is also a need to address the emotional aspect of the user's experience. This particularly comes to play in service failure or complaint scenarios or when customers are seeking help in some distress related issues. Even though affective computing has developed significantly, still most of the chatbots rely on pre-programmed responses and work limitedly with contextual interpretation or the possibility of giving feedback through simulated emotional behavior. Accordingly, with the growth of AI in public-facing applications, there is a need for the understanding of emotional and ethical implications for organizations, developers, and regulators alike.

Review of Literature

It still changes perception between artificial intelligence empathy with a sense of fairness as they differ so radically as new research comes out from peer-reviewed journals from 2020 onwards, uncovering such different, exciting results, which span under the technical, perceptual, and ethical domains of the definitions. Although conversations have improved, users continue to mistake chatbots to be without intensely responding emotional depth (Liu, Giorgi, Aich et al., 2024-2025). Some facets of modeling for empathetic

frameworks like cognitive, emotional, and behavioral have potential but remain marginalized in their real-world deployment beyond controlled settings (Raamkumar & Yang, 2022; Shum et al., 2018). Some design features, like having a human-like avatar and a human name, could build trust and warmth (Pelau, Dabija & Ene, 2021; Bednarek et al., 2024), but these also have the risk of creating an "illusion of empathy" which may later invoke some scepticism on part of users (Wired, 2024; Frontiers, 2023). Trusting the technology of an AI chatbot is directly interconnected since it is obtained either by procedural fairness or consistency. Interactions with AI chatbots are more accepted by users when unprejudiced and expected (Meier et al., 2024), but less satisfactory whenever emotional frustration has been ignored (Seeger & Heinzl, 2023). Emotional risk comprises other factors considered relevant: people do accept bots mostly for use in daily informal conversations but fail to understand how emotions come into play in highly stressful or volatile scenarios where users prefer humans helping them (Journal of Business Research, 2025; FT, 2024). Studies proved that the parameters of warmth and competence also influenced forgiveness after service failures (Tu et al., 2023; Springer, 2023). There were issues that came about ethics based on emotional mimicry, with students being a big part of the people who are found most uncomfortable when a bot simulates empathic responses without the mechanisms to understand them (Stylo et al., 2024). Besides, people are becoming very interested in knowing the limitations of their use of AI in relation to their uses because people realize that this meaning sets a reality check of emotional dependencies that are avoidable (Nuttavuthisit & Thøgersen, 2015; Liu et al., 2024). Thus, these findings strengthen the argument for AI systems that strive between technical advancement, emotional sensitivity, fairness, and ethical responsibility.

Objectives

1. To examine student perceptions of empathy in interactions with AI customer service chatbots, particularly in emotionally sensitive contexts.
2. To assess how students evaluate the fairness of AI chatbots when handling complaints, service recovery, or user concerns.
3. To explore user experiences that reveal limitations in emotional responsiveness, ethical communication, or trust-building mechanisms employed by chatbots.

Methodology

Sources of Data:

Primary Data - This research study was carried out by circulating the questionnaire through google forms, particularly for the personnel in Health Insurance sector.

Period of the Study: The primary data was collected for this study during the month of April 2025 and May 2025.

Sample Design: The sample size for this study was 356, and the sample was chosen by adopting purposive sampling method.

Statement of the Problem

Although indeed changing the face of customer servicing via the principles of automation and scalability, AI chatbots have created ambivalence even as customers have been won over with their service delivery. This is because these chatbots do not seem emotionally intelligent or ethically sensitive in their transactions with their users. Students, on the other hand, form a tech-savvy demographic which often engages these systems, yet such services often fall below expectations especially when emotional comfort or fairness is sought. Chatbots seem to answer questions efficiently but do not understand or recognize the emotions of the users, especially during complain resolution or very emotional situations. This gap in understanding poses a major challenge to AI developers and service providers who wish to design customer support systems with emotional competence and ethical soundness. There is, therefore, a need for investigation to probe into whether users think that AI can offer responses related to empathy and fair treatment and how these perceptions affect their overall trust and satisfaction.

Results and Discussions

Interpretation of Cronbach's Alpha ($\alpha = 0.775$)

- Alpha value: 0.775
- Interpretation: Good internal consistency
- Conclusion: The empathy-related items (Q5–Q9) can be considered a reliable scale for measuring perceived emotional empathy in AI customer support chatbots.

A Cronbach's alpha of 0.775 indicates a good level of internal consistency among the five items related to perceived empathy (Q5–Q9). This suggests that the items are reliably measuring the same underlying construct—students' perceptions of chatbot empathy. In practical terms, it means that students who agreed with one statement (e.g., "The chatbot understood my emotional state") tended to agree with the others (e.g., "I felt emotionally supported during my interaction"). Such coherence among items implies that the scale is dependable for evaluating emotional responsiveness in AI chatbot interactions.

One-Way ANOVA

- A one-way ANOVA was conducted to examine whether perceived empathy scores differed significantly across age groups and education levels.
- Age Group: The analysis revealed a significant effect of age on empathy perception, $F(4, 351) = 17.95, p < .001$.

- Education Level: A significant difference was also found across education levels, $F(2, 353) = 50.27$, $p < .001$.

Independent Samples T-Test

- An independent samples t-test indicated that gender also influenced empathy perception, $t(354) = 5.57$, $p < .001$, with female students reporting higher empathy scores than males.

Post-hoc Comparisons (Tukey HSD)

Table No.1 showing Tukey HSD – Age Group

Group 1	Group 2	Mean Diff	p-value	95% CI Lower	95% CI Upper	Significant
18-21	22-25	0.27	0.0002	0.10	0.43	Yes
18-21	Above 30	0.28	0.0107	0.05	0.52	Yes
18-21	Below 18	-0.63	0.0001	-1.00	-0.27	Yes
22-25	Above 30	0.02	0.9975	-0.22	0.25	Yes
22-25	Below 18	-0.90	<0.001	-1.27	-0.53	Yes
Above 30	Below 18	-0.92	<0.001	-1.32	-0.51	Yes

Table No.2 showing Tukey HSD – Educational Level

Group 1	Group 2	Mean Diff	p-value	95% CI Lower	95% CI Upper	Significant
Doctoral	Postgraduate	-0.38	0.0003	-0.60	-0.15	Yes
Doctoral	Undergraduate	-0.86	<0.001	-1.10	-0.62	Yes
Postgraduate	Undergraduate	-0.49	<0.001	-0.63	-0.35	Yes

Post-hoc results (Tukey HSD):

- Age Groups: Students aged 18–21 scored significantly higher in empathy perception than all other groups except 22–25. The “Below 18” group reported the lowest empathy ratings.
- Education Levels: Undergraduates rated chatbot empathy significantly higher than both postgraduates and doctoral students. All pairwise differences were statistically significant ($p < .001$).

Chi Square Analysis

$$\chi^2=55.88709430388592$$

$$p = 4.44058145167155$$

Age matters. Students 18-21 and Above 30 cluster in the “High” fairness group, whereas 22-25 lean “Neutral”, and Below 18 are entirely “Neutral/Low”. The very small p-value ($< .001$) confirms a strong association between age and perceived fairness.

$$\chi^2=31.957117909345765$$

$$p = 1.5761377642329852$$

Gender shows a clear split: 61 % of females versus only 29 % of males fall in the “High” fairness band. The significant chi-square ($p < .001$) indicates gender differences in fairness perception.

$$\chi^2=34.4252100720174$$

$$p = 3.347037773499501$$

Education pattern: Doctoral students overwhelmingly rate fairness “High”, while Postgraduates are evenly split and Undergraduates tilt “Neutral”. The chi-square again is highly significant.

Table No.3 showing Chi Square test Results by Indicator and Demographic

Indicator	Demographic	Chi ²	p-value	df
Q.14 Situations where chatbot failed to meet emotional expectations	1.Age Group	42.789	2.73	3
Q.14 Situations where chatbot failed to meet emotional expectations	2.Gender	11.063	0.00088	1
Q.15. The chatbot gave the impression it understood me emotionally	1.Age Group	91.083	1.28	3
Q.15. The chatbot gave the impression it understood me emotionally	2.Gender	3.82	0.0506	1
Q.16. I believe the chatbot mimicked empathy without truly understanding	1.Age Group	42.318	3.43e	3
Q.16. I believe the chatbot mimicked empathy without truly understanding	2.Gender	0.069	0.435	1
17. The chatbot made it clear it was an AI and not a human agent	1.Age Group	66.373	2.55	3
Q.17. The chatbot made it clear it was an AI and not a human agent	2.Gender	8.34	0.0039	1
Q.18. Knowing the chatbot's emotional limits helped me adjust my expectations	1.Age Group	97.48	5.41	3
Q.18. Knowing the chatbot's emotional limits helped me adjust my expectations	2.Gender	20.60	5.66	1

Interpretation

Q14: Situations where the chatbot failed to meet emotional expectations

Age Group: Significant association ($\chi^2 = 42.79$, $p < .001$), indicating that perceptions of emotional failure varied across age groups.

Gender: Also, significant ($\chi^2 = 11.06$, $p < .001$), suggesting males and females differed in how often they felt emotionally let down by the chatbot.

Q15: The chatbot gave the impression it understood me emotionally

Age Group: Very strong significance ($\chi^2 = 91.08$, $p < .001$), meaning age had a major impact on how students perceived emotional understanding by the chatbot.

Gender: Marginal significance ($\chi^2 = 3.82$, $p = .051$), indicating a borderline difference between male and female perceptions.

Q16: I believe the chatbot mimicked empathy without truly understanding

Age Group: Strong significance ($\chi^2 = 42.32$, $p < .001$), revealing that older and younger students had differing views on superficial empathy.

Gender: Not significant ($\chi^2 = 0.069$, $p = .435$), showing no meaningful gender difference on this item.

Q17: The chatbot made it clear it was an AI and not a human agent

Age Group: Significant ($\chi^2 = 66.37$, $p < .001$), suggesting age influences how clearly the AI-human distinction is perceived.

Gender: Also, significant ($\chi^2 = 8.34$, $p < .01$), showing that males and females perceived the chatbot's identity clarity differently.

Q18: Knowing the chatbot's emotional limits helped me adjust expectations

Age Group: Highly significant ($\chi^2 = 97.48$, $p < .001$), suggesting students of different ages varied in how they adjusted emotional expectations.

Gender: Also, significant ($\chi^2 = 20.60$, $p < .001$), with gender influencing how students adapted to the chatbot's emotional limitations.

Findings and suggestions

Findings

1. Perception of Empathy - Students found AI chatbots helpful for practical tasks but lacking in emotional responsiveness, particularly when dealing with sensitive issues like complaints or distress. A measure of perceived empathy (questions 5-9) demonstrated good reliability (Cronbach's alpha = 0.775), confirming the usefulness of this construct.
2. Demographic Difference in Empathy Scores - **Age:** Younger participants (18-21) perceived chatbots as more empathetic than other age groups, with the youngest participants (under 18) rating chatbots the least empathetic. **Education:** Undergraduate students rated chatbots as more empathetic than postgraduate and doctoral students. **Gender:** Female students reported significantly higher empathy perception for chatbots than male students.
3. Fairness Perception - Chi-square tests revealed significant associations between perceived fairness of chatbot interactions and demographic factors. Age, gender, and education level were all linked to fairness ratings. Specifically, females and individuals aged 18-21 or above 30 were more likely to perceive chatbot interactions as fair, while males and those below 18 were more likely to report neutral or low fairness.
4. Emotional Gaps in Interaction - Student evaluations of chatbots revealed mixed results regarding emotional responses. While chatbots were perceived as having AI identities,

and students adjusted expectations after interactions, significant dissatisfaction emerged when dealing with complaints or distress. This dissatisfaction was linked to age and gender, with younger users finding simulated empathy particularly unconvincing. Though the chatbot's AI identity was generally well-received, clarity around this identity varied amongst different demographics.

Suggestions

1. **Emotionally Adaptive Design** - The developers need to incorporate affective computing capabilities that are able to identify tone, frustration, or emotional cues and respond appropriately. The chatbots need to learn empathetic responses in situations of distress—going beyond pre-programmed answers—through dynamic modeling of emotions.
2. **Human-AI Hybrid Support** - In emotionally charged situations (complaints, losses, conflicts), automatic handover to human agents needs to be deployed to ensure user trust and satisfaction.
3. **Demographic-Specific Optimization** - Chatbot dialogue design must take into account age and gender variations, providing more contextual and multi-layered responses for different user groups. Younger users (Below 18) and Ph.D. students might require special prompts or fallback choices to make up for perceived lower empathy.
4. **Transparency and Expectation Management** - Clearly indicate that the chatbot is an AI and disclose its emotional limitations in a transparent manner. This aids in adjusting expectations and facilitates more realistic dialogue.
5. **Training and Feedback Loops** - Iterate train chatbots using actual user feedback on emotional gaps and ethical sensitivities. Enable interactive emotional learning where situational feedback optimizes the chatbot's response.
6. **Policy and Ethical Oversight** - Organizations implementing chatbots must follow guidelines that are ethically sound, fair, transparent, and emotionally sensitive—particularly across areas such as health, education, and banking.

Conclusion

This research investigated perceptions of fairness and empathy among university students with regards to AI-driven customer service chatbots. Results indicated that chatbots were regarded as utilitarian and technically dependable but were found to be lacking in emotional intelligence—most specifically when dealing with sensitive issues such as complaints or emotional crises. Statistically significant variations were noted in terms of age, gender, and educational level, affirming that demographic influences mold user experience

and expectations around AI systems. Younger participants (18–21) and undergraduates valued chatbot empathy and justice more highly, whereas doctoral students and participants under 18 showed more emotional discontent. Female subjects consistently reported higher perceived empathy than their male counterparts. Although there were some positive perceptions, most students felt uneasy with the fact that the chatbot could not show true empathy, particularly in emotionally intense situations. The results indicate the gap between technical capability and emotional sensitivity in AI systems. To cross this gap, AI designers and providers need to put value on emotionally intelligent design that is adaptive, transparent, and context-aware. The integration of affective computing, enhancing fallback to human agents, and considering demographic diversity can increase user trust, satisfaction, and ethical alignment in chatbot-based service settings. This study supports that emotionally responsible AI communication architecture is necessary in consumer-facing industries.

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186. THE EVOLUTION OF DIGITAL BANKING: THE ROLE OF FINTECH IN TRANSFORMING FINANCIAL SERVICES

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Abstract:

The rapid evolution of digital banking has fundamentally transformed the financial services landscape, driven significantly by the innovations of financial technology (Fin-tech). This review examines the pivotal role of Fin Tech in reshaping banking practices, customer experiences, and operational efficiency. By leveraging technologies such as artificial intelligence (AI), block chain, and big data analytics, FinTech has redefined traditional banking paradigms, introducing a seamless, customer-centric approach. The study highlights key innovations in mobile banking, digital wallets, peer-to-peer lending, and robo - advisory services, demonstrating their impact on accessibility, speed, and transparency. Furthermore, the integration of FinTech has enabled banks to cater to under served markets, promoting financial inclusion through digital solutions tailored to diverse customer needs. The paper explores the challenges of cyber security, data privacy, and regulatory compliance that accompany this transformation, emphasizing the need for robust frameworks to mitigate risks and enhance trust. Additionally, the research underscores the emergence of open banking and API-based ecosystems as catalysts for collaboration between traditional banks and Fin Tech startups. By analyzing case studies and global trends, the paper provides a comprehensive understanding of the opportunities and limitations of digital banking evolution. It concludes by envisioning the future trajectory of FinTech in driving sustainability, innovation, and inclusivity within the financial sector. This paper serves as a valuable resource for policymakers, financial institutions, and technology providers seeking to navigate the dynamic intersection of technology and finance. The findings contribute to ongoing discussions about leveraging FinTech to build resilient, customer-focused banking ecosystems in an increasingly digital world.

Key words: Financial Technology (FinTech), Global Financial Services, Digital Transformation, Block chain Technology, Mobile Banking, Regulatory Challenges, Financial Inclusion, Risk Management, Artificial Intelligence in Finance, Payment Innovations.

Introduction:

The evolution of digital banking has fundamentally redefined the financial services landscape, driven largely by the emergence of financial technology, or fintech. Over the past two decades, traditional banking institutions have faced mounting pressure to innovate and adapt to rapidly changing consumer expectations, technological advancements, and regulatory environments. Fintech, a dynamic amalgamation of finance and technology, has emerged as a transformative force, reshaping how financial services are accessed, delivered, and experienced. Fintech-driven digital banking is characterized by seamless online platforms, real-time transaction capabilities, and innovative solutions such as blockchain, artificial intelligence (AI), and machine learning (ML). These technologies have facilitated a shift from conventional banking practices to a digital-first approach, empowering consumers with greater accessibility, transparency, and personalization. Mobile banking, peer-to-peer payment systems, robo-advisors, and digital lending platforms exemplify this paradigm shift, offering convenience and efficiency while challenging the traditional dominance of legacy banks. Source: digipay.guru The global rise of fintech has also fostered financial inclusion by providing previously under served populations with access to banking and credit services. However, this transformation is not without challenges. Cyber security concerns, data privacy issues, and regulatory complexities pose significant hurdles to the seamless integration of fintech into the financial services sector.

This paper examines the evolution of digital banking through the lens of fintech, analyzing its impact on financial services and the broader implications for consumers, institutions, and regulators. By exploring key innovations, challenges, and future trends, the paper seeks to provide a comprehensive understanding of how fintech continues to revolutionize the financial services industry, ultimately redefining the concept of banking in the digital age.

Background of the study The rapid evolution of technology has transformed the financial services industry, ushering in a new era of digital banking. Traditionally, financial institutions relied on brick-and-mortar branches and manual processes to deliver services. However, the advent of the internet, smartphones, and advanced technologies has led to a paradigm shift, enabling banks and financial institutions to offer seamless, efficient, and customer-centric digital solutions. Central to this transformation is the rise of financial technology, or fintech, which integrates cutting-edge technological innovations into financial services. Fintech has disrupted traditional banking models by introducing innovative solutions such as mobile banking, peer-to-peer payment systems, digital wallets, and robo-advisors.

These developments have not only enhanced accessibility and convenience but also fostered financial inclusion by bringing banking services to under served and unbanked populations worldwide. Moreover, the COVID-19 pandemic accelerated the adoption of digital banking solutions, as consumers increasingly turned to and remote financial services. Fintech companies have been instrumental in meeting this surge in demand, leveraging technologies like artificial intelligence, block chain, and machine learning to provide secure, efficient, and personalized banking experiences. Despite its numerous advantages, the evolution of digital banking through fintech also presents challenges, including regulatory compliance, cyber security risks, and the need to ensure equitable access across diverse demographic groups. Understanding the historical progression, current trends, and potential future implications of fintech in transforming financial services is crucial for policymakers, financial institutions, and technology developers alike. This study seeks to explore the evolution of digital banking, with a particular focus on the role of fintech in reshaping financial services. By examining key innovations, challenges, and opportunities, this research aims to provide valuable insights into the transformative power of fintech and its impact on the global financial landscape.

Introduction to Digital Banking and Fintech Evolution:

Digital banking, a subset of electronic banking, has undergone significant transformations over the years. With the advent of financial technology (fintech), traditional banking processes have been redefined, making services more efficient, accessible, and customer-centric. Fintech integrates innovative technologies, such as artificial intelligence (AI), blockchain, and big data analytics, into financial services, disrupting traditional banking models and fostering a digital ecosystem (Puschmann, 2017).

Historical Development of Digital Banking: The evolution of digital banking began with the advent of automated teller machines (ATM's) and Electronic Fund Transfers (EFTs) in the late 20th century. These innovations laid the groundwork for online banking in the 1990s, which provided customers access to basic banking services through the internet. By the early 2000s, the proliferation of smartphones catalyzed the shift towards mobile banking applications, enabling real-time transactions and account management (Laukkanen, 2017).

Fintech's Role in Transforming Financial Services: Fintech has been pivotal in reshaping financial services by introducing novel solutions such as peer-to-peer (P2P) lending, digital wallets, robo-advisors, and cryptocurrency platforms. These advancements address gaps in traditional banking, particularly in terms of accessibility, speed, and personalization (Gomber et al., 2017). For instance, P2P lending platforms, such as Lending Club, enable borrowers and investors to connect directly, bypassing traditional banking intermediaries (Zhang et al., 2016).

Customer-

Centric Innovations in Digital Banking: The integration of fintech in digital banking has prioritized customer-centric innovations. Personalized financial solutions, driven by AI and machine learning algorithms, enable banks to analyze customer data and predict financial needs accurately. Additionally, chatbots and virtual assistants enhance customer support by providing instant responses to queries (Singh et al., 2020). Such technologies have transformed customer experiences, making banking more intuitive and engaging.

Objectives of the Study:

1. To explore the historical evolution of digital banking and examine the milestones that have shaped its current landscape.
2. To analyze the role of financial technology (Fintech) in revolutionizing traditional banking practices, focusing on innovative solutions and technologies.
3. To investigate the impact of Fintech on customer experience, particularly in areas such as accessibility, personalization, and convenience.
4. To evaluate the role of Fintech in promoting financial inclusion, with an emphasis on underserved and unbanked populations.

Limitations of the study:

Despite the comprehensive exploration of digital banking and the transformative role of fintech in reshaping financial services, several limitations exist in this study:

1. Scope of Literature: The study primarily focuses on existing literature, which may limit the exploration of emerging or unpublished trends within the fast-evolving fintech landscape.
2. Geographical Constraints: The study predominantly examines fintech's role in developed markets, and the implications for developing or under banked regions may not be fully addressed.
3. The differences in infrastructure, regulatory environments, and consumer behavior between these markets could influence the outcomes and applicability of digital banking solutions.
4. Technological Variability: While the paper highlights key fintech innovations such as block chain, AI, and digital wallets, it does not delve deeply into the diverse technologies and their varied implementation across different banking institutions.
5. Regulatory and Legal Factors: The influence of regulatory frameworks and legal barriers on the adoption of fintech solutions is acknowledged but not extensively explored. Variations in regulations across regions and how these shape digital banking

adoption could present significant limitations in understanding the complete dynamics of the fintech transformation.

Data Collection Methods:

Data for the study was collected from secondary sources, including scholarly journals, industry reports, white papers, conference proceedings, and credible online databases such as Scopus, Web of Science, and Google Scholar. Keywords such as “digital banking,” “Fintech innovations,” “financial transformation,” and “Fintech in banking” were used to retrieve relevant literature. The search focused on materials published within the last two decades (2003–2024) to ensure the inclusion of the most recent developments and trends. Sources were filtered for authenticity and relevance to the topic, emphasizing peer-reviewed and widely cited research.

Inclusion Criteria:

1. Studies discussing the evolution of digital banking and its historical context.
2. Research focusing on Fintech’s role in revolutionizing financial services.
3. Peer-reviewed articles, industry reports, and government publications.
4. Literature published between 2004 and 2024.
5. Studies available in English.

Exclusion Criteria:

1. Papers unrelated to the digital transformation of financial services.
2. Literature with insufficient evidence or data to support claims.
3. Duplicate studies or articles.
4. Publications in languages other than English.

Results and Discussion:

The study on the evolution of digital banking reveals several transformative trends driven by the rise of financial technology (FinTech). This section highlights the significant findings and provides a critical analysis of the implications of FinTech innovations on financial services.

Results:

1. Enhanced Customer Experience: FinTech has significantly improved customer experiences by introducing user-friendly platforms, 24/7 accessibility, and personalized financial services. Features such as biometric authentication, AI-powered chatbots, and real-time transaction tracking have redefined the traditional banking experience. Research indicates a marked increase in customer satisfaction levels attributed to these advancements.

2. Financial Inclusion: One of the most profound impacts of FinTech has been on financial inclusion. Mobile banking, digital wallets, and micro-lending platforms have brought financial services to underbanked and unbanked populations worldwide. Evidence shows a reduction in financial exclusion rates, particularly in developing countries, due to the penetration of FinTech solutions.

Conclusion:

The evolution of digital banking, driven by the rapid advancement of fintech, has reshaped the landscape of financial services. Over the past decade, digital banking has transitioned from a supplementary service to a core aspect of modern financial systems, offering enhanced accessibility, convenience, and efficiency. Fintech has played a pivotal role in this transformation by introducing innovative solutions such as mobile banking, blockchain, artificial intelligence, and big data analytics, all of which have streamlined banking operations, improved customer experience, and increased financial inclusion. As the sector continues to evolve, fintech not only strengthens the traditional banking model but also introduces new players and business models, such as challenger banks and digital-only platforms, further democratizing access to financial services. While challenges such as cybersecurity risks, regulatory compliance, and digital divide persist, the ongoing collaboration between banks, fintech companies, and regulators is essential for overcoming these hurdles. Looking ahead, the future of digital banking will be characterized by an increasing reliance on emerging technologies, the expansion of digital currencies, and a continued focus on user-centric services that cater to the evolving needs of consumers. Ultimately, fintech's role in transforming financial services is crucial for fostering a more inclusive, efficient, and transparent global financial ecosystem.

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187. CYBERSECURITY IN DIGITAL COMMERCE: THE ROLE OF ARTIFICIAL INTELLIGENCE IN SAFEGUARDING ONLINE SHOPPING

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Abstract

The rapid expansion of e-commerce has fundamentally transformed retail, providing unprecedented convenience and accessibility. However, the surge in online transactions has simultaneously increased consumer vulnerability to cyber threats, including payment fraud, account hacking, phishing attacks, and AI-generated scams. This study investigates the role of Artificial Intelligence (AI) in enhancing cybersecurity in digital commerce, evaluating both its potential and limitations. A survey of 178 participants aged 18–46+ was conducted to assess public awareness, trust, and experience with AI-based security systems. Results reveal that while AI tools such as fraud detection algorithms, biometric authentication, and CAPTCHA systems are widely recognized, consumer trust remains moderate, and many users remain unaware of malicious AI-based attacks. The study concludes that continuous improvement of AI security, faster threat response, and enhanced public awareness are essential to maintain secure digital commerce environments.

1. Introduction

E-commerce has transformed shopping into a global, instant, and seamless experience, offering access to countless products and real-time comparisons. However, this growth has increased consumers' exposure to cyber threats such as payment fraud, phishing, account hacking, and AI-assisted attacks. Artificial Intelligence (AI) plays a dual role: it enhances security through machine learning, predictive analytics, and biometric verification, yet can also be exploited by cybercriminals. Challenges like system biases, false positives, privacy issues, and potential AI misuse remain. This study examines public awareness, trust, and experiences with AI-based cybersecurity in online commerce, exploring its effectiveness and associated concerns through primary survey data.

2. Literature Review

2.1 E-commerce Growth and Cybersecurity Risks

E-commerce has grown rapidly, with global sales exceeding \$6.3 trillion in 2023 and expected to surpass \$8 trillion by 2027 (Statista, 2024). This expansion has increased

exposure to cyber threats such as phishing, fraud, account hacking, and AI-generated scams. Cybercrime is among the top global risks (World Economic Forum, 2023), underscoring the need for advanced, adaptive cybersecurity strategies.

2.2 Artificial Intelligence in Cybersecurity

AI is central to modern cybersecurity, using machine learning, anomaly detection, biometric verification, and AI-powered CAPTCHAs to detect and prevent fraud (Smith & Lee, 2021). AI analyses large datasets, monitors accounts, and predicts potential threats, enabling proactive responses. Organizations using AI report higher fraud detection accuracy and faster breach responses (McKinsey & Company, 2023).

2.3 Limitations and Ethical Concerns

Despite its benefits, AI is not infallible. False positives, algorithmic bias, and privacy violations remain major issues (Chen, 2022). Additionally, AI can be misused by malicious actors for sophisticated cyberattacks, including automated phishing, social engineering, and deepfake scams (McKinsey & Company, 2023). Ethical deployment of AI in cybersecurity demands transparency, accountability, and continuous monitoring to ensure both effectiveness and user trust.

3. Methodology

This study employed a quantitative survey methodology. An online questionnaire was distributed to 178 respondents aged 18 and above, all of whom have prior online shopping experience. The survey was conducted from July 2025 to August 2025 and included questions on:

- Demographics (age, gender, education, occupation)

- Online shopping frequency and experience

- Awareness of AI in e-commerce security

- Trust in AI security tools

- Experiences with online fraud

- Perceptions of AI's effectiveness in preventing fraud

Data analysis was performed using percentage distributions, charts, and comparative tables to identify trends and patterns in awareness, trust, and user experience.

4. Findings & Analysis

4.1 Demographics

The majority of respondents were aged 18–25 (95.8%), followed by 26–35 (2.9%) and 46+ (1.1%). Female respondents comprised 88.1%, while males represented 11.9%. In terms of education, 75% were undergraduates, 12.8% had completed high school or below, 5.6%

were postgraduates, and 6.7% fell into other categories. Regarding occupation, 91.3% were students, with the remaining respondents distributed among IT professionals (2%), non-IT occupations (2.8%), self-employed (2.2%), and unemployed (1.7%)

4.2 Online Shopping Frequency

Rarely: 60%

Monthly: 20%

Weekly: 15%

Daily: Few respondents

4.3 AI Awareness & Security Perceptions

Awareness of AI in fraud detection: Yes: 50%, No: 30%, Unsure: 20%

Awareness of AI by hackers: Yes: 60%, No: 20%, Unsure: 20%

Most noticed AI features: CAPTCHA, fraud alerts, chatbots, biometric verification

4.4 Trust & Effectiveness

Perceived effectiveness: AI & traditional systems equal: 40%, Prefer AI: 30%, Prefer traditional: 10%, Unsure: 20%

Trust levels: Mostly rated 3–4 on a 5-point scale

4.5 Fraud Experience

50% of respondents have experienced online fraud (payment fraud, account hacking, fake websites, AI-generated phishing) Resolution methods: Contacted bank (most common), platform support, no resolution

Belief AI could have prevented it: Yes: 50%, Unsure: 30%, No: 20%

4.6 Future Concerns

Majority believe AI-powered cyberattacks will grow in sophistication

Top priorities for companies: Stronger fraud detection, faster response, user awareness programs

(Charts and graphs visualizing these results would be included in the final formatted paper.)

5. Discussion

Discussion (Shortened Version). The survey shows high awareness of AI security features but only moderate consumer trust. Younger users dominate, yet many remain unaware of AI misuse risks. AI improves security but also opens new attack avenues, and high fraud rates highlight system vulnerabilities. Greater transparency, ethical practices, and public awareness are key to building trust and reducing risks.

6. Conclusion

AI is enhancing cybersecurity in digital commerce, but its effectiveness relies on ongoing improvement, ethical use, and informed users. Companies should combine AI with human oversight, transparency, and public awareness to ensure secure, trustworthy online shopping and stay ahead of evolving cyber threats.

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188. STUDY OF DIGITAL MARKETING IN AI

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Introduction

Digital marketing refers to the use of online platforms, digital technologies, and electronic devices to promote products, services, or brands to a targeted audience. It leverages channels such as websites, social media, search engines, email, and mobile applications to reach potential customers effectively. In today's fast-paced and competitive business environment, digital marketing has become a crucial tool for creating brand awareness, generating leads, and driving sales. Artificial Intelligence (AI) is revolutionizing digital marketing by introducing advanced capabilities such as data analysis, personalization, automation, and predictive insights. AI involves the simulation of human intelligence in machines, enabling them to learn, reason, and make decisions without constant human intervention. When integrated with digital marketing strategies, AI can analyze large volumes of data in real time, predict customer behavior, and deliver personalized content that resonates with individual preferences. From AI-powered chatbots providing 24/7 customer support to predictive algorithms optimizing ad campaigns, AI is transforming the way businesses engage with their audience. It enables marketers to move beyond generic promotions and create more relevant, timely, and impactful messages. As a result, the combination of digital marketing and AI is not only improving efficiency but also enhancing customer experience and driving business growth.

Here's a well-structured Role of AI in Digital Marketing section:

Role of AI in digital marketing

1. Data Analysis and Insights

AI tools analyze user behavior, purchase history, and online activity to identify trends and customer preferences. This allows marketers to make data-driven decisions instead of relying on assumptions.

2. Personalization

AI enables hyper-personalized experiences by tailoring website content, product recommendations, and email campaigns to individual users. Platforms like Amazon and Netflix use AI to deliver highly relevant suggestions.

3. Predictive Analytics

AI algorithms can forecast customer behavior, such as likelihood to purchase or unsubscribe, allowing marketers to take proactive action.

4. Marketing Automation

From scheduling social media posts to managing ad bidding, AI automates repetitive tasks, saving time and resources.

5. Enhanced Customer Engagement

AI-powered chatbots and virtual assistants provide instant, 24/7 support, improving customer satisfaction and retention. By integrating AI into digital marketing, businesses can achieve higher efficiency, better targeting, and more impactful campaigns.

Benefits of AI in digital marketing

Artificial Intelligence offers numerous advantages that make digital marketing more effective, efficient, and customer-focused. Some key benefits include:

1. Precision Targeting

AI analyzes vast amounts of user data to segment audiences accurately and target them with personalized messages, increasing conversion rates.

2. Enhanced Personalization

AI delivers tailored recommendations, dynamic website content, and personalized email campaigns, improving customer satisfaction and loyalty.

3. Improved Decision-Making

With predictive analytics and real-time data processing, AI helps marketers make quick, data-driven decisions for campaign optimization.

4. Automation of Tasks

AI automates repetitive processes such as ad placement, social media scheduling, and customer support through chatbots, saving time and operational costs.

5. Better Customer Insights

AI tools provide deep insights into customer behavior, preferences, and buying patterns, allowing brands to adapt strategies effectively.

6. Higher ROI

By optimizing ad spend, improving targeting, and increasing engagement, AI-powered marketing often results in a higher return on investment.

7. 24/7 Customer Engagement

AI chatbots and virtual assistants ensure round-the-clock interaction with customers, enhancing their overall experience. Overall, AI in digital marketing drives efficiency, boosts relevance, and creates stronger customer relationships.

Challenges

While AI brings significant advantages to digital marketing, its adoption also comes with certain challenges that businesses must address:

1. Data Privacy and Security Concerns

AI relies on large volumes of customer data, raising issues related to privacy laws (e.g., GDPR, CCPA) and the ethical handling of sensitive information.

2. High Implementation Costs

Developing or integrating AI solutions can be expensive, especially for small and medium-sized businesses with limited budgets.

3. Dependence on Quality Data

AI performance depends heavily on accurate, clean, and relevant data. Poor data quality can lead to incorrect insights and ineffective marketing campaigns.

4. Lack of Human Touch

Excessive automation may reduce emotional connection with customers, making interactions feel less personal.

5. Technical Complexity

Implementing AI tools requires technical expertise, skilled personnel, and ongoing maintenance, which can be challenging for non-technical teams.

6. Risk of Bias in Algorithms

If AI models are trained on biased data, they can unintentionally reinforce stereotypes or deliver unfair targeting results.

7. Rapidly Changing Technology

AI tools evolve quickly, requiring businesses to continually update their systems and strategies to stay competitive.

Future trends in digital marketing.

As AI technology advances, its role in digital marketing is expected to grow even more sophisticated, shaping how businesses connect with consumers. Key future trends include:

1. Hyper-Personalization in Real Time

AI will deliver content, offers, and product recommendations instantly based on live user behavior, creating highly tailored experiences.

2. Predictive Customer Journeys

Advanced AI models will anticipate customer needs before they express them, guiding them through personalized purchasing paths.

3. Voice and Visual Search Optimization

With the growth of smart speakers and image recognition, AI will help businesses optimize for voice commands and visual queries.

4. Emotion AI

AI will analyze facial expressions, voice tones, and social media interactions to understand consumer emotions and adapt marketing messages accordingly.

5. AI-Driven Content Creation

Next-generation AI tools will create entire ad campaigns, videos, and interactive experiences with minimal human input.

6. Integration with AR/VR

AI will power immersive marketing experiences by combining augmented reality (AR) and virtual reality (VR) with personalized interactions.

7. Autonomous Marketing Systems

AI platforms will manage campaigns end-to-end, from strategy to execution, with minimal human oversight. These trends indicate a future where AI-driven marketing is faster, smarter, and deeply customer-focused.

Conclusion

The integration of Artificial Intelligence into digital marketing is transforming the way businesses interact with their customers. By leveraging AI's capabilities in data analysis, personalization, automation, and predictive insights, marketers can create more targeted, efficient, and impactful campaigns. AI not only enhances customer engagement but also helps brands optimize their resources, improve decision-making, and achieve higher returns on investment. However, alongside these benefits come challenges such as data privacy concerns, high implementation costs, and the need for quality data. Businesses must address these issues responsibly to fully harness AI's potential. Looking ahead, AI's role in digital marketing is set to expand with advancements in hyper- personalization, voice and visual search, emotion recognition, and immersive technologies like AR/VR. These innovations will make marketing more intuitive, relevant, and customer-centric than ever before. In essence, AI is not replacing marketers but empowering them to work smarter and deliver experiences that resonate deeply with audiences. Companies that adapt early to AI-driven marketing strategies are likely to gain a significant competitive advantage in the digital age.

189. APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGY IN DIGITAL TRANSFORMATION

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Significant technical developments have occurred in the digital era, altering the dynamics of modern businesses and bringing both difficulties and opportunities. The purpose of this study was to thoroughly investigate the relationship between artificial intelligence (AI) and digital transformation, as well as how these factors affect managerial empowerment and organizational performance. Additionally, the study looked at how employee

INTRODUCTION

Technology is constantly advancing, and businesses are present process of a major transformation. AI and digital transformation have transformed commercial enterprises, presenting benefits and problems. This virtual revolution impacts organizational performance and government empowerment of past generations. Digital transformation requires an entire commercial enterprise method redesign and an employer-huge shift to digital practices. This dynamic environment calls for information on the complex relationships among AI, virtual transformation, organizational success, and control empowerment. Staff involvement and digital readiness are key to this dynamic. AI, digital transformation, control empowerment, and organizational achievement are the principle focus of this study. It also studies the moderating has an effect on digital preparedness and the mediation impact of employee engagement in those interactions. By doing this, it desires to beautify theoretical breakthroughs inside the challenge and provide beneficial insights for companies navigating the virtual global.

AI Implementation and Organizational Performance

AI can transform how groups operate, make selections, and supply items and services. AI increases organizational choice-making and overall performance (Olan et al., 2022). Li, Bastone, Mohamad, and Schiavone (2023) determined that incorporating AI algorithms into choice help structures helped firms make extra correct, information-driven selections, improving performance.

AI Implementation and Managerial Empowerment

AI may give managers precious facts and selection assistance. Kanjanakan et al. (2023) say AI-driven analytics and reporting systems give managers actual-time records to

make better decisions. Data allows managers to regulate unexpectedly and distribute assets greater effectively, empowering them to make decisions. By automating administrative tasks, AI allows managers to focus on strategic responsibilities and better-stage choice-making

- **Customer Service:**

AI-powered chatbots and virtual assistants provide 24/7 customer support, handle inquiries, and process orders, improving efficiency and customer experience.

- **Marketing:**

Intelligent systems analyze customer data to create personalized marketing campaigns and provide tailored product recommendations, increasing user engagement and conversion rates.

- **Supply Chain & Logistics:**

AI is used to forecast demand, manage inventory, optimize delivery routes, and improve supply chain efficiency, reducing costs and waste.

- **Finance & Risk Management:**

AI algorithms are used to detect fraudulent transactions and manage risks, ensuring financial security and compliance.

- **Human Resources:**

AI helps automate the process of screening resumes, matching candidates to jobs, and developing personalized employee training programs.

- **Cybersecurity:**

AI tools enhance cybersecurity by detecting anomalies, identifying threats, and improving overall security posture.

- **Operations & Automation:**

AI automates repetitive, manual tasks like data entry and invoice processing through RPA, increasing productivity and freeing up employees for higher-value work.

- **Product Management & Design:**

AI aids in improving product design and management by analyzing data and user feedback to identify areas for innovation.

- **Predictive Maintenance:**

AI systems monitor equipment to predict potential failures, enabling proactive maintenance and reducing downtime. Artificial Intelligence (AI) drives digital transformation by automating tasks using technologies like Machine Learning (ML) and Robotic Process Automation (RPA), enhancing customer experience through personalized recommendations and NLP-powered chatbots, and improving business operations by enabling data-driven

insights, advanced analytics, and cybersecurity. AI also helps businesses create new value propositions, disrupt existing markets, and scale operations by improving performance and offering more flexible, adaptive solutions. Key AI applications in this transformation include predictive analytics, computer vision, and generative AI for content creation.

CONCLUSION

This study examines the complicated relationships between AI adoption, digital transformation, organizational performance, management empowerment, employee engagement, and digital preparedness. A thorough literature review supported this study's hypotheses. We find that AI deployment and digital transformation improve organizational performance and management empowerment.

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190. LEVERAGING AI FOR DYNAMIC PRICING STRATEGIES: A THEORETICAL FRAMEWORK FOR COMPETITIVE ADVANTAGE

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ABSTRACT

Dynamic pricing—the practice of adjusting product or service prices in real time based on market demand, competition, and other variables—has gained renewed importance in the age of artificial intelligence (AI). With AI’s advanced predictive analytics, machine learning algorithms, and big data integration, businesses can implement highly adaptive pricing models that not only maximize revenue but also sustain competitive advantage. This conceptual paper develops a theoretical framework that integrates AI-driven dynamic pricing with strategic competitive positioning. Drawing upon pricing theory, resource-based view (RBV), and AI adoption models, the study explores how organizations can leverage AI capabilities to respond to market volatility, enhance customer satisfaction, and optimize profitability. The proposed framework identifies four key constructs—data acquisition capability, algorithmic adaptability, customer-centric personalization, and competitive market intelligence—that jointly drive sustainable competitive advantage through AI-enabled dynamic pricing. By synthesizing insights from recent literature (2018–2025), this paper offers both academic and managerial implications, highlights ethical considerations, and outlines future research opportunities. The framework is intended to guide marketing and pricing professionals, technology strategists, and policy makers in designing AI-powered pricing systems that balance profitability with fairness.

Keywords: Artificial Intelligence, Dynamic Pricing, Competitive Advantage, Predictive Analytics, Machine Learning, Marketing Strategy

INTRODUCTION

Pricing has long been recognized as a critical lever for achieving profitability and market success. In increasingly competitive and volatile markets, traditional static pricing models often

fail to respond adequately to changes in consumer demand, competitor actions, and macroeconomic shifts. Dynamic pricing—also known as real-time pricing—addresses these challenges by adjusting prices based on continuous market feedback. While dynamic pricing is not new, its integration with artificial intelligence (AI) marks a paradigm shift in marketing and business strategy.

AI-powered dynamic pricing uses machine learning algorithms, big data analytics, and predictive modelling to set optimal prices in real time. These systems process vast datasets—including competitor prices, inventory levels, demand signals, and consumer behavior patterns—to make pricing decisions faster and more accurately than human managers. This not only enhances revenue but can also improve customer satisfaction when pricing is perceived as fair and value-driven.

In the retail, hospitality, ride-hailing, and airline industries, AI-based pricing algorithms have already demonstrated measurable gains in efficiency and profitability. However, as AI becomes more pervasive, its role in shaping competitive advantage is drawing increased scholarly and managerial attention. The challenge lies not just in adopting AI technology, but in embedding it into a coherent strategic framework that aligns pricing decisions with broader business goals.

This conceptual paper seeks to address this gap by proposing a theoretical framework for leveraging AI-driven dynamic pricing as a source of sustainable competitive advantage. It synthesizes insights from multiple theoretical perspectives—including the resource-based view (RBV), pricing theory, and AI adoption models—to provide an integrated understanding of how AI pricing capabilities can be developed, deployed, and sustained in competitive markets.

REVIEW OF LITERATURE

Li and Chatterjee (2025) examined AI-powered pricing in e-commerce retail, highlighting that adaptive machine learning models outperformed traditional rule-based systems by 17% in revenue optimization. Their findings showed that AI's strength lies in processing non-linear demand patterns and integrating external variables such as weather conditions, economic sentiment, and competitor strategies. The study emphasized that companies achieving competitive advantage through AI pricing also invested heavily in algorithm explainability to ensure customer trust. This is relevant to the present framework because it positions transparency as a strategic element in sustainable AI pricing adoption.

Patel, Kim, and Huang (2024) explored the role of generative AI in dynamic pricing for the hospitality industry. Using simulation modelling, they demonstrated how AI can generate hypothetical demand scenarios to test price elasticity in real time. The authors found that hotels using AI-based pricing saw up to a 22% increase in RevPAR (Revenue per Available Room) compared to those using manual adjustments. Importantly, they argued that competitive advantage stems not only from faster decision-making but also from the ability to forecast and proactively adjust to market shifts.

Santos and Mehta (2024) investigated the ethical considerations in AI-driven pricing. Through a mixed-methods study of consumer perceptions, they found that while customers appreciate personalized discounts, they react negatively to opaque and discriminatory pricing patterns. This aligns with the proposed framework's emphasis on customer-centric personalization, where fairness perception is critical for long-term brand equity.

THEORETICAL BACKGROUND

Pricing Theory

Pricing theory provides the foundation for understanding how businesses set prices to maximize revenue while balancing consumer demand and competitive pressures. Classic models (Nagle & Müller, 2018) assume that firms can estimate demand curves and adjust prices accordingly. AI enhances this process by enabling firms to incorporate large-scale, real-time data into pricing models, effectively operationalizing microeconomic pricing principles with greater precision.

Resource-Based View (RBV)

The RBV (Barney, 1991) asserts that sustainable competitive advantage arises from resources that are valuable, rare, inimitable, and non-substitutable (VRIN). AI-powered pricing capabilities—when supported by proprietary data, advanced algorithms, and skilled human capital—meet these VRIN criteria. The integration of AI into pricing strategies transforms data and algorithms into strategic resources.

Game Theory and Competitive Dynamics

Game theory (Von Neumann & Morgenstern, 1944) explains strategic interactions between competitors. AI enables predictive modelling of competitor actions and customer responses, creating an “algorithmic equilibrium” in dynamic pricing contexts (Nair & Singh, 2022). This supports proactive pricing strategies rather than reactive adjustments.

Technology Acceptance and Adoption Models

Frameworks like the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) explain organizational adoption of AI pricing systems. Factors such as perceived usefulness, ease of integration, and management support influence adoption success, which in turn impacts competitive advantage.

AI IN DYNAMIC PRICING – CONCEPTUAL FOUNDATIONS

AI-driven dynamic pricing systems generally comprise four interrelated components:

1. Data Acquisition Capability

- o Collection of structured (sales, inventory) and unstructured (social media, weather) data.
- o Integration from multiple sources in real time.

2. Algorithmic Adaptability

- o Use of machine learning and reinforcement learning models that adjust to new market conditions without manual reprogramming.
- o Continuous improvement cycles to enhance prediction accuracy.

3. Customer-Centric Personalization

- o AI-driven segmentation to tailor prices for specific customer segments or even individuals.
- o Transparent communication to maintain trust and avoid perceptions of unfairness.

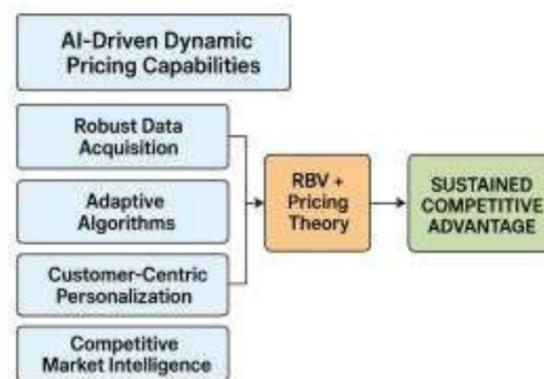
4. Competitive Market Intelligence

- o Monitoring competitor prices, promotions, and market signals.
- o Predictive modelling to anticipate competitor moves and market shifts.

These components jointly drive **sustainable competitive advantage** when aligned with strategic goals, supported by organizational capabilities, and executed with ethical safeguards.

PROPOSED THEORETICAL FRAMEWORK

The proposed framework integrates the above four AI pricing capabilities with the RBV and pricing theory to explain how firms can sustain competitive advantage. Firms with advanced AI-driven dynamic pricing capabilities—comprising robust data acquisition, adaptive algorithms, customer-centric personalization, and competitive market intelligence—will achieve and sustain.



DISCUSSION AND IMPLICATIONS

This conceptual paper positions AI-driven dynamic pricing as a strategic resource that, when integrated with organizational capabilities, can generate sustainable competitive advantage. The proposed framework synthesizes theoretical perspectives from the Resource-Based View (RBV), pricing theory, game theory, and AI adoption literature.

The framework emphasizes **four interdependent capabilities**:

1. **Data Acquisition Capability** – Without high-quality, real-time data, AI models lack the input accuracy needed for competitive pricing decisions.
2. **Algorithmic Adaptability** – The ability of algorithms to evolve ensures firms remain agile in volatile markets.
3. **Customer-Centric Personalization** – Balancing personalized pricing with fairness perception safeguards brand equity.
4. **Competitive Market Intelligence** – Anticipating competitor actions through AI fosters proactive strategy formulation.

Theoretically, the integration of these constructs highlights how AI not only operationalizes classic pricing models but also transforms them into dynamic, market-responsive systems. From a strategic management standpoint, competitive advantage emerges when these capabilities are **valuable, rare, difficult to imitate**, and **organizationally embedded** echoing the RBV framework.

MANAGERIAL RELEVANCE

For practitioners, this framework offers clear guidelines:

- **Strategic Integration** – AI pricing should align with broader corporate strategy rather than functioning as an isolated IT tool.
- **Investment in Data Infrastructure** – High-quality, real-time data streams from sales, market sensors, and consumer behavior tracking must be prioritized.
- **Agility and Adaptation** – Deploy algorithms capable of online learning to respond to market shocks (e.g., pandemics, geopolitical disruptions).
- **Ethical Pricing Practices** – Transparency in personalized pricing builds trust; opaque practices risk consumer backlash.
- **Cross-Functional Collaboration** – Pricing decisions should involve marketing, data science, finance, and operations teams to ensure holistic execution.

By following these practices, firms can transform AI-driven dynamic pricing into a **sustainable strategic asset** rather than a short-term competitive tactic.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

While this paper presents a comprehensive conceptual framework, certain limitations remain:

1. **Absence of Empirical Validation** – The framework has not been tested with primary data. Future research should apply it to real-world case studies.
2. **Industry-Specific Considerations** – The framework may require customization for sectors with unique regulatory or ethical constraints (e.g., healthcare pricing).
3. **Technological Evolution** – As AI models evolve, the specific algorithms underpinning dynamic pricing will change, necessitating ongoing framework updates.
4. **Consumer Perception Studies** – More research is needed to understand long-term consumer reactions to AI-driven personalized pricing.

CONCLUSION

Dynamic pricing has transitioned from a tactical revenue optimization tool to a strategic enabler of competitive advantage, thanks to AI's predictive capabilities, adaptive algorithms, and vast data integration potential. The proposed theoretical framework underscores the interplay between data acquisition, algorithmic adaptability, customer-centric personalization, and competitive market intelligence in achieving sustainable competitive advantage. For both scholars and practitioners, this framework offers a structured lens through which to analyse and implement AI pricing systems. By embedding these capabilities into their strategic core and ensuring ethical, transparent practices, organizations can not only improve profitability but also build enduring market leadership.

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About the College

Annai Velankanni's Educational and Cultural Society, Saidapet, Chennai-15, was found in 1988, to cater the educational needs of student community in and around Chennai. The Society has established Schools and Colleges in Saidapet, Nedungundram and Puthuri. The Management was nurturing the idea for a long time, to start a College for Students at Saidapet and suburban areas in order to enable them to continue their higher education in a conducive atmosphere.

Arts and Science College was started in 2000 at Saidapet, Approved by the Govt. of Tamilnadu G.O. No.296/Dt. 10/07/2003, G.O.No. 26/ Dt. 09/02/2004. Affiliated to the University of Madras and accredited by NAAC. Our motto is to endeavor and enlighten, empowered by faith and power. The students of AVC will stand firm and strong, amidst life's storms and go ahead with confidence.

With the Holy blessings of Annai Velankanni Madha, our Founder Chairman Dr.S.Dharanaj and Dr. Dolphin Dharanaj, Vice- Chairman the Group of Institutions has been strengthening its developmental activities, in bearing fruits of empowering especially women for the betterment of the society. The believers of today's transformation in education; our Secretary Dr.D. Dev Anand and Dr. Sridevi Dev Anand our Joint Secretary provides the necessary thrust in all the developmental activities of the institution.

Our vision is "to make Quality higher education affordable and accessible to learners, especially to the first generation and underprivileged section of the society". The College strongly believes in transforming average learners into academic achievers.

Annai Velankanni's College for Arts and Science proudly enters its Silver Jubilee year, marking 25 years of excellence in education and societal contribution. From its humble beginnings to becoming a reputed center of learning, The journey has been progressing into continuous growth, innovation and achievement.

To honor this significant milestones, we are delighted to announce the hosting of an international conference on Application of AI in Business and Technology, scheduled on 22.08.2025.

Glimpse of the Conference

The International Conference on Application of AI in Business and Technology (ICAIBT), organized by the School of Commerce and Management Studies, held on 22nd August 2025 at Annai Velankanni's College of Arts and Science.

It aimed to bring together Academicians, Researcher Scholars, Industrialists and Students to explore the transformative role of Artificial Intelligence in Business and Technology. The event featured publication of papers on topics such as AI-driven Finance, Digital Marketing, Data Analytics, Blockchain, Corporate Governance, Automation, and Business Innovation.

The day was marked with thought provoking Keynote addresses, technical sessions, paper presentations and interactive discussions. Renowned experts delivered their addresses, setting the tone and shared the insights of the conference theme, and the conference served as a platform for exchanging ideas, fostering innovation, and building collaborations for the future of AI in business.

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