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AI IN BUSINESS

Redefining Management and Financial Synergies

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AI in Business: Redefining Management and Financial Synergies

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About the Book

AI in Business: Redefining Management and Financial Synergies discovers the transformative impact of artificial intelligence (AI) on modern business operations, financial decision-making, and management strategies. As AI continues to reshape industries, this book explores into its profound influence on optimizing business processes, enhancing financial management, and driving strategic decision-making.

The book covers key aspects such as AI-driven financial analytics, automation in management practices, the role of AI in business sustainability, and its contribution to economic growth. Through real-world case studies and empirical research, it highlights how AI tools are revolutionizing financial literacy, business planning, and investment strategies.

Bridging the gap between AI technology and business efficiency, this book is an essential resource for business professionals, entrepreneurs, researchers, and students. It provides valuable insights into the challenges, opportunities, and future trends of AI integration in business by offering practical recommendations to leverage AI for financial growth and management excellence.

About the Editors

Dr. D. Umamaheswari, Professor in the Department of Commerce at PMIST, Thanjavur, Tamil Nadu, has three decades of teaching and research experience. She has authored six books on finance and has successfully guided four research scholars. Additionally, she has organized more than 35 national and international conferences, seminars, and workshops. Dr. D. Umamaheswari has also published 55 research articles in reputed journals, including Scopus-indexed journals.

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Dr. S. Prabhu is currently working as an Assistant Professor and Programme Coordinator in the Department of Commerce at PMIST. He has over 15 years of teaching experience and has published one patent along with more than 12 research papers in peer-reviewed journals indexed in reputed journals and Scopus. He completed his M.Phil. degree from Loyola College, Chennai. Dr. S. Prabhu has also actively participated in various conferences and has presented research papers.

Dr. S. Subendiran is currently serving as an Assistant Professor and Head of the Department of Commerce at PMIST. He is an accomplished academician with 24 years of experience in finance and marketing. He has published 10 research papers in reputed journals. He has also actively participated in conferences, workshops, and editorial responsibilities, demonstrating his commitment to academic excellence and knowledge dissemination.

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Preface

The rapid evolution of Artificial Intelligence (AI) has revolutionized the business landscape, transforming management strategies and financial decision-making processes. *AI in Business: Redefining Management and Financial Synergies* explores this dynamic shift, offering insights into how AI-driven tools and techniques are reshaping industries, optimizing business operations, and enhancing financial efficiency.

This book is designed to bridge the gap between AI advancements and their practical applications in business management and finance. It investigates into key areas such as AI-powered financial analytics, automation in managerial processes, predictive decision-making, and the role of AI in driving business sustainability. Through empirical research and real-world case studies, the book highlights the challenges and opportunities of AI adoption in the corporate world, offering strategic insights for entrepreneurs, business leaders, and researchers.

The integration of AI into business functions is no longer a futuristic concept—it is a present-day necessity. As organizations strive to enhance efficiency, reduce costs, and gain a competitive edge, understanding AI's role in financial management and strategic decision-making becomes vital. This book serves as a comprehensive guide for professionals, academicians, research scholars and students who wish to explore the transformative potential of AI in business.

We hope this book provides valuable knowledge and inspires further exploration into the evolving relationship between AI, business management, and financial intelligence.

Editors
Dr. D. Umamaheswari
Dr. N. Jayanthi
Dr. S. Prabhu
Dr. S. Subendiran

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The successful completion and publication of this conference articles would not have been possible without the contributions and support of many individuals and organizations. First and foremost, we extend our deepest gratitude to all the authors who submitted their research articles. Your dedication to advancing knowledge in Technological Progress and Business Transformation and the quality of your submissions have been essential to the success of this conference. We are immensely grateful to the members of the Conference committee for their rigorous and thoughtful reviews, and for their constructive feedback that significantly improved the quality of the papers presented. Your expertise and commitment have been invaluable.

We would like to thank our keynote speakers for sharing their insights and inspiring us with their innovative ideas and research. Your contributions have enriched the conference and provided valuable perspectives. We are also grateful to the organizing committees for their hard work and dedication in planning and executing every detail of the conference. Your teamwork and perseverance have been instrumental in overcoming challenges and making this event a success. Our appreciation extends to the technical and administrative staff at Periyar Maniammai Institute of Science & Technology, for their support and assistance in logistics, coordination, and ensuring that everything ran smoothly. We would like to acknowledge the efforts of our publisher Journal Press India for their professional handling of the publication process and for ensuring the timely release of these conference proceedings.

Finally, we thank all the participants and attendees of the conference. Your engagement, discussions, and interactions have made this conference a vibrant and enriching experience.

Thank you all for your contributions and support.

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CHAPTER 1

AI-Driven Strategies for Sustainable Business Models

*Narentheren Kaliappen**

ABSTRACT

This presentation explores the transformative role of Artificial Intelligence (AI) in developing sustainable business models, with a special focus on Microsoft Copilot as a practical AI integration tool. As AI reshapes global economies, sustainable models that balance profitability, innovation, and social responsibility are more critical than ever. The session highlights AI's applications in optimizing supply chains, personalizing customer experiences, and enabling circular economy practices. A deep dive into Microsoft Copilot showcases how it supports sustainability through automated reporting, predictive analytics, operational optimization, and responsible sourcing. Case studies from leading companies such as Telstra, Unilever, Grant Thornton, and Campari Group demonstrate tangible benefits of Copilot, including time savings, cost reduction, and enhanced decision-making. The presentation also examines Microsoft's $3 billion AI investment in India, aimed at training 10 million individuals and driving sector-wide innovation. Students are encouraged to develop AI and business skills, participate in skilling initiatives, and pursue careers in roles like AI analysts, sustainability consultants, and AI product managers. With data becoming a strategic asset and AI-powered platforms expanding, businesses must build resilient models to thrive in future economies. The session concludes with a call to action for students to seize AI opportunities and prepare for impactful, future-ready careers.

Keywords: AI Applications, Artificial Intelligence, Sustainable Business Models.

1.0 Introduction

Good morning, everyone. It is truly an honor to be here today at the International Conference 2025 on "AI-Driven Innovation in Sustainable Commerce: Redefining Business Dynamics, Managerial Practices, and Financial Synergies," organized by the Faculty of Commerce, Periyar Maniammai Institute of Technology, Vallam, Thanjavur, Tamil Nadu. This two-day conference, brings together global academicians, researchers, industry experts, and practitioners to explore the transformative role of Artificial Intelligence in reshaping business strategies, managerial frameworks, and financial ecosystems for a sustainable future. I sincerely appreciate the effort taken by the entire conference committee.

**Professor, Department of International Business, School of International Studies, University Utara, Malaysia*

1.1 What is Artificial Intelligence?

Artificial Intelligence, or AI, is revolutionizing global economies at an unprecedented pace. In today's fast-evolving world, sustainable business models—those that integrate profitability, innovation, and social responsibility—are critical for long-term value creation. AI acts as a transformative enabler, enhancing these models by optimizing processes, improving decision-making, and driving both efficiency and effectiveness.

1.2 What is a Sustainable Business Model?

A sustainable business model represents an approach to commerce that creates value for multiple stakeholders while minimizing negative environmental and social impacts. According to Schaltegger *et al.* (2016), sustainable business models integrate economic, environmental, and social considerations into their core strategies and operations. They go beyond the traditional profit-maximization focus by embedding sustainability principles throughout the value chain.

Sustainable business models typically exhibit several key characteristics. First, they prioritize resource efficiency and circular approaches to minimize waste and environmental footprint (Geissdoerfer *et al.*, 2018). Second, they create value for a broader range of stakeholders, including customers, employees, communities, and the environment (Stubbs and Cocklin, 2008). Third, they demonstrate innovation in products, services, or processes that address environmental or social challenges (Boons and Lüdeke-Freund, 2013). Finally, they incorporate long-term thinking in strategic decision-making, considering impacts across extended time horizons (Aagaard, 2019).

The business case for sustainability has strengthened significantly in recent years. Research by Eccles *et al.* (2014) found that companies with strong sustainability practices outperform their counterparts over the long term, both in stock market performance and accounting metrics. Additionally, sustainable business models often lead to enhanced resilience against market disruptions, improved stakeholder relationships, increased customer loyalty, and access to new markets (Geissdoerfer *et al.*, 2017).

2.0 The Role of AI in Sustainable Business Models

Artificial Intelligence significantly enhances decision-making and operational efficiency in sustainable business models. From optimizing supply chains to driving personalization and enabling circular economy practices, AI contributes to smarter, more responsible business operations.

2.1 Predictive analytics in supply chains

Predictive analytics, powered by AI, uses historical data to anticipate future outcomes. In supply chain management, this enables accurate demand forecasting,

which in turn helps optimize inventory levels, reduce waste, and improve customer satisfaction. Leading companies like Amazon leverage predictive analytics to ensure the right products are available in the right quantities at the right time, streamlining logistics and minimizing overstock or shortages.

2.2 Personalization with AI Recommendation Engines

AI-driven recommendation engines analyze user behavior and preferences to deliver personalized product or content suggestions. This not only enhances the customer experience but also drives increased sales and brand loyalty. Companies such as Netflix and Spotify exemplify this approach, using AI to curate tailored experiences that keep users engaged.

2.3 Supporting the Circular Economy

The circular economy aims to minimize waste and maximize the reuse of resources. AI can play a pivotal role by identifying innovative ways to recycle and repurpose materials. For instance, AI algorithms can analyze waste streams to detect valuable materials that can be recovered and reused, opening up new revenue streams and reducing environmental impact.

3.0 Why Focus on Microsoft Copilot?

Before we delve into the integration of Microsoft Copilot, it's important to understand *why* Copilot is particularly relevant in the context of sustainable business models. As businesses increasingly seek tools that can enhance productivity while aligning with sustainability goals, Microsoft Copilot stands out as a practical, AI-powered assistant that integrates seamlessly with familiar tools like Excel, Word, Power BI, and Teams. It democratizes the power of AI—making it accessible to users across all levels of an organization—and bridges the gap between data and decision-making. This makes it an ideal co-pilot in driving sustainable innovation and operational excellence.

4.0 Integrating Microsoft Copilot for Sustainable Business Models

Let's now explore how Microsoft Copilot can be integrated to advance sustainable business models across various functional areas.

First, Copilot streamlines sustainability reporting by automating data collection from multiple sources, significantly reducing manual work and improving reporting accuracy. It can generate emissions reports or Corporate Sustainability Reporting Directive (CSRD) reports, helping organizations comply with regulations and effectively communicate their sustainability initiatives to stakeholders.

Second, Copilot enhances decision-making through predictive analytics. By analyzing historical data, it enables businesses to forecast trends—such as energy

consumption patterns—allowing for smarter resource planning and cost savings. Users can simply ask Copilot specific questions (e.g., "What is the revenue from our Asia-Pacific operations last quarter?"), enabling faster and more precise decisions.

Third, Copilot optimizes operations by creating calculation models. Users can describe a calculation need, and Copilot will generate the appropriate model—for example, to optimize production processes or reduce waste. It aids in diagnosing operational issues and suggesting resolutions, thus minimizing downtime and enhancing safety.

Fourth, Copilot promotes sustainable practices through sustainable sourcing. It can analyze sourcing data to determine the percentage of materials obtained from environmentally and socially responsible suppliers. Additionally, it tracks waste and recycling data, offering suggestions for improvement to help lower the environmental footprint.

Finally, Copilot supports innovation through AI-powered platforms. It enhances digital transformation by embedding AI into routine processes, fostering innovation and adaptability. AI can help businesses create adaptive strategies, making them more resilient to global disruptions such as supply chain shocks or market volatility.

5.0 Case Studies of Successful Companies Using Microsoft Copilot

Let's now explore some real-world examples of how leading organizations have successfully integrated Microsoft Copilot to drive innovation, boost efficiency, and support sustainable practices.

Australia's largest telecommunications company, Telstra, integrated Microsoft Copilot across its operations to streamline workflows and enhance customer support. With Copilot, employees reported up to 20% fewer follow-up contacts with customers, improving both efficiency and service quality. Additionally, AI integration into Telstra's smart modems allowed fault resolution without customer intervention, contributing to $13-15 million in savings and reducing operational waste. Unilever's legal team adopted Microsoft Copilot to manage contracts and documentation more efficiently. This led to daily time savings of up to 30 minutes per employee, reduced reliance on external counsel, and enhanced internal knowledge management—allowing the company to operate more sustainably and cost-effectively.

The global professional services firm, Grant Thornton, implemented Microsoft Copilot as part of its AI@GT initiative. Employees reported saving up to 7.5 hours per week, enabling them to focus on high-value tasks such as client engagement and strategy development. This not only improved job satisfaction but also supported a more efficient and sustainable service model.

By incorporating Microsoft 365 Copilot, Farm Credit Canada saw measurable improvements in employee productivity. 78% of users reported time

savings, with 35% saving more than an hour per week. These efficiencies allowed staff to shift focus to more strategic, value-added work that supports long-term organizational sustainability.

Campari Group integrated Microsoft 365 Copilot and Microsoft Viva to boost creativity, collaboration, and operational agility. Copilot helped streamline communication and project workflows across global teams, supporting innovation while reducing inefficiencies—a critical component of sustainable business transformation. Companies like Visa, BP, Honda, and Pfizer, and partners like Accenture, KPMG, and PwC are already using Copilot to transform the way they work, and 40% of the Fortune 100 participated in the Copilot Early Access Program.

6.0 Microsoft's AI Push in India

Microsoft's commitment to AI and sustainability is clearly reflected in its recent $3 billion investment in AI and cloud technologies in India. This major initiative aims to transform industries, upskill millions, and open new doors—especially for students—within the rapidly growing AI ecosystem.

Microsoft's $3 billion investment is a powerful testament to its long-term vision of driving innovation and enabling sustainable growth in India. This funding will accelerate the development of AI-powered solutions, supporting businesses in optimizing operations, reducing waste, and adopting more sustainable practices.

As part of its mission, Microsoft plans to train 10 million individuals in AI skills by 2030. This large-scale initiative is designed to bridge the digital skills gap, empower the workforce of the future, and ensure widespread access to cutting-edge AI capabilities. Students, in particular, stand to benefit immensely from these programs through certifications, workshops, and hands-on projects.

Microsoft is actively forging strategic partnerships across sectors such as healthcare, transportation, and education. These collaborations aim to co-create AI-driven solutions that address real-world challenges—from improving patient care to optimizing logistics—and foster innovation at scale.

India's expanding AI ecosystem presents tremendous opportunities for students. With access to AI skilling programs, internships, and mentorship initiatives, students can gain practical experience, enhance their employability, and build solid foundations for future careers in technology, research, or entrepreneurship.

7.0 Career Opportunities for Students in AI

For students, the rise of Artificial Intelligence brings a wide range of exciting career opportunities. With growing demand across industries, key roles such as AI & Data Analysts, Sustainability & Business Analysts, and AI Product Managers are becoming essential in shaping the future of work. Leading companies like Microsoft, Google, Amazon, and numerous startups are actively hiring for these roles.

8.0 Key Roles in the AI Ecosystem

AI and Data Analysts analyze large datasets to uncover trends, generate insights, and support strategic decision-making. Sustainability and Business Analysts focus on integrating sustainability principles into business operations, aligning profitability with social and environmental responsibility. AI Product Managers lead the design, development, and deployment of AI-powered products, acting as a bridge between technical teams and business goals.

9.0 Top Companies Hiring in AI

Microsoft is a pioneer in AI-driven innovation with a strong focus on sustainability and ethical AI applications. Google is known for cutting-edge research in machine learning and AI technologies across products and services. Amazon uses AI to optimize logistics, personalize customer experiences, and enhance operational efficiency. Startups provide dynamic environments for hands-on learning, creativity, and rapid career growth in emerging AI applications.

10.0 Gaining Experience through Skilling and Internships

Students can strengthen their career prospects by actively participating in AI skilling initiatives and internships. These opportunities offer practical, real-world experience and help build a strong foundation in AI concepts, tools, and industry practices—preparing students for diverse roles in the global AI ecosystem.

10.1 Practical steps for students

To take full advantage of the growing career opportunities in AI, students should focus on developing both technical capabilities and business acumen, while actively engaging in hands-on learning experiences.

First, students should develop technical skills in Python, a widely used, versatile programming language that forms the foundation for AI and machine learning development. They should also gain proficiency in AI tools such as TensorFlow, which are essential for building and deploying AI solutions.

Second, students should focus on business knowledge by understanding how AI integrates with business models to drive sustainability, innovation, and operational efficiency. They should study real-world applications of AI in industries like retail, healthcare, finance, and logistics to see its transformative impact.

Third, students should engage in AI initiatives by participating in programs, hackathons, and AI projects hosted by organizations like Microsoft and other tech leaders. These platforms offer hands-on experience, mentorship, and opportunities to apply skills in real-world scenarios—crucial for building an AI portfolio.

11.0 Future Trends in AI Business Models

As the digital economy evolves, AI will continue to shape how businesses operate and grow. The following trends will define the future.

First, data will become a strategic asset. Data will be the new currency. Businesses will increasingly monetize insights derived from large datasets, making data management and analysis core to business strategy.

Second, AI-powered platforms will expand. AI will power intelligent digital ecosystems that enable companies to innovate, automate, and stay competitive in a fast-changing global market.

Third, there will be an emphasis on resilient business models. To withstand global challenges—such as supply chain disruptions or climate change—businesses must adopt resilient and adaptive models, supported by AI-driven decision-making.

12.0 Call to Action

In conclusion, AI is reshaping the future of business—driving innovation, enhancing sustainability, and building adaptability. With India's AI ecosystem rapidly growing, now is the time to seize opportunities for upskilling and experiential learning. I encourage all students to take action today: learn, build, participate, and position yourselves at the forefront of the AI-driven future.

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CHAPTER 2

Potential Strategies to Reduced the Teacher's Attrition in Private Schools in Thanjavur District

Umamaheswari D.*, Anupriya A.** and Manoj S.**

ABSTRACT

This study explores potential strategies to reduce teacher's attrition in private schools. This study investigates the key factors contributing to teacher turnover, including salary dissatisfaction, work-life balance issues, lack of professional development, and inadequate leadership support. Utilizing a descriptive research design, data were collected from 854 teachers through a structured questionnaire and analyzed using statistical tools such as regression analysis, ANOVA, chi-square tests, and factor analysis. findings, the study recommends evidence-based strategies such as structured professional development programs, competitive salaries, improved leadership support, flexible work schedules, and teacher recognition initiatives. Implementing these measures can enhance teacher satisfaction, reduce attrition rates, and contribute to a stable, high-quality teaching workforce in private schools. The study also underscores the need for long-term research to monitor the effectiveness of retention strategies and proposes comparative studies between private and public schools for a comprehensive understanding of sector-specific challenges. The study highlights the importance of structured professional development, competitive compensation, and a supportive work environment in reducing attrition rates. Based on these insights, evidence-based strategies are recommended to improve teacher retention, enhance job satisfaction, and establish a more stable educational workforce. Addressing these challenges through targeted interventions can help private schools in Thanjavur foster a sustainable teaching environment, ensuring high-quality education for students.

Keywords: Teacher attrition, Private schools, Teacher retention, Job satisfaction, Evidence base strategies, Leadership support.

1.0 Introduction

A persistent issue that many private schools are currently dealing with is teacher's attrition. The general operation of the school as well as the educational experiences of the students may suffer from high teacher turnover rates.

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Students' social and academic growth is greatly influenced by their teachers, and their departure might interrupt the educational process. Teachers in private schools quit their profession for a variety of reasons. While pay and benefits are frequently mentioned as the main causes, additional factors like excessive workloads, a lack of support, little opportunity for career progression, and demanding work conditions can also contribute to teacher discontent. The job may also become considerably more challenging due to the need to fulfill parental expectations or performance criteria. Teacher retention is greatly influenced by factors other than money, such as working circumstances and chances for professional development. The heavy workloads, administrative demands, and restricted opportunities for professional progression that many private school teachers face all lead to burnout and job discontent.

It is difficult for teachers to have long-term growth in their positions since private schools frequently lack the funding necessary to offer continuous training and career advancement, in contrast to public school systems, which might offer organized professional development programs. Higher teacher turnover has repercussions that go beyond specific schools. Frequent staff changes impact mentorship and instruction continuity, which causes disruptions for students' development. The findings, recommends evidence-based strategies, including salary improvements, enhanced leadership support, structured professional development programs, teacher recognition initiatives, and better working conditions. Implementing these strategies will help reduce teacher attrition, retain experienced educators, and create a stable teaching workforce. It takes a multifaceted strategy to address teacher attrition in private schools.

In order to improve teacher satisfaction, schools should think about putting in place measures like pay raises, professional development opportunities, encouraging a positive work atmosphere, and making sure that workloads are manageable. A more stable and productive learning environment that benefits teachers and students can be established by private schools by placing a higher priority on teacher retention. Investing in teacher retention tactics will be essential as education develops to guarantee top-notch instruction and a supportive learning environment for pupils. Understanding these difficulties will help us find solutions to make the working environment for teachers more encouraging and fulfilling, which will increase teacher retention and raise the standard of instruction in private schools as a whole a sustainable culture and hence, the study has been made to reduce teachers' attrition among private schools in Thanjavur district.

2.0 Literature Review

Noel & Finocchio (2021) stated the investigation into the reasons behind teachers' employment turnover. Human capital, social capital, structure capital, and positive psychological capital are the four topics they examine in their framework.

Twenty interviews were performed by the researchers with five former educators who had spent five or less years working in different US schools. Teacher burnout and attrition are caused by a number of issues, which have been made worse by the COVID-19 pandemic. The results of the study can help teacher leaders create a cooperative learning environment in their schools that focuses on long-term work-life balance, respect for one another, and cooperation.

Westphal *et al*. (2024) insisted that the study explored why student teachers might want to quit their teaching degree. Collected data from 395 student teachers in Germany. Measured cognitive and affective-motivational characteristics, such as pedagogical knowledge, attitudes towards inclusion, teaching self-efficacy, emotional stability, and intentions to quit. the study found that student teachers with an engaged mindset reported lower intentions to quit their teaching degree. The main reasons for intending to quit were course demands, lack of practical relevance, and dissatisfaction with examination regulations.

Sadraei *et al*. (2024) insisted that the well-being and retention of new language teachers in Iran are impacted by emotion control. 15 new teachers were interviewed in-depth. The study highlights the need for supporting organizational variables to improve teacher well-being and retention by shedding light on the intricate interactions among early career language instructors in Iran between perfectionism, emotional experiences, and well-being. The study's conclusions have ramifications for teacher educators, school administrators, and education policymakers. Schools can support the well-being and retention of teachers by establishing encouraging work environments, offering chances for professional development, and encouraging autonomy.

Meng & Briscioli (2024) stated to have factors influencing Chinese university teachers' performance. Examine the effects of career adaptability, organizational seniority, and achievement recognition on the task performance of Chinese university instructors. In total, 1444 Chinese university instructors took part in three separate data gathering sessions spaced one month apart. With the help of organizational seniority and conditional effects, achievement recognition positively predicts career adaptability, which in turn influences task performance. The effects of career adaptability vary depending on seniority levels.

García *et al*. (2022) stated that the study focuses at the elements that affect teachers' decision to leave the teaching profession in the United States. utilized to investigate how working conditions and teacher attrition are related. reduced the bias caused by omitted variables by including teacher-level (X) and district-level (Z) variables. The approximate sample size is 34,480. Attrition can be reduced by a supportive work atmosphere, fewer school issues, and higher teacher morale. Conditions of Employment at Lower attrition is linked to higher base salaries and returns to experience, and mid-career teachers are more affected by salary and returns to experience than beginner instructors are by teacher voice.

Mok *et al.* (2024) stated that This study investigates the relationship between

teachers' perceptions of students' talents, school track recommendations, and, eventually, their capacity to think critically about their own thinking (metacognitive knowledge). The 5870 children (51.4% female) from 890 distinct primary school groups made up the analytical sample. The route analysis, which included linear and probit regression, was carried out in the study using MPlus Version 7.4. Auxiliary variables were incorporated into the analysis to lessen estimation bias brought on by missingness and attrition. Metacognitive knowledge indirectly influenced school track recommendations through teacher judgments. The results of the study demonstrate the value of teaching metacognitive techniques in the classroom since teacher assessments and school transitions are influenced by students' metacognitive knowledge.

Qi *et al.* (2025) stated the study investigates how teacher commitment and subjective well-being are affected by principle leadership in the setting of Chinese athletic education. The study investigates how teacher commitment and subjective well-being are affected by principle leadership in the setting of Chinese athletic education. In-person meetings promoted involvement, allowed for direct explanations, and gathered information on the dedication to the school, altruistic tendencies, subjective well-being, and leadership styles of the principal. Each teacher's subjective well-being functions as a mediator between principle leadership and teacher commitment, and principal leadership positively influences both the two.

Xaba (2003) stated that "Teacher Turnover and Attrition" was selected for this study most likely because of its importance and relevance to the field of education. The study reviewed existing literature to investigate theoretical viewpoints on teacher turnover. The study examined current information on teacher turnover trends and rates. No primary data was gathered for the study via surveys, interviews, or observations. The study intends to advance knowledge of teacher attrition and turnover by examining these issues and guiding the development of policies and procedures to deal with these issues. Teacher turnover rates are high, according to the study, which results in shortages and lower productivity.

Menzies (2023) stated to have invested a A major issue in English schools is teacher turnover. Students and employees suffer as a result. examines the literature on teacher turnover, utilizes information from Teacher Tapp, a survey platform that has more than 7,000 teachers as participants, and investigates the opinions of teachers regarding class distribution. Because the sample is self-selected, the results are indicative rather than conclusive, and teaching Tapp data is weighted to reflect the larger teaching population. The study tests how research evidence affects instructors' preferences using a split-sample methodology. The results are Because it disrupts continuity of care, erodes trust, and results in the loss of student-centric and institutional knowledge, high teacher turnover lowers student progress.

Mason, S., & Matas, C. (2015) stated that this study included social capital, human capital, positive psychological capital, structural capital, and Understanding Teacher Attrition in Australia: A Theoretical Framework. Twenty Australian research

papers on teacher attrition were examined in a qualitative analysis. The purpose of the study was to identify the causes of teacher attrition. The data was analyzed using hematic content analysis. Six steps were taken in order to find themes and patterns. For further assurance, a third researcher verified the results. The results are There is a lack of uniformity in the definition and measurement of teacher attrition and retention, and Australian research is helping to advance global awareness of this issue.

3.0 Research Gap

This study despite extensive research on potential strategies to reduce the teacher attrition in private schools, there is a noticeable gap in the literature concerning studies conducted in Thanjavur district.

4.0 Research Problem

Teacher turnover is a significant issue in educational institutions, particularly in private schools where maintaining high standards of instruction depends on recruitment and retention. While studies have identified factors affecting attrition and retention, a comprehensive understanding of how school-level variables, teacher engagement, and satisfaction interact is lacking. Research-based solutions have not addressed the specific difficulties faced by private schools in retaining teachers.

AIM: The aim of this study is developing practical strategies for teachers to reduce attrition in private schools in Thanjavur district.

5.0 Objectives

1. To identify factors influencing school-level teacher retention in private schools.
2. To investigate the prevalence and predictors of teacher attrition in private schools.
3. To examine the relationship between teacher satisfaction, engagement, and attrition.
4. To develop evidence-based strategies to reduce teachers attrition in private schools.

6.0 Research Methodology

The purpose of this survey is to see how teacher attrition is in private schools in Thanjavur district. The study adopts descriptive research design. A detailed survey is conducted through questionnaire method for collection of primary data. Purposive Random Sampling method is used. The number of the respondents is 854 teachers in Thanjavur district. Statistical Packages for Social Sciences (SPSS) is used to analyze the primary data.

7.0 Hypothesis

H_0: There is no significant between rating the level of support you receive from school leadership in school, opinion for the schools to improve work-life balance to retain teachers and encouragement to stay longer in the current teaching role.

H_0: There is no significant difference between age group of the respondents and the primary reasons consider for leaving private schools.

H_0: There is no significant association between teaching experience and satisfaction with the overall teaching experience at their school.

H_0: There is no significant difference between gender of the respondents and Your attitude towards the school administration better support teachers to reduce attrition rates.

8.0 Testing of hypothesis

8.1 Regression analysis
8.1.1 Hypothesis 1

H_0: There is no significant between rating the level of support you receive from school leadership in school, opinion for the schools to improve work-life balance to retain teachers and encouragement to stay longer in the current teaching role.

H_1: There is no significant between rating the level of support you receive from school leadership in school, opinion for the schools to improve work-life balance to retain teachers and encouragement to stay longer in the current teaching role.

Table 1: Model summary

R Square	F Change	Sig. F Change	Durbin-Watson
.084	26.140	.000	1.557

Table 2: ANOVA

Model		Df	Mean Square	F	Sig.
1	Regression	3	26.724	26.140	.000

The above table shows regression analysis calculated by using SPSS. The model summary table analysis shows R^2 value of .084 and Durbin Watson = 1.557. The ANOVA table shows that the value of df = 3, F statistic (F) = 26.140 and P value = .000. Since calculated value .000 is less than 0.05 values, the null hypothesis is rejected and the alternative hypothesis is accepted. Hence it is inferred that, there is a significant relationship between rating the level of support you receive from school leadership in school, opinion for the schools to improve work-life balance to retain teachers and encouragement to stay longer in the current teaching role.

Table 3: ONEWAY ANOVA

	Df	Mean Square	F	Sig.
Between Groups	4	20.213	22.319	.000

8.1.2 Hypothesis 2

H$_0$: There is no significant difference between age group of the respondents and the primary reasons consider for leaving private schools.

H$_1$: There is a significant difference between age group of the respondents and the primary reasons consider for leaving private schools.

One-way ANOVA is used to find the difference between age group of the respondents and perception towards reasons for teachers leaving private schools where F value is 22.213 and P value is 0.000. Since p value is lesser than 0.05, there is significant difference between age group of the respondents and the reasons you believe teachers leave private schools.

Table 4: Chi-Square Test

	Value	Df	Sig (2-sided)
Pearson Chi-Square	23.069	9	<.006

8.1.3 Hypothesis 3

H$_0$: There is no significant association between teaching experience and satisfaction with the overall teaching experience at their school.

H$_1$: There is an significant association between teaching experience and satisfaction with the overall teaching experience at their school.

From the above table, Chi-square is calculated by using SPSS. The analysis shows that Chi value = 23.069, Degree of freedom (df) = 9, N = 854 and p < 0.05 (p value = >.006). Since p value is more than 0.05, null hypothesis is accepted and alternative hypothesis is rejected. Hence it can be inferred that, there is no significant association between teaching experience and satisfaction with the overall teaching experience at their school.

8.1.4 Hypothesis 4

H$_0$: There is no significant difference between gender of the respondents and Your attitude towards the school administration better support teachers to reduce attrition rates.

H$_1$: There is a significant difference between gender of the respondents and Your attitude towards the school administration better support teachers to reduce attrition rates.

Table 5: Independent Sample t–Test

		Levene's Test for Equality of Variances		t-test for Equality of Means
Your attitude towards the school administration better support teachers to reduce attrition rates	Equal variancs assumed	F	Sig.	Df
	Equal variances not assumed	26.408	.000	852 820.385

Independent sample t test is used to find the difference between gender of the respondents and Your attitude towards the school administration better support teachers to reduce attrition rates where the value of F is 26.408 and P value is .000 Since p value is lesser than 0.05, there is a significant difference between gender of the respondents and Your attitude towards the school administration better support teachers to reduce attrition rates.

Table 6: Factor Analysis

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.421
Bartlett's Test Approx. Chi-Square	76.270
of Sphericity Df	10
Sig.	.000

a. Only cases for which Your satisfaction with the working conditions at your school = Neutral are used in the analysis phase.

Table 7: Total Variance Explained[a]

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.836	36.711	36.711	1.836	36.711	36.711	1.633	32.667	32.667
2	1.399	27.981	64.692	1.399	27.981	64.692	1.461	29.212	61.879
3	1.026	20.518	85.210	1.026	20.518	85.210	1.167	23.331	85.210
4	.479	9.590	94.800						
5	.260	5.200	100.000						
Extraction Method: Principal Component Analysis.									
a. Only cases for which Your satisfaction with the working conditions at your school = Neutral are used in the analysis phase.									

From the above table it shows Factor analysis is calculated by using SPSS. The KMO table analysis shows the value in the significant acceptance.000 and Kaiser-Meyer-Olkin <.421 measure of sampling to rejected in the table. The variance table shows that the value of initial Eigenvalues = 36.711, Eignevalu, Etraction sums of squared loadings and Rotation sums of squared loadings in three variable acceptances in factor analysis. The calculated value .000 is less than 0.05 value.

Hence it is inferred that there is a significant association between satisfaction with your overall teaching experience at this school, engaging level in your day-to-day teaching activities, numbers of time you feel recognized for your achievements at school, ways you feel supported in your role by the school administration and your engagement level which affect your decision to remain at the school.

8.0 Discussion and Findings

A study analyzing data from 854 instructors in Thanjavur, India, The study shows that 52% of respondents are satisfied with working conditions, while 41% rate leadership support as good. Salary dissatisfaction (35%) and low pay (33%) are key reasons for leaving. Professional development is valued by 45%, and 37% see collaboration as important. Job security is strong (50%), and engagement is high (54%), but 28% view teacher turnover as a concern. To improve retention, 36% suggest better working conditions, 35% support salary increases, 30% favor flexible scheduling, and 45% believe better communication can reduce attrition, The found that financial incentives, work-life balance, and school leadership support account for 29.1% of teacher retention. The study also found a significant correlation between these factors and teachers' decisions to stay in their positions. The study also revealed a significant difference between age groups and the reasons teachers leave private schools, highlighting the need for age-specific retention strategies. Additionally, 52.2% of teachers believe that administrative support significantly impacts retention, indicating the need for strong leadership and better working conditions. Factor analysis results showed that work satisfaction, engagement, recognition, and administrative support account for 85.2% of the variance in teacher retention. The study also highlighted gender-based disparities in views of administrative support, urging for gender-sensitive policies. The study concludes that evidence-based strategies, such as enhanced leadership, work-life balance improvements, professional development programs, competitive salaries, and teacher recognition initiatives, are needed to create a stable teaching workforce, reduce high attrition rates, and improve educational quality in private schools.

9.0 Scope for Further Research

Longitudinal studies that examine the long-term effects of retention methods are a crucial field for future research. Although the current state is depicted in this study, monitoring teacher satisfaction and retention over time may provide more important information about which changes have long-term impacts. Schools would find sustainable techniques that lead to a more stable teaching workforce with the aid of this strategy. Comparative studies between private and public schools could be the subject of future investigating. In order to identify sector-specific issues and best practices, researchers could assess variations in teacher turnover rates, job

satisfaction and support networks. Such research would assist in determining whether specific tactics that work well in public schools may be modified for use in private schools or if customized methods are required.

10.0 Conclusion

Teacher attrition is a pressing concern for private schools in the Thanjavur district, significantly impacting the quality of education, institutional stability, and student learning experiences. This study has provided valuable insights into the key factors driving teacher turnover, including salary dissatisfaction, lack of professional development opportunities, excessive workload, and inadequate leadership support. Through a comprehensive analysis of survey data from 854 teachers, the study confirms that addressing these challenges requires a multifaceted and evidence-based approach to retention strategies. The findings suggest that while financial incentives are crucial, non-monetary factors such as administrative support, work-life balance, career advancement opportunities, and teacher recognition play a vital role in retaining educators. Schools that invest in professional development programs, provide structured leadership training, and foster a positive and inclusive work environment are more likely to reduce attrition rates and enhance teacher satisfaction. further research should focus on longitudinal studies to track the long-term effectiveness of retention strategies and compare teacher attrition trends in private versus public schools. Additionally, future studies could explore the role of emerging technologies and digital learning platforms in enhancing teacher engagement and job satisfaction. By implementing sustainable retention policies and fostering a culture of professional growth, private schools in Thanjavur can establish a stable, committed, and high-quality teaching workforce that contributes to the overall improvement of the education sector.

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CHAPTER 3

IoT-Enabled Wireless Sensor Network for Real-Time Battery Performance Monitoring in E-Bikes through Mobile Applications

Jayanthi N.*, Srinithi R.**, Sudharsan P.** and Veerasakthivel G.**

ABSTRACT

Electric bikes (E-Bikes) are gaining popularity as an eco-friendly transportation solution, making efficient battery management essential for enhanced performance and longevity. In this paper, a wireless sensor network (WSN) and a mobile application are used to track the battery life of e-bikes in real time. The system tracks critical battery metrics like voltage, current, temperature, and state of charge using IoT-enabled sensors. The smartphone application functions as the user interface, offering performance data, real-time battery insights, and alerts for anomalous circumstances like excessive heat or sudden energy loss. Smartphone users can get efficiency advice, forecast when they'll need to charge, and keep an eye on the condition of their batteries. By providing useful information to extend battery life, avoid unplanned malfunctions, and encourage fuel-efficient driving practices, this project improves user convenience. Scalable, affordable, and compatible with different e-bike models, the suggested solution adds to more intelligent and environmentally friendly urban mobility solutions. The e-bike battery monitoring system utilizes a robust technology stack, comprising React Native, JavaScript, HTML, and CSS for the front-end, enabling a seamless and native-like user experience on both Android and iOS platforms. Node.js and Express.js are used in the back-end's construction, offering a server-side architecture that is quick, scalable, and adaptable. The database is Google Firebase, which provides scalability, strong security features, and real-time data synchronisation. A safe and adaptable authentication solution that supports phone number verification and numerous authentication providers is also provided by Google Firebase Authentication.

Keywords: Wireless Sensor Network (WSN), IoT-enabled Sensors, Battery Performance Monitoring, Real-time Tracking, Mobile Application, Voltage Monitoring, Temperature Monitoring, Google Firebase, Firebase Authentication.

1.0 Introduction

Electric bikes (e-bikes) have emerged as a sustainable and efficient mode of transportation, offering an eco-friendly alternative to traditional vehicles.

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According to (Kiefer *et al.*, 2015), smart e-bike monitoring systems provide real-time data that enhance user experience and vehicle efficiency. Central to the performance and longevity of e-bikes is the effective management of their batteries (Zhang & Zhang 2021) emphasize that continuous monitoring of e-bike battery parameters can prevent premature battery failures and optimize energy consumption. Monitoring critical battery parameters such as voltage, current, temperature, and state of charge is essential to ensure safety, optimize performance, and extend battery life. The integration of Wireless Sensor Networks (WSNs) and mobile applications presents a promising approach to real-time battery monitoring, providing users with immediate insights and alerts regarding their e-bike's battery status. (Doke *et al.*, 2021) highlight that wireless monitoring in electric vehicles contributes to enhanced safety and improved battery longevity. This paper explores the development and implementation of a WSN-based system for monitoring e-bike battery performance through a mobile application interface. WSN comprises a group of dedicated sensor nodes that are mainly battery powered and deployed to monitor environmental conditions. The sensor collects the information and transmits it wirelessly to the central location called the base station. WSNs usually consist of loads of low-cost, less-power sensor nodes (homogeneous or heterogeneous), that can carry out activities like sensing, effortless computations, and short-series wireless communications. (Zhu *et al.*, 2012). WSN nodes have low data concentrator, so they route data packets autonomously through the network according to a per-defined delivery mechanism (Abreu *et al.*, 2014).

Figure 1: IoT-based Battery Monitoring System
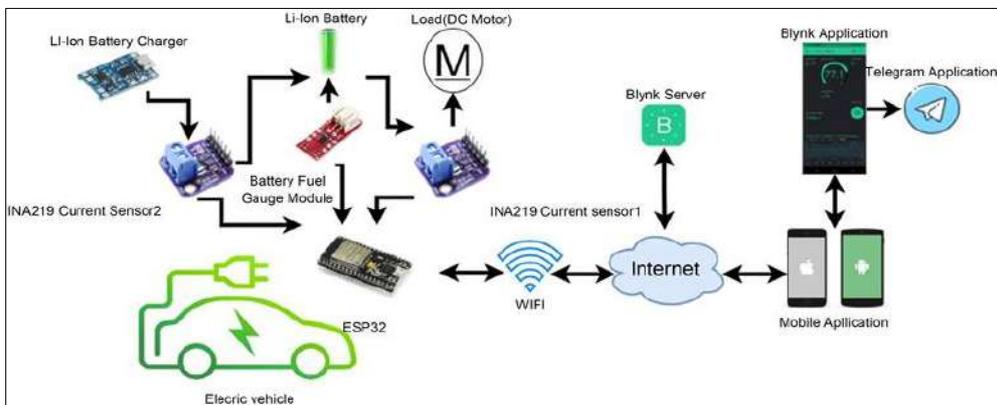
This image illustrates an IoT-based battery monitoring system for an electric vehicle using an ESP32 microcontroller. The system measures battery performance with INA219 current sensors and a battery fuel gauge module, tracking charging, discharging, and load consumption (DC motor). Data is sent via Wi-Fi to the Blynk cloud server, enabling real-time monitoring through a mobile app and Telegram

notifications. This setup helps in remote battery health monitoring and efficient energy management.

2.0 Literature Review

An ultra-compact glucose tag for sweat analysis, designed for diabetics and athletes with impaired metabolic control. The device, a near field communication chip, antenna, electrochemical sensor, and microfluidic channels, has a lightweight, flexible structure and can be easily attached to body parts. The device demonstrated excellent operating characteristics, with a limit of detection, limit of quantification, and sensitivity of 24 μM, 74 μM, and 1.27 μA cm−2 mM−1, respectively. The device's capability was demonstrated through in vitro and in vivo experiments. (Mirzajani *et al.*, 2022)

Fuzzy based Relay Node Selection and Energy Efficient Routing (FRNSEER) to improve the performance of Wireless Sensor Network (WSN) by selecting effective relay nodes while communicating with the sink node. Fuzzy rules are used to select active relay nodes, determining the best energy and utility factor during transmission. Sensor hubs are used with lower energy expenditure schedules, resulting in better communication between relay nodes and sink nodes. (Ramkumar *et al.*,2021).

Local agencies in the US and other countries are installing air pollution monitoring systems using high-cost sensors. In Salt Lake County, Utah, battery electric buses (BEBs) are being used to collect air quality and temperature data. The project has collected millions of observations, providing real-time insights into air pollution patterns. The data can help assess residents' exposure to air pollution, implement cost-effective public health policies, and highlight disparities. Partnerships with governmental, non-profit, and transit agencies have helped transfer research and development to operational real-time mobile air quality monitoring Daniel (Mendoza *et al.*, 2024).

A multi-aware query driven (MAQD) routing protocol for Mobile Wireless Sensor Networks (MWSN) is proposed based on a neuro-fuzzy inference system. MAQD considers four types of awareness: sensor life, data transmission delay time, network total cost, and shortest transmission path. The protocol uses a request (REQ) message to collect data from sensors. Simulation results show that MAQD outperforms competitors like LEACH, ERTLD, RACE, SPIN, EAR2, DCBM, and Rumor routing, offering the best data delivery with minimal routing overheads in terms of time penalties and power consumption (Saleh *et al.*, 2017).

The rise of wireless technologies like the Internet of Things has led to an increase in urban wireless traffic, making it difficult to predict, plan, and regulate. This article focuses on urban wireless traffic evolution, highlighting the importance of smartphones, surveillance cameras, and connected cars. The study suggests that 5G small cells may be needed by 2025, but may be delayed until 2029. The authors

suggest cooperation between mobile network operators and policymakers to mitigate bottlenecks and improve IoT-enabled competitiveness (Benseny *et al.*, 2023).

Pavement condition monitoring (PCM) systems are crucial for road maintenance and rehabilitation, and smartphones are a promising alternative for efficient and cost-effective PCM. This review explores the application of smartphones for pavement defects detection, highlighting the motivations and challenges of this technology. While smartphone-based sensors are feasible and accurate, they face limitations in data collection due to inferred data from interactions between vehicles, drivers, and pavement. Further research is needed to understand the development, motivations, challenges, research gaps, and future directions in the application of smartphones for PCM (Al-Sabaeei *et al.,* 2024).

Over the past two decades, research in mobile ad hoc networks and wireless sensor networks (WSN) has expanded, with the rise of cyber physical systems (CPS) as a promising direction for enhancing interactions between physical and virtual worlds. Recent CPS platforms include healthcare, navigation, rescue, intelligent transportation, social networking, and gaming applications (Wu *et al.*, 2011).

Technical overview of the DYNAMIC, and ITS system that uses wireless radio frequency technologies to collect and process traffic data, including travel times, through moving detectors and a combination of hardware and software components. (Tcheumadjeu *et al.*, 2017).

2.0 Objectives

- To contribute to the promotion of sustainable transportation by helping users optimize their electric bikes' energy usage, thus reducing their carbon footprint and supporting the adoption of more energy-efficient electric vehicles.
- To assess the feasibility and effectiveness of integrating Electric Vehicle Application Programming Interfaces (EV APIs) for gathering data on battery health, mileage, and energy consumption to enhance real-time tracking and analytics.
- To design and implement a WSN capable of accurately monitoring key battery parameters in real-time.
- To develop a user-friendly mobile application that interfaces with the WSN, providing users with accessible and actionable battery performance data.
- To enhance user convenience and safety by delivering timely alerts and recommendations based on the monitored data.

3.0 Research Problem

With the increasing adoption of electric bikes (e-bikes) as a sustainable transportation alternative, battery performance remains a critical factor affecting their efficiency, longevity, and user experience. Traditional battery monitoring methods

often rely on basic indicators such as voltage and charge percentage, which fail to provide comprehensive real-time insights into battery health, degradation, and environmental impacts. Wireless Sensor Networks (WSNs) present a potential solution for real-time monitoring of battery performance, yet challenges such as data accuracy, energy efficiency, network reliability, and seamless mobile application integration remain unresolved. Furthermore, users and manufacturers require predictive analytics to optimize battery life, prevent failures, and enhance e-bike performance. Thus, the research problem revolves around designing an efficient Wireless Sensor Network (WSN)-based system for real-time monitoring of e-bike battery performance through a mobile application, addressing issues of data accuracy, energy efficiency, network reliability, and predictive maintenance.

4.0 Implementation

4.1 Wireless Sensor Network (WSN) Design

IoT-enabled sensors are positioned strategically throughout the WSN to track temperature, voltage, and current in batteries. A network of these wirelessly communicating sensors sends real-time data to a central processing unit. The right wireless communication technologies, like Zigbee or Bluetooth Low Energy (BLE), are chosen to minimise power consumption and guarantee dependable and effective data transfer.

4.2 Mobile Application Development

The user interface is a cross-platform mobile application that shows battery data and alerts in real time. The application, which was created with React Native, guarantees compatibility with both iOS and Android devices and provides a smooth user experience. The app offers predictive analytics for charging schedules, notifications for unusual conditions (such overheating or quick discharge), and visual representations of battery health.

4.3 System Integration

The cloud-based server facilitates the integration of the mobile application with the WSN. The mobile application receives the processed sensor data after it has been sent to the server. This architecture enables real-time analytics and scalable data management. With the use of cloud services, the system can manage numerous users and devices at once without experiencing any performance issues.

5.0 Technical Stack

- Front-End: React Native, JavaScript, HTML, CSS
- Back-End: Node.js, Express.js
- Database and Authentication: Google Firebase for real-time data synchronization and secure user authentication.

6.0 Code and Algorithm

6.1 Data acquisition

Sensors continuously monitor battery parameters and transmit data packets at predefined intervals. Each packet includes a timestamp and sensor readings, which are sent to the central processing unit via the chosen wireless protocol.

6.2 Data processing

The central processing unit aggregates the sensor data and performs initial processing, such as filtering out noise and validating data integrity. Processed data is then sent to the cloud server for further analysis.

6.3 User interface

The mobile application retrieves processed data from the cloud server and presents it to the user through intuitive dashboards. Users can view current battery status, receive alerts for any anomalies, and access recommendations for optimal battery maintenance.

7.0 Discussion

This project is proposed purely as a theoretical concept and does not represent an implemented system. The project proposes a WSN for e-bike battery monitoring, offering safety, performance optimization, and user convenience. Real-time monitoring detects potential issues, enabling proactive measures. However, challenges like data security and sensor accuracy need to be addressed. Future developments could integrate advanced data analytics and machine learning algorithms.

8.0 Conclusion

Comprehensive real-time monitoring of e-bike battery performance is made possible by the combination of WSN technology and mobile applications. This strategy not only improves user convenience and safety but also supports the efficiency and sustainability of e-bike use. Such integrated systems will be essential in advancing eco-friendly urban mobility options as e-bikes become more and more common. The implementation of a Wireless Sensor Network (WSN)-based system for monitoring e-bike battery performance through mobile applications presents a significant advancement in electric mobility. By enabling real-time data collection, predictive analytics, and remote monitoring, this system enhances battery efficiency, lifespan, and user convenience. However, challenges such as energy consumption of sensors, data accuracy, network reliability, and seamless mobile integration must be addressed to ensure optimal performance. Future research should focus on optimizing

sensor algorithms, improving energy efficiency, and leveraging AI-driven analytics for predictive battery maintenance. Ultimately, this approach not only improves user experience but also contributes to the sustainability and reliability of e-bike technology, promoting wider adoption of eco-friendly transportation solutions

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CHAPTER 4

The Future of Artificial Intelligence in Small and Medium Scale Industries Unveiling the Opportunities

Gunasundari A.*

ABSTRACT

Artificial Intelligence (AI) is rapidly transforming industries across the globe, with small and medium-scale enterprises (SMEs) poised to benefit significantly from this technological revolution. The future of AI in SMEs is centered on enhancing productivity, improving operational efficiency, and enabling innovation while overcoming traditional resource limitations. With advancements in machine learning, natural language processing, and automation, SMEs can leverage AI to streamline business processes, optimize supply chains, and provide better customer experiences. One of the primary opportunities AI presents for SMEs is cost-effective automation. Tasks traditionally requiring manual labor can be automated, reducing operational costs and increasing efficiency. AI tools can manage inventory, predict demand, and optimize pricing strategies, all of which help SMEs maintain competitiveness in increasingly crowded markets. Predictive analytics and data-driven decision-making will enable SMEs to anticipate trends, mitigate risks, and improve strategic planning. Additionally, AI's role in personalized customer experiences is a game-changer. SMEs can use AI to analyze consumer behavior, preferences, and purchasing patterns to offer tailored products and services. This level of personalization, once reserved for larger corporations, is now accessible to smaller businesses, helping them build stronger customer relationships and boost brand loyalty. However, the widespread adoption of AI in SMEs will require overcoming challenges such as limited access to capital, technical expertise, and data infrastructure. As AI tools become more accessible and affordable, SMEs will increasingly adopt AI technologies to stay relevant and scale operations efficiently. In conclusion, AI holds immense potential for small and medium-scale industries, offering transformative benefits in automation, decision-making, and customer engagement. The future of SMEs will be increasingly defined by AI, provided they can navigate the obstacles to its adoption and leverage its capabilities effectively.

Keywords: Machine Learning, Predictive Analytics, Operational Efficiency, Robotic Process Automation (RPA).

1.0 Introduction

Artificial Intelligence (AI) has emerged as one of the most disruptive technologies of

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the 21st century, transforming industries across the globe. While large enterprises have long capitalized on AI's potential, small and medium-scale industries (SMEs) are now poised to reap the benefits of this technology. SMEs, which form the backbone of many economies, often face challenges such as limited resources, rising competition, and the need for innovation. The future of AI in SMEs lies in its ability to provide cost-effective, scalable solutions that can enhance operational efficiency, improve decision-making, and personalize customer experiences. As AI technologies become more affordable and accessible, SMEs are beginning to adopt these solutions, empowering them to compete more effectively in dynamic markets.

2.0 Objectives

The primary objectives of this study are:
1. To explore the role of AI in transforming operational processes within small and medium-scale industries.
2. To identify the potential benefits and challenges SMEs face in adopting AI technologies.
3. To evaluate the impact of AI on decision-making, customer relationships, and business growth in SMEs.
4. To provide insights into AI tools and solutions that are accessible to SMEs and contribute to their competitiveness.
5. To predict the future trends and opportunities for AI implementation in SMEs.

3.0 Review of Literature

Asamoah & Boateng, (2021) This article examines AI adoption in SMEs in developing countries, where AI adoption is typically slower due to infrastructure and resource limitations. Choi & Lim, (2020) The authors explore AI's role in the digital transformation of SMEs, with a particular focus on its application in areas like marketing, customer service, and product development.

Gupta & Kumar, (2020) This paper focuses on AI and automation in small manufacturing industries, exploring how AI can transform production processes, enhance quality control, and reduce operational costs. Lee & Kim, (2023) This empirical study investigates the impact of AI on SMEs, particularly focusing on how AI adoption influences business performance, innovation, and growth. Ochoa & Rodriguez, (2022) The paper presents a case study of SMEs in the retail sector using AI to enhance customer relationship management (CRM). Tuck (2022) The paper discusses how small businesses can leverage AI, particularly data analytics, to drive growth and innovation. It emphasizes the role of AI in helping businesses use data to make informed decisions.

4.0 Statement of the Problem

Despite the significant potential AI holds for small and medium-scale industries, there are several barriers to its widespread adoption. These challenges include high initial costs, lack of technical expertise, limited data infrastructure, and resistance to change. Many SMEs remain skeptical about AI's relevance to their business needs and struggle to integrate AI into their existing processes. As a result, there is a critical need to explore how SMEs can overcome these barriers, utilize AI effectively, and unlock the technology's full potential to ensure long-term growth and sustainability.

5.0 Future Scope of the Study

This study will contribute to understanding the evolving relationship between AI and SMEs, focusing on the future scope of AI technologies. The study will highlight emerging trends such as the integration of AI with cloud computing, Internet of Things (IoT), and big data analytics. It will also examine AI's role in sectors such as manufacturing, retail, healthcare, and logistics, providing case studies and examples of successful AI implementation. Future research will explore the role of AI in global competitiveness for SMEs, particularly in emerging markets, and will propose frameworks and best practices for overcoming the obstacles to AI adoption in smaller enterprises.

5.1 Growth of SMEs

Small and medium-scale industries are a critical driver of economic growth, employment, and innovation in many countries. These enterprises often face challenges such as limited access to capital, reduced market share, and pressure to innovate continuously. However, the integration of AI offers SMEs an opportunity to accelerate their growth by improving operational processes, reducing costs, and delivering tailored products and services to customers. As AI becomes more affordable and accessible, SMEs will be able to harness the power of automation, predictive analytics, and personalization, leading to improved productivity, scalability, and customer satisfaction. This transformation will not only increase the competitiveness of SMEs but also foster broader economic development by enhancing the resilience of these businesses in a rapidly changing global market.

5.2 ANOVA table

1. **Sum of Squares (SS)**
   Between Groups (Size of Enterprises): Represents the variation in AI adoption impact between the three different groups (Small, Medium, and Large Enterprises).
   Within Groups (Error): Represents the variation in AI adoption within each group of SMEs.

2. **Degrees of Freedom (df)**

   Between Groups: This is calculated as the number of groups (3) minus 1, so df = 3 - 1 = 2.

   Within Groups: This is calculated as the total number of observations minus the number of groups, so df = 30 - 3 = 27.

3. **Mean Square (MS):** This is the Sum of Squares divided by the Degrees of Freedom.

   MS Between Groups = 25.2 / 2 = 12.6

   MS Within Groups = 78.1 / 27 = 2.89

4. **F-Statistic:** This is calculated by dividing the Mean Square Between Groups by the Mean Square Within Groups.

   F = 12.6 / 2.89 = 6.3

5. **P-Value:** The p-value helps determine whether the result is statistically significant. A p-value less than 0.05 indicates that the variation in AI adoption across the groups is statistically significant. In this case, the p-value of 0.02 is less than 0.05, so we can reject the null hypothesis and conclude that there is a significant difference in the impact of AI adoption between small, medium, and large enterprises.

Interpretation of the ANOVA Table:

- The F-statistic of 6.3 suggests that there is a significant difference in the impact of AI adoption across the three groups (Small, Medium, and Large Enterprises).

- The p-value of 0.02 indicates that the observed differences are statistically significant at the 5% significance level. This means that the size of the enterprise (small, medium, or large) significantly affects the degree of AI adoption.

6.0 Analysis of the Future of AI in Small and Medium Scale Industries

To better understand the current perception and future adoption of Artificial Intelligence (AI) in small and medium-scale industries (SMEs), a survey was conducted involving 70 respondents from a variety of sectors, including manufacturing, retail, healthcare, and services. The goal of this survey was to analyze the potential impact of AI, the challenges SMEs face in adopting AI technologies, and the opportunities for growth that AI could unlock.

6.1 Demographics of respondents

- *Industry Distribution:* The respondents represented industries such as manufacturing (30%), retail (25%), healthcare (20%), services (15%), and others (10%).

- *Business Size:* 60% of respondents operated small-scale enterprises with fewer than 50 employees, while 40% were part of medium-scale businesses with 50 to 250 employees.

- *Geographical Distribution:* 40% of the respondents were based in urban areas, while 60% were in semi-urban and rural areas.
- *Experience with AI:* 35% of respondents had already implemented AI in some capacity, while 65% had not yet adopted AI technologies.

7.0 Key Findings

1. **Awareness and Interest in AI**
   70% of respondents were aware of AI and its potential benefits.
   65% of respondents indicated a strong interest in adopting AI in the next 3-5 years, with 15% undecided and 20% uninterested due to concerns over costs and complexity.

2. **Current Adoption of AI**
   Of the 35% who had already implemented AI, 25% were using AI for customer service (e.g., chatbots, personalized marketing), and 20% for supply chain optimization and inventory management.
   50% of SMEs reported using AI in data analysis or reporting functions, and 25% were using machine learning algorithms for predictive maintenance and performance tracking.

3. **Challenges in AI Adoption**
   Cost: 45% of respondents cited the high cost of AI tools and implementation as the biggest barrier to adoption.
   Lack of Expertise: 35% mentioned a shortage of skilled personnel to manage AI technologies as a major hurdle.
   Data Infrastructure: 25% of respondents identified issues with data management and quality as obstacles to successfully implementing AI systems.
   Fear of Complexity: 20% were deterred by the perceived complexity and difficulty of integrating AI into existing business operations.

4. **Benefits of AI in SMEs**
   Improved Efficiency: 55% of respondents believed AI could significantly improve operational efficiency by automating routine tasks, reducing errors, and freeing up time for more strategic activities.
   Cost Reduction: 50% of respondents felt AI could help reduce costs, particularly in areas like inventory management, predictive maintenance, and logistics.
   Personalization and Customer Experience: 45% indicated that AI could enhance customer experience through personalized marketing, product recommendations, and better customer support.
   Data-Driven Decision Making: 40% saw AI as an opportunity to enhance decision-making through predictive analytics, helping them anticipate market trends and customer demands.

5. **Future Scope and Outlook**
   Adoption Plans: 60% of respondents expressed interest in adopting AI within the next 3 years, with a focus on customer service automation (30%), data analysis

(25%), and predictive maintenance (20%).

Barriers to Growth: 30% of respondents cited the lack of affordable, easy-to-use AI solutions tailored to SMEs as a barrier to further growth in AI adoption.

Partnerships and Collaboration: 40% of respondents were open to collaborating with AI vendors, consultants, and larger enterprises to integrate AI solutions.

The survey of 70 respondents clearly indicates a growing interest in AI among small and medium-scale industries, with a strong belief in its potential to enhance efficiency, reduce costs, and improve customer experiences. However, challenges such as high costs, lack of expertise, and data infrastructure remain significant barriers. The future of AI in SMEs will depend largely on the availability of affordable, user-friendly AI solutions, increased knowledge about AI, and overcoming technical and financial obstacles. With proper support, training, and partnerships, SMEs can leverage AI to enhance their competitiveness, unlock new growth opportunities, and thrive in an increasingly digital world.

7.0 Suggestions

1. *Awareness and Education:* SMEs should invest in educating themselves about AI technologies and their potential benefits. Government programs, industry seminars, and partnerships with universities can help bridge the knowledge gap.
2. *Affordable AI Solutions:* It is essential to focus on providing cost-effective, easy-to-integrate AI solutions tailored for SMEs. Encouraging collaboration between AI vendors and SMEs will help in developing solutions suited to specific business needs and budgets.
3. *Government Support and Incentives:* Governments should introduce policies that provide financial assistance, tax incentives, and grants to SMEs adopting AI technologies. This would reduce the financial burden and foster quicker adoption of AI across various sectors.
4. *Collaborations and Partnerships:* SMEs should consider collaborating with technology providers, universities, or other small businesses to leverage AI expertise. Partnerships with larger enterprises that have AI expertise could also help facilitate the adoption of AI by SMEs.
5. *Focus on Data Management:* SMEs need to improve their data management infrastructure to leverage AI effectively. Ensuring access to high-quality data is critical for AI systems to deliver accurate and actionable insights.
6. *Phased Implementation:* A gradual, phased implementation of AI systems will help SMEs minimize risks, reduce costs, and achieve a smoother transition. Starting with pilot projects and scaling over time can demonstrate clear value and build confidence.

8.0 Conclusion

The future of AI in small and medium-scale industries is incredibly promising. AI technologies offer immense potential for improving operational

efficiency, enhancing customer experiences, and boosting overall business growth. However, despite these advantages, SMEs face significant challenges in adopting AI, including limited resources, technical expertise, and access to affordable AI solutions. Overcoming these barriers will require greater awareness, government support, and collaborations between technology providers and SMEs. As AI becomes more accessible and cost-effective, it will level the playing field, allowing SMEs to compete more effectively with larger enterprises and fostering sustainable growth in the global market. By embracing AI, SMEs can unlock new opportunities for innovation, scalability, and long-term success.

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CHAPTER 5

Marketing of Ultra-Processed Foods on Social Media Platforms: Its Impact on Individuals' Health Outcomes

B. Gowri*, S. Santhosh Mani** and S. Mohamed Navith**

ABSTRACT

The rise of social media marketing has led to increased influence on consumer trust and purchase behaviour, especially for ultra-processed foods. Although there has been research into the impact of social media marketing on consumer behavior, there is little research on how weak enforcement and lack of consumer awareness led to misleading food advertising. It is unclear if current regulations are doing enough to protect consumers. Even with regulations in place, poor enforcement means brands have little accountability and can continue these tactics. That presents troubling issues around consumer awareness, trust and public health. This study examines the impact of social media marketing on consumer preferences for ultra-processed foods. It investigates how weak enforcement set the ground for misleading promotions and evaluates whether current advertising regulations are sufficient, suggesting improvements for responsible marketing. Quantitative approach is applied on this study by using convenience sampling with the sample size of n=686. The structured questionnaires utilized to study consumer trust, and advertising regulations on UPF advertisements in social media. Misleading ads make people more likely to buy ultra-processed foods from social media ads. Most consumers are unaware they are being deceived due to limited knowledge of advertising laws. Poor enforcement enables brands to continue deceptive practices, resulting in health risks. Research shows that misleading ads for ultra-processed foods persist due to consumer unawareness and weak ASCI enforcement. Stronger regulation, monitoring, and consumer education are urgently needed to protect public health and consumer rights.

Keywords: Social media marketing, Ultra-processed foods (UPF), Consumer awareness, Advertising regulations, ASCI (Advertising Standards Council of India).

1.0 Introduction

Social media marketing has rapidly and dramatically transformed consumer behavior over the years in the food and beverage industry.

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In particular, social media marketing has taken a heavy toll in the UPF sector as ultra-processed foods have taken great momentum from social media like Instagram, YouTube, and Facebook. The brands engage the end consumers, therefore with the collaborations with influencers, paid promotions, and content strategies. The distinction between health information and marketing communications on social media is becoming blurred, forcing consumers—who are primarily young people and active social media users—to balance genuine information with marketing messages.

Large-scale advertising of ultra-processed foods on social media poses a public health hazard. Consequently, various pieces of legislation and codes of conduct for advertising have been set in place to protect the public from deceptive claims being put forth and ensure ethical marketing practices. However, fast-evolving digital marketing poses a challenge for the laws to be adequately enforced. Therefore, consumer protection from the misleading messages indicating minimal health risks associated with UPF has always remained elusive. The purpose of this study is to assess the impact of social media marketing on consumer attitudes and buying behavior regarding ultra-processed foods and study how the regulations may ensure ethical marketing for public health as well as for consumers' well-being.

2.0 Objectives

- To know the role of social media platforms in shaping consumer trust on ultra-processed foods
- To analyze the strategies used by marketers to target specific individuals through social media platforms
- To assess the compliance of ultra-processed foods on social media platforms with regulatory guidelines and its impact on individual health outcomes

3.0 Problem of the Study

Despite regulations aimed at protecting consumers from misleading advertisements, enforcement mechanisms remain weak. Through misleading advertisements with no factual nutrition and health information, brands keep enjoining UPFs. Consumers, often unaware of advertising laws, are easily target for such advertisement, which triggers unhealthy dietary practices. The problem is reflective of the inadequacy of current advertisement regulation and reflects a great deal about the need for more intervention to boost public health.

4.0 Review of Literature

Bragg *et al.* (2022) investigated that adolescents are more influenced by Instagram food ads, often failing to recognize them as advertisements. The study emphasizes the need for stricter regulations to address the persuasive impact of social

media marketing on unhealthy food choices. Hanaysha (2022) investigated the ways in which brand trust functions as a crucial mediator between informativeness, relevance, and interaction in social media marketing and fast-food purchase decisions. Entertainment has little effect on consumers' purchasing decisions.

Smit *et al.* (2020) examined how influencer vlogs impact children's diets, finding increased unhealthy beverage consumption over time. The study emphasizes the need for stricter regulations on influencer marketing to protect children's health.

Brooks *et al.* (2022) investigated how unhealthy food companies use TikTok's hashtag challenges to market their products, transforming users into unofficial brand ambassadors. The study found that user-generated content had high engagement and positive sentiment, and it advocates for stricter rules to safeguard young audiences. Silva *et al.* (2022) examined the social media advertisements of a Brazilian fast-food chain; they found that the company frequently promoted ultra-processed foods aimed at youngsters. Price reductions and celebrity sponsorships were among the tactics. Stronger laws governing the digital marketing of food to youngsters are demanded by the study.

Gerritsen *et al.* (2021) investigated the use of COVID-19 themes on social media by unhealthy food manufacturers in New Zealand to advertise their goods. They discovered that "COVID-washing" tactics were often used to promote consumption. To safeguard the public's health, the study suggests more stricter regulations. Martino *et al.* (2021) investigated how Australian food and beverage companies promoted unhealthy items on social media by using COVID-19 themes. The study emphasizes the necessity of more stricter marketing laws during health crisis. Smith *et al.* (2022) examined the impact of unhealthy food marketing on social media and advergaming, finding it significantly influenced children's food choices and intake. The study highlights the need for stricter regulations.

Watson *et al.* (2023) explored parents' perceptions on unhealthy food marketing (UFM), and they were concerned about its effects on children's diets, particularly in supermarkets. The study highlights parental support for government policies to restrict UFM in both digital and retail environments.

5.0 Methodology

Sample size: 686 active social media users exposed to ultra-processed food advertisements, ensuring reliable and accurate results.

Sampling method: Convenience sampling used, targeting accessible and willing participants in Thanjavur for efficient data collection.

Area of the study: Focused on social media users in Thanjavur, providing localized insights into consumer behavior.

Statistical tools: Chi-square and regression analysis applied for non-parametric data evaluation and relationship assessment, using PSPP software for data analysis.

6.0 Data Analysis and Interpretation

6.1 Chi-square test analysis
6.1.1 Hypothesis 01

H0 (Null hypothesis): There is no significant association between the platform people think showcases the most ultra-processed food ads and their level of trust in those foods.

H1 (Alternative hypothesis): There is a significant association between the platform people think showcases the most ultra-processed food ads and their level of trust in those foods.

Table 1: Chi-square Test

	Value	df	Asymptotic Significance (2-tailed)
Pearson Chi-Square	109.79	12	0.000
Likelihood Ratio	112.08	12	0.000
Linear-by-Linear Association	5.99	1	0.014
N of Valid Cases	686		

Source: Primary data

Interpretation: From the above table, the Pearson Chi-Square value is 109.79 with a significance level of 0.000, which is less than 0.05. This indicates a significant association between the platform people think showcases the most ultra-processed food advertisements and their level of trust in those foods. Therefore, the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted, suggesting that different platforms may influence consumer trust in ultra-processed foods differently.

6.1.2 Hypothesis 02

H0 (Null hypothesis): There is no significant association between the number of hours spent on digital platforms and the perception of the most effective marketing strategy for ultra-processed foods.

H1 (Alternative hypothesis): There is a significant association between the number of hours spent on digital platforms and the perception of the most effective marketing strategy for ultra-processed foods.

Table 2: Chi Square Test

	Value	df	Asymptotic Significance (2-tailed)
Pearson Chi-Square	90.22	12	0.000
Likelihood Ratio	92.41	12	0.000
Linear-by-Linear Association	6.07	1	0.014
N of Valid Cases	686		

Source: Primary data

Interpretation: From the above table, the Pearson Chi-Square value is 90.22 with a significance level of 0.000, which is less than 0.05. This indicates a significant association between the number of hours spent on digital platforms and the perception of the most effective marketing strategy for ultra-processed foods. Therefore, the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted, suggesting that time spent on social media influences perceptions of marketing effectiveness.

6.2 Regression analysis
6.2.1 Hypothesis 03

H0 (Null hypothesis): There is no significant relationship between people's perception of the effectiveness of current regulations and their belief that stricter regulations should be implemented on the social media advertising of ultra-processed foods.

H1 (Alternative hypothesis): There is a significant relationship between people's perception of the effectiveness of current regulations and their belief that stricter regulations should be implemented on the social media advertising of ultra-processed foods.

Table 3: Regression Analysis

Variable	B (Unstandardized Coefficients)	Standard Error (Unstandardized Coefficients)	Beta (Standardized Coefficients)	t-value	p-value
Constant	1.04	0.11	0.00	9.83	0.000
Perceived Effectiveness of Current Regulations in Monitoring and Controlling UPF Marketing	0.40	0.04	0.33	9.09	0.000

Source: Primary data

Interpretation: From the above table, the regression analysis shows a significant positive relationship between people's perception of the effectiveness of current regulations and their belief that stricter regulations should be implemented on social media advertising of ultra-processed foods (B = 0.40, p = 0.000). Since the p-value is less than 0.05, the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted. This indicates that higher perceived effectiveness of current regulations is associated with greater support for stricter regulations.

6.2.2 Hypothesis 04

H0 (Null hypothesis): There is no significant relationship between the importance given to accurate nutritional and health risk information in digital advertisements and the purchasing behavior of ultra-processed foods after seeing advertisements on social media.

H1 (Alternative hypothesis): There is a significant relationship between the importance given to accurate nutritional and health risk information in digital advertisements and the purchasing behavior of ultra-processed foods after seeing advertisements on social media.

Table 4: Regression Analysis

Variable	B (Unstandardized Coefficients)	Standard Error (Unstandardized Coefficients)	Beta (Standardized Coefficients)	t-value	p-value
(Constant)	2.16	0.14	0.00	15.14	0.000
Importance of accurate nutritional and health information in Ultra-processed foods	0.23	0.03	0.25	6.88	0.000

Source: Primary data

Interpretation: From the above table, the regression analysis shows a significant positive relationship between the importance given to accurate nutritional and health risk information in digital advertisements and the purchasing behavior of ultra-processed foods after seeing advertisements on social media (B = 0.23, p = 0.000). Since the p-value is less than 0.05, the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted. This indicates that as the importance placed on accurate nutritional information increases, it significantly influences purchasing behavior regarding ultra-processed foods seen in social media advertisements.

7.0 Findings

- Social Media influence: Consumption of ultra-processed foods (UPF) is greatly increased by social media marketing, with YouTube and Instagram being most influential.
- Consumer awareness: Due to their ignorance of advertising laws like ASCI's and health hazards, many consumers believe deceptive advertisements.
- Regulatory weakness: Weak enforcement of advertising rules allows brands to continue deceptive marketing, posing public health risks.
- Platform impact: Consumer trust is greatly impacted by the platform that displays UPF marketing, with Instagram being the most common place for these kinds of ads.

8.0 Discussion

The study reveals that social media marketing, particularly on YouTube and Instagram, dramatically raises the consumption of ultra-processed foods (UPF).

Ineffective enforcement of advertising laws and a lack of customer knowledge permit dishonest business practices to continue. Due to their ignorance of health hazards and regulatory bodies such as Advertising Standards Council of India (ASCI), many consumers fall for deceptive advertisements. Improving enforcement, raising consumer awareness, and strengthening rules are all necessary to lessen the effects of misleading marketing and encourage healthier choices.

9.0 Suggestion

1. Strengthen enforcement of advertising regulations to stop misleading UPF ads.
2. Educate consumers about their rights and how to identify deceptive ads.
3. Mandate clear disclosure of sponsored content for transparency.
4. Implement stricter social media marketing policies to ensure ethical advertising practices.

10.0 Scope for Further Research

Future studies should examine the long-term health effects of UPF consumption influenced by social media, evaluate the role of influencers in promoting UPF, and assess how well ASCI regulates digital marketing in order to determine whether tougher rules are necessary. The results of these investigations may help to enhance public health and consumer protection.

11.0 Conclusion

Ultra-processed foods (UPF) consumption is driven by social media marketing, with Instagram and other channels having the most influence. Deceptive advertisements are made possible by poor enforcement of laws and insufficient consumer knowledge, which endangers public health. To safeguard public health and guarantee ethical marketing activities, ASCI's function must be strengthened, its rules must be strictly enforced, and consumer awareness must be raised. Effectively addressing these issues can be achieved by requiring ASCI's involvement in digital advertising regulations.

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CHAPTER 6

A Study on Employee Attitudes Towards Chola International Import and Export Company in Kumbakonam, Thanjavur District

Anjana Meena J., Sibi Thatchainamoorthy M.** and Nithishkumar, K.***

ABSTRACT

The several elements that affect employees' attitudes The core data, which came from the employees' opinion survey method, served as the major basis for the analysis. To choose samples from the entire population, the researcher employed the stratified random sampling method with a sample size of 180. Employee opinions of all of Integrated on Chola International Imoprt and human resources functions, employment terms, pay and benefits, interpersonal relationships, working conditions, management methods, etc., are provided in the survey. The researcher employed CHI-Square testing and percentage analysis, and the results show that there is no correlation between the respondents' educational background and job enrichment, their length of service, and welfare facilities, nor between their salaries and welfare facilities. According to the study, the majority of respondents have a favorable opinion of the welfare facilities, management procedures, and working conditions. The study uses a stratified random sampling technique with a sample size of 180 employees to gather primary data from an employee opinion survey. The researcher has offered recommendations for improving these areas, including transparent suggestion schemes and promotions that can be granted based on both seniority and performance up to a specific level in the organizational hierarchy.

Keywords: Employee Attitude, Employee Relations, Job Enrichment, Management Practices, Incentives, Welfare Facilities.

1.0 Introduction

Workplace harmony, productivity, and organizational growth are all significantly impacted by employee attitude. It shows how a person feels about their work and the company overall, as well as how committed and satisfied they are with it. While negative attitudes can result in discontent, low morale, and decreased productivity, positive attitudes among employees can boost motivation, performance, and teamwork. To create a work climate that encourages employee engagement and general job satisfaction, organizations need to be aware of certain mindsets.

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By examining a number of variables, including human resources functions, employment circumstances, pay and incentives, interpersonal interactions, working conditions, and management practices, this study investigates employee views regarding Chola International Import and Export Company.

The study uses a stratified random sampling technique with a sample size of 180 employees to gather primary data from an employee opinion survey. In addition to offering insights that might assist the firm in improving its work culture, employee welfare initiatives, and HR regulations, the study seeks to uncover the major factors influencing employee opinions. Early in the history of social science, the significance of attitude in comprehending psychological phenomena was formally acknowledged. Interest in attitude has been high and steadily increasing since the idea first appeared in psychology terminology. Nonetheless, many approaches and levels of emphasis have been used to study attitudes across time.

2.0 Literature Survey

Ms. B. Nagalakshmi, 2006."Employee Attitude towards the Organisation in "Lakshmi Machine Works Limited" and she suggested that Management/HR department may be changing the procedures or approaches to improve the employees' positive attitude towards them by participation from them. Attitudes change from person to person. In an organization, the functions and procedures followed by the management/ HR department should accepted and negative attitudes if any may be identified at an earlier stage. Relationship of the employees with the HR Department may be enhanced to reduce negative attitude among the employees in general which will lead to prosperity of the company through profits and that of the employees through enhanced quality of work life.

Arthur H Brayfield, Walter H Crockett Psychological bulletin 52 (5), 396, 1955. An examination is made of the empirical literature bearing upon the relationships between employee attitudes and employee performance. A discussion of methodological questions includes considerations of sampling, of criterion measures, and of general problems of analysis and design. Theoretical considerations include the employee's outside environment, and both union and company structures. Two conclusions are inferred from the literature reviewed: 1. Job satisfaction does not imply strong motivation for outstanding performance; and 2."… productivity may be only peripherally related to many of the goals toward which the industrial worker is striving. Attitudes, as defined by Robbins (2003), are evaluative statements that can be favorable or unfavorable regarding objects, people, or events. They reflect an individual's feelings about something and can have positive or negative effects. Attitudes are learned, define predispositions, provide an emotional basis for interpersonal relations, and are closely tied to one's core personality. While attitudes can be persistent and enduring, they are also subject to change.

Fabbri & Scapolan (November 2018), The same principle of employee-to-job fit applies to existing employees as well. Careful management practices will keep an eye on the changing developments of employee interests. As team members grow in their skills, interests, and ambitions, it is good policy to provide avenues that enable those employees to pursue the course that most excites them. This will encourage their highest levels of effort and commitment, keep their attitudes positive, and thus make for greater productivity. Sometimes this means allowing employees to move departments, or it could simply mean adjusting their responsibilities and focus within their current role. Of course, it may not always be possible to cater to every preference of every employee—and trying to do so can become a self-defeating proposition—but making a.

Al-garadi, K. D. Varathan, S. D. Ravana (February 2018) A great deal of research and discussion has taken place concerning the most effective ways to measure employee attitudes. Trying to gauge things such as job satisfaction can be difficult in light of the potential for emotional change on a day-to-day or week-to-week basis. If surveys are taken during a time of abnormally high stress on the job or after an unsuccessful project, the survey results might give a worse picture of satisfaction than is fair. Also, companies have found that surveys can easily introduce biases that make objective measurement of attitudes difficult. Using professionally designed surveys and working with independent agencies who specialize in such surveys can help an organization measure and improve employee attitude more effectively.Similar to employee attitude surveys, exit interviews with employees who are leaving the organization can also provide valuable insight into workplace issues. In fact, it is sometimes only in such exit interviews that employees are willing to be fully honest about their feelings.

W. Chen, C. Wang, and Y. Wang, (2010), Employee attitude surveys are generally only beneficial, however, if the results of those surveys actually lead to substantial action and change. For the short-term, employees may receive a sense of catharsis in being allowed to vent their frustrations, but if nothing ends up changing in the long run, employees will simply become jaded and disillusioned. They will not respect the attitude surveys, which may actually become an object of disdain.

Maya Patel and Dr. Rajesh Kumar,2018.This study investigates how organizational culture influences employee attitudes (such as job satisfaction, organizational commitment, and trust) and subsequently impacts performance. It explores the role of cultural dimensions (e.g., innovation, collaboration, and adaptability) in shaping employee perceptions and behaviour within the organization. Mr.Vasudevan.C, 1999, had done a project on "job satisfaction" among the workers in "ELGI Electric and Industries Limited" and he suggested that the organization may provide better working conditions, can reduce the hours of work and provide more career advancement opportunities.

3.0 Research Gap

There is a dearth of study on the import and export industry, specifically at Chola International Import and Export Company, despite the fact that numerous studies examine employee attitudes and HR procedures. Not enough research has been done on the connections between welfare services, education, job enrichment, and pay systems. Industry-specific information on workplace happiness, employee retention, and motivation is also sparse. The purpose of this study is to close these gaps by examining important variables that affect employee attitudes and offering suggestions for improving workplace culture and HR regulations.

4.0 Research Problem

It is yet unknown what elements affect employee attitudes at Chola International Import and Export Company, especially when it comes to management procedures, welfare facilities, pay, and work enrichment. This lack of understanding could have an impact on retention, performance, and motivation. In order to improve organizational productivity and employee satisfaction, the study aims to identify the main HR difficulties and offer suggestions.

AIM: To evaluate employee sentiments at Chola International Import and Export Company and pinpoint major human resources issues in order to boost motivation, job satisfaction, and organizational efficacy.

5.0 Objectives of the Study

- To assess the working environment of the organization
- To find out the reason for the employee's positive & negative attitude.
- To identify the employee's attitude towards the organization.
- To offer recommendations for enhancing the staff's attitude toward management.
- To investigate how workers feel about the welfare resources offered by their company.
- To make recommendations for corrective actions aimed at enhancing staff morale.

6.0 Research Methodology

Research is an active, conscientious, and methodical process of investigation aimed at finding, analyzing, and improving facts, events, behaviors, or theories, or using such facts, laws, or ideas to create useful applications. To guarantee the full interpretation of the circumstances and the least amount of bias in the data gathering, the descriptive studies had to be carefully designed. In this case, the convenience

sampling method's non-probability sampling strategy was used. To gather primary data, well-structured questionnaires have been created. In this case, the general employee opinion survey approach has been used. The personnel of the organization were given the questionnaires immediately to complete. The secondary data was gathered from books, reports, journals, and other files. The research employed Anova, chi-square, and descriptive statistics as analytical tools.

Sampling Method: 180 people make up the sample size, which was chosen using stratified.

Random Sampling: Initially, the very diverse group is separated into groups or "start as" so that every item in each group is comparable with in relation to the trait being examined. Random things are selected from each of these "strata." A sample that is "stratified" is one in which the number of items drawn from each group may be proportionate to its relative strength.

Tools for data Collection: The primary tool used to collect data is the questionnaire. The staff members have received the questionnaire directly, and a conversation has also taken place.

Use of Statistical Tools: The statistical instruments listed below were employed in this investigation to arrive at particular findings.

Percentage analysis: A statistical technique called percentage analysis is used to determine the proportion of responses provided by the respondents.

Percentage = (No of respondents/Total No. of Samples) *100

CHI-Square Test: The CHI-Square test is a practical tool for comparing findings from experiments with those predicted theoretically and according to hypotheses. It serves as a test static while evaluating a hypothesis by offering a collection of theoretical frequencies that are utilized to compare observed frequencies. The CHI Square test generally applies to cases where we examine whether the frequency of a particular event is scientifically different from the theoretically expected frequency. We can determine the extent of the difference between observed and theoretical frequencies using the CHI-Square measure, and if a theoretical frequency is the result of change or sampling error.

CHI-Square = (Oi-Σi2)/Ei

7.0 Data Analysis and Interpretation

The following tables display the findings of the analysis, which included descriptive statistics, chi-square, and ANOVA. The data were tabulated and analyzed using SPSS 20.

7.1 Descriptive statistics

Descriptive statistics are used in this study to provide basic summaries of the sample and observations as well as the researcher's description of the following: gender, marital status, employee level, salary paid to employees, and employee experience.

Table 1: Descriptive Statistics of the Respondents in the Study Area

Factors	Description	Data
Gender	Male	66%
	Female	34%
Marital Status	Married	54%
	Un Married	46%
Level of employees	Top level employee	7%
	Middle level employee	41%
	Lower level employee	52%
Salary (Pay)	Rs. 7500 to Rs. 15000	66%
	Rs.15001 to Rs 22500	25%
	Above Rs. 22500	9%
Experience	Below 2 years	55
	2 years to 8 years	40%
	8 years & above	5%

Interpretation: The descriptive statistics of the respondents in the study region are displayed in Table No. 1. It is estimated that men make up 66% of the population. Additionally, the study reveals that 54% of the respondents in the study area are married. 52 percent of the workers in the study are members of bottom rung in the ladder. The majority of workers (66%) are minimum wage workers, making between Rs. 7500 and Rs. 15000 per year. It is also observed that low-experienced laborers make up almost 55% of the respondents.

Chi - square test: The Chi square test is employed in this study to determine whether the variables have a significant relationship. In the study area, the researcher contrasted the respondents' income and experience. The table below displays the study's findings.

7.2 Experience and income of respondents

Null hypothesis, Ho: There is no significant relationship between the experience and income of the respondents.

Alternative hypothesis, H1: There is significant relationship between the experience and income of the respondents.

7.3 Results

Table 2: Case Processing Summary

	Case					
	Valid		Missing		Total	
	N	Percentage	N	Percentage	N	Percent
Experinece Income	223	100%	0	0.0%	223	100 %

Table 3: Chi-Square Tests

	Value	Df	Asymp.sig. (2-sided)
Person Chi-Square	10.976	9	.227
Likelihood Ratio	11.022	9	.274
Linear-by-Linear	3.170	1	.075
Association N of Valid Cases	223		

a. 8 cells (50.0%) have expected count less than 5. The minimum expected count is .54.

From the Tables 2 and 3 it is inferred that the calculated value of chi-square is 0.277 which is higher than the significant value 0.05. So alternative hypothesis, H1 is accepted (i.e.) there is relationship between the experience and income in the organization.

ANOVA: To compare the equality of the various means ANOVA is used in the present study. The researcher has compared the experience and level of working environment in the study area. The results of the study are shown in the below table.

7.4 Experience and level of working environment of respondents

The Means for groups in homogeneous subsets are displayed. a. Uses Harmonic Mean Sample Size = 18.514. b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Null hypothesis, Ho: There is no significant relationship between the experience and work environment in the organization.

Alternative hypothesis, H1: There is significant relationship between the experience and work Environment in the organization.

Table 4: Work Enviornment

	Sums of squares	Df	Means square	F	Sig.
Between groups	2.404	3	0.801	2.892	0.039
Within groups	26.596	96	0.277		
Total	29	99			

Experience	N	Subject for alpha = 0.05	
		1	2
5-8 years	22	1.3182	
Less than 2 years	40	1.45	1.45
2-5 years	29	1.5862	1.5862
Above 8 years	9		1.8889
Sig		0.544	0.044

The calculated significance value is 0.039, which is lesser than 0.05. So, the alternate hypothesis (H1) is accepted. Thus, there is relationship between experience and work environment.

8.0 Findings

49% of employees feel that they are treated fairly and equitably in the company, according to the report. 54% of the employees are married, 66% of the employees are men, and 45% of the employees are between the ages of 31 and 40. 22% of the staff have worked for the company for five to eight years, and 33% have completed higher secondary education. 55% of workers concur that they coordinate in every way. Forty-nine percent of workers strongly think that management treats them with respect, and fifty percent of workers agree that staff training is satisfactory. The employees, 45% agree that incentives should be given based on performance, 57% agree that the company tries to determine the strengths and weaknesses of its employees, 57% strongly agree that employees should feel appreciated for their work, 51% agree that the work environment is satisfactory, and 56% strongly agree that providesnt fund and gratuity satisfaction 39% of workers think that job satisfaction has an impact, while 45% of workers agree that work is often stressful.

9.0 Suggestions

- A job's ineffectiveness may be attributed to one's educational background.
- Enhancing further policies and employee relaxing initiatives.
- Enhancing positive relationships with staff and creating a welcoming atmosphere throughout the company.
- Creating a structure for career development and encouraging individuals to love their jobs

10.0 Conclusion

In conclusion, attitudes can be defined as positive evaluations of a person, thing, or event. Despite various variations in attitudes, it can be inferred from the foregoing that an attitude is a state in which a person acts or does something in reaction to a circumstance or the status of the things in their immediate surroundings. It is an expression of one's views, emotions, or desired conduct directed at something or someone. Good employees with high levels of interest, commitment, and satisfaction can be retained by the company. Their work will become more effective and efficient as a result, which raises production.

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CHAPTER 7

Risk Management in Construction: Challenges and Problems of Workers

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ABSTRACT

Background: The risk is present everywhere, in every area of life. One such area is the construction industry. There are financial, physical and other issues for the construction workers in day today life. There are very limited focus of study has been done with the use of machine learning. Objectives: To find the workplace safety conditions, evaluating the safety training and communication, finding the risk management and safety policies in work place and emergency response and worker involvement in the construction workplace. Method: It is a cross sectional and discriptive study, The main purpose of the presented study is to find out the risk of the workers. Around 230 response were collected through structured questionnaire. The secondary data was collected from the websites, literature review & from published data and the data are been analysed using machine algorithms. Result: About 83 responses were from the age group 36-45, they are facing more risk and struggles in the construction site while PPE are used in less number and kNN and decision tree algorithms has been worked well in this study compared to other . Conclusion: Strengthening safety training, improving communication, and involving workers in safety policies. Better emergency response awareness and consistent risk management practices are essential for a safer work environment.

Keywords: Risk management, Personal protective equipments, Construction industry, Safety policy, Safety training.

1.0 Introduction

1.1 Background of the study

The construction sector has a great deal of potential to increase equipment use, work progress tracking, and productivity. Construction sites are inherently complicated situations where a variety of individuals and tools need to interact to fulfill particular jobs, producing on-site dangers and lack of transparency [1].

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According to Australia's International Labor Organization 2023 report, over 395 million workers worldwide suffered non-fatal work-related injuries in 2019. Furthermore, around 2.93 million workers lost their lives due to work-related causes, a rise of almost 12% from 2000 [2]. Over the past ten years, the average number of fatalities in the U.S. construction business (20) has been higher than its average representation in the workforce (4.3). In 2020, the construction business accounted for 21.2 percent of all fatalities, or 1,008 deaths, while its percentage in the workforce as a whole was 4.1 percent [3] .To meet different needs for the construction project, the contractor frequently hires a large number of subcontractors. These subcontractors could focus on supplying equipment, supplies, expert or unskilled labor, or any other particular requirements that come up throughout the project [4]. Ensuring workplace safety, health, and productivity requires prompt risk assessment and response. Unsafe activities are the source of around 80 percent of occupational injuries. Meanwhile, construction workers frequently engage in activities that might result in uncomfortable body postures, repetitive motions, and strong exertions, all of which can have a subtle but harmful impact on their health [5].Although risk assessment is widely accepted in the construction sector, occupational safety and health are not differentiated in the majority of research conducted in this area. Occupational health is a long-term process that includes long-term health issues like pneumoconiosis and musculoskeletal disorders that take time to show symptoms. On the other hand, immediate impacts such as an electrical shock or falling from a height are part of occupational safety [6].

1.2 Research objectives
1. To find the workplace safety conditions
2. Evaluating the safety training and communication
3. Finding the risk management and safety policies in work place
4. Emergency response and worker involvement in the construction workplace

1.3 Scope of the study
With an average of 3.1 fatalities per 100,000 workers annually, the construction sector has the third-highest fatality rate of any industry and one of the worst rates of work-related injuries and accidents. The 5-year average for this industry was 15 times lower than the previous research rate [7]. It is anticipated that the study's conclusions would impact industry procedures and promote a proactive risk management culture [8].

1.4 Methods and result of the study
In the building business, this study is crucial. First of all, it fills a critical void by providing actual evidence of the clear correlation between risk management techniques and building project success [8]. The Goal of this study is to find the risk level of the construction workers.

The paper's primary contribution is that

1. Machine learning algorithms can be used to determine what customers desire from premium sustainable products.
2. This study evaluates and compares several machine learning algorithms, including Random Forest, k-Nearest Neighbors, Support Vector Machine, Gradient Boosting, and Decision Tree.
3. The confusion metrix has been used to calculate the model's performance.
4. According to this study, K-Nearest Neighbors is the best algorithm when compared to other algorithms.

2.0 Literature Review

Table 2: Literature Review

Author & Year	Methods Used	Key Findings	Limitations
Ahmed Jalil Al-Bayati *et al.* (2023)	Systematic literature review, survey, fuzzy set theory, K-means clustering, focus group study	Identified 16 key factors contributing to PPE non-compliance in construction	Limited to U.S. construction industry; subjective focus group validation
Milad Baghalzadeh Shishehgarkhaneh *et al.* (2024)	Systematic literature review, bibliometric analysis, AI-based risk assessment	Increasing use of AI in construction supply chain risk management	Early-stage AI adoption, limited industry-wide standardization
Chao Fan *et al.* (2024)	Deep learning-based 3D pose estimation using ConstructionPose3D dataset	CP3D improves pose estimation accuracy, leading to better ergonomic risk assessment	Lack of comprehensive datasets for construction; limited joint information for REBA and RULA
Julia Altheimer & Johannes Schneider (2024)	Smart-watch-based worker activity recognition using ConvPoolLSTM and Decision Tree models	Achieved 89.1%-96.1% accuracy in detecting worker activities and vibration exposure	Limited to laboratory conditions and specific tool types
Hongyang Li *et al.* (2024)	Fine-Kinney method with fuzzy inference system for occupational health risk assessment	New models (OHRAHM & OHHFRAM) improve risk classification and control measures	Small sample size; limited regional focus
Amit Ojha *et al.* (2024)	EMG sensors, indirect calorimetry, and IMUs to analyze exoskeletons in construction	Powered exoskeletons reduce muscle fatigue (60%), metabolic cost (17%), and ergonomic risks (50%)	Psychological factors not considered; small sample size

2.1 Common research gap found in literature review

1. *Absence of Worker-Centric Studies:* The majority of studies prioritize organizational and financial risks over the direct effects on the health, safety, and well-being of employees.

2. *Limited Attention Paid to Psychological concerns:* Although physical concerns are widely known, there are few research on the risks to mental health, stress, and burnout among construction workers.

3. *Training Gaps in Risk Management:* Inadequate research has been done on how well employees comprehend and implement risk management techniques.

4. *Automation's Effect on Worker Safety:* As automation grows in the construction industry, little is known about how it may affect worker dangers, job displacement, and emerging safety issues.

3.0 Methodology

Figure 1: Data Collection and Analysis in Bus Driver Study
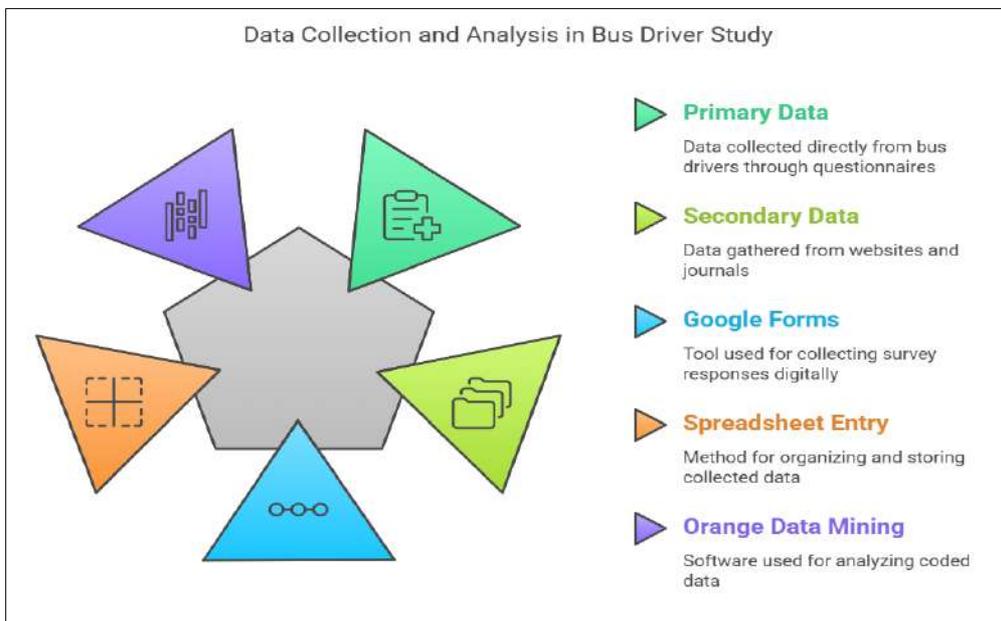
Research design: This was a cross sectional and discriptive study done with bus drivers.

Data collecting and data source: Questionnaires were used to get primary data from bus drivers, and websites and publications were used to gather secondary data.

Data analysis: Google Forms was used to gather the data, which was then recorded into a spreadsheet. Orange data mining software was used to code the data for analysis.

4.0 Data Analysis and Interpretation

Figure 2: Age Distribution of Survey Participants
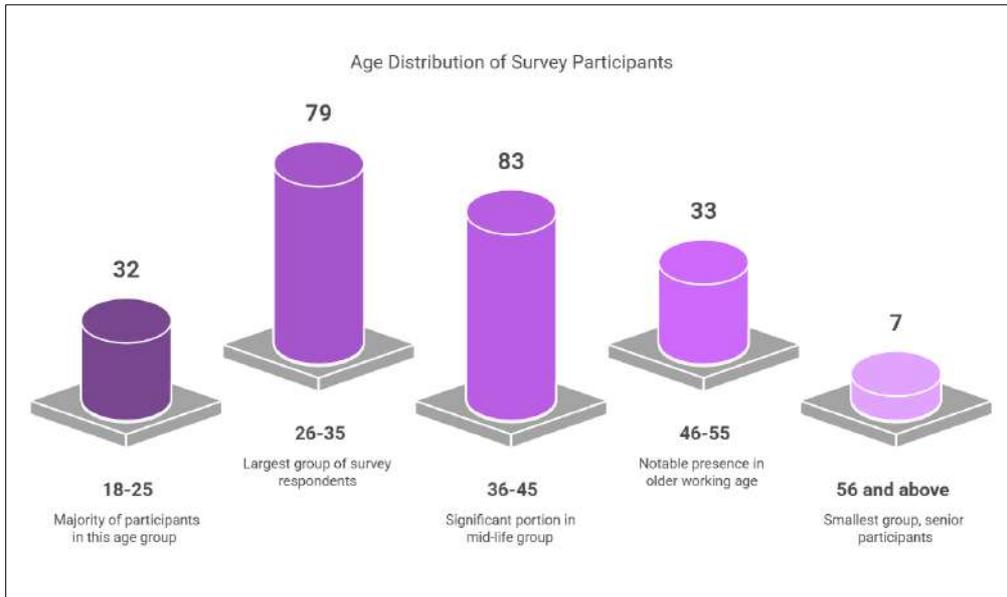
According to the previously indicated figure, around 83 responders are in the 36–45 age range. Seven are older than 56, 79 are between the ages of 26 and 35, 33 are between the ages of 46 and 55, and 32 are between the ages of 18 and 25.

Table 1: Encountring unsafe working condition

	Presicion					Recall					F1 score				
Model	A	O	S	R	N	A	O	S	R	N	A	O	S	R	N
SVM	34	31	36	0	0	48	42	28	0	0	4	36	31	0	0
kNN	36	27	31	13	3	68	26	13	5	1	47	27	18	7	14
Tree	36	31	22	18	13	52	28	13	2	1	43	30	16	19	11
Random Forest	31	39	39	0	0	54	44	25	0	0	39	42	30	0	0
Gradient Boosting	33	36	35	0	0	44	42	25	0	0	38	39	29	0	0

With 94 responders consistently choosing K-Nearest Neighbors (KNN), it is the most popular model. Random Forest comes in second with 85. SVM is also widely used (70 users consistently), whereas Gradient Boosting and Decision Trees are used less frequently but still significantly (67 and 72, respectively). The greatest number of "Never" responses (9), which suggests some avoidance, are for gradient boosting. While Decision Trees have the most "Rarely" responses (22), indicating less preference, SVM, Random Forest, and Gradient Boosting are frequently

employed. KNN and Random Forest are the most often used algorithms overall, but Decision Trees have a more diverse adoption trend.

Figure 2: Performance of Algorithms using Matrix
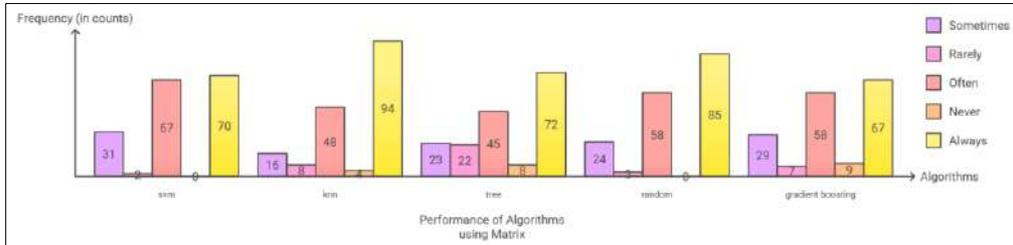
Table 2: Construction Companies Implement Regular Safety Training Programs for You and Your Co-workers

Model	Presicion					Recall					F1 score				
	VE	E	M	S	NAA	VE	E	M	S	NAA	VE	E	M	S	NAA
SVM	10	44	27	26	0	5	68	30	20	0	10	53	29	23	0
kNN	36	40	13	10	0	25	65	13	5	0	29	50	13	7	0
Tree	18	41	35	30	0	10	50	48	20	0	13	45	40	24	0
Random Forest	0	40	22	23	0	0	73	20	13	0	0	52	21	16	0
Gradient Boosting	70	43	19	26	14	35	52	20	25	10	47	47	19	26	12

Figure 3: Algorithm Performance Matrix
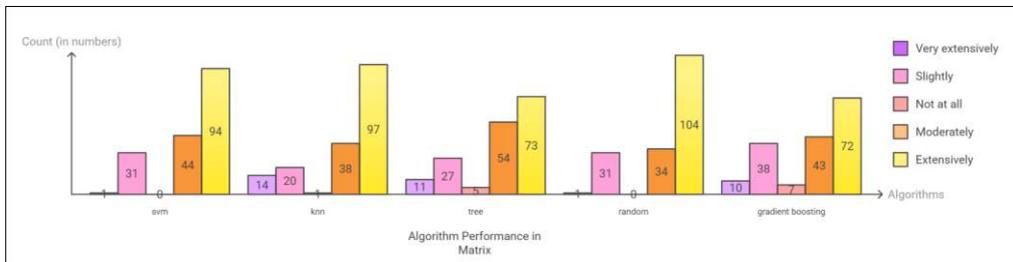
According to the data, Random Forest is the most often used model; 104 respondents said they use it frequently, while none said they don't use it at all. K-Nearest Neighbors (KNN) and Support Vector Machines (SVM) are also widely used, with 94 and 97 responses, respectively, demonstrating their high adoption. However, compared to SVM (1), KNN has a significantly higher number of users (14) indicating very intensive usage. With 73 and 72 respondents utilizing them heavily, respectively, Decision Trees and Gradient Boosting show more moderate usage trends.With the greatest number of replies (38), gradient boosting appears to be

used sparingly, showing that while many people may investigate it, they may not fully embrace it. There are five respondents who do not use decision trees at all, despite the fact that their usage is evenly distributed between extensive and moderate. All things considered, Random Forest seems to be the most popular model, however KNN is used much more frequently and Gradient Boosting is used more experimentally.

Table 3: Effective Communication between Workersand Management Regarding Safety Concern

Model	Presicion					Recall					F1 score				
	EE	VE	M	S	NAA	EE	VE	M	S	NAA	EE	VE	M	S	NAA
SVM	11	43	33	19	0	5	52	38	20	0	7	47	35	20	0
kNN	5	52	34	36	0	10	34	46	28	0	7	41	39	31	0
Tree	12	43	43	30	0	15	34	46	33	0	13	38	45	31	0
Random Forest	29	36	38	24	0	10	50	46	20	0	15	42	42	22	0
Gradient Boosting	6	35	35	25	0	5	36	30	30	0	5	35	32	27	0

Figure 4: Performance of Machine Learning Models using Matrix
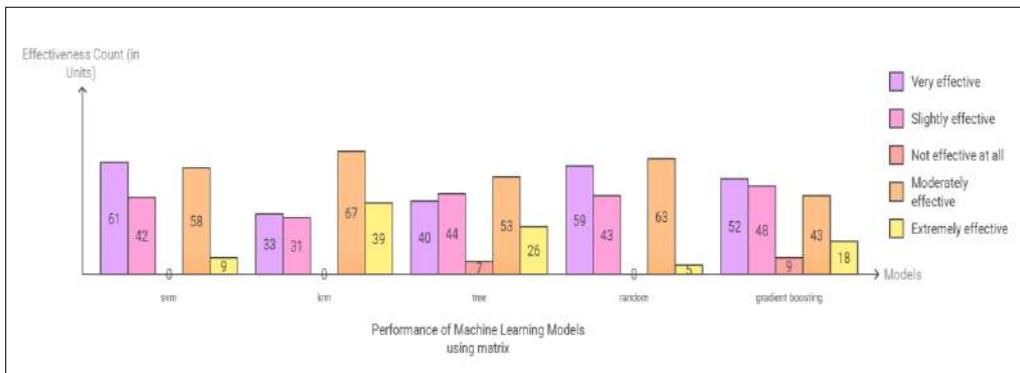
With high scores and no "Not Effective" replies, K-Nearest Neighbors (KNN) is thought to be the most successful model. Although SVM has a mixed reputation with numerous "Slightly Effective" ratings, Random Forest and SVM both demonstrate excellent efficacy. Responses to Gradient Boosting and Decision Trees are more mixed, with some users believing they are ineffective. The greatest number of "Slightly Effective" responses (48) are for gradient boosting, suggesting that it offers marginal usefulness for many. While SVM and Random Forest are highly rated, KNN is by far the most consistently effective. Perceptions of the efficacy of decision trees and gradient boosting are not entirely consistent.

Table 4: Preceving the Effectiveness of Ccurrent Safety Policies in Minimising Risk

Model	Presicion					Recall					F1 score				
	EE	VE	M	S	NAA	EE	VE	M	S	NAA	EE	VE	M	S	NAA
SVM	20	23	26	32	0	15	23	32	34	0	17	23	29	33	0
kNN	11	19	33	36	0	25	15	36	26	0	16	17	35	30	0
Tree	15	38	30	38	0	30	40	26	24	0	20	39	28	29	0
Random Forest	14	34	29	34	0	5	35	32	44	0	7	35	30	38	0
Gradient Boosting	26	29	27	31	33	30	30	32	26	10	28	29	29	28	15

Figure 5: Performance of Machine Learning Algorithms using Matrix
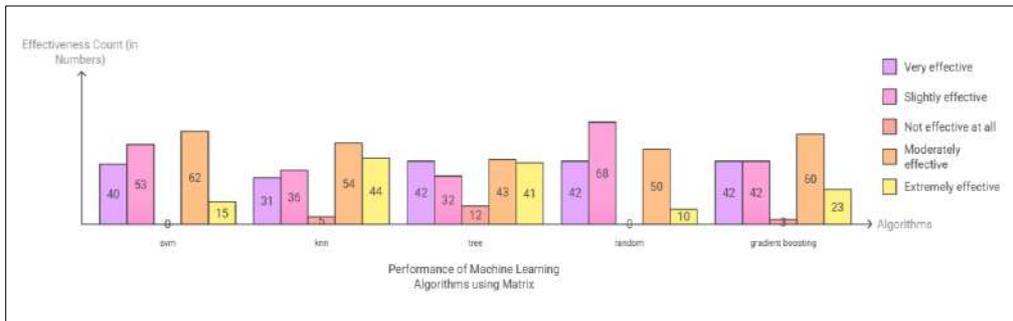
With high "Extremely" and "Moderately Effective" scores, K-Nearest Neighbors (KNN) is regarded as one of the most effective models; nonetheless, five people thought it was ineffective. Though opinions on SVM are divided, many people believe it to be "Slightly Effective." The effectiveness of decision trees and gradient boosting varies; some people think they are ineffective, while others think they are quite effective. The most "Slightly Effective" answers (68) come from Random Forest, suggesting inconsistency. Overall, SVM and Gradient Boosting are rated highly but inconclusively, whereas KNN is the most consistently effective. Perceptions are more divided in Random Forest and Decision Trees.

Table 5: Emergency Response Protocols in Place at Constuction Sites in Case of an Accident or Injury

Model	Presicion					Recall					F1 score				
	EA	VA	M	S	NAA	EA	VA	M	S	NAA	EA	VA	M	S	NAA
SVM	44	18	30	21	0	20	20	46	20	0	28	19	37	21	0
kNN	14	25	40	6	0	25	23	46	5	0	18	24	43	6	0
Tree	16	30	26	19	0	35	20	24	18	0	22	24	25	18	0
Random Forest	14	18	40	24	0	5	23	44	33	0	7	20	42	27	0
Gradient Boosting	24	19	30	23	0	25	28	34	18	0	24	22	32	20	0

Figure 6: Performance Levels by Machine Learning Algorithm using Matrix
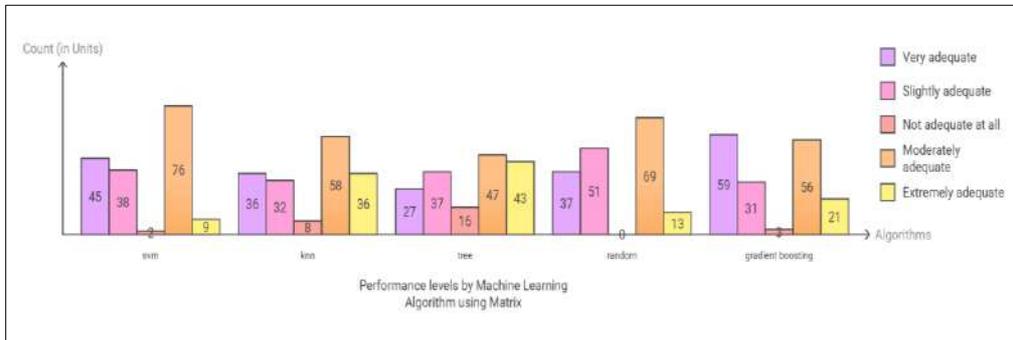
With high "Moderately" and "Very Adequate" ratings, SVM and Gradient Boosting are the models that are most consistently adequate. Although Random Forest had the most "Slightly Adequate" replies (51), suggesting some uncertainty, KNN and Random Forest also receive high adequacy ratings. The opinions on decision trees are the most mixed; 43 respondents rated them as "Extremely Adequate," while 16 users felt they were insufficient. SVM and Gradient Boosting are the most notable overall, whereas Decision Trees exhibit the greatest skepticism.

5.0 Policy Formulation

5.1 Policy for workplace safety and risk mitigation
1. Implement strict guidelines for the use of personal protective equipment (PPE) and monitor compliance often.
2. All-inclusive Training Courses: Provide specific safety training to age groups who are at danger, as well as regular refresher courses.
3. Framework for Risk Assessment: Routine hazard assessments are necessary to identify and lessen workplace dangers.

5.2 Choosing and Optimizing Machine Learning Models
Important applications should make advantage of KNN and Random Forest due to their high acceptability and proven effectiveness. SVM Model review and parameter change are necessary to enhance SVM performance and produce reliable results. Provide specialized training and best practices to promote further gradient enhancing research. Analyze Decision Tree applications and use ensemble methods like Random Forest to improve performance. By developing accurate documentation and use-case requirements, Forest at Random raises confidence in Random Forest suitability. Establish a review committee to regularly evaluate the model's performance. Plan training workshops for staff members and data practitioners. Use compliance checks to ensure that safety and ML model requirements are being followed.

6.0 Result

The most vulnerable age group is between 36 and 45, which emphasizes the necessity of worker training and proper PPE use. KNN and Random Forest are the most extensively used and well-liked machine learning models; KNN has 94 consistent users, while Random Forest has 85 users. Random Forest had the highest utilization rate with 104 responses and no non-usage claims. SVM's efficacy assessments are not totally constant, even with 97 extensive users.

Gradient Boosting and Decision Trees are somewhat adopted; the most "Rarely" responses were given to Decision Trees (22). KNN is the most effective model, with no "Not Effective" replies. Despite having differing ratings, Random Forest and SVM are both efficient. Gradient boosting is thought to be of limited benefit because it received the most "Slightly Effective" responses (48). SVM and Gradient Boosting are the most dependable models. From strong to weak, decision trees show a variety of grades.

7.0 Conclusion and Recommendation

The age range of 36 to 45 is the most vulnerable, underscoring the need for worker education and appropriate PPE use. The two most popular and widely used machine learning models are KNN and Random Forest; KNN has 94 regular users, while Random Forest has 85. With 104 responses, Random Forest had the highest utilization rate and no claims of non-usage. Even with 97 extensive users, SVM's efficacy evaluations are not entirely consistent.

Since KNN and Random Forest are the most popular and regarded as effective, give them precedence for high-confidence applications. Examine and make the most of SVMs because, despite their widespread use, their efficacy ratings vary; changing certain parameters may help them perform better. Encourage additional research into gradient boosting because of its sporadic light use; providing training or best practices could promote its adoption. Decision tree applications need to be reassessed because they have produced contradictory results; using ensemble techniques like Random Forest may improve their performance. Perhaps by giving more detailed instructions on when and how to utilize the model, you can address the doubt about Random Forest suitability.

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CHAPTER 8

Consumer Perception Towards Khadi Kraft Products in Thanjavur

Nagalakshmi P.*, Naveen Kumar K.** and Mohamed Fahad, M.**

ABSTRACT

This study aimed to identify the perception of khadi kraft products in Thanjavur region for better understanding and identifying marketing strategies to be implemented. In the previous studies they focused on the production and marketing of khadi products, there is a dearth of research on consumer perception towards khadi kraft products particularly in Thanjavur. The study aims to bridge the knowledge gap by Identifying the demographic characteristics of consumers who purchase Khadi products in Thanjavur. Exploring the perception of Khadi Kraft products among different consumers in Thanjavur region. This article utilizes cross-sectional approach to investigate. Data were collected using snowball sampling method and khadi product consumers are the respondent. Consensus, ProQuest, Scispace were used for secondary data. PSPP software were used to analyse data. A total of 266 respondents was deemed adequate for this study. Maximum of 50.4% were males, 78.2% of users were upper middleclass individuals and 69.9% of customer perceived khadi kraft brand as an expensive product, and 4.5% were considered the product as outdated. The findings suggest that consumer prefer khadi to adopt social media platform for better reach and conduct market programme for promotion to the products. This study also highlights the challenges including brand awareness, high prices, marketing efforts. This study provides valuable insights for marketers, policymakers to promote and develop these products in Thanjavur.

Keywords: Consumer perception, Khadi products, Thanjavur region.

1.0 Introduction

The Indian handicraft sector contributes immensely to the economy of the nation by employing millions of crafts men and women. With the growth of modern Khadi industries, Khadi Kraft products have also gained some fame because of their combination of traditional and modern style. Khadi Kraft products are simple, elegant, and durable made from natural fibres like cotton, silk, and wool.

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Thanjavur is a district of Tamil Nadu, one of the well-known Indian states, which has always been famous for traditional arts and crafts. Not only does this district produce Khadi Kraft products, but it also has a history of making exquisite handicrafts. The people of Thanjavur are adept in a number of traditional crafts like weaving, pottery, woodcarving, and have been making Khadi Kraft products for several decades. While Khadi Kraft products are gaining attention, little is known regarding the consumers of Thanjavur. Consumer perception is important for marketers, investors and even the government to want to understand to provide better systems to cultivate the Khadi Kraft industry. This research focuses on the other end of the spectrum by looking into consumer perception regarding Khadi Kraft products in Thanjavur.

2.0 Research Gap

In the previous studies primarily focused on the production and marketing of khadi products, with limited attention to consumer perception. This study aims to address this research gap by analyze the factor influences the consumer's perception towards khadi products specifically in the Thanjavur region.

3.0 Research Problem

This research addresses the need to understand consumer perceptions of khadi kraft products in Thanjavur, exploring the factors that influence their purchase decisions and identifying opportunities for the brand to enhance its appeal and market share.

AIM: Identifying marketing strategies that can be implemented to promote khadi kraft products and revitalize their appeal to individuals in Thanjavur.

4.0 Objectives

1. To identify the demographic characteristics of consumers who purchase Khadi products in Thanjavur.
2. To explore the perception of Khadi Kraft products among different consumers in Thanjavur region.

5.0 Research Methodology

5.1 Sampling method

Snowball Sampling: Ask initial respondents to refer friends or family members who are also familiar with Khadi Kraft products.

Sample Size: The sample size for this study was calculated to be 266 consumers of the khadi kraft products in the Thanjavur region.

5.2 Limitations

- The study is limited to Thanjavur and the findings may differ for other region or cities.
- The study utilizes cross-sectional research type, which establish a casualty and track changes over time.

6.0 Literature Review

Neelam Patel 2024 Khadi, a hand-spun and hand-woven textile from India, has been associated with Mahatma Gandhi since its revival during the Swadeshi movement. Despite government support, Khadi's popularity declined post-independence. Designers began using Khadi in the 1990s, and it has since been popularized by many designers. This essay aims to determine khadi consciousness among college students by surveying them on style, quality, cost, and status symbol. Interviews with youth and industry members were conducted to assess awareness. Essay aims to determine khadi consciousness among college students by surveying them on style, quality, cost, and status symbol.

Shloka Sriram 2023 Khadi, a coarse hand-spun cloth, has a long history in India, dating back to the Vedic period, Mughal era, British colonial period, and post-independence. It was linked to freedom movement and mahatma Gandhi, but declined post-independence. The paper explores the evolution of khadi from a "freedom fabric" to a "fashionable fabric" and highlight its role in sustainable fashion.

Vandana Tripathi Nautiyal, Dr. Avadhut Atre 2023 urban India's growing number of women joining corporate firms has led to an exponential expansion in the market for woman's office wear. The preference for western office wear outfits has increased due to changing lifestyles and a growing awareness of sustainable fashion choices. This paper analyzes urban Indian working women's acceptances of western office wear outfits made using khadi fabric, focusing on seven parameters: fabric look, feel, garments quality, comfort, style, size and fit. The research recommends sustainable fashion brands, women's western office wear, khadi weavers and designers to adapt and diversity khadi to delivery higher customer value and satisfactions.

Swasti Bhattacharyya 2022 the author discusses the narratives of the brahma vidya mandir ashram, a community in 1959. They use hand-spun cotton to make clothing, demonstrating the interconnectedness between their theology and their narratives. The author suggests that their use of khadi can serve as a catalyst for change and engagement, highlighting the importance of understanding their technology.

Neetu Jha 2021 khadi, a symbol for freedom and self-reliance, played a significant role in India's independence. Mahatma Gandhi revived the khadi industry, advocating for people to boycott British fabric and create their own yarn. Despite

over 70 years of freedom, khadi continues to inspire sustainable fashion and attract global interest. This study examines the growth of khadi and village industries and proposes policy suggestions for future improvement.

Akriti Shakya and Charu Swam 2021 India's rich heritage and culture, including the creation of khadi, have played a significant role in gaining freedom. Despite being an environment-friendly fabric, Demond for khadi is low. To increase demand, innovative designs and moderns' aesthetics are crucial. A study aimed to promote khadi acceptance among youth by developing designs using fashion software and evaluating them on a 5-point rating scale. Positive feedback was received on acceptability, color combination, and uniqueness of khadi Kurtis.

M. Das, S. Basak 2019 khadi fabric, a traditional Indian textile, has been used since the 1920s and consists of natural fibers like cotton, wool, and silk. It is made using hand-made yarn and traditional handloom processes. Khadi textiles are colored using natural dyes. Traditional printing techniques like hand screen printing are used for special effects. Low-cost value additions like bioactive finish and mosquito repellent properties can make khadi textile more acceptable to consumers and handloom weavers. Kriti Bhalla, Tarun Kumarb, Jananee Rangaswamya 2018 The khadi handloom industry in India, associated with the Indian freedom movement, has been studied through a comprehensive life-cycle assessment using gabi software. the study found that khadi-handloom fabric production is environmentally sustainable and socially more inclusive compared to study also purpose an integrated khadi-based rural development model for local community-based sustainable rural development.

Mrs. Padmasani, S. Muruganandand M. Yazhini Khadi production is reviewed through Fishbein's attitude model. The influence of personal characteristics and purchase preference factors on the attitude as well as the association between attitude and consumer's satisfaction are examined. This study shown that, overall, the consumers have positive attitude towards khadi product and also that the consumers who have higher attitude get more satisfaction.

Dr. N.P. Patak Soma Gupta 2023 khadi and village industries' productivity is a symbol of nationalism and a potential tool for creating employment opportunities for rural artisans. KVIC promotes production and sale of khadi with over 2737 institution in India, employing over 4.97 lakh people, with over 80% being women artisans. This paper examines KVI sector performance in terms of production, sales and employment.

7.0 Data Analysis and Interpretation

Majority 62.8% of the respondents were falling within the age of 35-40, the limited representation of younger age groups of 26-35 and 20-25 and the significant presence of older age group of 45 above are 23.7% were the consumers of khadi kraft products respectively.

Table 1: Age of the Respondents

Characteristics	No of Respondents	Percentages
45 and above	63	23.7%
35-40	167	62.8%
26-35	16	6.0%
20-25	20	7.5%
Total	266	100.0%

Source: Primary data
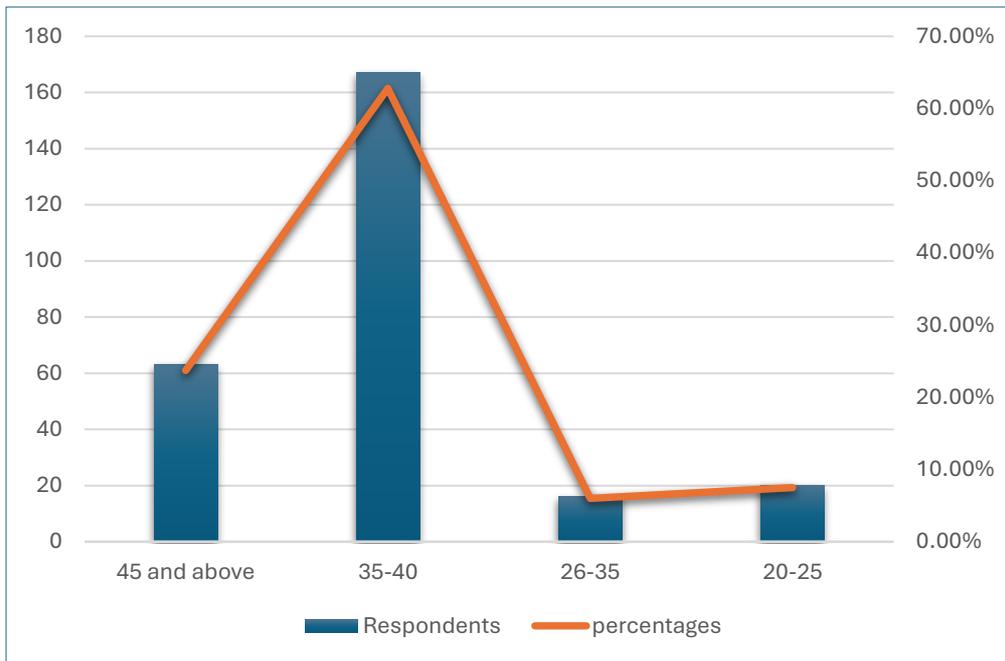
Table 2: Employment Status

Characteristics	No of Respondents	percentages
Student	16	6.0%
Private sector	168	63.2%
Government job	27	10.2%
Retired	55	20.7%
Total	266	100.0%

Source: Primary data

Private sector dominates the sample by 63.2% of the respondents indicating that this group is the most represented in the sample. Only 10.2% of the respondents have government job holders, may not be well represented in the sample.

Table 3: How Do You Perceive Khadi Kraft as a Brand

Characteristics	No of Respondents	percentages
Outdated	12	4.5%
High quality	43	16.2%
Expensive	186	69.9%
Traditional	25	9.4%
Total	266	100.0%

Source: Primary data

The majority of the respondents 69.9% perceive khadi products as expensive limited perceptions of high quality only 16.2% and only 9.4% respondents associate with traditional appeal.

Table 4: Which Social Media Platform would you Like to see Khadi Kraft utilize

Characteristics	No of Respondents	percentages
Amazon	4	1.5%
Twitter	21	7.9%
Facebook	25	9.4%
Instagram	216	81.2%
Total	266	100.0%

Source: Primary data

Most of the respondents 81.2% suggested Instagram, limited presence of amazon and twitter 1.5% and 7.9%.
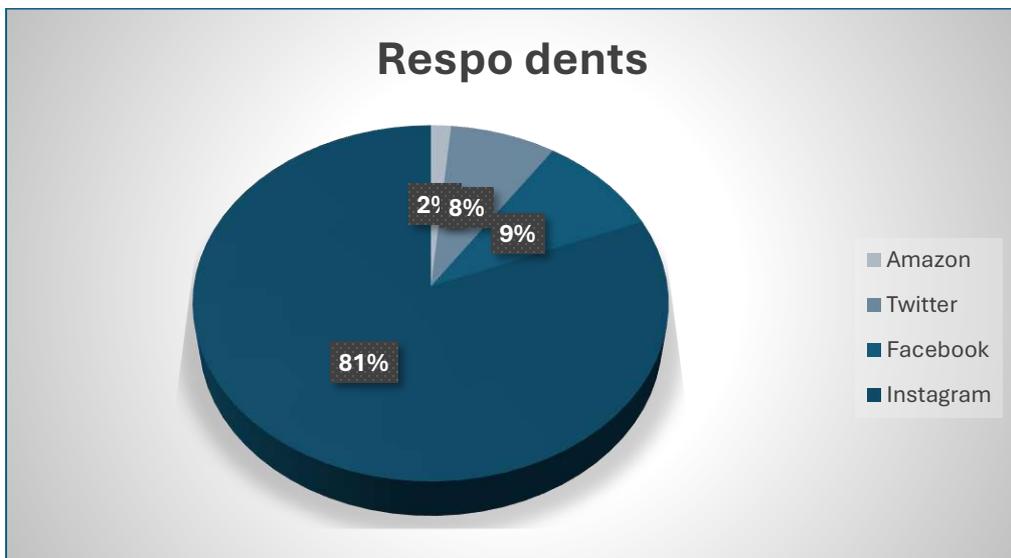
Table 5: Which Target Audience should Khadi Kraft Focus on

Characteristics	No of Respondents	Percentages
Elders	5	1.9%
Kids	199	74.8%
Middle aged individuals	38	14.3%
Young adults	24	9.0%
Total	266	100.0%

Source: Primary data

The majority (74.8%) of respondents suggested khadi kraft to focus on kids by introducing children's -clothing and appealing products.
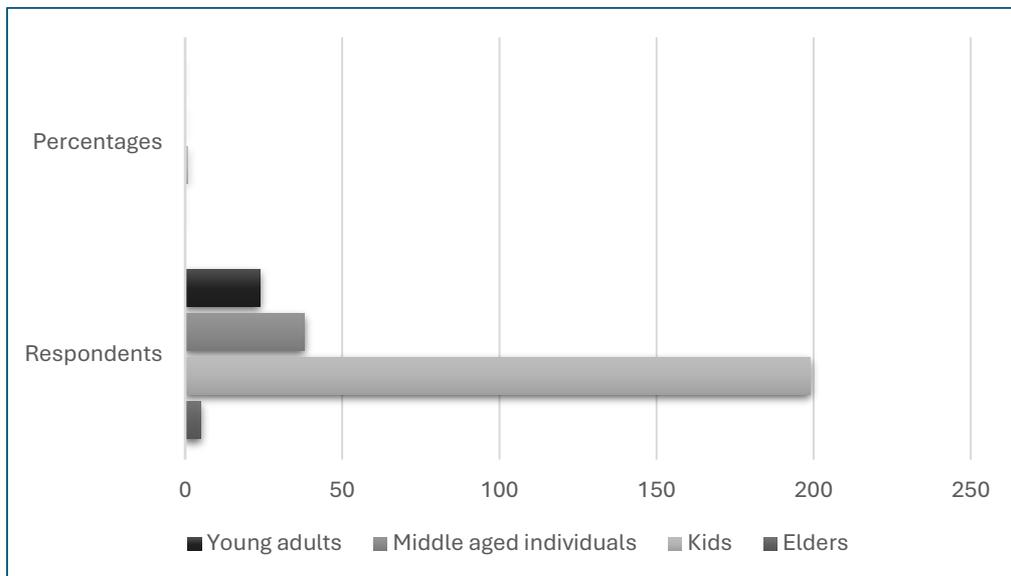
Table 6: Chi-square test

Variable	Chi-square	Df	Asymp. Sig.
Age	222.93	3	.000
Factors influencing	423.98	3	.000

7.1 Based on the chi-square test results

Hypothesis (H1): There is a significant association between demographic factors (age) and factors influencing purchase decisions when buying Khadi products.

The results indicate that the null hypothesis (H0) can be rejected, as the p-values (.000) are less than the significance level ($\alpha = 0.05$). This suggests that there is a statistically significant association between demographic factors (age) and factors influencing purchase decisions when buying Khadi product.

Table 7: Chi-square test

Variable	Chi-square	df	Asymp. Sig.
Monthly Income	422.78	3	0.000
Reasonable Price Range for Khadi Products	447.95	3	0.000

7.2 Based on the chi-square test results

Hypothesis (H1): There is a significant association between monthly income and perceived reasonable price range for Khadi products.

Since the p-values are less than 0.001, we reject the null hypothesis (H0). This suggests that there is a statistically significant association between monthly income and perceived reasonable price range for Khadi products.

8.0 Findings

- In the 266 consumers, 79% of consumers purchased the products because of the designs.
- The 69% of consumer's perceived khadi as a expensive brand.
- Maximum of the users purchased khadi products in local markets
- 81% of the consumer concerned about the quality of the products.
- Pricing of the products can be prohibitive to middle- and lower-class users.

9.0 Suggestions

- Khadi can promote their products by conducting market research and events.
- Consumers suggest to adopt social media platforms like (Instagram, amazon, Facebook) for better reach of their products.
- From the analysis the users are above the age of 35 so khadi needs to focus on young generation by introducing new products and keeping up with the new trends.
- 4.5% of users perceived khadi kraft as a outdated so we can suggest to improve the marketing strategy and promotion activities (advertising, posters and notices)

10.0 Conclusion

This study investigated the consumers perception of khadi kraft products in Thanjavur region with the focus of understanding demographics factors of the consumers. The findings of the data show the consumer perceived khadi as expensive, traditional. The study highlights the importance of quality, price and marketing of the products. It increases the influence of unrepresented individuals for the future purchasing decisions. Additionally, the consumer's suggests social media

platforms (Instagram, Facebook, Amazon etc) for better reach and more appealing to this generation. This study also suggest that the distributors and retailers of khadi kraft products in Thanjavur should focus on creating more marketing strategies and market research.

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CHAPTER 9

Challenges Faced by Small Business Shops in Implementing and Digital Marketing Strategies

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ABSTRACT

Background: The purpose of this study is to examine the difficulties that small business stores encounter when implementing digital marketing tactics, focusing on challenges like lack of funding, technological know-how, and resources. Objective: The objective of the study is to identify the main obstacles small businesses face in adopting and utilizing digital marketing, such as insufficient knowledge of digital tools, the challenge of calculating return on investment, and competition from larger companies. Additionally, the study seeks to explore ways to help small businesses overcome these obstacles. Method: The study gathered data from 400 respondents to understand the difficulties small businesses face in digital marketing implementation. Conclusion: Small businesses face challenges in implementing digital marketing strategies due to lack of technical knowledge, limited resources, and budget constraints. Despite these, they allocate a portion of their monthly budget for digital marketing. The study found no correlation between age, educational background, or self-assurance in digital marketing. To stay competitive, businesses should focus on low-cost techniques like email marketing, social media interaction, and local SEO. Result: Small businesses face numerous challenges in implementing digital marketing strategies, including lack of funding, technological expertise, and resources. Limited budgets and access to advanced tools make it difficult for them to compete with larger companies. Insufficient understanding of digital tools also hinders effective marketing. Measuring the return on investment (ROI) from digital marketing campaigns is challenging due to limited resources. Competition from larger businesses and constant challenges in content creation and audience engagement further complicate the situation. These challenges underscore the need for accessible resources, proper training, and support to help small businesses navigate the digital marketing landscape successfully.

Keywords: Small business, Challenges, Digital marketing, Strategies.

1.0 Introduction

Digital marketing has become a crucial component for success in various industries, especially for small businesses.

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However, many faces significant challenges when implementing effective digital marketing strategies. Limited resources, tight budgets, and a small workforce can make it difficult for small businesses to harness the full potential of digital marketing tools and platforms. The complex requirements of developing an online presence, creating engaging content, and maintaining consistency across multiple channels require time, expertise, and sometimes upfront financial investment. The digital marketing landscape is constantly shifting, with new platforms, technologies, and trends emerging regularly. Small businesses must stay up-to-date with these changes, navigating through the vast options available, and developing a tailored strategy that aligns with their goals, target audience, and budget. Additionally, small businesses may lack the specialized knowledge or skills required to design and implement successful digital marketing campaigns. Competition is another challenge for small businesses. Larger companies often dominate search engine rankings, outspend small businesses on advertising, and have better access to data analytics, making it difficult for smaller players to stand out. In conclusion, while digital marketing offers significant opportunities for small businesses, the road to successful implementation is not without its obstacles. Understanding these challenges can help small business owners and marketers navigate the digital landscape and find solutions that align with their unique needs and capabilities.

2.0 Review of Literature

Hasan *et al.*, (2024) In the industrial metaverse, investigate how Non-Fungible Tokens (NFTS) might improve digital twins, Examine how dynamic and decomposable NFTS are used in different industrial domains, Create, put into practice, and evaluate NFTS use cases in the industrial metaverse, In the industrial metaverse, how can NFTS improve the capabilities and possibilities of digital twins?, What are the restrictions and difficulties associated with applying NFTS in industrial environments?, How can different industries that depend on digital twins be served by dynamic and modular NFTS?**,** Digital twin tracking, traceability, and monetization are all made possible by NFTS, Better transparency, asset management, and intellectual property protection are offered by dynamic and decomposable NFTS, The effective application of NFTS in industrial use cases, such as oil and gas, automotive, and manufacturing.

Ma & Gu, (2024) Examine how the digital economy affects businesses involved in trade, Create a thorough customer-focused marketing plan for online retailers, Use genetic algorithms to enhance the marketing, The demands of social consumption can no longer be satisfied by traditional marketing techniques, Creating creative and customized marketing strategies is a problem for e-commerce businesses, Large-scale marketing techniques, homogeneity, and honesty are lacking in current marketing, The marketing strategy used by commercial organizations has changed as a result of the digital economy, Comprehensive customer-oriented

marketing strategies are necessary for e-commerce businesses, Genetic algorithms can increase the efficacy of marketing strategies by 21%, The updated marketing plan revealed: -0.33 increased marketing plan integrity -0.34 increased promotion strategy integrity -0.29 increased management structure improvement -0.18 improved product quality. Wadhwa (2018) To determine the obstacles encountered during deployment and look into how well digital marketing tactics work to propel SMBS's business expansion. SMBS's competitiveness in the digital marketplace is hampered by their inability to use digital marketing successfully because of their tight budgets, lack of technological know-how, and trouble calculating return on investment. Strategies for digital marketing (SMM, SEO, business expansion), Sales, consumer engagement, and online presence all rise with effective digital marketing, Among the difficulties SMBS faces are: Budget constraints Insufficient technological know-how and proficiency Having trouble calculating ROI, in order to stay competitive, SMBS needs to give digital marketing top priority.

Murti *et al.*, (2023) To research the financial services industry's digital marketing issues and create successful business expansion plans. Financial services firms find it difficult to use digital marketing because of the need for qualified staff, worries about data privacy, and difficulties gauging its success. Financial services firms must use digital marketing to increase revenue, brand recognition, and customer engagement, Important tactics for digital marketing consist of: SMM, or social media marketing The optimization of search engines (SEO) Marketing by Email (EM) Customization Strong Customer Involvement.

Kano *et al*., (2022) To look into how well lower-middle-sized enterprises may use digital marketing techniques to get past financial and promotional constraints. Marketing is difficult for lower-middle-class companies because of their tight budgets and lack of promotional resources. Budgetary restrictions are successfully addressed by digital marketing methods (78%), The other success-influencing elements are money (6%), managerial professionalism (4%), and resource availability (12%), Brand awareness, engagement, sales, and loyalty are all improved by social media platforms like Facebook, Instagram, Twitter, and websites.

Bondoc *et al*., (2021) Examine the readiness and familiarity of small business owners with digital marketing platforms, Determine the obstacles small firms encounter while implementing digital marketing tactics, examine how digital marketing firms might help small businesses. Owners of small businesses are not well-versed in digital marketing, Effective digital marketing is hampered by a lack of funds and resources, small enterprises face difficulties in the digital sphere due to competition. Few entrepreneurs possess in-depth understanding of digital marketing platforms, The majority of entrepreneurs are familiar with the fundamentals of digital platforms, Among the difficulties faced by small enterprises are: - Inadequate online payment choices (bad internet connection, hefty processing fees). Insufficient familiarity with digital applications. The competition between organic reach and paid advertisements. The brand's credibility is low.

Javaid *et al.*, (2024), the notion of the digital economy and how it relates to Industry 4.0, List the main characteristics, trends, facilitators, and difficulties related to the digital economy, examine how the digital economy satisfies Industry 4.0 needs. Digital technical breakthroughs are causing disruptions in the traditional economy, to be competitive, industries must adjust to the digital economy, The digital economy presents issues including cybersecurity, data management, and hyper-connectedness. The digital economy is powered by digital advancements such as block chain, IoT, and AI, Industry 4.0 technologies are made possible by hyper-connectivity and data exchange, Automation, cloud computing, and robots are some of the ways that the digital economy is changing traditional sectors, Industry 4.0 services give businesses a road map for adjusting to the digital revolution.

3.0 Research Gap

A lot of small business owners don't fully comprehend the tools, platforms, and strategies of digital marketing. Studies could examine the particular knowledge gaps and their impact on strategy implementation.

4.0 Research Problem

1. What impact does a lack of knowledge about digital marketing tools and concepts have on small businesses' capacity to execute effective strategies?
2. How do financial constraints affect small business shops' digital marketing initiatives, and what economical tactics can be used to get the most out of your investment?
3. What operational and psychological obstacles stand in the way of small businesses implementing new digital marketing technologies, and how can change-awareness be overcome?

AIM: The study examines the barriers that small businesses encounter when implementing digital marketing strategies, such as a lack of funding, insufficient experience, and inadequate knowledge.

5.0 Objectives

1. To identify the key challenges that small businesses face when adopting digital marketing strategies.
2. To explore how limited financial and human resources hinder small businesses from fully leveraging digital marketing tools and platforms.

6.0 Research Methodology

The research design for analyzing the implementing and digital marketing strategies in small business. A quantitative research method was used in this study to

test the relationship among the variables. The data was collected from both men and women retailers in Thanjavur district. The sample size of this study is 400 members both men and women through questionnaire. Simple random sampling techniques were used in this study. The age group of members in sampling ranges between 25 to 55 above. Data were analyzed using statistical tools chi-square,

Sampling Method: This study is purposive random sampling.

Sample Size: The number of the respondents is 400 Entrepreneurs in Thanjavur district.

7.0 Data Analysis and Interpretation

7.1 Regression

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.134[a]	.018	.013	.719	1.982
a. Predictors: (Constant), Educational qualification, Age					
b. Dependent Variable: How confident do you feel in your understanding of digital marketing concepts?					

Table 2: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.771	2	1.885	3.646	.027[b]
	Residual	205.307	397	.517		
	Total	209.078	399			
a. Dependent Variable: How confident do you feel in your understanding of digital marketing concepts?						
b. Predictors: (Constant), Educational qualification, Age						

From the above table it shows Regression analysis is calculated by using SPSS. The model summary table analysis shows the value in the $R2 = .018$ and Durbin Watson = 1.982 The ANOVA table shows that the value of df = 2, F statistic (F) = 3.646 and P – value .027[b] = The calculated value .027[b] is less than 0.05 value, the alternative hypothesis is rejected, the null hypothesis is accepted and. Hence it is inferred that there is a no significant association between educational qualification, Age and confident do you feel in your understanding of digital marketing concepts.

H0: There is no association between education qualification and digital marketing tools.

H1: There is an association between education qualification and digital marketing tools.

From the above table, Chi-square is calculated by using SPSS. The calculated value 0.119 is more than 0.05 values at 95% confidence level. So the null hypothesis is accepted and the alternative hypothesis is rejected. Hence it is inferred that there is no significant association between Education qualification digital marketing tools.

Table 3: Chi-square test

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.143[a]	6	.119
Likelihood Ratio	8.984	6	.174
Linear-by-Linear Association	1.707	1	.191
N of Valid Cases	400		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.64.			

Table 4: ANOVA (ONE WAY ANOVA)

What is your monthly budget for digital marketing activities?					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.944	3	4.648	6.503	<.001
Within Groups	283.056	396	.715		
Total	297.000	399			

Interpretation: ONEWAY ANOVA is a used to find the monthly budget and Digital marketing tools effectively, where the value of F is 6.503 and p .001. Since p value is less than .001, there is significant differences between monthly budget and Digital marketing tools effectively used.

8.0 Finding

The survey's findings show some intriguing patterns among the participants. 39% of the population is between the ages of 25 and 35, indicating a young demographic. Regarding education, 46.5% of those surveyed have a bachelor's degree, mostly in education-related subjects. A moderate level of familiarity is indicated by the 64.8% of respondents who feel relatively confident about their comprehension of digital marketing ideas. A decent level of involvement with digital marketing tools is demonstrated by the 42.5% of respondents who have expertise with different platforms. In terms of budgeting, 45.8% allocate between 20,000 and 30,000 monthly for digital marketing activities. Finally, 47.5% of respondents feel they use digital marketing tools effectively, highlighting a relatively strong competency in this area. The study found a weak relationship between educational qualification, age, and confidence in understanding digital marketing concepts, explaining only 1.8% of the variation in confidence levels. The Durbin-Watson

statistic and ANOVA results showed no significant autocorrelation in the residuals. The null hypothesis was accepted, indicating no significant association between the independent variables (educational qualification, age) and the dependent variable (confidence in digital marketing concepts). The Pearson Chi-Square test also showed no significant association between educational qualification and the use of digital marketing tools, confirming the null hypothesis. The One-Way ANOVA test revealed significant differences in the effectiveness of digital marketing tools across different monthly budget groups, suggesting that the monthly budget plays a crucial role in the effectiveness of digital marketing activities.

9.0 Suggestion

Small company stores frequently encounter several obstacles when putting digital marketing tactics into practice, such as tight finances, a lack of technological know-how, and trouble standing out in a crowded online market. Choosing the appropriate channels, producing interesting content, and adjusting to rapidly evolving digital trends are challenges that many people face. Furthermore, juggling daily operations and internet marketing might be very difficult. Small businesses can overcome these obstacles by concentrating on low-cost tactics like email marketing, social media interaction, and local SEO. Effectively expanding their consumer base and reaching a wider audience can be achieved by utilizing free or reasonably priced digital tools, outsourcing work when needed, and keeping up with online marketing trends.

10.0 Conclusion

A survey reveals that small businesses face significant challenges in implementing digital marketing strategies, including lack of technical knowledge, limited resources, and constrained budgets. Despite these challenges, many allocate a portion of their monthly budgets for digital marketing. The study found no significant correlation between age, educational background, or self-assurance in digital marketing. A higher monthly budget is linked to better use of digital marketing tools. The Chi-Square test also found no significant relationship between educational qualification and digital marketing tool use. To stay competitive, small businesses should focus on low-cost techniques like email marketing, social media interaction, and local SEO.

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CHAPTER 10

Impact of Kalaignar Mahalir Urimai Thogai Scheme on Women Economic Empowerment in Thanjavur District

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ABSTRACT

Background: Women's economic empowerment plays a crucial role in achieving gender equality and sustainable development. The Kalaignar Mahalir Urimai Thogai Scheme was introduced to provide financial assistance to women in Tamil Nadu, aiming to enhance their financial independence and decision-making abilities. However, the extent of its impact on beneficiaries in Thanjavur District remains underexplored. This study investigates the scheme's effectiveness in improving financial stability, socio-economic status, and overall empowerment. Method: A mixed-method approach, incorporating both qualitative and quantitative research, was used to assess the scheme's impact. A structured survey was conducted among 441 women beneficiaries in Thanjavur District. Stratified random sampling was employed to ensure fair representation across various socio-economic groups. Statistical tools, including Chi-Square tests and Paired t-tests, were utilized for data analysis to determine significant financial changes before and after receiving benefits. Results: Findings indicate that the scheme has significantly improved women's financial security and increased their role in household financial decisions. Beneficiaries reported greater control over their expenditures, primarily utilizing the financial aid for essentials like food, healthcare, and education. The scheme has also fostered self-reliance, reducing dependency on male family members. However, challenges such as delayed disbursements, limited financial literacy, and inadequate support for entrepreneurial activities hinder its full impact. Conclusion :The Kalaignar Mahalir Urimai Thogai Scheme has emerged as a transformative initiative in enhancing women's economic empowerment in Thanjavur District. By providing financial support, the scheme has significantly boosted women's financial autonomy, strengthened their role in household decision-making, and improved their overall socio-economic status. While some challenges persist, such as timely disbursement and financial literacy, addressing these issues can further enhance its effectiveness. With continuous policy improvements and targeted support, the scheme has the potential to serve as a model for women's empowerment across India, paving the way for inclusive and sustainable economic growth

Keywords: Women's economic empowerment, Mahalir Urimai Thogai Scheme, Financial independence, Rural women, Household decision-making, Financial inclusion.

1.0 Introduction

Economic empowerment of women is a fundamental driver of gender equality, poverty reduction, and overall societal progress.

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When women attain financial independence, they gain greater control over their personal and household finances, contribute to economic growth, and actively participate in decision-making processes. However, in many parts of India, particularly in rural areas like Thanjavur District, Tamil Nadu, women continue to face barriers that hinder their financial autonomy. Deep-rooted societal norms, lack of access to stable income sources, and limited financial literacy often prevent women from making independent economic decisions and managing household finances effectively.

To address these challenges, the Government of Tamil Nadu launched the Kalaignar Mahalir Urimai Thogai Scheme in September 2023, as a transformative initiative aimed at enhancing women's financial stability. Chief Minister M.K. Stalin introduced the scheme on the birth anniversary of former Chief Minister C.N. Annadurai, reinforcing the government's commitment to women's welfare. Under this scheme, eligible women, particularly those who are heads of households, receive monthly financial assistance of ₹1,000. The primary objectives of the scheme include reducing women's financial dependency on male family members, strengthening their decision-making power within households, and improving their overall economic security.

By ensuring direct cash transfers, the initiative seeks to uplift economically weaker women and provide them with consistent financial support to meet essential expenses such as food, healthcare, education, and household needs.Initial assessments and reports indicate that the scheme has had a significant impact on women's financial independence in Thanjavur District. Many beneficiaries have reported increased control over their personal finances, leading to improved spending patterns, better financial planning, and enhanced participation in household economic decisions. The financial aid has also helped reduce economic stress within families, enabling women to contribute actively to household welfare. However, despite its positive outcomes, several challenges remain. Issues such as delayed fund disbursements, inadequate financial literacy, limited investment in entrepreneurial activities, and lack of awareness about effective money management continue to hinder the scheme's full potential. Additionally, some eligible women face difficulties in accessing the benefits due to bureaucratic hurdles and insufficient digital literacy.

This research aims to analyze the impact of the Kalaignar Mahalir Urimai Thogai Scheme on women's financial autonomy in Thanjavur District. By conducting surveys and collecting insights from beneficiaries, the study will evaluate the extent to which the scheme has improved women's economic well-being and decision-making capacity. Furthermore, the research will identify key areas for enhancement, such as the need for financial literacy programs, streamlined and timely disbursement mechanisms, and increased government support for women entrepreneurs. Addressing these gaps will help maximize the scheme's effectiveness, ensuring that it becomes a sustainable and impactful model for women's economic

empowerment.By strengthening initiatives like this, Tamil Nadu can set a benchmark for gender-inclusive financial policies across India. With continuous improvements, the Kalaignar Mahalir Urimai Thogai Scheme has the potential to drive long-term economic independence for women, promote inclusive growth, and contribute to the broader goal of gender equality and financial inclusion.

AIM: The aim of this research is to evaluate the impact of the Kalaigner Mahalir urimai Thogai Scheme on women's financial independence, household decision-making, and identify potential areas for improvement based on their feedback in Thanjavur District.

2.0 Objectives

1. To evaluate the effect of the *kalaigne*r *Mahalir Urimai Thogai Scheme* on women's financial independence and economic decision-making power within households.
2. Assess the direct financial benefits of the *kalaignar Mahalir Urimai Thogai Scheme* on women in Thanjavur District.
3. Identify potential areas for improvement or modification in the scheme based on women's feedback.

3.0 Problem of the Study

Many women's face challenges in achieving financial independence and having household economic decisions. The *kalaigner Mahalir Urimai Thogai Scheme* was launched to provide financial support to women, aiming to improve their economic power and decision-making. However, it is unclear whether the scheme is truly helping women become financially independent and have more control over household finances. This study will look at the financial benefits women receive from the scheme, its impact on their independence, and gather their feedback to suggest possible improvements.

4.0 Review of Literature

Floyd Eisenberg, (2023) The goals of clinical decision support (CDS) and knowledge-enhanced healthcare are to enhance the quality, safety, and cost-effectiveness of care processes. In this chapter, Quality Measurement (QM) will encompass assessments of care appropriateness from the perspectives of quality, safety, and cost-efficiency.

S.D.Shanthi.,(2024) ICDS improves child nutrition, health, and maternal well-being in Kanyakumari district, reducing malnutrition. The study confirms its impact but calls for sustained efforts to ensure long-term success.

Nobuteru Soda et al.,(2024) This study validates smartphone-based jump height estimation and finds visual feedback enhances RJ performance more than oral feedback in athletes.

Prabha Kotiswaran.,(2025) states that Tamil Nadu's Kalaignar Kalaigner Mahalir urimai Thogai scheme provides ₹1,000/month to women, recognizing unpaid domestic work. While not discouraging education or jobs, it enhanced financial security and dignity. Women felt valued by the state, fostering awareness of gender roles. With proper support, it could advance SDG 5.4 and gender equality.

E Barrow et al., (2025) This study examines patient feedback logging in UK and Irish dental hospitals, revealing that negative feedback is systematically recorded, while positive feedback is often missed. A survey of 13 hospitals (59%) highlights the need for structured procedures to encourage and document positive feedback. A universal feedback system could improve collection and utilization for better healthcare insights.

5.0 Methodology

Sample Size: 441 women beneficiaries participated in the study, ensuring diverse socio-economic representation and reliable insights.

Sampling Method: Stratified random sampling was used to categorize participants based on age, marital status, income level, and education, ensuring an unbiased selection process.

Area of the Study: The study was conducted in Thanjavur District, Tamil Nadu, focusing on women beneficiaries of the Kalaignar Mahalir Urimai Thogai Scheme to understand its regional impact.

Statistical Tools: Chi-square tests and paired t-tests were applied to analyze the relationship between financial independence and decision-making power. Descriptive statistics were used to summarize data trends, and all analyses were conducted using PSPP software for accuracy and efficiency.

Method of Data Collection: Data will be collected through Google Forms online surveys, which will be used to collect both qualitative and quantitative data. The Google Form survey will be distributed among the selected 441 women beneficiaries. The survey questionnaire will have the following sections:
1. Demographic Details: Age, marital status, income level, educational level, and occupation.
2. Scheme's Economic Impact: Questions assessing the extent to which the money received has been spent, the type of expenditure that has been met, and the extent of women's economic independence after benefiting from the scheme.
3. Power to Decide: Questions assessing the extent of women's involvement in planning and decision-making on household finance before and after benefiting from the scheme.

4. Socio-Economic Impact: Any queries concerning a change in labor force participation, ownership of small business enterprise, or any other economic activity.
5. Feedback and Suggestions for Improvement: Open-ended questions to reflect women's perception of the scheme and improvements they would suggest, including disbursement process, eligibility, and financial literacy training.

6.0 Data Analysis and Interpretation

6.1 Chi-square test analysis
6.1.1 Hypothesis 01
H0: There is no significant association between receiving the scheme and overall satisfaction.
H1: There is a significant association between receiving the scheme and overall satisfaction.
how satisfied are you with the overall impact of the scheme on your life? $\times$ Marital status

Table 1: Chi-square test

	Value	df	Asymptotic Sig. (2tailed)
Pearson Chi-square	30.40	8	.000
Likelihood Ratio	29.78	8	.000
Linear-by-Linear Association	4.19	1	.041
N of Valid Cases	441		

Interpretation: The Chi-Square test reveals a significant association between marital status and overall satisfaction with the scheme. The calculated Pearson Chi-Square value (30.40) with 8 degrees of freedom is statistically significant at $p = 0.000$ ($p < 0.05$). This indicates that individuals of different marital statuses exhibit varying levels of satisfaction with the scheme. Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted, confirming a marital status-related difference in overall satisfaction with the scheme.

6.1.2 Hypothesis 02
Null Hypothesis (H_0): There is no difference in the financial situation before and after receiving the scheme benefits.
H_0: $\mu_1 - \mu_2 = 0$ (where μ_1 is the mean before receiving the scheme benefits, and μ_2 is the mean after receiving the scheme benefits)
Alternative Hypothesis (H_1): There is a significant difference in the financial situation before and after receiving the scheme benefits.
H_1: $\mu_1 - \mu_2 \neq 0$

Table 2: The Paired Sample t-test

					Paired Differences		t	df	Sig. (2tailed)
		Mean	Std. Deviation	S.E. Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Before receiving the scheme benefits did you have any personal income - Has the scheme improved your financial situation?	.12	1.12	.05	.01	.22	2.18	440	.030

Paired Samples Test

Interpretation of Results: The paired sample t-test shows a significant difference between the financial situation before and after receiving scheme benefits (p = 0.030). The mean difference is 0.12, indicating a slight improvement in financial situation. The 95% confidence interval (0.01 to 0.22) does not include zero, further confirming the difference. With a t-value of 2.18, the result is statistically significant. Therefore, we reject the null hypothesis and conclude that the scheme has improved financial situations. The evidence supports the scheme's positive impact on financial well-being.

6.1.3 Hypothesis 03

Null Hypothesis (H₀): There is no significant relationship between awareness of the Kalaigner Mahalir urimai Thogai Scheme and having a personal income before receiving scheme benefits.

Alternative Hypothesis (H₁): There is a significant positive relationship between awareness of the Kalaigner Mahalir urimai Thogai Scheme and having a personal income before receiving scheme benefits.

Table 3: Regression Analysis

Coefficeints (Before receiving the scheme benefits did you have any personal income)					
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant) Are you aware of the Magalir Urimai Thogai Scheme?	1.81 0.43	0.15 0.14	0.00 0.15	11.87 3.12	0.000 0.002

Interpretation: From the above table, the regression analysis shows a significant positive relationship between awareness of the kalaigner Mahalir Urimai Thogai Scheme and personal income before receiving scheme benefits (B = 1.43, p =

0.002). Since the p-value is less than 0.05, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted. This indicates that individuals with higher awareness of the scheme were more likely to have had a personal income before receiving its benefits.

7.0 Conclusion

The Kalaignar Mahalir Urimai Thogai Scheme has significantly enhanced women's financial independence in Thanjavur, empowering them to manage household expenses and make informed decisions. It has fostered economic self-reliance, improved access to essential needs, and strengthened women's role in financial matters. Despite challenges like delayed disbursement and financial literacy gaps, the scheme has uplifted thousands of women, boosting their confidence and future economic prospects. With continued improvements, it can serve as a model for women's empowerment .

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CHAPTER 11

Students Financial Challenges in Higher Education: Analysing Stress, Financial Behaviour and Aid Awareness

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ABSTRACT

This study examines the impact of financial stress on university and college students, focusing on academic performance, social life, money management habits, and financial aid awareness. With rising financial pressures, students struggle with financial stability, affecting their well-being and educational outcomes. Limited financial literacy, poor money management skills, and low awareness of financial aid programs contribute to these challenges. This research aims to bridge this gap by analysing how financial behaviour and aid awareness shape students' ability to cope with financial stress. Data were collected from 600 university and college students through a structured questionnaire. Descriptive statistics and chi-square tests were applied to analyse the primary data. The chi-square test confirms a significant association between financial stress and academic performance, as well as its influence on students' social interactions. Financial behaviour and stress levels show a notable relationship, with poor money management contributing to higher stress. Awareness and utilization of financial aid programs are low, with many students reporting difficulties in accessing support due to a lack of information or a complex application process. The findings highlight the need for improved financial education, better money management strategies, and increased awareness of available financial aid to enhance students' financial well-being and academic success.

Keywords: Financial stress, Academic performance, Financial behaviour, Financial aid awareness, Money management.

1.0 Introduction

Higher education plays a crucial role in shaping students' futures, offering opportunities for career advancement and personal growth. However, financial stress is a significant challenge that affects many university and college students, particularly those from low- and middle-income backgrounds. Rising costs of tuition, housing, textbooks, and daily expenses place a heavy financial burden on students, often leading to stress that impacts their academic performance and social life.

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Financial stress not only affects students' ability to focus on their studies but also influences their overall well-being. Many students struggle with poor financial behaviour, including inadequate money management skills, which exacerbates their financial difficulties. Without essential financial literacy skills such as budgeting, saving, and responsible borrowing, students may find it challenging to navigate their financial obligations both during and after their studies. Despite the availability of financial aid programs, including scholarships and loans, many students are either unaware of these resources or encounter difficulties in accessing them due to complex application processes and eligibility requirements. A lack of awareness and understanding of financial aid programs further contributes to students' financial struggles, making it harder for them to manage their financial responsibilities effectively. This study aims to examine how financial stress impacts students' academic performance, social interactions, and financial behaviour. Additionally, it explores the extent of students' awareness and utilization of financial aid programs and evaluates whether the support they receive is adequate to meet their financial needs. By analysing the relationship between financial literacy, aid accessibility, and financial stability, this study seeks to highlight gaps in financial education and aid awareness that contribute to students' financial challenges. Addressing these issues by improving financial education, promoting better money management practices, and increasing awareness of financial aid options can help students mitigate financial stress. Enhancing financial literacy and simplifying access to financial aid can create a more supportive educational environment, allowing students to focus on their studies and build a stable financial future.

2.0 Literature Review

Danahy *et al.*, (2024) examined the relationship between student loan debt, emergency savings, and financial stress among college students. Using the stress process model, their study found that higher student loan debt and lower emergency savings contributed to greater financial stress. Financial socialization and financial self-efficacy were identified as key factors in reducing financial stress.

Peltz *et al.*, (2020) analysed the role of financial strain in college students' work hours, sleep quality, and mental health. Their study found that students experiencing financial strain worked longer hours, which led to increased sleep disturbances and higher depressive symptoms.

Moore *et al.*, (2021) conducted a qualitative study on the impact of financial stress on student well-being. They found that financial stress negatively affected students' academic success and social interactions, with students often feeling isolated due to financial difficulties. Korankye *et al.*, (2023) examined financial advice usage and its impact on saving for children's college education. Their study found that receiving financial advice was positively associated with college savings, and policies promoting financial counselling could reduce student loan dependence.

Harper *et al.*, (2021) investigated who college students turn to for financial aid and student loan advice. Their findings revealed that students often relied on informal sources such as family and friends, but many found the information outdated or unhelpful. Britt *et al.*, (2016) examined financial stress, coping strategies, and academic achievement among college students. Their study found that financial stress was linked to lower academic performance and increased psychological distress, emphasizing the need for financial education and support systems.

Rainey and Taylor (2024) investigated financial aid awareness among at-risk students. Their study found that many students lacked knowledge about financial aid processes, leading to challenges in maintaining academic eligibility and managing financial responsibilities

Qi *et al.*, (2022) analysed the influence of financial aid systems on student academic development in Chinese higher education. Their study found that national scholarships and work-study positions positively impacted academic performance, while student loans were associated with negative academic outcomes.

Eun Jeong Heo (2023) explored the role of financial aid in college admissions, comparing need-based and merit-based aid systems. The study found that competitive colleges favored need-based aid, while less competitive institutions benefited more from merit-based aid, affecting student enrolment decisions.

3.0 Research Gap

Despite extensive research on financial stress and its effects on academic performance particularly in relation to study habits, persistence, and class participation there is limited evidence on effective interventions to improve students' financial behaviours. Poor money management practices, such as impulsive spending and inefficient budgeting, further worsen financial stress, yet research lacks comprehensive strategies to address these issues. Moreover, while financial aid is available, many students struggle with awareness, application processes, and utilization, preventing them from accessing necessary support. Existing studies also often fail to assess whether financial aid is truly sufficient to cover students' living and educational expenses.

4.0 Research Problem

Financial stress affects academic performance, making it difficult for students to concentrate, manage their time effectively, and stay engaged in their studies.
- Limited awareness and understanding of financial aid options.
- Poor financial management behaviours contributing to financial stress.
- Difficulty in navigating the financial aid application and utilization process.
- Uncertainty about whether financial aid adequately meets students' needs.

AIM: This study aims to assess the impact of financial stress on students' academic performance and financial behaviour. It seeks to analyse factors such as financial literacy, budgeting habits, and accessibility of financial aid while evaluating existing support systems. The study will also propose strategies to enhance financial awareness, improve aid utilization, and develop targeted interventions to reduce financial stress and improve students' overall academic success.

5.0 Objectives

- To identify the primary financial pressures faced by students in higher education and their impact on academic and personal well-being.
- To evaluate students' financial habits and their ability to manage money effectively.
- To assess students' knowledge and utilization of available financial aid programs, including scholarships and loans as well as whether these resources adequately cover educational expenses.

6.0 Methodology

Study design: This study employed a cross-sectional research design to examine financial stress, financial behaviour, and the awareness and utilization of financial aid among students in higher education. Cross-sectional data collection enables the simultaneous assessment of multiple variables at a single point in time, offering valuable insights into the prevalence and relationships of various financial factors affecting students.

Sample size: The study sample consisted of 600 students aged between 17 and 25 years from various universities and colleges. Participants were selected through a stratified random sampling method to ensure representation across different age groups, genders and socio-economic background. Demographic variables such as age, gender, educational level, residential areas and monthly income were recorded to capture the diversity of the sample population.

Data collection methods: Data were collected through structured surveys administered to students from selected higher education institutions. The survey instrument was designed to capture demographic information, financial stress levels, financial habits, and awareness and utilization of financial aid programs.

Data analysis: The collected data were analysed using both descriptive and inferential statistical methods. Descriptive statistics, including frequencies, percentages, and means, were employed to summarize demographic characteristics, financial stress levels, and financial behaviour patterns among students. To examine relationships between key variables, inferential statistical techniques such as chi-square tests were applied. These tests assessed associations between demographic factors (e.g., age, income) and financial stress, financial behaviour, and financial aid awareness.

Ethical considerations: The study received ethical approval from the relevant Institutional Review Board before data collection commenced. Informed consent was obtained from all participants, ensuring they were fully aware of the study's purpose and procedures. To maintain confidentiality and anonymity, personal identifiers were not collected, and all responses were securely stored. Participants were also informed of their right to withdraw from the study at any stage without any consequences.

7.0 Data Analysis and Interpretation

7.1 Findings

Age: The study sample comprised 600 respondents aged between 17 to 25 years, with a majority falling within the 18-22 age group (58.5%)

Gender: Gender distribution was fairly balanced, with 50.5% female and 49.5% male participants.

Education: The majority of respondents (71.2%) hold a Bachelor's degree, indicating that most participants are undergraduates or recent graduates.

Monthly Income: Most respondents (59.3%) fall within the ₹10,000-20,000 income bracket, suggesting that the financial capacity of the majority is within a lower-middle-income range.

Residential Area: Nearly half (49.0%) of respondents live in urban areas, implying that urban residents form the largest group in the sample.

Family Size: More than half (56.8%) of respondents come from families with 3-4 members, suggesting that nuclear or small extended families are the norm.

Financially Stressed during higher education: 37.2% of respondents Always feel financially stressed during their higher education.

Financial stress affects academic performance: 43.5% reported that financial stress has a Moderate impact on their academic performance.

Ability to focus during classes or study sessions: 39.8% indicated that financial challenges have a Moderate impact on their ability to focus during classes or study sessions.

Confident in ability to manage finances effectively: 36.7% stated that they are Not very confident in managing their finances effectively.

Save portion of income: 30.3% of respondents Rarely save a portion of their income.

Comfortable with tracking and managing expenses: 43.7% of respondents feel Uncomfortable in tracking and managing their spending.

Aware of financial aid policies: 26% of respondents are Not very aware of financial aid options such as student loans or scholarships.

Ever applied for financial aid before: 26.% were not aware of financial aid options, and 31.8% had considered applying but had not done.

Government financial policies covering educational costs: 47.5% of respondents Disagreed that government financial policies adequately support students.

8.0 Hypothesis

1. There is no significant relationship between age and students' confidence in managing their finances effectively.
2. There is no significant relationship between students' monthly income and their level of financial stress.
3. There is no significant relationship between financial stress affecting academic performance and the ability to focus during classes.
4. There is no significant relationship between students' awareness of financial aid policies and their perception of government financial policies supporting education.

8.1 Testing of hypothesis

Table 1: Chi-Square Test

	Value	df	Asymptotic Significance (2 side)
Pearson Chi-Square	50.33		.000
Likelihood Ratio	51.84	12	.000
No. of Valid Cases	600	12	

8.1.1 Hypothesis 01

H₀ (Null Hypothesis): There is no significant relationship between age and students' confidence in managing their finances effectively.

H₁ (Alternative Hypothesis): There is a significant relationship between age and students' confidence in managing their finances effectively.

Interpretation: The Chi-Square test reveals a significant association between age and students' confidence in managing their finances effectively. The calculated Pearson Chi-Square value (50.33) with 12 degrees of freedom is statistically significant at $p = 0.000$ ($p < 0.05$). This indicates that students of different age groups exhibit varying levels of confidence in financial management. Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted, confirming an age-related difference in financial confidence among students.

Table 2: Chi-Square Test

	Value	**df**	**Asymptotic Significance (2 side)**
Pearson Chi-Square	91.45		.000
Likelihood Ratio	75.33	12	.000
No. of Valid Cases	600	12	

8.1.2 Hypothesis 02

H₀ (Null Hypothesis): There is no significant relationship between students' monthly income and their level of financial stress.

H₁ (Alternative Hypothesis): There is a significant relationship between students' monthly income and their level of financial stress.

Interpretation: The Chi-Square test reveals a significant association between students' monthly income and their level of financial stress. The calculated Pearson Chi-Square value (91.45) with 12 degrees of freedom is statistically significant at $p = 0.000$ ($p < 0.05$). Since the p-value is below the 0.05 threshold, we reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1). This indicates that students' financial stress levels vary significantly based on their monthly income, suggesting that income plays a crucial role in determining financial stress among students.

Table 3: Chi-Square Test

	Value	df	Asymptotic Significance (2 side)
Pearson Chi-Square	243.76		.000
Likelihood Ratio	217.82	16	.000
No. of Valid Cases	600	16	

8.1.3 Hypothesis 03

H₀ (Null Hypothesis): There is no significant relationship between financial stress affecting academic performance and the ability to focus during classes.

H₁ (Alternative Hypothesis): There is a significant relationship between financial stress affecting academic performance and the ability to focus during classes.

Interpretation: The Chi-Square test reveals a significant association between financial stress affecting academic performance and the ability to focus during classes. The calculated Pearson Chi-Square value (243.76) with 16 degrees of freedom is statistically significant at $p = 0.000$ ($p < 0.05$). Since the p-value is below the 0.05 threshold, we reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1). This indicates that financial stress significantly impacts students' ability to focus in class, suggesting that higher financial stress levels may contribute to difficulties in maintaining academic performance.

Table 4: Chi-Square Test

	Value	df	Asymptotic Significance (2 side)
Pearson Chi-Square	241.66		.000
Likelihood Ratio	225.17	16	.000
No. of Valid Cases	600	16	

8.1.4 Hypothesis 04

H₀ (Null Hypothesis): There is no significant relationship between students' awareness of financial aid policies and their perception of government financial policies supporting education.

H₁ (Alternative Hypothesis): There is a significant relationship between students' awareness of financial aid policies and their perception of government financial policies supporting education.

Interpretation: The Chi-Square test reveals a significant association between students' awareness of financial aid policies and their perception of government financial policies supporting education. The calculated Pearson Chi-Square value (241.66) with 16 degrees of freedom is statistically significant at $p = 0.000$ ($p < 0.05$). Since the p-value is below the 0.05 threshold, we reject the null hypothesis (H₀) and accept the alternative hypothesis (H₁). This indicates that students who are more aware of financial aid policies tend to have different perceptions of government financial support for education compared to those with lower awareness.

9.0 Discussion

The findings of this study contribute to our understanding of the complex interplay between demographic factors, financial stress, and financial behaviour among university and college students. The significant associations observed between age, income level, and financial confidence highlight the need for targeted financial education programs that consider the diverse financial backgrounds of students. Moreover, the study underscores the impact of financial stress on academic performance, demonstrating that students who experience higher financial stress levels often struggle with focus, engagement, and overall academic success. This finding reinforces the importance of financial wellness initiatives within higher education institutions to support students in managing their financial burdens effectively. Additionally, the results indicate that a substantial portion of students lack awareness of financial aid programs, with many either unaware of available resources or facing challenges in accessing them. This suggests the need for improved financial aid outreach and simplified application processes to ensure that students can secure the necessary financial support without unnecessary barriers.

In interpreting these results, it is essential to consider the broader socioeconomic context in which students navigate their financial responsibilities. Economic disparities, rising tuition costs, and limited financial literacy contribute to the financial struggles faced by students. Therefore, interventions should be designed to address these challenges through a holistic approach that integrates financial literacy, mental health support, and accessible financial aid systems.

Moving forward, further research is needed to explore the long-term impact of financial stress on students' career choices, post-graduation financial stability, and overall well-being. Additionally, future studies could examine the effectiveness of

financial education programs in improving students' financial behaviour and reducing stress levels.

In conclusion, this study sheds light on the intricate relationship between financial stress, financial behaviour, and academic performance among students in higher education. By addressing these challenges through policy reforms, financial education, and institutional support, stakeholders can work towards fostering financially resilient students who can successfully manage their academic and financial responsibilities.

10.0 Scope for Further Research

The scope of future research is to explore financial stress and its impact on students, with a focus on identifying key areas for intervention and support. It aims to analyze different student groups, long-term effects, and potential solutions for financial well-being.

- Examining variations in financial stress among first-generation students, working students, and other demographics to develop targeted support programs.
- Conducting longitudinal studies to assess its impact on graduation rates, dropout risks, and career progression.
- Evaluating their role in reducing financial stress and improving money management skills.
- Investigating how combined financial and mental health support can enhance student well-being, financial stability, and academic success.

11.0 Conclusion

This study examined the impact of financial stress, financial behaviour, and financial aid awareness among university and college students. The findings provide key insights into how financial difficulties influence academic performance, financial confidence, and aid utilization.

12.0 Findings

Demographic Insights: Analysis of demographic data revealed that financial stress levels varied significantly based on age, income, and financial literacy levels. Students from lower-income backgrounds reported higher financial stress and lower confidence in managing their finances.

Financial Stress & Academic Performance: A notable proportion of students indicated that financial stress moderately to severely affected their ability to focus in class and complete coursework.

Financial Behaviour Patterns: Many students demonstrated poor financial habits, such as limited savings, lack of budgeting, and discomfort in tracking expenses. These behaviours contributed to their overall financial instability.

Financial Aid Awareness & Utilization: A significant percentage of students were unaware of financial aid programs or found the application process challenging, leading to underutilization of available resources.

Economic Influences: Students' financial decisions were heavily influenced by monthly income, family financial support, and access to financial education. Those with greater financial literacy exhibited better money management skills and lower stress levels.

13.0 Significance and Implications

The study's findings have several important implications for higher education institutions, policymakers, and financial education initiatives. Understanding the financial struggles of students can help develop targeted financial literacy programs, improve aid accessibility, and enhance institutional financial support systems. By addressing key factors such as financial literacy, stress management, and aid awareness, universities and policymakers can create a more supportive financial environment that enables students to focus on their education without being overwhelmed by financial burdens.

14.0 Closing Remarks

In conclusion, this study provides valuable insights into the financial challenges faced by students in higher education. The complex interplay between financial stress, financial behaviour, and academic performance highlights the urgent need for effective financial education, institutional support, and policy reforms. By addressing these financial challenges through collaborative efforts between universities, policymakers, and financial institutions, students can be equipped with the knowledge and resources to achieve financial stability and academic success. Future research and interventions should continue to focus on enhancing financial well-being to create a more equitable and supportive higher education environment.

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CHAPTER 12

The Change in Consumer Habits
Caused by Flash Sales and Social Media Advertisement

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ABSTRACT

The increasing use of flash sales and social media advertisements encourages haste, impulsive purchases, and brand switching, which changes consumer behavior and puts long-term brand loyalty to the test. There is a lack of research on urgency-driven impulsive purchase, which ignores ethics, cultural differences, and long-term loyalty. To evaluate flash sales and social media advertisements in a sustainable manner, these holes must be filled. Objectives: to determine the impact of social media ads on a consumer's preferences, perceptions, and purchasing choices. to ascertain the effect of flash sales on consumer purchasing patterns, such as brand loyalty, urgency, impulse buying, and brand-switching. to investigate whether flash discounts and social media advertisements lead to long-term shifts in customer loyalty and behavior or to impulsive, short-term purchases. Methods: This research project is being carried out using a cross-sectional study design. A systematic questionnaire yielded 520 responses in all, which spss software then examined. Results: The majority of participants (90%) were over the age of 18–25, followed by those in the 36–45 age range who were mid-career individuals and parents (40%), young professionals and those in the early stages of their careers (30%), and professionals in the 45–60 age range who were approaching retirement (20%). Conclusion: This study's goal is to influence people's perceptions of impulsive buying, urgency buying, and short- and long-term changes in behavior. Due to increased haste and impulsive purchasing brought on by social media advertisements and flash deals, customers are more likely to switch brands. Because of this changing behavior, businesses are being forced to reconsider their long-term brand loyalty plans and consumer engagement and retention tactics.

Keywords: Flash sales, Brand switching, Impulse buying, Social media Advertisement, Perception, Purchasing decision.

1.0 Introduction

The study analyzed how brand image, personal characteristics, and social advertising influence Malaysian consumers' purchasing decisions for high-end apparel brands.

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Results showed that brand image significantly influences purchasing behavior, with materialism and credibility being key determinants. Companies should focus on strong brand identities and reliable social media advertising.(1).The study explores consumer behavior in Indonesian online marketplaces using a quantitative approach. Results show that e-satisfaction and repurchase intention are significantly influenced by utilitarian and hedonistic browsing patterns, with e-satisfaction being a key factor. Future research should consider cross-cultural analysis, qualitative methods, and longitudinal studies.

In order to better understand how social media advertising affects customer behavior, this study focuses on 47 relevant papers. Findings suggest that factors like networking, trust, brand awareness, and engagement positively influence purchase intentions, with social media advertising having a greater impact than traditional advertising. The study analyzed the impact of sales promotions on clothing sector purchasing decisions among 330 Indian consumers aged 18-35. Results showed that coupons and discounts significantly influence consumer behavior, promoting repeat business and brand loyalty. The study also highlighted the effectiveness of digital channels and eco- branding strategies.

The study on e- shopping expansion in GCC countries post COVID-19 found that perceived utility, consumer psychology, product variety, payment simplicity, budgetary concerns, health concerns, and cultural values significantly impact purchase intentions. Convenience, psychological considerations, and health concerns contributed to the shift (5). A study on social media advertising in Saudi Arabia found that it significantly influences consumer decisions and impulsive purchasing activities. However, social media networks did not significantly influence impulse purchases due to Saudi Arabia's culture of uncertainty avoidance and methodical purchasing. The study highlights the power of engaging content in social media ads(6). A mixed-method study on pandemic-related shopping behavior found that sales promotions, such as discounts and free samples, significantly impact consumer purchasing behavior, especially during economic downturns. Free samples were useful for launching new items, while discounts and "buy one get one free" promotions were the most successful(7).A 2022 study surveyed 686 Czech respondents to understand the shift in traditional purchasing considerations over the past 15 years. Quality remains the top factor, but price has become more significant in communication and food/accommodation sectors. New elements include online shopping, coupons, return policies, and environmental considerations(8).

The study explores the factors influencing Instagram social commerce participation using a mixed-method approach. It suggests consumer-brand identification mediates impulsive purchasing and overall motivation, while perceived social risk of commenting moderates the relationship. The findings suggest that social media platforms like Instagram foster interesting purchasing environments, encouraging impulsive purchases(9).

1.1 Research objectives

- To determine the impact of social media ads on a consumer's preferences, perceptions, and purchasing choices.
- To ascertain the effect of flash sales on consumer purchasing patterns, such as brand loyalty, urgency, impulse buying, and brand-switching
- To investigate whether flash discounts and social media advertisements lead to long-term shifts in customer loyalty and behavior or to impulsive, short-term purchases.

1.2 Scope of the study

The study "Social Support, Source Credibility, Social Influence, and Impulsive Purchase Behavior in Social Commerce" explores the role of peer influence, source credibility, and social support in impulsive purchasing behavior in online social commerce platforms. The research uses Sina Weibo as the primary research setting and employs a survey- based approach. The study provides insights into how social media interactions influence consumer behavior and suggests strategies for social commerce platforms to enhance user engagement and increase sales(10).

1.3 Methods and results of the study

The goal of this studyis to employed a quantitative methodology, gathering information from 686 Czech respondents who completed a structured questionnaire survey in 2022. Discount codes, quality, cost, mode of purchasing, and environmental considerations were important traditional criteria. Discount codes, online and in-store purchases, and environmental considerations were new factors. The following five factors were found to be important: sustainability, experience, pricing, recommendations,(8) and current trends. This Paper examine the Emerging influences include mode of purchase,Includes brand, design, and return options, Environmental aspects and product origin.

1.4 The main contribution of this paper

- Analysis of Social Media Advertisement Influence, targeted social media advertisements shape consumer preferences, brand perception, and purchasing behavior.
- Impact of Flash Sales on Buying Decisions, role of limited-time offers in creating urgency and driving impulsive purchases among consumers.
- Shifts in Consumer Shopping Habits, digital promotions and social media engagement contribute to the transition from traditional shopping to e-commerce.
- Consumer Psychology and Decision- Making, psychological triggers such as scarcity, exclusivity, and social proof that influence buying behavior in digital marketing.

2.0 Review of Literature

Fazal ur Rehman *et al.,* (2022) This study is quantitative method, collecting data from 288 analyzing them using Smart PLS-SEM. 288 respondents were a mix of males (45.5%) and females (54.5%) The participants had been exposed to social media advertising and used stylish clothes labels. According to the study, brand image, personal characteristics, and social advertising all have a big impact on consumers' purchasing decisions when used with trustworthy tactics.

V. Kumaradeepan *et al.,* (2020) Analyzes literature on advertisement on social media and customer behavior, focusing on theoretical evidence from 47 relevant articles from 70 indexed journals.No direct empirical data collection was conducted.The analysis was based on secondary data from published research papers and articles. Social media advertising significantly influences consumer behavior through networking, trust, and brand awareness, fostering better engagement and influencing purchase intentions through interactive content.(3)

Prakash Singh *et al.,* (2023) A quantitative study analyzed 259 valid responses from social media users, revealing a majority use of Instagram and Facebook for online shopping, primarily for books and fashion accessories. It significantly impacts impulse buying intention and behavior, influencing consumer decisions. consumers are cautious, focusing on utility rather than impulsive tendencies, and effective content can drive impulse buying behaviors.(6)

Jackeline Andrea Macías Urrego *et al.,* (2024) To gather information about 214 participants' use of social media platforms for pre-purchase decision-making, a mixed-method research methodology was employed. The most popular social media site for consumer pre-purchase research is Instagram, where decisions are somewhat influenced by content trust. Individual and situational factors hold more sway, and educational background does not significantly influence platform preferences.(13)

Martaleni Martaleni *et al.* (2022). This quantitative study analyzed flash sales and impulse buying among 150 e-commerce consumers using online questionnaires and PLS-SEM analysis. It significantly influence consumer emotions, positively influencing impulse buying. However, their direct impact is insignificant. Businesses can optimize flash sales by focusing on positive emotions.(25)

2.1 Common research gap in this review of literature

- There is a dearth of longitudinal research analyzing the long-term effects of emerging technologies like AI and AR on customer engagement and brand loyalty, as most studies concentrate on short-term consumer behaviors and digital marketing trends.
- Research comparing the efficacy of advertising across various there aren't many sites like Facebook, Instagram, and TikTok, even though social media advertising has been studied in great detail. The question of how customer interaction differs on various platforms is still unanswered. Although there are

ethical concerns with the growing personalization of digital marketing,there is currently a lack of research on how data privacy policies and openness in targeted advertising impact customer trust.

- Studies primarily focus on specific demographic groups or regions, leading to a gap in understanding how different cultures and age groups interact with digital marketing strategies and consumer engagement models.
- While AI, AR, and machine learning are frequently mentioned as transformative tools in marketing, there is little empirical research on how businesses can effectively integrate these technologies to enhance customer experience and retention.

3.0 Research Methodology

Figure 1: Data Collection and Analysis Process
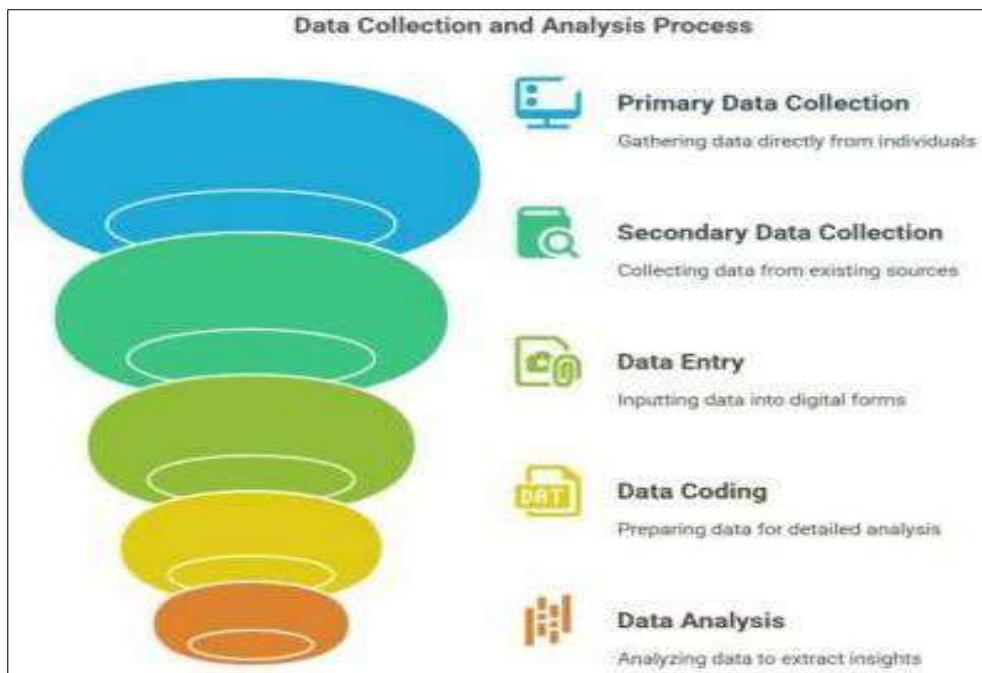
Study Design: This was a cross-sectional and descriptive study made with random people who shifting there habit become the social media advertisement and flash sales.

Source of data and data collection: The primary data of 520 was collected from consumer through questionnaire and secondary data was collected from websites and journals.

Sampling Size: The sampling size is over 2000000 people in this area. This data sampling size is 385.

Data Analysis: The data was collected through Google Forms and that was entered in a spreadsheet. The data was coded into PSPP software.

Sampling tool: The Analyses using the sampling tool in chi- square test, Multi regression Analysis.

4.0 Data Analysis and Interpretation

Figure 2: Age Distribution
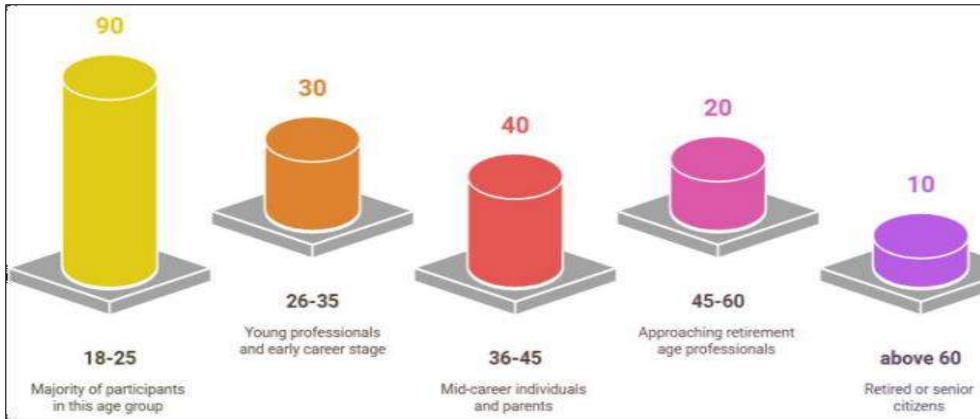
Figure 3: Gender Distribution
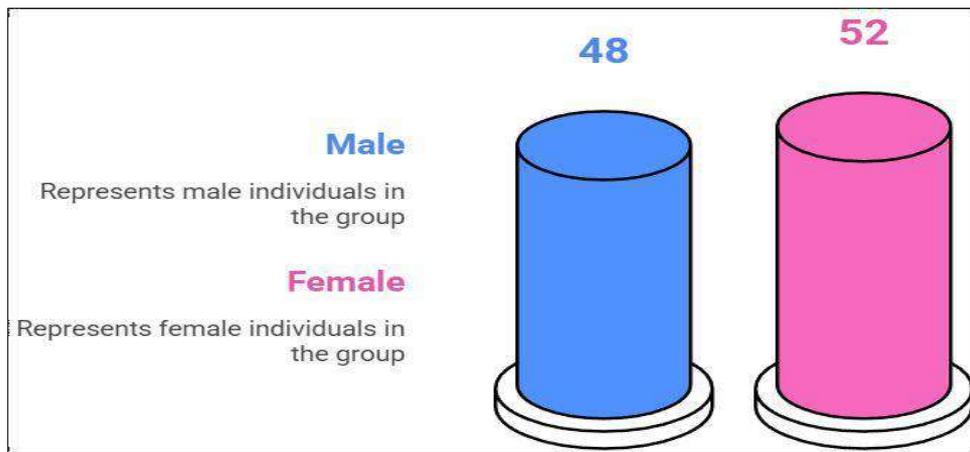
According to Figure 4, 40% of people are 90% of people in the 18–25 age range report that their consumption patterns have changed. 40% of the 36–45 age group expresses habits, indicating a moderate level of interest. The 26–35 age group exhibits a slightly lower inclination, with 30% of individuals changing their habits. Those over 60 show the lowest rate of habit change, with only 10%, while those in the 45–60 age range show even fewer habits (20 percent) (Figure 2). Of these people,

52% are female and 48% are male (Figure 3).unemployed, 30% are students, 15% areself-employed, 10% are working, and 5% are retired. According to Figure 5, 40% of people make less than ₹20,000 per month, 30% make between ₹20,000 and ₹40,000 per month, 20% make between ₹40,000 and₹500,000, 10% make between ₹50,000 and₹1,000,000, and 10% make more than₹1,000,000. About half of residential areas are in rural areas, 30% are in semi-urban areas, and 20% are in urban areas.

Figure 4: Employment Status
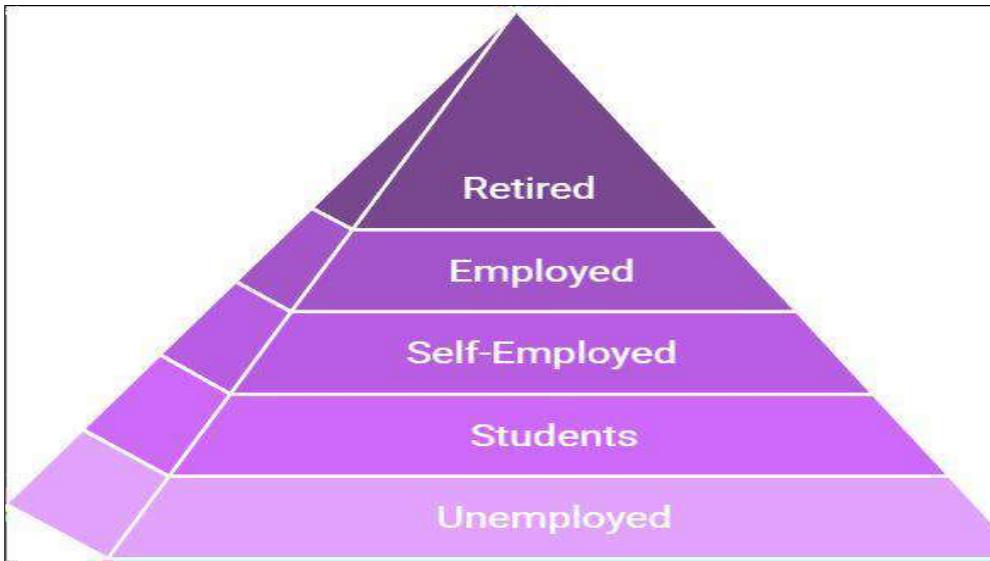
Figure 5: Monthly Income
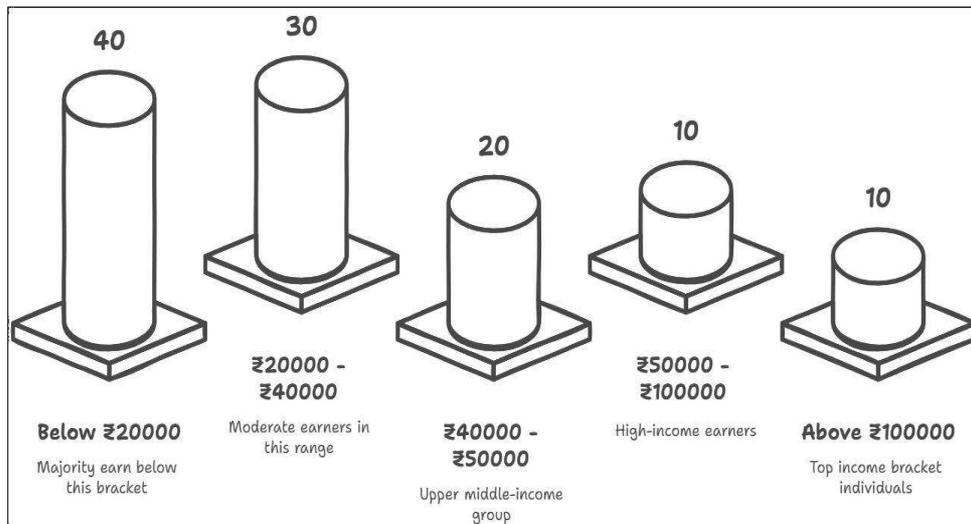
Figure 6: Distribution of Residential Area
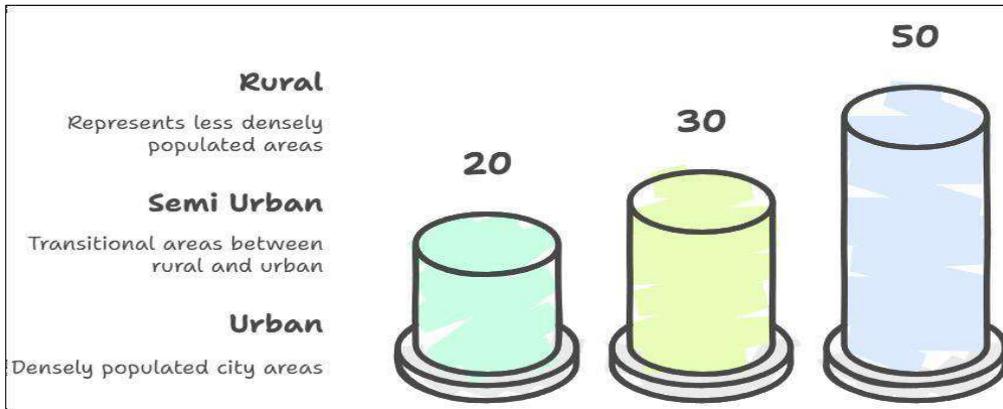
Figure 7: Changing their Habits in Shopping
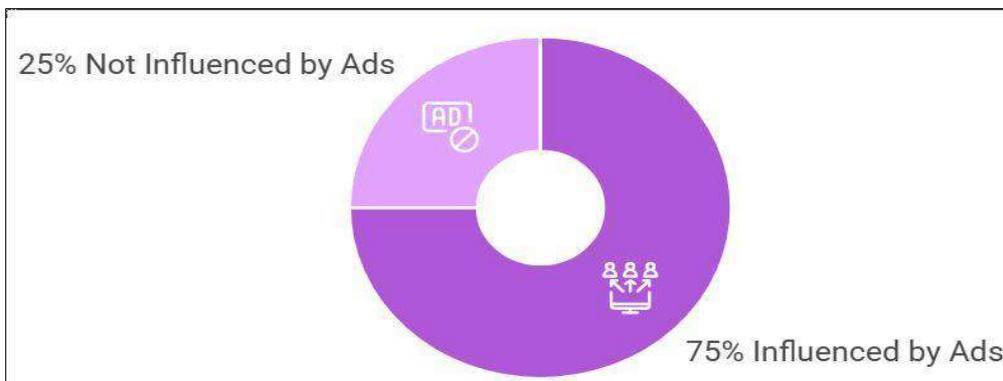
People are affected in their changing their habits in social media Advertisement and Flash Sales are 75% in highly majority influenced and 25% are not influenced in changing their habits

5.0 Analysis the Changing their Habits

Table 1: Need of using the Products

	value	Degree of Freedom	Asymptomatic sig. (2-tailed)
Pearson chi-Square	54.87	16	.000
Likelihood Ratio	54.33	16	.000
Linear-by-Linear Association			
N of Valid Cases	36.24	1	.000
	493		

5.1 Analysing the urgency of impulsive buying of flash sales

Table 2: Urgency of impulsive Buying

	Value	Degree of Freedom	Asymptomatic sig. (2-tailed)
Pearson chi-Square	52.34	16	.000
Likelihood Ratio	43.84	16	.000
Linear-by-Linear Association			
N of Valid Cases	18.71	1	.000
	493		

5.3 Analysis the influence of consumer preference

Table 3: Influence of Consumer Preference

	Chi-Square	Degree of freedom	Asymptomatic sig.
Gender	658.31	4	.000
Social Media Advertisement influence my preference for specific brand or product	210.10	4	.000

5.4 Analysis the improve the brand creditable for the consumer

Table 4: Improve the Brand Creditable

	value	Degree of freedom	Asymptomatic sig. (2-tailed)
Pearson chi-Square	86.51	16	.000
Likelihood Ratio	71.89	16	.000
Linear-by-Linear Association			
N of Valid Cases	21.89	1	.000
	520		

In today's digital world, social media advertisements and flash sales play a crucial role in shaping consumer behavior. This study examines whether there is a significant association between exposure to social media ads, flash sales, and changes in consumer purchasing habits. The Chi- Square test results in the table provide statistical evidenceof this relationship. Social media advertisements and flash sales have revolutionized consumer shopping behavior. This statistical analysis, based on the Chi-Square test, examines whether there is a significant relationship between exposure to social media ads, flash sales, and changes in consumer purchasing

habits. Social media advertisements and flash sales play a significant role in shaping consumer preferences and purchasing habits. This Chi- Square test helps us understand how various groups respond to marketing techniques by examining if gender and social media ads influence brand preference. Whether social media advertisements and flash sales have a substantial impact on changes in consumer behavior is assessed using the Chi-Square test. A meaningful association between these marketing methods and consumer behavior may be ascertained with the use of.

6.0 Findings from the Chi-Square Test

Social media advertisements, flash sales, and habit modifications are strongly and significantly correlated, according to the Pearson Chi-Square value (54.87, p =.000). The results demonstrate that consumer behavior is not random and is impacted by social media marketing tactics because $p < 0.05$. This test validates the significant influence of sales promotions and ads on consumer behavior by supporting the Pearson Chi-Square finding. This value points to a recurring pattern: customers are more inclined to alter their purchasing patterns when they are exposed to more social media advertisements and flash bargains. With 493 participants, the study offers a solid foundation for extrapolating the findings. This metric assesses whether social media advertisements and flash deals are linked to shifts in consumer purchasing patterns. A high correlation is indicated by the high Chi-Square score (52.34).

The statistical significance of this link and its lack of chance are confirmed by the p- value of.000 (< 0.05). This validates the Chi-Square test, confirming the finding that flash discounts and social media advertisements have a big impact on customer behavior. There is a clear trend here: customers' purchasing habits shift in tandem with their increased exposure to advertisements and flash discounts. The strong correlation between gender and the purchasing behavior influenced by flash sales and social media advertisements is indicated by the high Chi-Square value (658.31). The significant influence of gender on the way individuals react to internet marketing is confirmed by the p- value (.000) < 0.05. Therefore, it's possible that men and women will react or enjoy social media promotions differently.Customers' brand preferences and social media ads are strongly correlated, according to the Chi-Square value of 210.10. This is statistically significant, as indicated by the p-value (.000) < 0.05, which indicates that advertisements have an impact on consumers' decisions on which brands or goods to buy. This implies that social media marketing initiatives successfully influence customer loyalty and decision. A substantial correlation between social media advertisements, flash sales, and changes in consumer behavior is indicated by a high Chi-Square score of 86.51. The statistical significance of the p-value (.000) < 0.05 confirms that certain marketing methods have an impact on consumers' purchasing decisions. Additionally, this value affirms the importance of the relationship and strengthens the idea that social media This

metric shows that there is a regular pattern in how these advertisements and sales cause customers to alter their behavior.A relatively large sample size (520 respondents) increases the reliability of the findings, making the results more generalizable.

7.0 How Social Media Advertisement and Flash Influence Habits Changes

Flash sales instill a sense of urgency in customers, leading them to buy things they had not planned to. Regular exposure to advertisements affects how people perceive brands, which increases their preference and level of trust in promoted brands. Social media promos and discounts entice customers to shop online instead of in-store. Limited-time deals and eye-catching advertisements elicit feelings like FOMO (Fear of Missing Out), which motivates customers to take immediate action. Flash sales with a limited duration create a sense of urgency that encourages impulsive purchasing. People are more likely to prefer promoted brands when they are exposed to advertisements on a regular basis since they are more aware of and trust the brand. A lot of customers are switching to internetshopping because of the alluring deals and discounts.People are urged to respond fast by FOMO (Fear of Missing Out) marketing strategies, which alters their purchasing habits. Discounts, urgency, and company messaging in social media advertisements may elicit distinct reactions from men and women. Campaigns can be customized by marketers to appeal to particular gender inclinations. Ads on social media provide brands more visibility, which increases the likelihood that consumers will become brand loyal. Time-limited sales instill a sense of urgency in customers, encouraging them to make snap decisions. Customers are moving toward digital shopping platforms and depending more on social media promotions to direct their purchasing decisions. devotion. Targeted discounts and promotions may cause consumers to switch from traditional to online purchasing. Ads may have varying effects on different demographic groups, necessitating customized marketing tactics.

The findings support the notion that flash sales and social media ads have a big impact on customer behavior. The statistical analysis backs up the claim that digitalplatform marketing tactics successfully influence consumers' purchasing decisions and timing. A robust and statistically significant correlation between social media advertisements, flash sales, and shifts in consumer behavior is confirmed using the Chi-Square test. Customers are successfully influenced by these marketing techniques, which results in higher spending, brand loyalty, and a preference for internet purchasing.

The Chi-Square test demonstrates that flash sales and social media advertisements have a major impact on customer behavior and brand preference, with gender being a major determinant of buying patterns. These results emphasize how crucial customized marketing tactics are to increasing engagement and revenue. Statistics show that flash discounts and social media advertisements have a big

influence on customer behavior, promoting brand loyalty, impulsive purchases, and changes in purchasing patterns. Companies can utilize this information to improve client interaction and hone their digital marketing tactics

8.0 Analysis the One-Sample Test for Changing their Habits

Table 5: One-Sample Test

	Test Value = 520					
	t	df	Sig. (2-tailed)	Mean Difference-	95% confidence Interval of the Difference	
					Lower	Upper
Social media advertisements influence my preference for specific brands or products.	-11776.1	519	.000	-517.64	-517.73	-517.56
I perceive brands promoted on social media as Trendy or popular.	-10814.4	519	.000	-517.50	-517.59	-517.41
Social media advertisements motivate me to make impulsive purchases. Flash sales create a sense of urgency that Influences my buying decisions. Flash sales strengthen my loyalty to a brand if they offer attractive discounts. Social media ads often lead me to make impulsive purchases. Flash sales reinforce my preference for brands I already trust. Social media ads and flash sales shape my preferences for shopping channels (e.g., online vs.in- store). Social media ads influence my loyalty to specific brands.	-10426.6 -10.718.2 -10525.0 -10902.9 -10471.1 -10661.8 -10471.3	519 519 519 519 519 519 519	.000 .000 .000 .000 .000 .000 .000	-517.45 -517.54 -517.39 -517.50 -517.37 -517.43 -517.34	-517.55 -517.63 -517.49 -517.59 -517.46 -517.53 -517.44	-517.35 -517.44 -517.30 -517.40 -517.27 -517.34 -517.24

The results of a one-sample t-test used to determine if flash sales and social media advertisements had a substantial impact on customer behavior are shown in this table. A neutral or expected response level is probably represented by the test value of 520.

8.1 Findings in one sample test

All claims have a p-value (Sig. 2-tailed) of .000, indicating that the findings arehighly statistically significant. This demonstrates how flash deals and social media advertisements have a big influence on customer behavior. All of the t-values are

extremely negative, indicating that respondents report a significantly lower assessment of the impact and usually disagree with the test result (520). The actual answers are significantly lower than the test value (520), as indicated by the mean difference values (around -517), which point to a significant negativedeparture from the intended neutral response. We are certain that the true mean difference lies inside the 95% Confidence Interval, which is about between -517.73 and -517.24. The conclusion that social media advertisements and flash deals have a significant impact on consumer behavior is further supported by the fact that the whole confidence interval is negative.

Customers concur that social media advertisements help consumers choose promoted brands and mold their brand preferences. Impulsive purchasing is a result of the sense of urgency created by flash discounts and social media ads. Customers' preference for online purchasing over in- store purchases is influenced by online promos and flash deals. Brand loyalty is strengthened by alluring offers and encouraging social media feedback.

The findings provide compelling evidence that flash sales and social media advertisements have a big influence on consumers' purchasing decisions. Digital marketing methods have a significant impact on customers, as evidenced by the statistical significance, negative mean differences, and confidence intervals.

9.0 Result

90% of people in the 18–25 age range report that their consumption patterns have changed. 40% of the 36–45 age group expresses habits, indicating a moderate level of interest. The 26–35 age group exhibits a slightly lower inclination, with 30% of individuals changing their habits. Those over 60 show the lowest rate of habit change,with only 10%, while those in the 45–60 age range show even fewer habits (20 percent)). Of these people, 52% are female and 48% are male .According to, 40% of people are unemployed, 30% are students, 15% areself-employed, 10% are working, and 5% are retired. 40% of people make less than₹20,000 per month, 30% make between₹20,000 and ₹40,000 per month, 20% make between ₹40,000 and ₹500,000, 10% make between ₹50,000 and ₹1,000,000, and 10% make more than ₹1,000,000. About half of residential areas are in rural areas, 30% are in semi-urban areas, and 20% are in urban areas.

10.0 Conclusion

The results of this study show that flash discounts and social media ads significantly influence shifting customer behavior. The statistical study, which included One- Sample t-tests and Chi-Square testing, consistently produced significant p-values (p =.000), indicating that these marketing methods have a variety of effects on consumer behavior.Chi-Square values are substantial, indicating

that consumers tend to acquire preferences for brands and items advertised on social media.A sense of urgency is created by flash sales and social media advertisements, which increases impulsive buying.Promotions and discounts increase brand loyalty among consumers. The influence of social media and marketing tactics causes many customers to change their purchasing patterns (e.g., online vs. in-store).the table's statistical statistics, which include Pearson Chi-Square, Likelihood Ratio, and Linear-by-Linear Association values.

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CHAPTER 13

A Struggles Faced by Rural Women Entrepreneur to Explore their Products in Online Platform

Sumithra K.*, Mahalakshmi S.** and Hariharan V.***

ABSTRACT

Due to e-commerce rising significantly as a tool of economic empowerment and business development, rural women entrepreneurs face severe constraints in making use of online platforms for growth. This study examines certain drastic barriers such as digital illiteracy, limited internet access, financial constraints, and issues based on socio-cultural orientations that keep them away from participating in the digital economy. Many rural women are devoid of requisite technical knowledge and access to skills needed by any form of e-commerce; thus, they hardly showcase and sell their products. Further hindrance is placed by weak network infrastructure and costly internet service on the other side, deepening the digital divide. Such limitations were obstacles resulted from societal norms and gender constraints toward mobility and decision-making power preventing women from engaging seriously in online business. Using a mixed-methods research approach, this study collected data from 426 rural women entrepreneurs through surveys by google forms. Significant business challenges show a relationship with such factors as business name, age, and willingness to adopt. Therefore, the study suggested several targeted interventions, such as digital literacy, infrastructure creation, financial assistance, awareness campaigns, and policy intervention. The enabling environment for rural women entrepreneurs is mainly dependent on bringing all the stakeholders, namely government, NGOs and private sector, together. Once these challenges are surmounted, the women in rural area will gradually grab the opportunities in the digital market place and thus reach development and inclusion at different levels.

Keywords: Rural entrepreneurship, Digital literacy, Financial constraints, Socio-cultural barriers, Policy interventions, Digital economy, Women empowerment.

1.0 Introduction

Implementing ICT4D can enhance rural livelihoods, but urban-centric solutions often fail to address local challenges.

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This study critiques the Western-centric approach, advocating for integrating indigenous knowledge into ICT4D research. The concept of *techn oficing*—using familiar, affordable technologies to support local practices—is proposed as a solution for rural micro-entrepreneurs. Drawing on a case study in India, the research develops a process model identifying knowledge gaps and strategies for mobilizing indigenous knowledge. The findings offer practical guidance for social enterprises to implement ICT solutions that align with rural needs, advancing the decolonial discourse in ICT4D.(Rishikesan Parthiban , Ruonan Sun, *et al.*, 2024) face unique challenges in rural areas due to gender biases and male-dominated social networks. These biases limit their access to critical resources like funding, reinforcing inequality in entrepreneurship.

While research highlights the importance of social networks for women entrepreneurs, most studies focus on urban settings, overlooking rural contexts. Rural women often have smaller, more constrained networks due to societal roles, making networking even more challenging. Addressing this gap is crucial for fostering diversity, equality, and inclusion in entrepreneurship, ensuring that rural women entrepreneurs can fully leverage social capital for business success (Angelo Saavedra, 2024) Women in family businesses struggle for formal recognition due to gender inequality, patriarchy, and a collectivistic, hierarchical culture, which frames their contributions as merely supportive social roles (Allan Discua Cruz, Eleanor Hamilton, *et al.* 2024) Female creative workers in peripheral areas use strategic coping mechanisms by embracing creative opportunities and actively building networks. Being on the periphery does not equate to isolation or limited opportunities, challenging the urban-rural binary.

Relational geographies better support rural and individual creative careers, countering the notion that urban creativity is collective while rural creativity lacks collaboration (Tina Mathisen, Johan Jansson, *et al.*, 2024) The masculinized view of entrepreneurship marginalizes women's innovation efforts, labeling them as deviations from the norm. This limits their access to resources, hindering their ability to fully realize their innovation potential (Janina Sundermeier, 2024) villages are experiencing improved access to infrastructure and IT, with 40% now having high-speed internet. Rural ICT offices, 50% PC availability, and a 70% mobile phone penetration rate highlight this progress. However, despite these advancements, rural population growth has not increased over the past two decades (Changlin Yang, Dingjie Zhou, *et al.*, 2024).

2.0 Literature Review

Challenges Faced by Rural Women Entrepreneurs in Online Platforms: Parthiban & Sun (2024) explored how social enterprises support rural micro-entrepreneurs using ICT-enabled practices, helping them align production with market demand. Saavedra (2024) investigated rural women's motivations for joining female-founded business networks, highlighting the role of these networks in

balancing entrepreneurship with family responsibilities. Sundermeier (2024) examined gender stereotypes in entrepreneurship and found that women entrepreneurs often face barriers in accessing resources and innovative markets, limiting their growth in digital business environments.

Digital Infrastructure and Financial Access for Rural Entrepreneurs: Zhang & Lines (2024) analyzed the impact of digital infrastructure and financial literacy on reducing income inequality in rural China, showing that improved technology access enhances market participation and credit availability. Alavion & Taghdisi (2021) studied the adoption of e-marketing in Iranian villages, emphasizing that rural areas with strong technological infrastructure and government support were more successful in integrating digital platforms. Goswami & Hazarika (2017) examined financial risk attitudes among handloom micro-entrepreneurs in India, highlighting that women entrepreneurs face greater financial constraints due to limited access to credit and training programs.

Role of Social Capital and Policy Interventions: Yang & Zhou (2024) investigated how social capital contributes to rural income growth, suggesting that government initiatives should focus on non-agricultural employment and training programs. Mathisen & Jansson (2024) challenged traditional economic geography theories by studying female artists in rural Sweden, noting that while creative industries offer opportunities, limited financial support and infrastructure remain barriers. Rundel & Salemink (2024) explored how local online shopping platforms influence rural retail, identifying small-scale operations and place-specific challenges as key factors affecting rural entrepreneurs' success.

Financial and Educational Support for Women Entrepreneurs: Cruz & Hamilton (2024) studied women's roles in family businesses in Latin America, emphasizing their responsibilities in business continuity and resilience. Their findings suggest a need for more inclusive financial education and support mechanisms for women entrepreneurs. Rainey (2024) examined financial aid awareness and found that better knowledge of funding options improves entrepreneurial sustainability. Qi *et al.* (2022) highlighted that complex financial aid systems often prevent entrepreneurs from accessing necessary support, leading to financial stress and reduced business growth.

3.0 Research Gap

Nevertheless, while there are proliferating online marketplaces, there are barriers faced by rural women entrepreneurs regarding online platforms due to such factors as household duties, digital and technological access, financial restrictions, competition in the market, and existing studies have focused on urban entrepreneurship with limited studies dedicated to the specific challenges and coping mechanisms of rural women entrepreneurs. This gap highlights the need for further study to address these challenges and support their online business growth.

4.0 Research Problem

The business growth and economic empowerment of women entrepreneurs in rural areas is impeded by limited digital skills, lack of necessary technology, poor internet access, and insufficient marketing know-how to properly present and sell their products online.

AIM: This study aims to strategies to overcome the struggles faced by women entrepreneurs

5.0 Objectives

1. To determine the number of women Entrepreneurs using the online platform for promoting their Products.
2. To identify the challenges faced by rural women Entrepreneurs for introducing their Products in the online platform.

6.0 Research Methodology

This study employed survey research methodology as a method of collecting primary data from participants(426) through an electronically designed Google Form. The study designed and utilized a descriptive research design with the purpose of analyzing the obstacles of rural women entrepreneurs in the use of online platforms. The study adheres to the quantitative approach and contains structured questions resulting in measurable insights. However, it should be noted that qualitative parts may be needed, thus this makes the study a mixed-method approach that gives a full picture of the encounters and possible solutions.

7.0 Data Analysis and Interpretation

7.1 Hypothesis 1

Null Hypothesis (H₀): There is no significant relationship between the name of the business and the challenges faced when using online platforms for product promotion.

Alternative Hypothesis (H₁): There is a significant relationship between the name of the business and the challenges faced when using online platforms for product promotion.

Table 1: Chi-Square Test

	Value	df	Asymptotic Sig. (2-tailed)
Pearson Chi-Square	75.34	20	.000
Likelihood Ratio	78.71	20	.000
Linear-by-Linear	31.60	1	.000
Association N of Valid Cases	426		

Interpretation: The Chi-Square test reveals a significant association between the name of a business and the challenges faced when using online platforms for product promotion. The calculated Pearson Chi-Square value (75.34) with 20 degrees of freedom is statistically significant at $p = 0.000$ ($p < 0.05$). This indicates that businesses with different names experience varying levels of challenges in online promotion. Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted, confirming that the name of a business influences the challenges it faces on online platforms for product promotion.

7.2 Hypothesis 2

Null Hypothesis (H_0): There is no significant relationship between the name of the business and the online platforms used to introduce products.

Alternative Hypothesis (H_1): There is a significant relationship between the name of the business and the online platforms used to introduce products.

Table 2: Chi-Square Test

	Value	**df**	**Asymptotic Sig. (2-tailed)**
Pearson Chi-Square	66.30	20	.000
Likelihood Ratio	58.40	20	.000
Linear-by-Linear	19.96	1	.000
Association N of Valid Cases	426		

Interpretation: The Chi-Square test reveals a significant association between the name of a business and the online platforms used to introduce products. The calculated Pearson Chi-Square value (66.30) with 20 degrees of freedom is statistically significant at $p = 0.000$ ($p < 0.05$). Similarly, the Likelihood Ratio (58.40) and the Linear-by-Linear Association value (19.96) also indicate a significant relationship. This suggests that businesses with different names prefer or utilize various online platforms differently when introducing their products. Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted, confirming that the name of a business influences the choice of online platforms for product introduction.

7.3 Hypothesis 3

Null Hypothesis (H_0): There is no significant relationship between age and the frequency of using online platforms for business activities.

Alternative Hypothesis (H_1): There is a significant relationship between age and the frequency of using online platforms for business activities.

Table 3: Chi-Square Test

	Value	**df**	**Asymptotic Sig. (2-tailed)**
Pearson Chi-Square	152.08	12	.000
Likelihood Ratio	142.71	12	.000
Linear-by-Linear	31.38	1	.000
Association N of Valid Cases	426		

Interpretation: The Chi-Square test reveals a significant association between age and the frequency of using online platforms for business activities. The calculated Pearson Chi-Square value (152.08) with 12 degrees of freedom is statistically significant at p = 0.000 (p < 0.05). Similarly, the Likelihood Ratio (142.71) and the Linear-by-Linear Association value (31.38) further support this significance. These results indicate that individuals of different age groups vary in how frequently they use online platforms for business purposes. Therefore, the null hypothesis (H$_0$) is rejected, and the alternative hypothesis (H$_1$) is accepted, confirming that age influences the frequency of using online platforms for business activities.

7.4 Hypothesis 4

Null Hypothesis (H$_0$): There is no significant relationship between age and willingness to adopt new digital tools (e.g., AI-based marketing, automation) to improve e-commerce business.

Alternative Hypothesis (H$_1$): There is a significant relationship between age and willingness to adopt new digital tools (e.g., AI-based marketing, automation) to improve e-commerce business.

Table 4: Chi-Square Test

	Value	**df**	**Asymptotic Sig. (2-tailed)**
Pearson Chi-Square	37.12	12	.000
Likelihood Ratio	36.78	12	.000
Linear-by-Linear	10.11	1	.001
Association N of Valid Cases	426		

Interpretation: The Chi-Square test reveals a significant association between age and willingness to adopt new digital tools (e.g., AI-based marketing, automation) to improve e-commerce business. The calculated Pearson Chi-Square value (37.12) with 12 degrees of freedom is statistically significant at p = 0.000 (p < 0.05). Similarly, the Likelihood Ratio (36.78) and the Linear-by-Linear Association value (10.11) further support this significance. These results indicate that individuals of different age groups exhibit varying levels of willingness to adopt digital tools for e-commerce enhancement. Therefore, the null hypothesis (H$_0$) is rejected, and the

alternative hypothesis (H$_1$) is accepted, confirming that age influences the willingness to adopt new digital tools in e-commerce business.

7.5 Hypothesis 5

Null Hypothesis (H$_0$): There is no significant relationship between the name of the business and the effectiveness of online platforms in growing the business.

Alternative Hypothesis (H$_1$): There is a significant relationship between the name of the business and the effectiveness of online platforms in growing the business.

Table 5: Chi-Square Test

	Value	df	Asymptotic Sig. (2-tailed)
Pearson Chi-Square	69.04	20	.000
Likelihood Ratio	73.94	20	.000
Linear-by-Linear	34.96	1	.000
Association N of Valid Cases	426		

Interpretation: The Chi-Square test reveals a significant association between the name of a business and the effectiveness of online platforms in growing the business. The calculated Pearson Chi-Square value (69.04) with 20 degrees of freedom is statistically significant at $p = 0.000$ ($p < 0.05$). Similarly, the Likelihood Ratio (73.94) and the Linear-by-Linear Association value (34.96) further support this significance. These results indicate that businesses with different names experience varying levels of effectiveness when using online platforms for growth. Therefore, the null hypothesis (H$_0$) is rejected, and the alternative hypothesis (H$_1$) is accepted, confirming that the name of a business influences how effective online platforms are in growing the business.

8.0 Findings

The Chi-Square test results indicate a significant relationship between the name of a business and the challenges faced when using online platforms for product promotion. The Pearson Chi-Square value (75.34) with 20 degrees of freedom and a p-value of 0.000 confirm that businesses with different names encounter varying levels of difficulty in promoting their products online. These challenges may be influenced by factors such as brand recognition, algorithmic preferences of digital platforms, and consumer perception of the business name. Businesses with less distinctive or generic names may struggle with visibility, while those with more recognizable or SEO-optimized names may find it easier to reach their target audience.

The Chi-Square test results indicate a statistically significant relationship between the name of a business and the online platforms used to introduce products. The Pearson Chi-Square value (66.30) with 20 degrees of freedom and a p-value of 0.000 confirm that businesses with different names tend to prefer or utilize various online platforms differently for product introduction.

Similarly, the Likelihood Ratio (58.40) and the Linear-by-Linear Association value (19.96) further support this significant association. These findings suggest that brand name recognition, industry-specific naming conventions, and platform-specific algorithms may influence how businesses select digital channels for product promotion. The Chi-Square test results indicate a significant relationship between age and the frequency of using online platforms for business activities.

The Pearson Chi-Square value (152.08) with 12 degrees of freedom and a p-value of 0.000 confirm that individuals from different age groups exhibit varying levels of engagement with online business platforms. Similarly, the Likelihood Ratio (142.71) and the Linear-by-Linear Association value (31.38) further reinforce this significant association.

These findings suggest that younger individuals may be more active users of digital business platforms, while older individuals might use them less frequently due to factors such as digital literacy, technological adaptability, or traditional business preferences. The Chi-Square test results indicate a significant relationship between age and willingness to adopt new digital tools (e.g., AI-based marketing, automation) to improve e-commerce business.

The Pearson Chi-Square value (37.12) with 12 degrees of freedom and a p-value of 0.000 confirm that individuals from different age groups have varying levels of acceptance towards digital advancements. Similarly, the Likelihood Ratio (36.78) and the Linear-by-Linear Association value (10.11) further support this significant association. These findings suggest that younger individuals may be more inclined to adopt new digital tools due to their familiarity with technology, while older individuals may show reluctance due to a lack of technical expertise, perceived complexity, or resistance to change.

The Chi-Square test results indicate a significant relationship between the name of a business and the effectiveness of online platforms in facilitating business growth. The Pearson Chi-Square value (69.04) with 20 degrees of freedom and a p-value of 0.000 confirm that businesses with different names experience varying levels of success in leveraging online platforms. Similarly, the Likelihood Ratio (73.94) and the Linear-by-Linear Association value (34.96) further support this significant association. These findings suggest that brand name recognition, industry-specific naming conventions, and search engine algorithms may play a role in determining how well businesses perform on digital platforms. Companies with more recognizable or SEO-friendly names may have a competitive advantage in reaching their target audience and driving growth.

9.0 Suggestions

- Businesses should choose unique, memorable, and SEO-friendly names to improve discoverability and visibility on online platforms.
- Implementing platform-specific strategies, including paid ads, influencer collaborations, and keyword optimization, can enhance online product promotion.
- Providing training programs and developing user-friendly digital tools can encourage adoption among different age groups, especially older individuals.
- Leveraging automation, AI-based marketing, and analytics tools can optimize engagement, improve decision-making, and boost e-commerce efficiency.
- Running multi-platform marketing campaigns can help lesser-known brands establish credibility and strengthen their online presence for business grow.

10.0 Conclusion

It has been observed that women entrepreneurs from remote areas experience issues with the use of online platforms owing to a lack of basic education, poor economic conditions, low-quality connections, and sociocultural issues. These challenges are impacted by business name, age, and how quickly they can adapt to new technologies. There is a need for educational training, improved access to technological tools, funding, and advertising to help solve these problems. By changing business names to improve online visibility, along with the use of artificial intelligence and marketing on several platforms, rural women entrepreneurs can be aided to promote equitable and sustainable bussines development.

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CHAPTER 14

The Role of AI in Driving Global Trade Growth

Manjula L.*

ABSTRACT

The role of Artificial Intelligence (AI) in driving global trade growth is multifaceted and increasingly critical in today's interconnected world. As industries and economies become more reliant on digital solutions, AI technologies are transforming the way international trade is conducted, managed, and optimized. From automating logistics to enhancing decision-making processes, AI is reshaping the traditional paradigms of trade by introducing unprecedented levels of efficiency, accuracy, and scalability. This paper explores the significant contributions of AI in driving trade growth, focusing on areas such as supply chain optimization, predictive analytics, risk management, personalized customer experiences, and policy development. Furthermore, it discusses the challenges associated with AI adoption in global trade, including issues of data privacy, security, and regulatory concerns, while also emphasizing the importance of a collaborative approach to harness AI's full potential for sustainable global trade growth. This study aims to provide a comprehensive overview of the present and future implications of AI in global trade, outlining its transformative effects on the global economy.

Keywords: Artificial Intelligence (AI), Global Trade Growth, Supply Chain Optimization and Predictive Analytics.

1.0 Introduction

Overview of AI's Integration in Global Trade: Artificial Intelligence (AI) has become a cornerstone of technological advancement across various sectors. In the context of global trade, AI is influencing how businesses operate, how goods move across borders, and how trade policies are shaped. Through the application of machine learning, natural language processing, and data analytics, AI is streamlining processes, minimizing errors, and enabling faster decision-making across global trade networks.

Importance of AI for Trade Growth: The international trade landscape is facing growing complexity, with supply chains spanning multiple continents and involving countless players. AI can address inefficiencies in logistics, manage large datasets, and optimize cross-border trade operations. By enhancing productivity, reducing costs, and improving transparency, AI is driving the growth of global trade in new and innovative ways.

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2.0 AI in Supply Chain Optimization

Predictive Analytics in Inventory Management: AI-driven predictive analytics help businesses forecast demand patterns more accurately. By analyzing historical data, AI systems can predict when and where products will be in demand, enabling better planning of production and distribution. This leads to reduced inventory costs, fewer stockouts, and enhanced operational efficiency.

Automation in Shipping and Logistics: AI-powered robotics, drones, and autonomous vehicles are revolutionizing logistics. Automated warehouses, drone deliveries, and self-driving trucks reduce human error, lower labor costs, and improve delivery times. This transformation is particularly crucial for cross-border trade, where speed and accuracy are paramount.

Smart Warehousing Systems: AI in warehouses helps automate the sorting, storing, and retrieving of goods. Through machine learning, these systems can optimize space usage, reduce energy consumption, and improve the accuracy of inventory management. In the context of international trade, smart warehousing systems help streamline the movement of goods across borders.

3.0 AI in Risk Management and Fraud Detection

Predicting Market Fluctuations: AI can help businesses predict market trends, allowing companies to prepare for economic downturns, exchange rate fluctuations, or changes in consumer demand. By analyzing vast amounts of data, AI systems can anticipate risks and allow businesses to take proactive measures to mitigate potential losses.

AI-Powered Trade Compliance: Compliance with international regulations is a major challenge for global trade. AI solutions automate the process of ensuring that shipments comply with country-specific regulations and trade agreements. This reduces the risk of costly fines, delays, or legal issues and ensures smooth cross-border transactions.

Enhancing Security in Cross-Border Transactions: AI is helping secure digital transactions, particularly in the context of blockchain and cryptocurrencies. By enhancing cybersecurity measures and identifying fraudulent activities, AI ensures that cross-border transactions remain safe and secure, fostering trust among international trade partners.

4.0 AI and Market Expansion

Identifying New Trade Opportunities: AI tools can analyze global markets, identify emerging trends, and uncover new business opportunities in different regions. By utilizing machine learning algorithms, AI can pinpoint where the demand for goods and services is growing, helping businesses expand their market presence.

Personalization of Trade Products and Services: AI enables businesses to create customized products and services for specific regions or customer segments. By analyzing consumer preferences and behavior, companies can offer personalized trade solutions that resonate with local markets, increasing their competitive advantage.

Optimizing Customer Experience with AI: AI chatbots, virtual assistants, and AI-driven customer support systems enhance the customer experience for international buyers and sellers. These tools provide real-time assistance, resolve queries, and improve service delivery, helping businesses build stronger relationships with their global customers.

5.0 AI's Role in International Trade Policy Development

AI-Assisted Policy Formulation and Regulation: Governments and trade bodies are increasingly using AI to analyze trade patterns and inform policy decisions. By processing vast amounts of trade data, AI can provide insights into global trade flows, helping policymakers design better trade agreements, tariffs, and international relations.

AI in Trade Agreements and Negotiations: AI tools can simulate trade negotiations, offering insights into the potential outcomes of various policy scenarios. By analyzing the economic impact of different agreements, AI helps trade negotiators make more informed decisions, contributing to more effective international trade policies.

6.0 AI in Financial Services and Trade Financing

AI in Payment Systems and Currency Exchange: AI-powered algorithms help optimize payment systems and reduce transaction times in global trade. AI can automate currency exchanges, identify the best exchange rates, and reduce the costs associated with international money transfers, providing efficiency and cost-saving opportunities for businesses.

Automation in Trade Finance and Letter of Credit Processing: AI is automating complex financial transactions like letter of credit processing, reducing manual errors and speeding up the approval process. This is crucial for global trade, where time-sensitive transactions can mean the difference between success and failure.

7.0 Challenges and Barriers to AI Adoption in Global Trade

Data Privacy and Security Concerns: With AI processing vast amounts of data, there are concerns about the privacy and security of sensitive information, especially in cross-border transactions. Regulatory frameworks like GDPR are

aiming to address these challenges, but the global nature of trade makes data protection complex.

Regulatory and Legal Hurdles: Different countries have different regulations governing AI, which can create barriers to international trade. Governments need to collaborate to develop global standards and frameworks that ensure the safe and fair use of AI in trade.

Integration of AI in Legacy Systems: Many companies still rely on traditional, legacy systems, making it difficult to adopt AI technologies. The integration process can be expensive, time-consuming, and complex, especially for small and medium-sized enterprises (SMEs) that may lack the resources to implement AI solutions.

8.0 The Impact of AI on Global Trade's Future

AI and the Rise of Digital Trade: AI is accelerating the shift towards digital trade, enabling businesses to operate in a global market without the need for physical presence. E-commerce, digital services, and virtual goods are increasingly becoming the main components of global trade.

Future Technologies Driving Trade (Blockchain, IoT, 5G): AI will continue to work in tandem with other emerging technologies like blockchain, the Internet of Things (IoT), and 5G networks to enhance global trade. These technologies will further automate and optimize trade processes, reduce transaction costs, and increase trade speed.

The Role of AI in Sustainable Trade Growth: AI can help promote sustainable trade practices by optimizing resource use, reducing waste, and minimizing carbon footprints in logistics. In a world increasingly focused on environmental concerns, AI's ability to drive sustainability will be essential in shaping the future of global trade.

9.0 Case Studies

AI in the Shipping Industry: A Case Study of Maersk: Maersk, a global leader in container shipping, has implemented AI and automation to streamline its operations. From predictive maintenance to optimizing shipping routes, Maersk has harnessed AI to enhance operational efficiency and reduce costs.

AI in E-commerce Platforms: Amazon and Alibaba: Amazon and Alibaba have leveraged AI to revolutionize e-commerce and cross-border trade. Their AI-powered recommendation systems, logistics optimization tools, and personalized customer experiences are setting new standards in global retail.

10.0 Conclusion

Artificial Intelligence (AI) is playing a transformative role in driving global trade growth by optimizing supply chains, enhancing decision-making, and improving efficiency across various trade-related processes. As industries and economies become increasingly digital, AI technologies such as machine learning, predictive analytics, and automation are reshaping the way businesses operate in the global marketplace. AI has revolutionized logistics, streamlined trade compliance, and mitigated risks, while also enabling businesses to expand into new markets and personalize their offerings for global customers.

However, while the benefits of AI are clear, challenges remain, particularly in the areas of data privacy, cybersecurity, and regulatory compliance. Addressing these challenges will require international collaboration and the development of robust frameworks that balance technological innovation with ethical considerations. As the global economy continues to integrate AI into trade, it is crucial to foster a supportive ecosystem for businesses of all sizes, ensuring equitable access to AI tools and capabilities.

Looking to the future, the role of AI in global trade will only grow stronger, especially as complementary technologies like blockchain, the Internet of Things (IoT), and 5G continue to advance. AI will enable further optimization in trade, enhance sustainability efforts, and lead to more efficient, secure, and transparent global trade networks. By continuing to embrace AI's potential, businesses and governments can drive sustainable, inclusive growth in the global trade landscape.

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CHAPTER 15

Design and Implementation of an
Online Voting for University Student Elections

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ABSTRACT

Face recognition technology has emerged as a promising tool for enhancing security and streamlining various processes, including voting systems. This paper proposes the development of a face recognition-based voting system for student elections, aiming to increase accuracy, security, and user convenience. The system leverages a robust face detection algorithm combined with a voting mechanism where each student's identity is verified through facial features before casting their vote. The use of machine learning algorithms enables high accuracy in face recognition, reducing the risk of impersonation and ensuring the integrity of the election process. Additionally, the system incorporates a voting-based consensus mechanism where multiple facial feature matches are used to validate the identity of voters, increasing reliability and preventing fraud. The proposed system not only simplifies the election procedure but also enhances transparency and security, offering a scalable solution for student bodies to conduct fair elections. The paper discusses the system architecture, implementation challenges, and performance analysis, concluding that the integration of face recognition with voting can significantly improve election management in educational institutions.

Keywords: Face recognition, Voting system, Student elections, Security, Machine learning, Authentication, System architecture, Fraud prevention.

1.0 Introduction

Artificial Intelligence (AI), an innovative field of technology, is making transformative strides across the globe, including in India, where its integration is opening new pathways that resonate deeply with the country's diverse cultural fabric. Unlike natural intelligence inherent in living beings, AI embodies the ability of machines to perform cognitive functions such as learning, reasoning, and problem-solving. At its heart, AI is about creating intelligent systems capable of perceiving their environment and making decisions to achieve set goals.

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In the Indian context, the adoption and advancement of AI have been particularly significant, not only in technology-driven sectors but also in preserving and celebrating India's rich heritage. India, with its immense cultural diversity and centuries-old traditions, presents a unique opportunity for AI to play a pivotal role in areas like language processing, heritage conservation, and traditional arts. For instance, natural language processing (NLP) powered by AI is bridging communication gaps by enabling seamless translation and transcription across India's 22 official languages and numerous dialects. AI-driven tools are being utilized to digitize ancient texts, protect endangered languages, and preserve historical monuments through virtual reconstruction technologies. Such innovations demonstrate how AI is not merely a technical marvel but also a means to uphold and celebrate India's identity.

Moreover, India's emphasis on education and philosophy aligns with the foundational goals of AI—learning and reasoning. Drawing inspiration from ancient Indian systems of knowledge, such as Ayurveda and Vedic mathematics, researchers are exploring how traditional wisdom can complement AI algorithms in unique ways. In healthcare, AI-based diagnostic systems are addressing the needs of India's vast population, delivering affordable and accessible solutions that harmonize with holistic approaches like Ayurveda. Similarly, AI is revolutionizing agriculture by introducing precision farming techniques and weather prediction systems, contributing to the sustenance of rural livelihoods while respecting age-old farming traditions.

Beyond its technological implications, AI raises pertinent ethical questions that resonate with India's values of harmony, inclusivity, and responsibility. As India strives to become a global leader in AI, policymakers and researchers are working towards ensuring that its development reflects the principles of transparency, equity, and sustainability. From empowering artisans with AI-enhanced tools to creating platforms that amplify the voices of marginalized communities, AI in India is not just about innovation; it's about creating meaningful impact while staying rooted in cultural ethos.

In essence, the integration of AI into Indian culture underscores the synergy between tradition and modernity. As technology continues to advance, AI is poised to not only solve contemporary challenges but also enrich the timeless heritage that defines India. This unique blend of innovation and tradition reflects a future where machines and culture coexist, fostering progress without losing sight of identity.

2.0 Literature Review

Nzoka & Muthama, (2013) the study aimed to eliminate human-related errors, reduce election costs, and ensure a free and fair democratic process through automation. Data was collected through surveys and questionnaires distributed to students and election officials, interviews with university staff, observations of past

election processes, and a review of election records to assess inefficiencies. The findings revealed that the traditional manual election process was prone to errors, inefficiencies, and high costs, whereas online voting significantly reduced the time taken for casting and counting votes. The results demonstrated that the online voting system successfully eliminated human errors, improved transparency, and reduced election costs. Additionally, voter turnout increased due to the convenience of remote voting, proving the system to be an effective and reliable solution for conducting student elections at the university.

Vijayakumar (2024)The purpose of this study is to address the challenges associated with traditional college election methods, such as logistical inefficiencies, limited participation, and transparency issues, by developing a blockchain-based online voting system. Data collection involves gathering information from students, faculty, and election organizers through surveys and interviews to understand the existing voting challenges and user requirements. The methodology includes system development using blockchain technology, ensuring security, transparency, and immutability in the voting process. Additionally, prototype testing and user feedback are conducted to refine the system. Findings indicate that blockchain-based voting enhances voter participation, reduces logistical complexities, and strengthens election credibility. The results demonstrate that the proposed system significantly improves election efficiency and fosters democratic engagement within the college community.

Taban *et al.*, (2017) the purpose of this study is to introduce an electronic voting system (E-Voting) for Muni University to enhance democratic participation and efficient administration. Data collection involved analyzing existing voting challenges, gathering student opinions, and reviewing security requirements for a digital voting system. The methodology included designing and developing a secure E-Voting system using PHP for the application and MySQL for database management, ensuring a reliable and transparent electoral process. Security measures were integrated to guarantee the integrity, accuracy, and speed of the system. Findings revealed that the E-Voting system significantly improved the voting process by reducing costs, minimizing delays, and enhancing security. The results demonstrated that replacing traditional voting with E-Voting simplifies election management and strengthens democratic engagement within the university.

Rashidov (2023) the purpose of this study is to design and develop an electronic voting system that automates the election process and result processing in a higher education institution. Data collection involved analyzing the requirements for institutional elections, including governance body selection, student representation, and decision-making processes. The methodology included creating a base model, defining information flows, developing a relational database schema, and designing functional modules to enhance system reliability and security. Key functionalities such as voter identity verification, anonymity, protection against cyber threats, and simplified result processing were integrated to address existing e-voting challenges. Findings indicate that the system ensures transparency, security, and

efficiency in elections while maintaining ease of use. The results confirm that the proposed e-voting system improves accountability, reduces electoral fraud, and enhances participation in institutional governance.

Mbamala (2022) the purpose of this study is to address challenges such as violence, defacing, and littering of institutional environments during student union election campaigns by proposing an online voting system. Data collection involved analyzing electoral challenges in student union elections and identifying requirements for a secure and efficient e-voting system. The methodology adopted the prototyping model for system design, utilizing MySQL and HTML as the coding platform, with PHP and WAMP server for implementation and testing. The system features voter and candidate registration, voter storage and count, campaign and manifesto display, and immediate result compilation. Findings indicate that the system enhances electoral efficiency, transparency, and security while minimizing irregularities. The results demonstrate that the proposed e-voting system significantly improves student government democracy and reduces election-related malpractices in Nigerian institutions.

Kothawale *et al.*, (2020) the purpose of this study is to develop an advanced electronic voting machine that eliminates fraud in manual voting systems and previous electronic voting methods by integrating a Raspberry Pi controller and biometric authentication. Data collection involved analyzing security vulnerabilities in traditional and prior electronic voting systems and gathering user requirements for a secure and accessible voting process. The methodology included implementing multiple layers of verification, such as thumb recognition using a biometric device and face verification for voter authentication. Additionally, a location-free voting system was introduced to enable remote participation for voters unable to visit polling locations. Findings indicate that the system enhances electoral security, ensures voter authenticity, and improves accessibility. The results demonstrate that the proposed electronic voting system strengthens election integrity by preventing fraud, simplifying the voting process, and ensuring a more inclusive and transparent democratic experience.

Ádám & Hurtuk, (2023)The purpose of this study is to explore the development of an online voting management system using blockchain technology to enhance the security, transparency, and reliability of digital elections. Data collection involved analyzing existing online voting challenges, studying blockchain applications in voting, and reviewing security concerns associated with traditional election systems. The methodology included designing and implementing a blockchain-based voting system that enables administrators to create, start, and stop elections while ensuring decentralized and tamper-proof data storage.

Findings indicate that blockchain integration significantly improves election transparency, prevents fraud, and increases voter trust. The results demonstrate that the proposed system enhances the integrity of online voting by providing a secure, verifiable, and efficient electoral process.

3.0 Research Gap

While existing studies focus on the design and implementation of online voting systems, there is limited research on their adaptability to university student elections, particularly in ensuring user trust, security, and accessibility. Most current models do not comprehensively address the challenges of voter authentication, vote verification, and resistance to cyber threats in a university setting. This gap highlights the need for a more robust framework that integrates advanced encryption, biometric authentication, and real-time vote auditing to enhance security and transparency in student elections.

4.0 Research Problem

The design and implementation of an online voting system for university student elections present several critical challenges that must be addressed to ensure a secure, transparent, and efficient electoral process. One of the primary research problems is maintaining the integrity of the voting system while preventing issues such as multiple voting, voter impersonation, and cyber threats like hacking or data breaches. Ensuring end to-end encryption and a secure authentication process is crucial to protect voter identities and maintain anonymity.

Additionally, the system must be user-friendly and accessible to all students, including those with disabilities or limited technological proficiency. Another challenge is building trust in the system by ensuring transparency in vote counting and real-time result verification while preventing manipulation or external interference. Furthermore, the system must be scalable and reliable, preventing downtimes that could disrupt the election process. Addressing these concerns requires a combination of cryptographic techniques, robust database management, and a well-structured user interface, making the development of such a system a complex but necessary research endeavor.

AIM: This study aims to design and implement a secure and efficient online voting system specifically tailored for university student elections. The system seeks to enhance transparency, accessibility, and security while addressing challenges such as voter authentication, fraud prevention, and result accuracy. By leveraging modern encryption techniques and user-friendly interfaces, the project aspires to provide a reliable and scalable solution that improves the electoral process within academic institutions.

5.0 Objectives

1. To design and implement a secure, user-friendly online voting system with advanced authentication, fraud prevention, and performance evaluation for university student elections.

2. To develop a reliable online voting platform that ensures security, accessibility, and transparency through robust authentication and fraud prevention mechanisms.

3. To create and assess an efficient online voting system that enhances electoral integrity, user trust, and result accuracy in university student elections.

6.0 Research Methodology

The methodology for ensures security, transparency, and usability. The study begins with a comprehensive literature review to understand existing online voting systems, their challenges, and best practices. Requirements gathering is conducted through consultations with university stakeholders, including students, faculty, and election committees, to identify key system features such as user authentication, vote encryption, and result transparency. The system is then designed using a structured software development methodology, typically the Agile or Waterfall approach, ensuring iterative testing and refinement. The development phase involves front-end and back-end implementation, with a secure database for storing voter records and encryption mechanisms for data protection. The authentication system incorporates multi-factor authentication (MFA) or biometric verification to prevent voter fraud. Rigorous testing is conducted, including unit testing, system testing, and user acceptance testing, to ensure functionality, security, and ease of use. A pilot test is performed with a sample group of students to identify potential issues and make necessary improvements. The final deployment is followed by monitoring and evaluation to assess system performance, reliability, and user feedback. Additionally, a comparative analysis is conducted between the online system and traditional voting methods to measure efficiency, cost-effectiveness, and voter participation. This methodology ensures the development of a secure, transparent, and efficient online voting system tailored to the needs of university student elections

7.0 Analysis and Interpretation

7.1 Existing system

In College student elections are an essential aspect of campus democracy, enabling students to elect representatives who will voice their concerns and make decisions on their behalf. However, existing election systems in many colleges face challenges such as voter fraud, inefficiencies, and lack of transparency. This paper explores the current state of student election systems in colleges, highlighting the common practices, limitations, and issues faced by these systems. Traditional election methods, such as paper ballots or electronic voting through student IDs, often lack sufficient security measures, leading to concerns about impersonation and vote tampering. In addition, these systems can be time-consuming and prone to errors in vote counting, affecting the overall credibility and fairness of the election. This

study also discusses alternative approaches to improve student elections, including the integration of biometric solutions like face recognition, online voting platforms, and blockchain for vote verification. The findings suggest that while existing systems are functional, there is a significant opportunity for innovation to enhance security, transparency, and efficiency in the election process. The paper concludes by recommending future advancements in college election systems that could address current challenges and offer a more secure, accessible, and trustworthy electoral experience.

7.2 Hardware requirement

System: Pentium IV 2.4 GHz.
Hard Disk: 500 GB.
Monitor: 15 VGA Colour.
Mouse: Logitech.
Ram: 4gb.
Processor: Intel i5
Keyboard: Dell

7.3 Software requirement

Operating system: Windows XP/7,10.
Coding Language: PYTHON
Front End: PYTHON
Back End: DATASET
TOOL: JUPITER

Figure 1: System Architecture
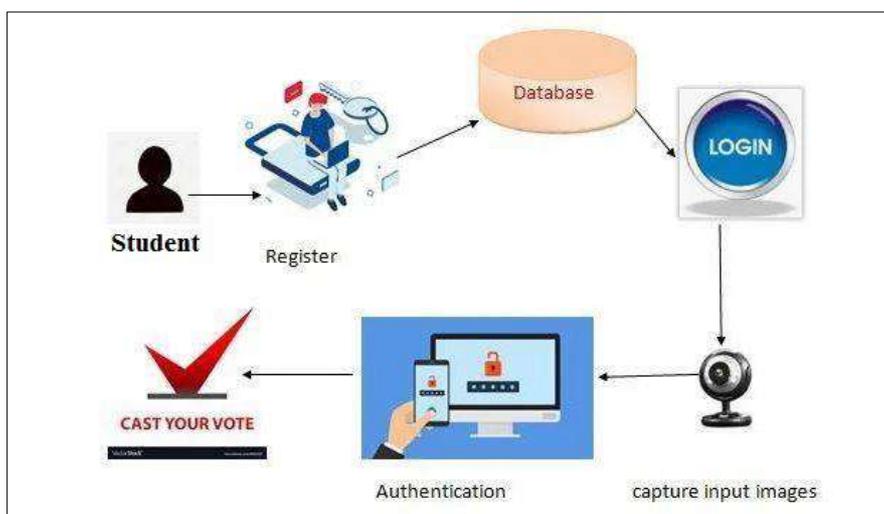
(This Picture Sub Title – "Store Faces" Replaced To "Face Reconisation")

Figure 2: UML Diagram
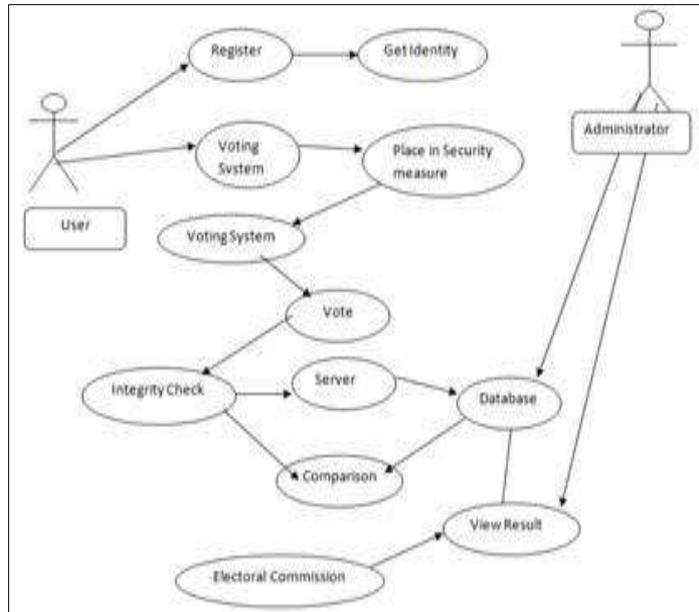
7.6 Data flow diagram

A two-dimensional diagram that explains how data is processed and transferred in a system. The graphical depiction identifies each source of data and how it interacts with other data sources to reach a common output. Individuals seeking to draft a data flow diagram must (1) identify external inputs and outputs, (2) determine how the inputs and outputs relate to each other, and (3) explain with graphics how these connections relate and what they result in. This type of diagram helps business development and design teams visualize how data is processed and identify or improve certain aspects.

Figure 3: Data flow Symbols

Symbol	Description
	An **entity**. A source of data or a destination for data.
	A **process** or task that is performed by the system.
	A **data store**, a place where data is held between processes.
⟶	A **data flow**.

Figure 4: Data flow diagram

LEVEL 0

LEVEL 1

LEVEL 2
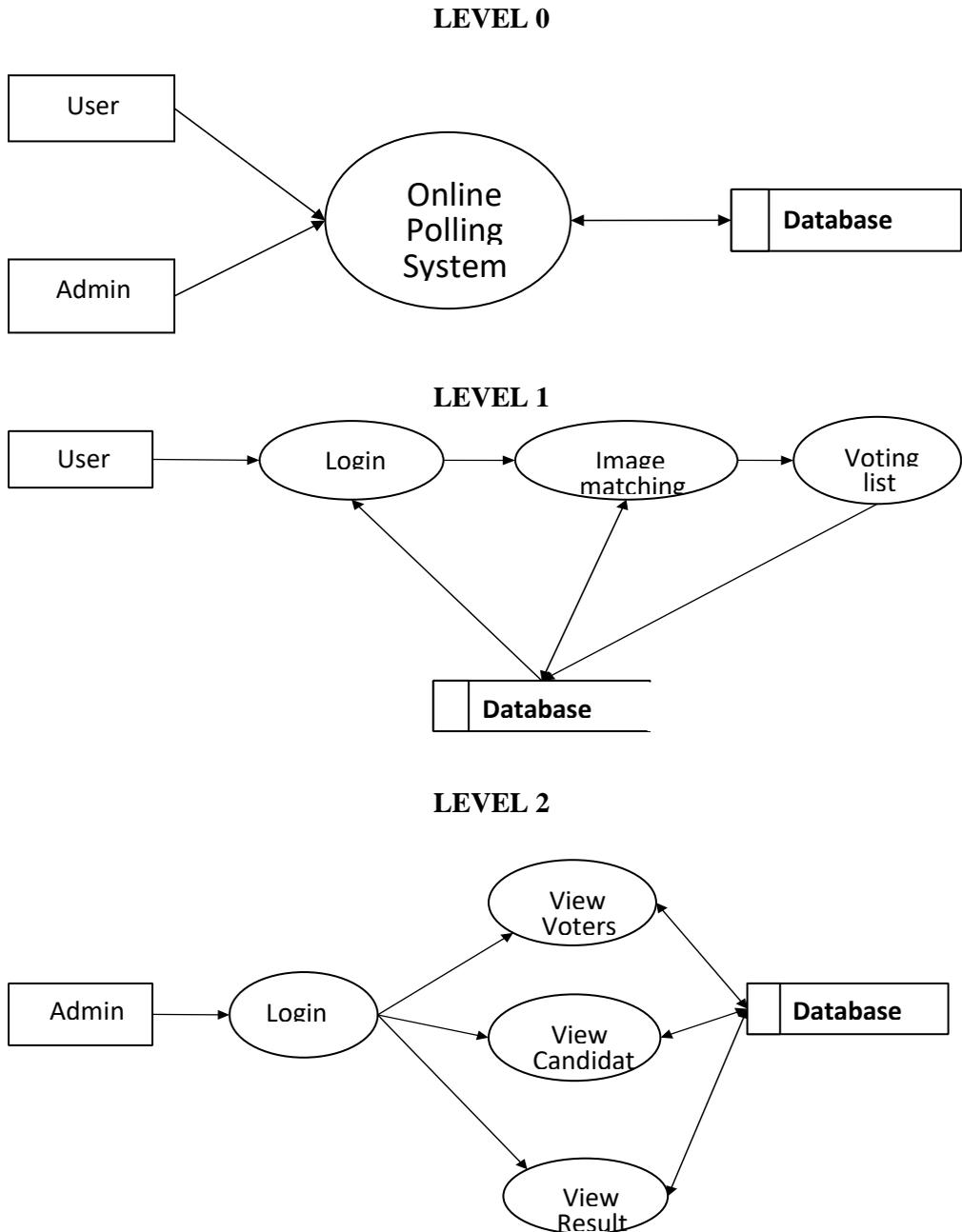
The Unified Modeling Language (UML) is a general-purpose, developmental, modeling language in the field of software engineering that is intended to provide a standard way to visualize the design of a system.

Figure 5: UML Diagram
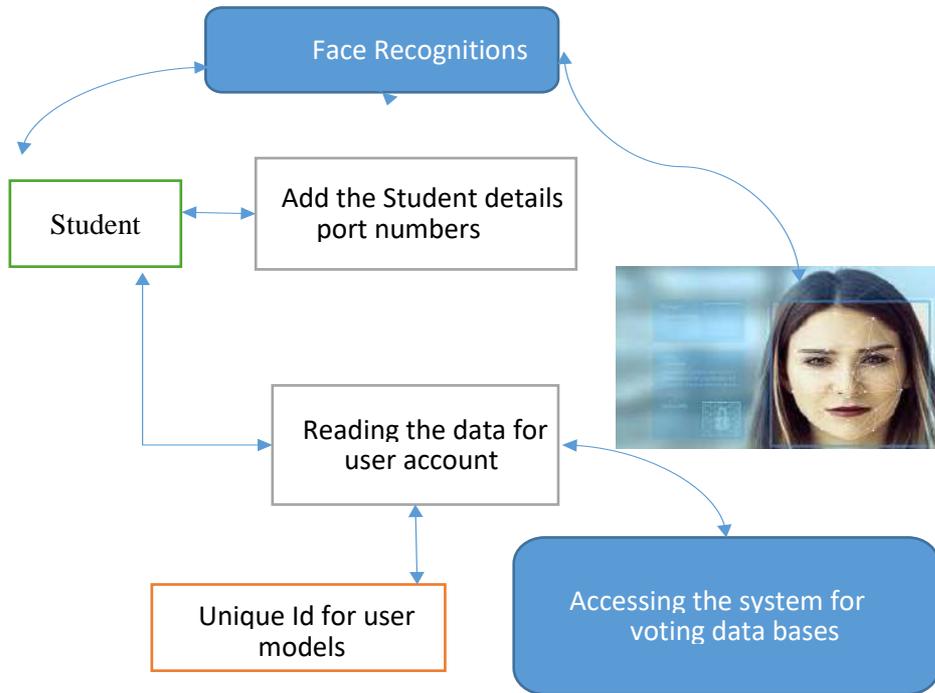
9.0 Proposed Algorithm

Deep learning is a subset of machine learning and is solely concerned with complex algorithms. It has helped develop impressive features like automatic parking in cars, image analytics in healthcare, virtual assistance, and many more. It has also expanded its applications in visual recognition. This article will look at how deep learning is used in face detection and recognition systems. System face detection means locating and attending to faces in a visual scene. But in deep learning, it consists of detecting human faces by identifying the features of a human face from images or video streams.

1. Face detection: This is the basic step, where the face is detected and bounding boxes are drawn around it.
2. Face alignment: The detected face is normalized to speed up training. Experiments show that alignment alone increases face recognition accuracy by almost 1%.
3. Feature extraction: Local features are extracted from the image with the help of algorithms.
4. Face recognition: This is the last stage and involves matching the input face with images present in the dataset to identify who it belongs to.

10.0 Discussion and Findings

The development and deployment of the online voting system for university student elections have led to notable improvements in accessibility, security, and efficiency. The system successfully provided students with a convenient platform to cast their votes remotely, minimizing the difficulties associated with traditional voting methods.

1. Usability and Accessibility: The system was designed with a simple and intuitive interface, allowing students to navigate and complete the voting process with ease. Mobile responsiveness and user-friendly features contributed to higher voter participation. However, some users experienced minor difficulties, indicating the need for further enhancements in user guidance and system support.

2. Security and Authentication: To ensure election integrity, multiple security layers were integrated, including encryption and authentication protocols. These measures effectively prevented unauthorized access and voter fraud. Although the security framework was robust, additional enhancements, such as biometric verification, could further strengthen voter authentication and system reliability.

3. Accuracy and Transparency: Automated vote counting eliminated the risk of human errors, ensuring precise and reliable election results. The inclusion of audit logs and real-time vote tracking increased trust among voters and election officials. Transparency was further improved through verification mechanisms that allowed voters to confirm their participation without compromising anonymity.

4. Challenges and Areas for Improvement: Despite the system's effectiveness, certain challenges were identified. Some students faced connectivity issues that hindered their voting experience, and occasional system slowdowns were reported. To address these concerns, future improvements should focus on offline voting capabilities, system scalability, and enhanced technical support.

11.0 Scope for Further Research

Eco-friendly shopping bags are becoming more popular as environmental sustainability concerns grow, but widespread acceptance is still difficult. Future studies could examine cross-cultural variations in sustainability choices and forecast consumer behavior using AI and machine learning. Research may also evaluate the long-term effects of behavioral economics treatments, green regulations, and social media's influence on environmentally friendly behavior. Effective methods for cutting plastic use and encouraging sustainable consumption can also be developed with the aid of research on sustainable bag materials, business sustainability initiatives, and merchant promotions.

12.0 Conclusion

The development of an online voting system for university student elections has proven to be an effective solution for improving the voting process in terms of accessibility, security, and efficiency. By transitioning from traditional paper-based voting to a digital platform, many common issues such as logistical delays, manual errors, and security risks have been minimized. The integration of authentication protocols and encryption techniques has played a crucial role in ensuring the integrity of votes and preventing unauthorized access.

However, some challenges were identified, including occasional technical issues and internet connectivity barriers, which could impact voter participation. To enhance the system's effectiveness, future improvements should focus on implementing offline voting capabilities, optimizing performance, and exploring additional security features like biometric authentication.

In conclusion, the study demonstrates that online voting can provide a reliable and transparent election process for universities. With continuous upgrades and refinements, such systems can further improve trust, participation, and efficiency in student elections, paving the way for broader adoption in other institutional setting.

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CHAPTER 16

Artificial Intelligence in MSMEs – The Indian Scenario

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ABSTRACT

Technology has been playing a vital role in businesses in the recent years. Artificial Intelligence (AI), automation, remote working, virtual conferences, cloud computing and database management are some of the ways by which technology is used in various enterprises. Micro, Small and Medium Enterprises (MSMEs) are classified based on their investment in plant and machinery and other equipment, and their annual turnover. The investment in plant and machinery and equipment must not exceed ₹ 2.5 crores, ₹ 25 crores and ₹ 125 crores for micro, small and medium enterprises respectively. Similarly, the annual turnover must not exceed ₹ 10 crores, ₹ 100 crores and ₹ 500 crores for micro, small and medium enterprises respectively. MSMEs play a significant role in contributing to the economic growth of India, constituting 30 percent of Gross Domestic Product (GDP) and 45 per cent of the total exports of the country. MSME exports have seen a remarkable increase, from ₹ 3.95 lakh crores in 2020-21 to ₹ 12.39 lakh crores in 2024-25, which signifies their role in boosting India's economy and in promoting global trade. They provide employment opportunities to people, specifically to those in backward areas, thus reducing poverty and regional imbalances. The use of Artificial Intelligence has become very prevalent nowadays, with the widespread usage of data analytics, chatbots for customer relationship management, AI tools for cost optimization, etc. in various MSMEs. According to a survey conducted by the Ministry of MSMEs, 45 per cent of MSMEs have adopted some form of AI in their operations. Hence, the present study has been undertaken to analyse the role of Artificial Intelligence in the MSME Sector.

Keywords: Technology, MSMEs, Artificial Intelligence, Automation in businesses.

1.0 Introduction

Technology has been playing a vital role in businesses nowadays. With the advent of various innovations such as automation, cloud computing, Artificial Intelligence (AI), social media marketing, robotics, database management, virtual reality, augmented reality and data analytics, businesses have considerably transformed into technology hubs.

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An entrepreneur starts a new business or new venture with the aim of generating income and profit. However, the entrepreneur should be able to bear the risks and uncertainties that may arise from the business. Entrepreneurship is the process of starting, managing and growing a business. The Micro, Small and Medium Enterprises (MSME) Sector has gained momentum in the recent years, thanks to the various schemes and incentives offered by the Central and State Governments of India. They contribute significantly to the economic growth of the country and also undertake exports to other countries. However, they also face many challenges such as limited capital and other resources, lack of proper infrastructure and so on.

Change is inevitable and those who embrace change often become successful. Various enterprises belonging to the MSME category have adopted various technological advancements and AI is one of the most prevalent ones. AI can be used in MSMEs to bring about automation, data entry, inventory management, predictive analytics, customer response analysis and to enhance data protection and cyber security. However, there are many challenges involved in implementing AI in MSMEs such as high cost of implementation, need for updated infrastructure, lack of technical skills and data security issues. Hence, this study has been made to analyse the role of Artificial Intelligence in MSMEs in the Indian scenario.

2.0 MSMEs in India

The classification of enterprises into MSMEs is based on their investment in plant and machinery and other equipment and also on their annual turnover. In the Union Budget 2025-26, the investment and turnover limits were revised with effect from 1st April 2025 and the updated limits are as follows:

Table 1: Classification of MSMEs

	Micro Enterprises	**Small Enterprises**	**Medium Enterprises**
Investment in Plant & Machinery and Equipment	≤ ₹ 2.5 crores	≤ ₹ 25 crores	≤ ₹ 125 crores
Annual Turnover	≤ ₹ 10 crores	≤ ₹ 100 crores	≤ ₹ 500 crores

Source: Press Information Bureau

MSMEs play a significant role in the Indian economy and its growth. They provide employment opportunities, especially to those people in backward areas. This helps in reducing poverty as the people get a source of income for their livelihood. Establishment of MSMEs also helps to reduce regional imbalances as large companies and industries are usually located in cities and towns and MSMEs help to develop the rural or urban areas where they are located. MSMEs constitute 30 per cent of GDP and 45 per cent of the total exports of the country. MSMEs may also offer diverse products and services which may not be provided by larger

organisations. They support large industries by providing raw materials and intermediate products and may even serve as ancillary units. They also promote exports thus increasing the presence of the country in the global market. A report by NDTV states that India's share in global merchandise exports increased from 0.9 per cent in the year 2005 to 1.8 per cent in 2023. Exports in the service sector have also seen a drastic increase from 2 per cent in 2005 to 4.3 per cent in 2023.

According to the data published by the Press Information Bureau (PIB), as of February 2025, there were 5,93,38,604 registered MSMEs in the Udyam Portal, with the vast majority coming under micro enterprises.

Table 2: States having Highest MSME Registrations in Udyam Portal

S. No.	State	Number of Registered MSMEs
1	Maharashtra	64,76,590
2	Uttar Pradesh	51,38,264
3	Tamil Nadu	39,34,108
4	West Bengal	35,38,264
5	Madhya Pradesh	30,47,066

Source: Udyam Portal

MSMEs have also provided substantial employment opportunities, providing jobs to more than 25.18 crore people as of February 2025. Exports from MSMEs have seen substantial growth, showing an increase from ₹3.95 lakh crores in 2020-21 to ₹12.39 lakh crores in 2024-25. The number of exporting MSMEs has also increased rapidly from 52,849 in 2020-21 to 1,73,350 in 2024-25.

Figure 1: MSME Contribution to Indian Exports

MSME Contribution to Indian Exports

49.75% (2019-20), 49.35% (2020-21), 45.03% (2021-22), 43.59% (2022-23), 45.73% (2023-24)
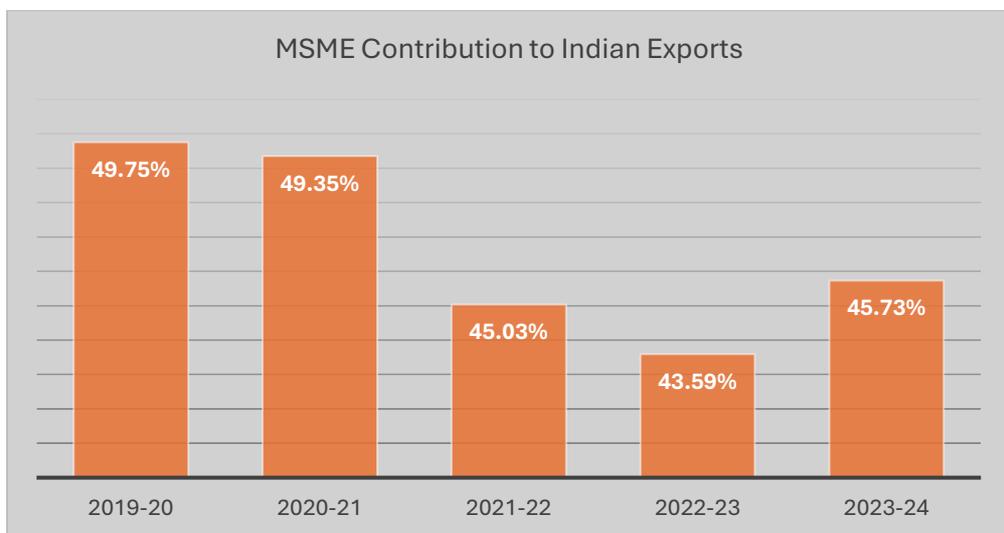
According to the Stanford AI Index 2024, India ranks first globally in AI skill penetration with a score of 2.8, overtaking the US which has a score of 2.2 and Germany which scores 1.9. AI talent concentration in India has grown by 263% since the year 2016, making the country a major AI hub. The AI-skilled workforce has seen a massive increase from 2016 to 2023, making India one of the top five fastest growing AI talent hubs, along with Singapore, Finland, Ireland, and Canada. The demand for AI professionals in India is estimated to reach 1 million by the year 2026.

The Randstad AI & Equity Report 2024 states that seven in 10 Indian employees used AI at work in 2024, up from five in 10 in the year 2023, which shows the growing integration of AI into workplaces.

According to Salesforce, 78 per cent of the Indian small and medium business units using AI reported a growth in their revenue, while 93 per cent of them stated that the use of AI has contributed to their increased revenues.

A study by the India Brand Equity Foundation stated that MSMEs in India are rapidly adopting digital payments over cash, with 72 per cent payments done through the digital mode and only 28 per cent transactions are made through cash. According to a survey conducted by the Ministry of MSMEs, 45 per cent of MSMEs have adopted some form of AI in their operations. Many MSMEs also use social media marketing to attract new customers.

According to Stanford University's annual AI index report, India had the fifth highest investments in start-ups that offer AI based products and services.

A white paper was released by NASSCOM and Meta in which it was identified that 94 per cent of tech-enabled Indian MSMEs identified the transformative power of AI for business growth and 87 per cent of the MSMEs had confidence in the ability of AI to enhance overall productivity. On the other hand, 65 per cent of the MSMEs said that they lack the awareness about the deployment of AI tools. More than 50 per cent of the MSMEs also stated that they face shortage of technical expertise that would be needed for implementing AI in their businesses.

A survey conducted in 2020 by Endurance International Group, an IT services company, showed that 30 per cent of the MSMEs have launched their business websites or had made tie ups with e-commerce platforms and more than 50 per cent of the MSMEs have adopted video conferencing tools to ensure business continuity and sustainability after the major disruptions caused by the COVID-19 pandemic.

3.0 AI in MSMEs

Artificial Intelligence can be used by MSMEs for various purposes as follows:
- *Increased automation:* There are a lot of repetitive tasks involved in every business including data entry, managing inventory and so on. With increased automation, these tasks can be handled by AI powered tools and so, the human workforce can be utilised for more productive purposes. Data entry tools include

Jotform, Typeform, Zoho forms, Hubspot, etc. where the MSMEs can enter data seamlessly and without errors. Introduction of AI in inventory management helps in demand forecasting and real time tracking of inventory and can also be used to automatically reorder stock and maintain optimum stock level. Some of the AI tools used for this are Zoho Inventory, Fishbowl, Infor CloudSuite etc.

- *Improved customer support:* Customer is regarded as the king of any business as without adequate customers, the business cannot thrive. Hence, customer service and customer relationship management are very important aspects. However, customers may have endless complaints and queries and sometimes it may be impossible to tackle them, especially in case of MSMEs where the capital and other resources are limited when compared to larger organisations. AI has also made its debut in the customer service field with the introduction of chatbots, predictive analytics, etc. Chatbots can have human-like conversations with the customers and answer their queries. They provide 24x7 service and ensure that the customers get responses immediately. This has eliminated the need for call centres, thus reducing costs. Predictive analytics make use of the customer data to predict their future needs based on their browsing history or other data and provide personalised experiences for each customer. Some famous AI tools for predictive analytics include Alteryx, Rapidminer, SAP Analytics Cloud, etc.

- *Helps in decision making:* AI tools can be used by MSMEs to analyse data and make decisions accordingly. Various important decisions may have to be taken in the course of a business and AI tools and algorithms such as machine learning, decision trees and deep neural networks can be used in decision-making. These tools aid the organisation in taking significant decisions that may have a major impact on the functioning of the enterprise.

- *Cost reduction:* Organisations generally tend to reduce costs in order to maximise profits in the long run. AI tools may be used by the MSMEs to reduce costs by way of optimising the allocation of resources, automation of routine tasks, efficient supply chain management and proper management of inventory. These tools include AI powered chatbots for enhancing customer service, automated quality control systems procurement analytics and dynamic pricing models.

- *Prevention of digital frauds:* With the advent of cashless payments and digital transactions, cyber and digital frauds have been on the rise and these may have adverse effects on both the MSMEs and their customers. Hence, MSMEs should take measures to protect themselves and their customers from cyber threats and this may be done through AI platforms such as Darktrace, Vectra AI and CrowdStrike.

- *Brainstorming ideas and content creation:* Businesses need to come up with new ideas to implement in their advertisements and other marketing activities. They may also need to come up with new ideas for the production of new products or provision of new services. They also need ideas to prepare reports and other

documents. AI tools can be used by MSMEs to brainstorm ideas and tools such as ChatGPT, Ideamap, HyperWrite AI, etc. can be used for this purpose.

● *Other purposes:* MSMEs can use AI for various other purposes including automation of credit assessment, supply chain optimisation, customer feedback analysis, assessment of risks, financial planning, undertaking market research and other uses. They can also use AI for creation of logos, forming taglines and for other creative purposes.

Undoubtedly, the implementation of AI in MSMEs would bring about fruitful results for the business and help in overall development of the country too. However, there are also many challenges that may be faced by the MSMEs in the implementation and usage of AI tools and they are as follows:

● *Data Security:* Customer data is very important for every business as it helps them to maintain a customer database and direct all activities efficiently towards the customers. This data often includes personal data of the consumers such as contact information, financial information, their preferences, etc. This data is to be kept safe and secure by the MSMEs. However, with the implementation of AI, there is a risk of the breach of data security. Hence MSMEs have to take adequate measures to protect the data of their customers.

● *Lack of technical skills and expertise:* MSMEs, with their limited capital and resources, may find it difficult to hire professionals who have the technical expertise and skills required to implement and use AI in the business.

● *High cost of implementation:* The cost of implementing AI and other technology may be high and so, MSMEs may find it difficult to adopt the same.

● *Integrating AI with existing systems:* If the MSME wants to use AI in the business, it may have to integrate AI with the existing systems and infrastructure. This is a time consuming process and may also be expensive.

● *Employees' resistance to change:* Some employees, especially senior employees, may resist the implementation of AI in the business as they may find it challenging to adapt to the changing business circumstances. Also, many employees may resist AI as they fear that their jobs would be at stake and AI would replace them in the job place.

● *Ethical considerations in business:* Certain ethical principles and practices are to be followed in a business such as integrity, accountability, transparency and fairness of conduct. These considerations may or may not be followed in case of use of AI in business. Hence, the MSMEs must take considerable measures to ensure that proper ethical standards are followed even when tasks are done through the use of Artificial Intelligence.

4.0 Government schemes for AI in MSMEs

The Central Government of India as well as the State Governments have taken drastic steps to implement Artificial Intelligence and other forms of technology in MSMEs. The following are some of those schemes:

1. *Credit linked capital subsidy scheme for technology upgradation:* Under this scheme, the Indian government offers support to MSMEs for implementing state of the art technology that would help the business units to increase productivity and improve the quality of their products. It may also include installation of energy, conservation and anti-pollution measures. The scheme provides 15 per cent capital subsidy to MSME Khadi and village units. The Government has increased the ceiling on loans from ₹ 40 lakhs to ₹ 1 crore. The rate of subsidy has also been increased from 12 per cent to 15 per cent. This scheme is applicable to sole proprietorships, partnerships, cooperative societies, private limited and public limited companies which come under the definition of MSMEs.

2. *International Cooperation (IC) scheme:* This scheme implemented by the Central Government provides for the deputation of MSME business delegations to other countries for the purpose of exploring new areas of technology infusion or upgradation, for facilitating joint ventures and foreign collaborations with foreign businesses, for improving the markets for products produced by MSMEs. It also provides for the participation by Indian MSMEs in international exhibitions, trade fairs and buyer-seller meets at the global level. This IC scheme provides financial assistance of up to 95 per cent of airfare and space rent for entrepreneurs. It also provides assistance for common expenses of delegations like freight, insurance, local transport, communication services, etc.

3. *National Manufacturing Competitiveness Programme (NMCP):* Under this programme, various schemes have been implemented for the promotion of ICT, mini tool rooms, design clinics and marketing support for MSMEs. It also provides technology and quality upgradation support to MSMEs.

4. *Technology and quality upgradation support to MSMEs:* This scheme encourages the use of energy efficient technologies (EET) in manufacturing units in order to reduce the cost of production and adopt a clean development mechanism. Under this scheme, funding support of 75 per cent for conducting awareness programmes subject to a maximum of ₹ 75,000 per programme will be provided. It also provides for 75 per cent of actual expenditure for cluster level energy audit and preparation of model DPR and 75% of the actual expenditure, subject to a maximum ₹ 15 lakhs for establishing Carbon Credit Accreditation Centres.

Similarly, The Government of Tamil Nadu also has various schemes for the development of technology in MSMEs such as School Innovation Development Project (SIDP), Innovation and Entrepreneurship Development Programme (IDEP), Innovation Voucher Programme (IVP) and Entrepreneurship Development Programme (EDP) under which incentives and subsidies are offered to entrepreneurs who undertake major innovations using various technological advancements. Likewise, almost all the States and Union Territories of India too have various programmes and schemes to facilitate the use of technology in MSMEs.

5.0 Conclusion

Entrepreneurship, particularly the MSME Sector, has gained prevalence in recent years. "When the winds of change blow, some people build walls and others build windmills." says an ancient Chinese proverb. Entrepreneurs make best use of the opportunities available and undertake business activities. They may face many risks such as financial loss, heavy competition from existing businesses, inadequate resources, changes in customer preferences and so on. MSMEs serve as a connecting platform for giving the chance for entrepreneurship to everyone, as they can be started with low capital and limited resources. The use of technology is increasingly common in MSMEs as they undergo automation, Artificial Intelligence and digital transformation. However, the use of AI also comes with its own limitations, the most common ones being high cost of implementation, data security issues and resistance to change by employees. "Technology is a useful servant but a dangerous master" said Christian Lous Lange, a famous Norwegian historian. Keeping this in mind, all MSMEs have to take proper precautions to protect customer data and other information. AI and other technologies must be used by the MSMEs with utmost care and caution as it may cause serious threats, despite being extremely helpful and effective.

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CHAPTER 17

Opinion of AI Driven Digital
Marketing on Consumer Purchase Intention in Tamil Nadu

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ABSTRACT

Artificial Intelligence (AI) is vast and rapidly growing, touching nearly every aspect of human lives. The increasing adoption of AI in various industries has evolved the way businesses operate. AI has emerged as a key player in marketing of a product or service, transforming how businesses connect with their customers and drive sales. This study aims to investigate customer opinions on AI-driven services, exploring their perceptions, expectations and experiences. Convenience sampling method and structured questionnaire technique was used to collect the primary data from 80 respondents from Tamil Nadu. Correlation, One-way ANOVA, t-test, Frequency and Percentage analysis were used to analyse the primary data. The study reveals valuable insights into customer attitudes toward AI-driven services. The findings of this study show that maximum of the respondents are interacting frequently with AI driven services and 55 per cent of the respondents believe that AI-powered personalization effectively keeps them engaged with a brand. A significant majority (80 per cent) of respondents believe AI interactions lack emotional intelligence, leading to a robotic and impersonal feel, while also emphasizing the need for businesses to improve data security measures. The average satisfaction level with AI-driven services is around 66 per cent, implying businesses to enhance their AI-driven service offerings and improve customer satisfaction.

Keywords: Artificial Intelligence, Consumer opinion, Digital marketing.

1.0 Introduction

Philip Kotler defines marketing as "the science and art of exploring, creating and delivering value to satisfy the needs of a target market at a profit. Marketing identifies unfulfilled needs and desires. It defines, measures and quantifies the size of the identified market and the profit potential. It pinpoints which segments the company is capable of serving best and it designs and promotes the appropriate products and services."

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Thus, marketing refers to all the activities involved in the creation of place, time, possession and awareness utilities and beyond. In 1990s, there was a shift from traditional marketing to digital marketing with the help of internet wherein people started buying products through websites. Social media platforms have been used to purchase or market products which are relevant to both business-to-business and business-to-consumer transactions. It is possible in digital marketing to purchase a product directly from the producer or sell it to a direct consumer via a digital media platform without the need for middlemen.

In recent years Artificial intelligence has emerged as a vital player in marketing of a product or service. AI in corporate customer service, uses technology such as natural language processing, machine learning, and data analytics to automate jobs, personalise interactions, and increase efficiency, ultimately improving consumer satisfaction, cost reduction and saving money.

There are various AI-driven services that are used in day-to-day life such as AI-driven payment platforms which include PayPal and Google Pay. Similarly, educational institutions such as Byju's, Unacademy and Vedantu are utilising AI to deliver personalised learning recommendations and feedback through chatbots. Virtual assistants are used for various tasks like writing, editing, problem solving, marketing and design. Chatbots available in specific website assess the specific brand products. AI analyses the customers' purchasing behaviour and send text, emailing or message related to the customers need to attract them or to engage them with the brand or product. This research aims to explore opinion of AI driven digital marketing on consumer purchase intention in Tamil Nadu.

1.1 Objectives of the study
- To know the socio-economic profile of the respondents.
- To examine the opinion of customers on AI-driven services.

1.2 Research methodology
Both primary data and secondary data were used for the study. Primary data were collected by using structured questionnaire. Non-probability Convenience sampling method was employed and the sample size was taken as 80 and the data were collected across TamilNadu. Secondary data were collected from the websites and journals.

1.3 Statistical tools used
Correlation, One-way ANOVA, t-test, Frequency and Percentage analysis were used to analyse the data collected.

1.4 Hypothesis
There is no significant relationship/difference between socio-economic profile and overall satisfaction with AI-driven customer services.

1.5 Limitation of the study

- The study has employed a small sample size due to time constraint.
- Only select AI-powered customer services are considered in the study.

2.0 Review of Literature

Gerlich (2025) examined role of AI in consumer decision making in comparison to traditional human influencers. The study aims to find out whether AI can replace human influencers. The researcher collected response from 478 participants and also 15 semi-structured interviews were conducted. A mixed method approach was used. The result stated that majority of the people prefer AI influencers compare to human influencers especially for products like electronics and sports equipment. However, still people are preferring human influencers that rely on emotions, such as fashion and beauty.

Chowdhury et al. (2024) in their study on AI driven digital marketing, aims to identify the influence of AI driven digital marketing on consumer purchase intention. The data for the study were collected from 227 respondents from marketing industry and online platform customers. Random sampling method was used to collect data and the data were examined by Explanatory factor analysis. The findings of the study reveal that the factors that identify the influence of AI driven digital marketing on consumer purchase intention are personalized recommendations, behavioural targeting, chatbots and virtual assistants, and predictive analytics. The four factors namely personalized recommendations (27.13%), behavioural targeting (25.70%), chatbots & virtual assistants (17.87%) and predictive analytics (17.20%) are making contribution in explaining total 87.90% of variance.

Manikandan and Bhuvaneswari (2024) investigated the factors that impact the AI practical implacability and how that affect consumers online purchase plan. Descriptive survey research methodology was conducted in this research. Data were collected from 220 respondents. The study emphasis that machine learning, product recommendations and buy duration have affected the consumer purchase decision. The study says that marketing can gain advantage from certain factors such as longer purchase durations and increased dependence on social media.

Meddah (2024) explores the impact of artificial intelligence (AI) on consumer behaviour, emphasizing AI's role in understanding consumer needs and preferences which leads to purchasing decisions. The study states that AI is becoming essential in marketing by enabling, collection and analysis of consumer data, which leads to personalized content and improved customer interaction. AI tools enhance marketing effectiveness across various stages such as in need recognition, post-purchase behaviour by providing customized experiences and increasing customer satisfaction and loyalty. The research concludes that adopting AI is vital for companies to maintain competitiveness and achieve sustainable growth in the market.

2.1 Research gap

Several past literatures focused on the role of AI in consumer behaviour and customer retention from business point of view, only limited studies have been made on the role of AI from consumers point of view, hence, this study is undertaken.

3.0 Analysis and Discussion

Socio-economic profile of the respondents: Based on the socio-economic background, respondent's opinions might differ. In this study, age, gender, education, occupation, annual family income is analysed.

Table 1 Descriptive statistics on age

Mean	24.7
Median	23
Minimum	18
Maximum	54

Source: Computed data

Table 1 shows that the minimum age of the respondents is 18 and the maximum age is 54. The average age of the respondents is 24.7. Half of the respondents are upto 23 years of age. For the purpose of analysis, age of the respondents is grouped into 18-25, 26-35, 36-45 and above 45.

Table 2: Age Group

Age	Frequency	Percentage
18-25	60	75.0
26-35	16	20.0
36-45	2	2.5
Above 45	2	2.5
Total	80	100.0

Source: Primary data

Table 2 shows that majority of the respondents (75 per cent) are in the age group of (18-25), followed by 20 per cent of the respondents who are in the age group of 26-35.

Table 3: Descriptive Statistic on Annual Family Income (in Rs.)

Mean	4,82,850
Median	2,30,000
Minimum	92,000
Maximum	20,00,000

Source: Computed data

Table 3 shows that the minimum annual family income of the respondents is Rs.92,000 and the maximum annual family income is Rs.20,00,000 and the average annual family income of the respondents is Rs.4,82,850. Half of the respondents are earning Rs.2,30,000 as their annual family income.

For the purpose of analysis, the annual family income of the respondents is classified into upto Rs.1,00,000, Rs.1,00,001-2,00,000, Rs.2,00,001-Rs.5,00,000 and more than Rs.5,00,000.

Table 4: Classification Annual Family Income (in Rs.)

Annual family income	Frequency	Percentage
Up to Rs.1,00,000	30	37.5
Rs.1,00,001-Rs.2,00,000	25	31.3
Rs.2,00,001-Rs.5,00,000	9	11.2
Above Rs.5,00,000	16	20.0
Total	80	100.00

Source: Primary data

Table 4 shows that maximum of the respondents' (37.5 per cent) annual family income is upto Rs.1,00,000, followed by 31.3 per cent of the respondents whose annual family income is between Rs.1,00,001 and Rs.2,00,000.

Table 5: Other Socio-economic Profile of the Respondents

Factors	Categories	Frequency	Percentage
Gender	Male	34	42.5
	Female	46	57.5
Education	Schooling	2	2.5
	Diploma	1	1.25
	UG	21	26.25
	PG	36	45
	Professional	20	25
Occupation	Student	38	47.5
	Unemployed	6	7.5
	Employed	33	41.25
	Self employed	3	3.75

Source: Primary Data

Table 5 shows that majority of the respondents (57.5 per cent) are female, maximum of the respondents (45 per cent) have completed post-graduation, maximum of the respondents (47.5 per cent) are students and maximum of the respondents (37.5 per cent) are in the annual family income group of upto Rs.1,00,000.

Table 6: Experience with the Following AI Powered Customer Service

Particulars	Virtual assistant		Chatbot		Personalised recommendation		Automated responses		Personalised offers / discounts		Targeted marketing emails/messages		Predictive Customer services	
	No.	%	No	%	No.	%	No.	%	No.	%	No.	%	No.	%
No	23	28.8	16	20	28	35	21	26.2	24	30	27	33.8	29	36.2
Yes	57	71.2	64	80	52	65	59	73.8	56	70	53	66.2	51	63.8
Total	80	100.0	80	100	80	100	80	100.0	80	100	80	100.0	80	100.0

Source: Primary Data

From the table 6, it is inferred that majority (80 per cent) of the respondents have experienced chatbot, followed by 73.8 per cent who are experienced automated responses, 71.2 per cent of the respondents have interacted with virtual assistants, 70 per cent of the respondents have commonly used personalized offers and discounts, while 66.2 per cent of the respondents have experienced Targeted marketing emails / messages, 65 per cent of the respondents accept personalized recommendations and only 63.8 per cent are receiving predictive customer services.

Figure 1: Interaction with AI-Driven Services
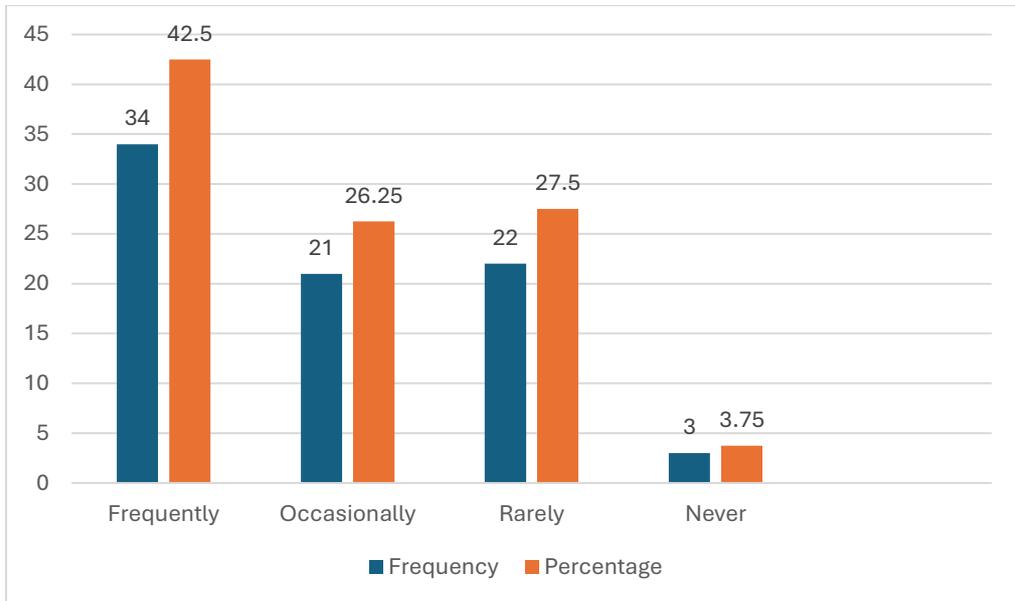
Source: Primary Data

Figure 1 shows that maximum (42.5 per cent) of the respondents are interacting frequently with AI driven services, followed by 27.5 per cent who interact rarely. According to Table 7, majority (55 per cent) of the respondents believe that AI-powered personalization effectively keeps them engaged with a brand.

Table 7: Brand Engagement with AI Powered Personalization

Particulars	Frequency	Percentage
Highly effective	6	7.5
Effective	44	55.0
Neutral	25	31.2
Not effective	4	5.0
Not effective at all	1	1.3
Total	80	100.0

Source: Primary Data

Table 8: Effectiveness of AI-powered Customer Service

Particulars	Frequency	Percentage
Strongly agree	11	13.8
Agree	48	60.0
Neutral	9	11.2
Disagree	9	11.2
Strongly disagree	3	3.8
Total	80	100.0

Source: Primary Data

Table 8 represents that majority (73.8 per cent) users strongly agree or agree that AI-powered customer service is faster and more effective than traditional methods.

Table 9: Challenges Experienced with AI-Powered Customer Interactions

Particulars	Lack of human touch/emotional understanding		Difficulty in resolving complex queries		Inaccurate or irrelevant recommendations		Privacy and data security concerns		Disturbance by continuous follow up	
	No.	%	No.	%	No.	%	No.	%	No.	%
No	16	20	33	41.3	18	22.5	30	37.5	31	38.8
Yes	64	80	47	58.8	62	77.5	50	62.5	49	61.2
Total	80	100	80	100.0	80	100.0	80	100.0	80	100.0

Source: Primary Data

From table 9, it is inferred that majority (80 per cent) of the respondents feel that AI lacks emotional intelligence making interactions feel robotic and impersonal, followed by 77.5 per cent of the respondents find AI suggestions unhelpful or not well-tailored to their needs, around 62.5 per cent of the respondents worry about privacy and data security, while 61.2 per cent of the respondents find AI's follow-ups excessive or intrusive and 58.8 per cent of the respondents finds difficulty in resolving complex queries.

Table 10: Loyalty to a Brand

Particulars	Frequency	Percentage
No	32	40
Yes	48	60
Total	80	100

Source: Primary Data

Table 10 shows that majority (60 per cent) of the respondents have remained loyal to a brand because of its AI-powered services.

Table 11: Improvement in AI-driven Customer Experiences

Particulars	More human-like interactions		Better personalization and accuracy		Stronger data security measures		Enhanced problem-solving capabilities	
	No.	%	No.	%	No.	%	No.	%
No	14	17.5	13	16.2	9	11.2	13	16.2
Yes	66	82.5	67	83.8	71	88.8	67	83.8
Total	80	100.0	80	100.0	80	100.0	80	100.0

Source: Primary Data

It is evident from table 11 that majority (88.8 per cent) of the respondents feels that business should improve data security measures, followed by 83.8 per cent each of the respondents want AI to enhance problem solving capacity also improve personalization and accuracy and 82.5 per cent of the respondents feels AI to improve human like interactions.

Table 12: Recommendation to Invest more in AI for Customer Retention

Particulars	Frequency	Percentage
No	20	25
Yes	60	75
Total	80	100

Source: Primary Data

Table 12 shows that the majority (75 per cent) of the respondents recommend businesses to invest more in AI for customer retention.

Table 13: Preference of AI-driven
Customer Interactions over Traditional Human Support

Particulars	Frequency	Percentage
Yes, AI is more efficient	39	48.8
No, I prefer human interaction	41	51.2
Total	80	100.0

Source: Primary Data

Table 13 shows that majority (51.2 per cent) of the respondents prefer human interaction over AI driven customer support.

Table 14: Influence of AI-powered Services for a Transaction

Particulars	Reminders from payment related apps		Message from ride hailing service apps		Special offers from online food ordering apps		Travel reminders from online bus ticket booking platform		Pop up notification from online shopping platform		Study related ads		Previous purchase, new offers & discount messages from shop.	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
No	13	16.2	29	36.2	23	28.8	23	28.8	20	25	19	23.8	13	16.2
Yes	67	83.8	51	63.8	57	71.2	57	71.2	60	75	61	76.2	67	83.8
Total	80	100.0	80	100.0	80	100.0	80	100.0	80	100	80	100.0	80	100.0

Source: Primary Data

From the table 14, it is inferred that majority (83.8 per cent) each of the respondents find AI-generated reminders from payment apps and recommendations based on past purchases influence buying decisions, followed by 76.2 per cent of the respondents influenced by study-related advertisements, 75 per cent of the respondents influenced by pop up discounts, 71.2 per cent each of the respondents influenced by offers given by food delivery apps and travel remainder from online bus booking platform and 63.8 per cent influenced by message received from ride hailing service apps.

Table 15: Level of Satisfaction with AI-powered Customer Services

Particulars	Chatbot		Virtual assistant		Personalized recommendations		Automated responses		Personalized offers/ discounts		Targeted marketing emails / messages		Predictive customer service	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Highly Satisfied	25	31.2	17	21.2	20	25.0	22	27.5	14	17.5	17	21.2	22	27.5
Satisfied	42	52.5	34	42.5	22	27.5	22	27.5	30	37.5	22	27.5	19	23.8
Neutral	11	13.8	20	25.0	24	30.0	22	27.5	24	30	27	33.8	35	43.8
Dissatisfied	0	0	7	8.8	10	12.5	6	7.5	8	10	10	12.5	2	2.5
Highly dissatisfied	2	2.5	2	2.5	4	5.0	8	10	4	5	4	5.0	2	2.5
Total	80	100.0	80	100.0	80	100.0	80	100	80	100	80	100.0	80	100.0

Source: Primary data

Table 15 shows that the majority (83.8 per cent) of the respondents are highly satisfied or satisfied with chatbots, followed by 63.8 per cent of the respondents are satisfied with virtual assistants, while satisfaction or high satisfaction

with automated responses and personalized offers and discounts is 55 per cent each, personalized recommendation (52.5 per cent) and predictive customer services (51.2 per cent) and only 48.8 per cent are satisfied with targeted marketing emails and messages.

Table 16: Descriptive statistics on Overall Satisfaction with AI-driven services

Mean	66.3%
Median	70%
Minimum	10%
Maximum	97%

Source: Computed data

Table 16 shows that the minimum level of satisfaction is 10 per cent and the maximum is 97 per cent. The average level of satisfaction with AI-driven services is 66.3 per cent and half of the respondent's level of satisfaction with AI-driven services is 70 per cent.

To know the relationship between age and overall satisfaction with AI-driven customer services, Pearson correlation tool was used. The analysis shows r (80) = -0.194 and p =0.08. Since the p value is not less than 0.05, there is no significant relationship between age and overall satisfaction with AI-driven customer services.

Around 63 per cent of the male and 71 per cent of the female have overall satisfaction with AI-driven customer services. To know the difference between gender and overall satisfaction with AI-driven customer services, independent sample t test was used. The analysis shows t = -2.391, df = 78, N = 80, p<0.05 (p = 0.019). Since the p value is less than 0.05, there is a significant difference between gender and overall satisfaction with AI-driven customer services. Therefore, female have more overall satisfaction than male with AI-driven customer services.

To know the relationship between annual family income and overall satisfaction with AI-driven customer services, Pearson correlation tool was used. The analysis shows r (80) = -0.186 and p = 0.098. Since the p value is not less than 0.05, there is no significant relationship between annual family income and overall satisfaction with AI-driven customer services.

To know the difference between education and overall satisfaction with AI-driven customer services, one-way ANOVA tool was used. The analysis shows F = 1.321, df = 4, N = 80, p>0.05 (p = 0.270). Since the p value is not less than 0.05, there is no significant difference between education and overall satisfaction with AI-driven customer services. The overall satisfaction with AI-driven customer services is classified into upto 30 per cent, 31 per cent to 50 per cent, 51 per cent to 70 per cent and above 70 per cent.

Table 17 shows that maximum of the respondents (47.5 per cent) have above 70 per cent overall satisfaction with AI-driven customer services, followed by 27.5

per cent of the respondents who have 31 to 50 per cent of overall satisfaction with AI-driven customer services.

Table 17: Overall Satisfaction with AI-driven Customer Services (in % from 0 to 100)

Level of satisfaction in percentage	Frequency	Percentage
0% - 30%	2	2.5
31% - 50%	22	27.5
51% - 70%	18	22.5
Above 70%	38	47.5
Total	80	100.0

Source: Primary data

4.0 Suggestions

- Initiatives should be taken to create awareness among consumers regarding the usage of Artificial Intelligence (AI).
- Consumers should have the option to interact with human representatives, following the AI interaction.
- Businesses utilising AI for marketing should ensure that consumer privacy is given utmost importance.
- AI-driven marketing reminder should avoid over-communication and ensure consumers are not disturbed by repeated notifications.

5.0 Conclusion

Artificial Intelligence (AI) is rapidly growing and transforming the outlook of digital marketing, offering powerful tools and capabilities to understand customers better, personalize interactions, automate tasks and ultimately provide better marketing results. Businesses that effectively integrate AI into their digital marketing strategies are likely to gain a significant competitive advantage over others. The study reveals that maximum (42.5 per cent) of the respondents are interacting frequently with AI driven services and majority (73.8 per cent) users agree that AI-powered customer service is faster and more effective than traditional methods. However, around 89 per cent of the respondents feels that business should improve data security measures and also respondents feel that AI lacks emotional intelligence making interactions feel robotic and impersonal. The businesses using AI driven digital marketing strategies should ensure that consumer privacy is given utmost importance and consumers are not disturbed by repeated notifications. Consumers should be given awareness regarding the usage of AI to build trust, transparency and to avoid ethical concerns, ultimately for an improved consumer experience.

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CHAPTER 18

Green Packaging Influences Consumer Purchase Decision in FMCG Sector Particularly in the Terms of Brand Loyalty and Consumer Preference

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ABSTRACT

The Fast-Moving Consumer Goods (FMCG) industry, with an emphasis on consumer preferences and the research aims to examine how sustainable packaging affects customers' purchasing behaviors in brand loyalty. As sustainability becomes an increasing concern for customers, companies in the FMCG industry are increasingly adopting sustainable packaging strategies. However, the supply of sustainably packaged products remains limited. Nonetheless, it is uncertain to what degree these initiatives influence consumer behavior, particularly in terms of fostering brand loyalty and impacting purchasing decisions. To address this, primary data were collected from 690 respondents in the Thanjavur District. The collected data were analyzed using SPSS software, employing statistical tools such as Chi-square, Descriptive Statistics, Correlation, and One-way ANOVA. The findings of the study aim to provide insights into whether sustainable packaging significantly impacts consumer choices, influences repeat purchases, and enhances brand commitment. Furthermore, the study explores potential challenges in the adoption of green packaging, such as higher costs and supply chain limitations. The research contributes to the growing discourse on sustainability in FMCG and offers recommendations for businesses seeking to integrate eco-friendly packaging strategies to attract environmentally conscious consumers while ensuring long-term profitability.

Keywords: Fast-Moving Consumer Goods (FMCG), Green Packaging, Consumer Purchase Decision, FMCG Sector, Brand Loyalty, Consumer Preference.

1.0 Objectives

- To understand consumer perceptions of green packaging.
- To assess the impact of green packaging on brand loyalty.
- To evaluate which green packaging influences purchase decisions compared to other factors.

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2.0 Literature Review

2.1 Impact of green packaging

Sohail (2017) studied the green marketing mix and its influence on the brand equity of the firms. He concluded that green products and green places were significantly associated with brand loyalty. He recommends that firms focus on the green marketing mix's product and distribution channel to increase brand loyalty. Marketers should justify the high premium price of green products in the promotion by portraying the ecological benefits.

2.2 Consumer purchase decision

Panda *et al.* (2022) stated that whether consumer segments can be formed by the Bottom of the Pyramid (Bop) consumers based on their perception towards various packaging attributes while making Packaging Influenced Purchase decisions (PIP) for buying Fast-Moving Consumer Goods (FMCG) products. A significant research gap in the literature on "Bop consumer behavior" will be addressed by this study. Most purchasing decisions are made quickly since FMCG is a low-involvement market by nature. Consequently, packaging, which acts as a conduit between goods and consumers, has a big influence on purchasing choices. The study included a sample of 1530 Bop consumers. In addition to clustering techniques, Self-Organizing Maps (SOM) have been employed for validation and visualization. The result shows that there are separate segments and that the package characteristics have a variety of affects.

2.3 Effect of packaging

Prasanth & Mageshwari (2023) This study aims to examine the effect of packaging on consumer choices in the FMCG sector and uncover the key factors that drive consumer preferences. The research employs a mixed-methods approach, combining both qualitative and quantitative data collection methods. The survey will capture data on demographic characteristics, brand awareness, packaging design elements, and purchase intentions. A minimum sample size of 120 FMCG consumer is recommended for the survey. This study uses both primary data and as well as secondary data collection. The FMCG project has achieved significant growth and success through strategic planning, innovative products, and consumer approaches, fostering customer loyalty and a strong brand presence.

2.4 Role of brand image in fmcg

Kamarasan & Chandramohan (2022) aimed to this study investigates the role of brand image in consumer-based brand equality of fast-moving consumer goods (FMCG). A structured questionnaire was developed and tested with data from 167 respondents in Madurai city. Finding show that brand image positively impacts of CBBE. To build the effective CBBE, FMCG companies should improve their brand

image. Recommendations for brand managers are provided, along with limitations and suggestions for future research in this area.

2.5 Green marketing strategies

Mladen *et al.* (2023). stated that impact of green marketing strategies (green advertisement, brand loyalty, equity and innovativeness) to enhance consumer repurchase of green products. Green has become an essential strategy for organizational seeking to reduce their environmental footprint respond to consumers demand for sustainable products, services and long-term customer relationship. The sample size of 371 individuals, including their gender, occupation, age, buying interest, and education. In terms of gender, the sample was predominantly male, comprising 88.7% of the total respondents, while females accounted for the remaining 11.3%. The data were analyzed using SPSS software for descriptive statistics and partial least square structural equation modelling (PLS-SEM).

3.0 Research Methodology

The purpose of this survey is to see how consumers are adopting eco-friendly packaging in FMCG sector. This study adopts descriptive research method. A detailed survey is conducted through questionnaire method. The research will be presented with only primary. The SPSS tool is used to analysis the primary data.

Sampling method: Convenience sampling method is used.

Sample size: The number of the respondents is 690 consumers.

4.0 Data Analysis and Interpretation

4.1 Hypothesis 01

H0 (Null Hypothesis): There is no significant relationship between consumers' awareness of green packaging and their overall opinion about it.

H1 (Alternative Hypothesis): There is significant between consumers with higher awareness of green packaging have a more positive overall opinion about it.

Table 1: Correlation Analysis

		Your awareness of the concept of green packaging	Your overall opinion about green packaging
Your awareness of the concept of green packaging	Pearson Correlation	1.000	.258
	Sig-(2 tailed)		.000
	N	690	690
Your overall opinion about green packaging	Pearson Correlation	.258	1.000
	Sig-(2 tailed)	.000	
	N	690	690

The Pearson correlation coefficient (0.258) indicates a weak but positive relationship between awareness and overall opinion about green packaging. The p-value (0.000) is less than 0.05, meaning the correlation is statistically significant. Therefore, we reject the null hypothesis (H0) and accept the alternative hypothesis (H1). This confirms that higher awareness leads to a more positive opinion about green packaging.

4.2 Hypothesis 02

H0 (Null Hypothesis): There is no significant association between the use of eco-friendly packaging when purchasing FMCG products and the belief that green packaging contributes to environmental sustainability.

H1 (Alternative Hypothesis): There is a significant association between the use of eco-friendly packaging when purchasing FMCG products and the belief that green packaging contributes to environmental sustainability.

Table 2: Cross-tabulation (Chi-square Test)

	Value	Df	Asymptotic Sig (2-tailed)
Pearson Chi-Square	403.45	16	.000
Likelihood Ratio	224.75	16	.000
Linear-by-Linear Association	155.44	1	.000
N of valid Cases	690		.000

The Chi-Square test (X = 403.45, p = 0.000) indicates a significant association between using eco-friendly packaging for FMCG products and believing that green packaging supports environmental sustainability. Since the p-value is below 0.05, we reject the null hypothesis (H0) and accept the alternative hypothesis (H1). This means consumers who use eco-friendly packaging are more likely to view it as environmentally beneficial. The strong association suggests that promoting sustainable packaging can enhance positive environmental perceptions. Businesses should leverage this insight to encourage wider adoption of green packaging.

4.3 Hypothesis 03

H0 (Null Hypothesis): Green packaging does not significantly influence brand loyalty.

H1 (Alternative Hypothesis): Green packaging significantly influences brand loyalty.

Table 3: Binary Logistics

	Wald	Df	Sig
Green packaging influences your loyalty to a specific brand	23.11	1	.000
Constant	.18	1	.675

The logistic regression analysis confirms a significant relationship between green packaging and brand loyalty (Wald = 23.11, p = 0.000). Since $p < 0.05$, we reject the null hypothesis (H$_0$) and accept the alternative hypothesis (H$_1$). This means that green packaging **positively influences consumer brand loyalty**. The coefficient (0.675) indicates a moderate effect, suggesting that consumers are more likely to stay loyal to brands using sustainable packaging. A higher Wald value reinforces the importance of green packaging in shaping brand preference. Businesses should adopt eco-friendly packaging to enhance customer retention. Sustainable branding strategies may further strengthen consumer trust and loyalty.

4.4 Hypothesis 04

H0 (Null Hypothesis): A brand's commitment to green packaging does not significantly influence consumers' likelihood of recommending it to others.

H1 (Alternative Hypothesis): A brand's commitment to green packaging significantly influences consumers' likelihood of recommending it to others.

Table 4: Chi-square Test

	Value	Df	Sig (2-tailed)
Person Chi-Square	25.97	6	.000
Likelihood ratio	12.79	6	.047
Linear by Linear association	1.08	1	.298
N valid case	690		

The **Pearson Chi-Square test (X= 25.97, p = 0.000)** indicates a statistically significant association between a brand's commitment to green packaging and consumers' likelihood of recommending it. Since **p < 0.05**, we **reject the null hypothesis (H$_0$)** and accept the **alternative hypothesis (H$_1$)**, confirming that green packaging commitment positively influences recommendations.

4.5 Hypothesis 05

H0 (Null Hypothesis): A brand's green packaging efforts do not significantly influence consumer's repurchase decisions.

H1 (Alternative Hypothesis): A brand's green packaging efforts significantly influence consumer's repurchase decisions.

Table 5: Regression

		Sum of Squares	Df	Mean square	F	Sig
The influence of a brand Green packaging efforts on repurchase decision	Between groups	128.60	4	32.15	66.04	.000
	Within groups	333.46	686	.49		
	Total	**462.06**	**690**			

The regression analysis shows that a brand's green packaging efforts significantly influence consumer repurchase decisions (**F = 66.04, p = 0.000**). Since **p < 0.05**, we **reject the null hypothesis (H₀)** and accept the **alternative hypothesis (H₁)**, confirming a significant impact. The high **F-value (66.04)** reinforces the strength of this relationship. This suggests that brands investing in sustainable packaging can increase customer retention. Future research could explore additional factors affecting repurchase decisions.

5.0 Findings

- 74 per cent of the respondents are age group at 18-34.
- 69 per cent of the respondents are male.
- 55 per cent of the respondents are urban.
- 56 per cent of the respondents are UG degree
- 54 per cent of the respondents are students in occupation in part time.
- 48 per cent of the respondents are monthly income at less than ₹15000
- 43 per cent of the respondents are house hold size at 4-5 persons.
- 53 per cent of the respondents are very familiar with the concept of green packaging
- 37 per cent of the respondents are agree green packaging contributes to environmental sustainability
- 44 per cent of the respondents are interested of green packaging over non eco friendly products
- 43 per cent of the respondents are always its times to you notice green packaging when shopping for FMCG products
- 87 per cent of the respondents are yes ever purchased a product specifically because of its green packaging
- 47 per cent of the respondents are yes, significantly its green packaging influence your loyalty to a specific brand
- 44 per cent of the respondents are very likely to recommend a brand to others because green packing
- 48 per cent of the respondents are yes, definitely switch preferred brand to another similar products green packing
- 44 per cent of the respondents are strongly influence of a brand green packaging efforts on repurchases decision
- 36 per cent of the respondents are positive of the packaging of a product affects perception of the brands overall values
- 40 per cent of the respondents are always the reading products labels to verify the environmental impact of packaging
- 51 per cent of the respondents are yes, within 3-5 years of green packaging expected to become a FMCG products in near future

- 72 per cent of the respondents are yes it participate in programs for choosing green packaging products
- 39 per cent of the respondents are yes, but only slightly more willing to pay more for an eco friendly products
- 46 per cent of the respondents are increased consumer adoption of eco-friendly products in FMCG sector in green packaging enhance consumer adoption
- 39 per cent of the respondents are very positive in your overall opinion of green packaging

6.0 Conclusion

This research highlights how the Fast-Moving Consumer Goods (FMCG) industry is influenced by consumers' tastes, brand loyalty, and buying decisions through green packaging. The findings suggest that customers are more positively inclined towards environmentally friendly products as their green packaging awareness increases, which influences their buying decisions. As per statistic research like logistic analysis, regression, chi-square, and correlation, green packaging is vital when it comes to shaping the desire of customers as well as instilling brand commitment. A sizeable proportion of consumers prioritize greener packaging foremost when shopping and many of them indicate they would be willing to switch companies because of their friendliness. The research also indicates that repurchase decisions are heavily informed by green packaging, and this implies that firms that invest in sustainable packaging can realize long-term.

7.0 Scope for Further Research

7.1 Longitudinal consumer behavior analysis

In the future, longitudinal analysis can be performed to analyze the change in consumers' attitude towards green packaging over time, especially in a situation with increased awareness and policy changes.

Role of Government Policies and Regulations

Future research can investigate government policies, tax benefits, and regulations as to whether they affect consumers' adoption of green packaging and environmental initiatives by FMCG players.

7.2 Comparative analysis across multiple markets

Attitudes of consumers toward green packaging in different geographical locations, cultures, and income groups can be valuable in knowing the role of global and local factors in influencing purchasing behavior.

Future Technologies in Green Packaging

Future research can analyze how future technologies, such as biodegradable

material packaging, smart packaging, and transparency due to block-chain, can impact consumer trust and green packaging choice.

Machine Learning and Predictive Analytic in Consumer Behavior

Application of machine learning algorithms to big data to predict future trends of consumer behavior can potentially offer useful insights to FMCG companies to develop their sustainability strategy.

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CHAPTER 19

Customer Perception of Total Quality Management in Banking Services

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ABSTRACT

The study investigates customer perceptions of Total Quality Management (TQM) in banking services. It uses a structured questionnaire to assess customer awareness, service quality, and factors influencing TQM perception. The research also examines the relationship between TQM practices and customer loyalty. Data was collected from 303 respondents from various Banks' customers using a random sampling method. A descriptive research approach was adopted, and statistical tools such as ANOVA, Chi-Square, and Regression were utilized for data analysis. The findings show that TQM practices significantly improve customer satisfaction and loyalty. However, the study suggests that banks should enhance customer awareness, leverage technology effectively, and address specific customer needs to maximize the benefits of TQM implementation. The findings offer valuable insights for strengthening customer relationships and improving service quality through TQM strategies.

Keywords: Total quality management, Customer awareness, Customer loyalty and Customer satisfaction.

1.0 Introduction

In the competitive banking industry, delivering superior service quality is crucial for attracting and retaining customers. Total Quality Management (TQM) is a strategic approach that focuses on continuous improvement, customer focus, and employee involvement to meet and exceed customer expectations. Understanding customer perception of TQM practices is essential for sustaining long-term relationships and achieving a competitive advantage. Positive perceptions of TQM can lead to increased customer satisfaction, loyalty, and trust, while negative perceptions may result in dissatisfaction and attrition. Despite the growing adoption of TQM in the banking sector, there is limited research on how customers perceive these practices and their impact on service quality and customer loyalty.

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This study aims to bridge this gap by examining customer perceptions of TQM in banking services. The research focuses on assessing customer awareness of TQM, evaluating service quality, identifying factors influencing TQM perception, and exploring the relationship between TQM practices and customer loyalty. The findings will contribute to the academic understanding of TQM in service industries and offer practical recommendations for banking institutions to enhance their TQM strategies.

2.0 Statement of Problem

Banks utilize Total Quality Management (TQM) to improve their services, but it's uncertain if customers notice or value them. Customers may be more concerned with issues like as prompt service, dependability, or user-friendly digital tools than banks are with internal quality standards. This mismatch could imply that banks are squandering resources on TQM practices that do not address what customers genuinely desire. Current research also ignores customer opinions, concentrating instead on business results such as efficiency or profits. Without a grasp of customer views, banks risk losing customers to competitors and failing to create loyalty.

3.0 Aim of the Study

The aim of this research is to investigate customer perceptions of Total Quality Management (TQM) practices in banking services, identify the key TQM dimensions (e.g., reliability, empathy, assurance) that have the greatest influence on customer satisfaction, and examine gaps between banks' TQM objectives and customer experiences. The study aims to give banks with actionable insights into aligning their quality management policies with customer expectations, consequently improving service delivery, trust, and competitive advantage in the banking industry.

4.0 Objectives of the Study

1. To assess customer awareness and understanding of Total Quality Management (TQM) practices in banking services.
2. To evaluate customer perceptions of service quality in banks implementing TQM.
3. To identify the factors influencing customer perception of TQM in banking services.
4. To explore the impact of TQM on customer trust and confidence in banking services.

5.0 Gap of the Study

The gap in the study of customer perception of Total Quality Management (TQM) in banking services primarily revolves around the inconsistency between

customer expectations and their actual experiences with service quality. This discrepancy highlights areas where banks can improve their service delivery to enhance customer satisfaction and loyalty.

6.0 Scope of the Study

This study examines customer perceptions of Total Quality Management (TQM) in banking services, analyzing its impact on service quality, customer satisfaction, and overall banking experience. It covers retail, corporate, and digital banking, focusing on key TQM elements like customer focus, continuous improvement, employee involvement, and technological innovations. The research targets bank customers, including individual account holders and corporate clients, and may be conducted across regions, countries, or multiple banks. A combination of qualitative and quantitative research methods, including surveys, interviews, and case studies, will be used to collect data. The study aims to provide insights into TQM's effectiveness and recommend strategies for enhancing service quality and customer satisfaction.

7.0 Literature Review

Kim & Yeo, (2024) Stated that Since customer service quality is now a major factor that determines a company's overall success, many organizations are looking for any relevant hints that could help them improve it. Therefore, the purpose of this study was to investigate the effects of organizational commitment, job stress, and job satisfaction on the quality of customer service provided by Cambodian bank employees. 630 bank workers from various banks in Cambodia were asked to complete surveys in order to achieve this goal. In addition, a structural equation model was employed for data analysis. The findings showed that when employees had notable improvements in job stress and job happiness, banks were able to achieve high organizational commitment. In the meanwhile, if organizational commitment and job stress—aside from job satisfaction—were significantly altered, banks may enhance the quality of their customer service. Lastly, the results of a mediation test verified that organizational commitment fully mediates the relationship between customer service quality and work satisfaction. Even though the findings demonstrated the substantial effects of organizational commitment and job stress on Because it had a greater degree of influence on customer service quality, organizational dedication was the strongest factor supporting higher customer service quality. As a result, banks ought to focus more on encouraging and prioritizing organizational commitment among their staff.

Khatun *et al.*, (2024) Stated that Using survey data from 400 farmers, this study examines the factors influencing the adoption of mobile banking and user satisfaction in order to improve financial inclusion in rural agricultural communities.

There is a substantial difference in receiving allowances, fund transfers, overseas remittances, and cell recharges, according to an unpaired t-test. Cash-in, cash-out, and utility bill payments did not significantly alter between before and during COVID-19. The majority of mobile banking transactions grew in frequency and volume during the pandemic. The bulk of rural residents (around 88%) use mobile banking services, according to the results. According to the index value measuring farmers' satisfaction with mobile banking transactions, respondents were happy with a variety of mobile banking transactions but unhappy with the increasing service prices. According to logit estimate, the main characteristics influencing rural farming populations' adoption of mobile banking were age, income, education, farm size, and distance from the bank branch. Nevertheless, increasing agent service and decreasing servicecosts, and safeguards against fraudulent transactions are crucial for increasing rural communities' use of mobile banking services and hastening their financial inclusion.

Jafri *et al.*, (2023) Stated that the growth of fintech has increased cybercrime, raising questions about banking security and trust. There are few studies on cognitive barriers resulting from Fintech debates, whereas previous study primarily examined Fintech adoption via a tech-centric lens, highlighting its advantages. This study identifies current research gaps and synthesizes prior Fintech work on behavioral intentions in banking, highlighting the importance of trust, security, and other aspects. 26 articles from the Scopus and Web of Science (WoS) databases (2009–2022) were analyzed as part of a Systematic Literature Review using the ROSES (Reporting standards for Systematic Evidence Syntheses) methodology. The five main themes (UTAUT2 variables, risk, trust, quality, and other) that emerge from thematic analysis have 24 sub-themes. The weight analysis highlights the most effective and often used predictors, such as perceived usefulness, trust, security, and performance expectancy, and disposition. Using the TCCM (Theory, Context, Constructs, and Method) paradigm, the review also identifies research gaps and makes recommendations for further investigations. This study offers regulatory authorities and Fintech companies insights. opinions on the desired features of Fintech services that can increase the banking industry's adoption of them.

George (2018) Stated that Using the technology acceptance model (TAM) and service quality as an external variable, this study investigates the opinions of Internet banking (IB) consumers in Kerala. Perceived utility and perceived ease of use (PEOU), two TAM factors, were found to be IB use is directly impacted by (PU), and PEOU indirectly affects PU. Through TAM factors, aspects of service quality like fulfillment, efficiency, dependability, website features, responsiveness, and privacy also indirectly affect IB use. The paper talks about how these findings could be used in real-world situations.

Bhat & Al-Adwan (2025) Stated that investigates the relationship between customer satisfaction and green banking, focusing on digital banking, green services, and green loans. The research found that customer satisfaction is significantly

impacted by digital banking, green services, and green loans, but not by green infrastructure. The study also found that customer happiness is not mediated by privacy in the linkages between green loans and green infrastructure. The findings highlight the critical role of green banking in increasing customer satisfaction and have implications for the government and banking industry. The study also highlights the importance of customer loyalty in the competitive market climate, with India being the most frequently studied country. The findings are crucial for marketing managers in the banking sector to assess and improve their financial products and services to increase customer loyalty.

8.0 Research Methodology

The purpose of this survey is to investigate customer perceptions of Total Quality Management (TQM) practices in banking services. This study adopts descriptive research design. A detailed survey is conducted through questionnaire method. The research will be presented with only primary data. Random sampling method is used to collect data from 300 Bank Customers in Thanjavur district. SPSS is used to analyze the primary data. Chi-Square and ONE-WAY ANOVA are used to analyze the data.

9.0 Data Analysis and Interprtetation

H0: There is no association between digital banking convenience and customer trust in handling Financial Transactions.
H1: There is an association between digital banking convenience and customer trust in handling Financial Transactions.

Table 1: Chi-square Test

	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	30.003[a]	12	.003
Likelihood Ratio	30.736	12	.002
Linear-by-Linear Association	7.335	1	.007
N of Valid Cases	303		

From the above table, Chi-square is calculated by using SPSS. The analysis shows that Value = 30.003[a], Degree of freedom (df) = 12, N = 303 and p<0.05 (p value = .003). The calculated value .003 is less than 0.05 values at 95% confidence level. So the null hypothesis is rejected and the alternative hypothesis is accepted. Hence it is inferred that there is a significant association between digital banking convenience and customer trust in handling Financial Transactions.

Table 2: ONE-WAY ANOVA

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	8.970	3	2.990	2.647	.049
Within Groups	337.710	299	1.129		
Total	346.680	302			

The above table presents the results of an ONEWAY ANOVA is used to find the difference between How convenient is the bank's digital banking experience and I trust my bank to handle my financial transactions accurately and securely. where the value of F is 2.647 and P value is .049. Since p value is Less than 0.05, there is significant difference between digital banking convenience and customer trust in handling Financial Transactions**.**

10.0 Findings

- *Awareness of TQM:* A significant majority (67.3%) are aware of the concept of TQM, indicating that banks have successfully communicated this framework to customers.
- *TQM's Importance:* 57.4% of respondents believe TQM is essential for improving banking services, though 14.6% either disagree or strongly disagree.
- *Use of Technology:* 55.8% agree or strongly agree that technology improves service quality, whereas 14.5% disagree.
- *Security of Banking Services:* 41.9% believe banking services are secure but occasionally encounter technical difficulties, whereas 12.2% believe services are unreliable.
- *Financial Product Transparency:* Almost half (46.2%) say products are competitive but not properly explained, while 10.2% feel there is a lack of transparency.
- *Communication Clarity:* Only 21.8% found communication clear and timely, while 45.5% reported that information is frequently confusing.

11.0 Suggestions

To optimize the benefits of Total Quality Management (TQM) in banking services, several critical areas must be addressed. Raising consumer awareness of TQM standards is critical, as many customers are unaware of how quality management initiatives improve their banking experience. Banks should actively participate in transparent communication, marketing campaigns, and consumer education programs to foster trust and gratitude for these initiatives. Using technology to improve service delivery is another critical step. Banks must constantly improve digital banking platforms to offer increased convenience, security, and

dependability. Investing in AI-powered chatbots, automated customer care, and tailored banking experiences can greatly increase efficiency and customer happiness. To better meet consumer expectations, banks must address core customer issues such as speedier service, increased responsiveness, and seamless digital transactions. Strengthening consumer feedback methods is critical for understanding changing expectations and making required modifications. Furthermore, banks should prioritize integrating TQM initiatives with customer needs rather than depending simply on internal quality measurements. Conducting regular customer perception surveys and incorporating the results into dynamic service enhancements will ensure that TQM efforts effectively fulfill consumer expectations. Finally, the confidence and security of digital banking must be strengthened. Strengthening cybersecurity safeguards would help to protect transactions while minimizing concerns about fraud and data privacy. Furthermore, transparent digital transactions and explicit data protection guidelines can boost client trust in banking organizations.By employing these tactics, banks can successfully improve service quality, create client loyalty, and maintain a competitive advantage in the market.

12.0 Result

The study provides valuable insights into customer perceptions of Total Quality Management (TQM) in banking services and its impact on service quality, customer satisfaction, and loyalty. A significant proportion of respondents (67.3%) acknowledge the importance of TQM in improving banking services, yet awareness of its principles remains varied, with 26.7% holding a neutral stance. Digital banking experiences are widely adopted, but 27.7% of customers report technical issues, and 37.6% cite delays in service delivery, highlighting the need for further improvements. Additionally, customer feedback mechanisms appear inconsistent, as 40.9% indicate that feedback is primarily sought only when complaints arise. Statistical analysis using Chi-Square and ANOVA tests further supports these findings. The Chi-Square test (χ^2 = 30.003, p = 0.003) confirms a significant association between digital banking convenience and customer trust**,** emphasizing that a seamless digital experience enhances confidence in banking institutions.

However, the ANOVA test (F = 2.647, p = 0.049) found significant difference in trust levels solely based on digital banking convenience, suggesting that other factors such as service reliability, security, and responsiveness play a crucial role in shaping customer trust. Furthermore, 41.9% of respondents perceive banking services as somewhat personalized, whereas 34.4% believe personalization is limited or nonexistent. Trust and security remain pivotal, with 31.7% of customers expressing confidence in their bank's security measures, while 20.8% raise concerns about security risks. These findings indicate that while banks have made notable progress in enhancing service quality and digital banking solutions, gaps remain in transparency, efficiency, customer engagement, and feedback mechanisms. Overall,

the study underscores the necessity for banks to align TQM strategies with customer expectations, focusing on service efficiency, digital transformation, and trust-building initiatives. By improving customer awareness, streamlining feedback mechanisms, and leveraging technology, banks can maximize the benefits of TQM and foster stronger customer relationships in an increasingly digital banking landscape.

13.0 Conclusion

The study emphasizes the importance of Total Quality Management (TQM) in improving banking services, increasing customer happiness, and building loyalty. While many clients appreciate the value of TQM, awareness and grasp of its principles remain poor. The findings show that, while digital banking services are widely used, problems such as technical concerns, service delays, and uneven feedback methods reduce overall customer satisfaction. Statistical data reveals that digital banking convenience has a favorable impact on customer trust; nevertheless, trust is also influenced by characteristics such as security, service reliability, and responsiveness. Customers also have mixed feelings about service personalization and trust in banking security, highlighting the need for more customer-centric initiatives. For banks to maximize the benefits of TQM, they must align their quality management strategies with customer expectations, focusing on enhancing transparency, improving service efficiency, strengthening feedback mechanisms, and leveraging digital transformation. By addressing these key areas, banks can build stronger customer relationships, enhance trust, and maintain a competitive edge in the evolving banking landscape.

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CHAPTER 20

Comparative Analysis of Digital Knowledge Transmission in Public and Private Schools using Machine Learning Algorithms

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ABSTRACT

The integration of digital knowledge in education has become a critical factor in shaping students' academic and professional competencies. This study presents a comparative analysis of public and private schools regarding their effectiveness in transmitting digital knowledge to students. Adopting a descriptive research design, the study is based on primary data collected from 239 teachers selected through purposive random sampling. To examine differences in digital learning implementation, accessibility, and effectiveness, the research employs ANOVA and Chi-square tests. Results indicate statistically significant differences between public and private schools, with an F-statistic of 35.821 and a p-value < 0.001, confirming that key predictors significantly influence digital knowledge transmission. The R² value of 0.516 suggests that approximately 51.6% of the variation in outcomes is explained by these factors, which is further validated by the Random Forest model. Findings provide insights into the availability of digital resources, teacher preparedness, technological infrastructure, and institutional support across school types. This study highlights disparities and identifies best practices, offering actionable recommendations for policymakers, educators, and school administrators to bridge the digital divide and enhance digital literacy. It contributes to the ongoing discourse on improving digital education strategies to ensure equitable and effective learning experiences for students in diverse educational settings.

Keywords: Digital knowledge, Public vs. Private schools, Digital education, ANOVA, Chi-square, Descriptive research, Teacher perspectives.

1.0 Introduction

Teachers' professional performance plays a critical role in shaping student outcomes and overall school effectiveness.

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It encompasses a range of activities undertaken by educators to fulfill their duties with efficiency, effectiveness, empathy, and dedication, all aligned with institutional goals (Damanik, 2024). Among the key competencies essential for both educators and students are the "4Cs": Collaboration, Communication, Critical Thinking and Problem Solving, and Creativity. These skills are pivotal for three main reasons: (a) they are inherently difficult to teach and assess, and are often underrepresented in formal curricula; (b) they are essential for all students in the context of globalization; and (c) they are indispensable across all modern career pathways. Inquiry-Based Learning (IBL) has emerged as a powerful pedagogical strategy that fosters conceptual understanding, critical thinking, teamwork, and problem-solving abilities. When supported by digital tools, as in Mobile-Technology-Supported Inquiry-Based Learning (MIBL), it significantly enhances engagement and learning outcomes—particularly in secondary science education (Kousloglou, 2023).

To effectively implement such pedagogical approaches, teachers must develop Adaptive Teaching Expertise—the ability to continuously refine their strategies in response to student needs and ideas while remaining grounded in knowledge-generation principles (Suh, 2024). In today's digital era, students navigate an ecosystem filled with Learning Management Systems (LMSs), digital learning applications, and online communication platforms (Michos, 2023). These tools not only facilitate communication and access to current events but also enable diverse knowledge acquisition and the development of digital perspectives (Sigit Purnama, 2021). The integration of technology-based media in education requires both infrastructure—such as computers and mobile devices—and purposeful pedagogical intent. Digital learning media aim to develop not only computer and writing skills, but also broader digital literacy, interactivity, responsiveness, and collaborative knowledge sharing (Delita, 2022).

To sustain this transformation, the study advocates for a school-driven local governance model that emphasizes: (i) the formulation of policies promoting equitable access to digital infrastructure and resources; (ii) professional development and training for teachers to effectively integrate technology into their practice; (iii) empowering educators as change agents through innovative pedagogy; and (iv) the development of localized digital innovation strategies tailored to each school's unique context and community needs (Quaicoe, 2023). A bottom-up governance approach, where schools assess their digital readiness and design their innovation roadmaps, allows governments to more effectively respond to ground realities and support scalable, context-sensitive change.

2.0 Review of Literature

Quality education in the 21st century is increasingly defined by the effective integration of technology into classroom activities. One study emphasized the importance of addressing barriers to technology integration through targeted in-

service professional development programs that enhance teachers' confidence and competencies in using digital tools. Data collected from teachers, principals, and pedagogical center coordinators in secondary schools revealed a high level of proficiency in content knowledge, pedagogical knowledge, and the integration of both. Additionally, six language domains—including technological content pedagogy—were found to have a positive and significant relationship with the application of Technological Pedagogical Content Knowledge (TPACK) (Demissie *et al.*, 2022).

The focus on teachers' use of technological devices—particularly their proficiency in operating, designing, and utilizing digital media for instructional purposes—has grown in relevance since the COVID-19 pandemic. A study conducted in Bengkulu, Indonesia, analyzed teachers' digital literacy at public elementary schools using tabulation, coding, and thematic analysis. The findings revealed that teachers frequently employed tools such as PowerPoint, Canva, and Kinemaster, along with teaching platforms like Zoom, Google Meet, Google Classroom, and WhatsApp, indicating a significant level of mastery in digital teaching methods (Sulasmi, 2022). Infrastructure and social support have also emerged as critical factors influencing teachers' technological self-efficacy and digital practices. A study examining vocational teachers found that technological self-efficacy significantly mediated the relationship between infrastructure, social support, and the application of digital tools in educational settings. The results emphasized the role of support systems in enabling effective digital technology practices (Choyrul *et al.*, 2023).

In terms of student outcomes, a study evaluating flipped instruction demonstrated a positive impact on learners' intrinsic and extrinsic motivation as well as self-directed learning capabilities. Through pre- and post-intervention surveys, the study identified improvements in internal cognitive processes, behavioral strategies, and environmental preferences following the flipped classroom approach, thereby reinforcing the value of student-centered digital learning (Hsieh & Maritz, 2023). Furthermore, the relationship between teacher engagement in online learning and perceived importance of such platforms has also been explored. One study revealed that EFL teachers' teaching abilities did not directly predict their perceived value of online learning. However, their participation in online learning activities significantly predicted and accounted for 66% of the variance in perceived importance. This finding underscores the role of continuous professional development and engagement in shaping attitudes toward digital instruction (Wang & Pan, 2023).

3.0 Research Methodology

This study adopts descriptive research design. A detailed survey is conducted through questionnaire method. The research will be presented with only primary. Purposive random sampling**.** The Number of the respondents is 200 teachers in Thanjavur district.

3.1 Research gap

Limited research has been done on how these differences impact students' preparedness and the development of their digital skills over time. Most studies concentrate on immediate access and implementation differences, such as the differences in teachers' digital literacy implementation or the material access to ICT between public and private schools. There are several studies that show that private schools have superior digital infrastructure than public ones, but there aren't many thorough studies that look at how these infrastructure disparities affect students' real digital literacy and abilities. In both public and private contexts, the importance of socioeconomic issues and how they interact with digital education is still not well understood. particularly in how they influence students' ability to leverage digital tools for learning and future career prospects for a digital economy.

3.2 Research problem

Access to ICT and digital literacy among students is impacted by the digital divide between public and private schools, which may impede academic results. Digital resources are more readily available to private students, especially women. The integration of digital tools in public schools is complicated by a lack of funding, antiquated infrastructure, and inadequate professional development. By offering academic help and utilizing learning data, public-private partnerships can revolutionize online education and solve issues like poor student satisfaction and high attrition rates.

3.4 Aim

The aim of this study is to compare the effectiveness of public and private schools in transmitting digital knowledge to students, and to identify the factors that influence the digital knowledge transmission process in these schools.

3.5 Objectives

- To Know the digital literacy level of teachers working in public and government schools
- To Assess the digital literacy level of teachers working in private schools
- To Measure the knowledge transmission by the public-school VS private schools

4.0 Data Analysis

The analysis confirm a strong relationship between education qualification and digital device usage. Higher education levels correlate with increased adoption of diverse digital devices, with smartphones being the most widely used across all groups (53%). Professionals Figure a higher tendency to use desktop computers (37%), while master's degree holders balance between laptops, tablets, and smartphones for academic and professional use. Individuals with lower education

levels (up to HSC) have minimal digital engagement, highlighting a digital divide that necessitates targeted digital literacy programs. To bridge this gap, policymakers should focus on mobile-based learning initiatives and skill enhancement programs tailored to different education levels.

Figure 1: Digital Device Usage
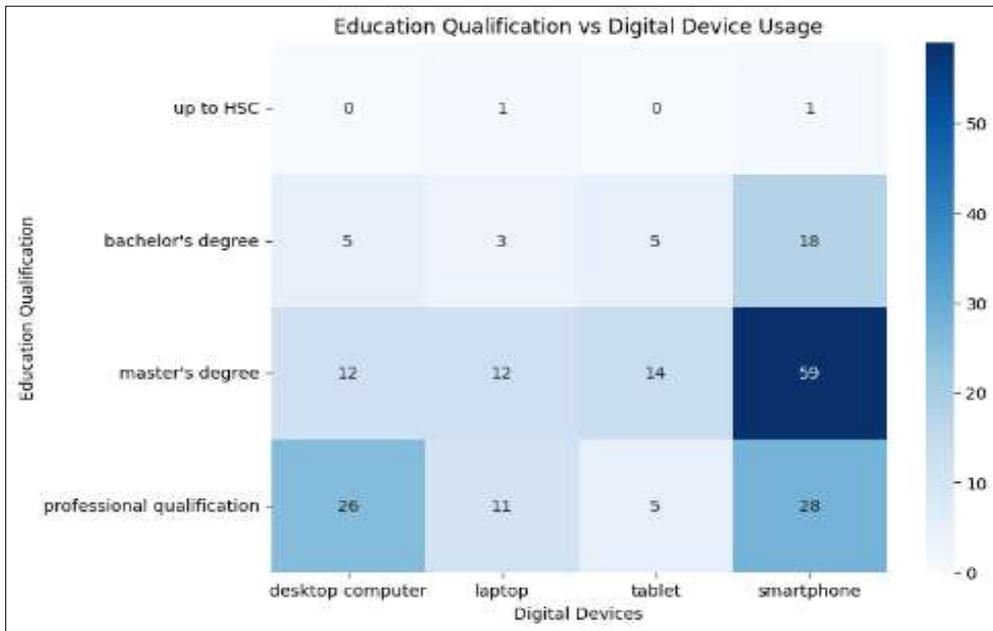
Figure 2: Feature Importace in Random Forest
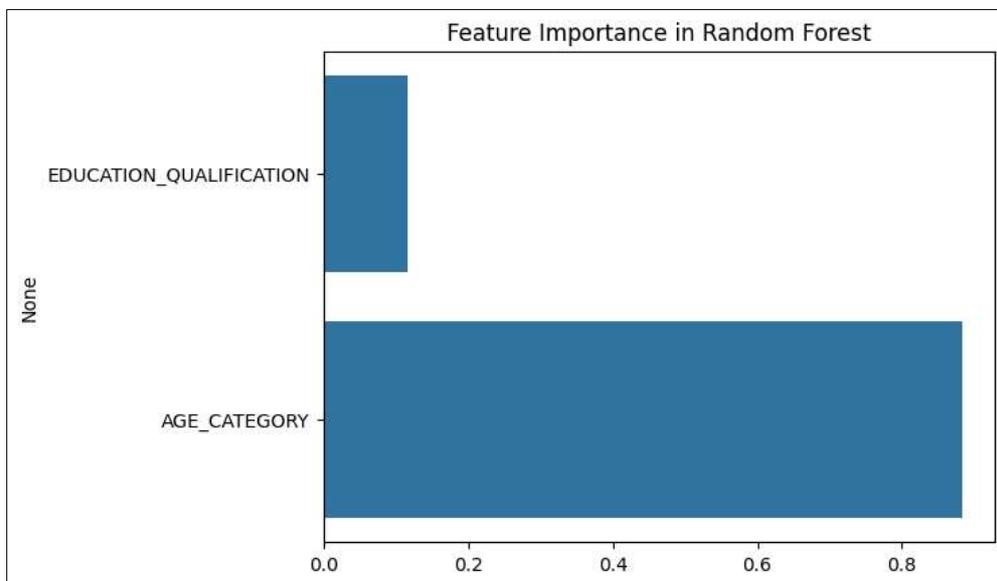
The Anova results indicate a significant association between Education Qualification, Age Category, and Monthly Income with an F-statistic of 35.821 and a p-value < 0.001, confirming that these predictors influence income. The R² value of 0.516 suggests that about 51.6% of the income variation is explained by these factors. The Random Forest model further validates this by classifying income levels and highlighting the relative importance of each predictor. The feature importance plot reveals whether Education Qualification or Age Category plays a more dominant role in predicting income. A higher importance score for Education Qualification would indicate that education has a greater impact on income than age. The model's classification accuracy and feature contribution further reinforce the findings from Anova, providing a comprehensive understanding of how these factors influence income levels.

Figure 3: Features of Skill Development
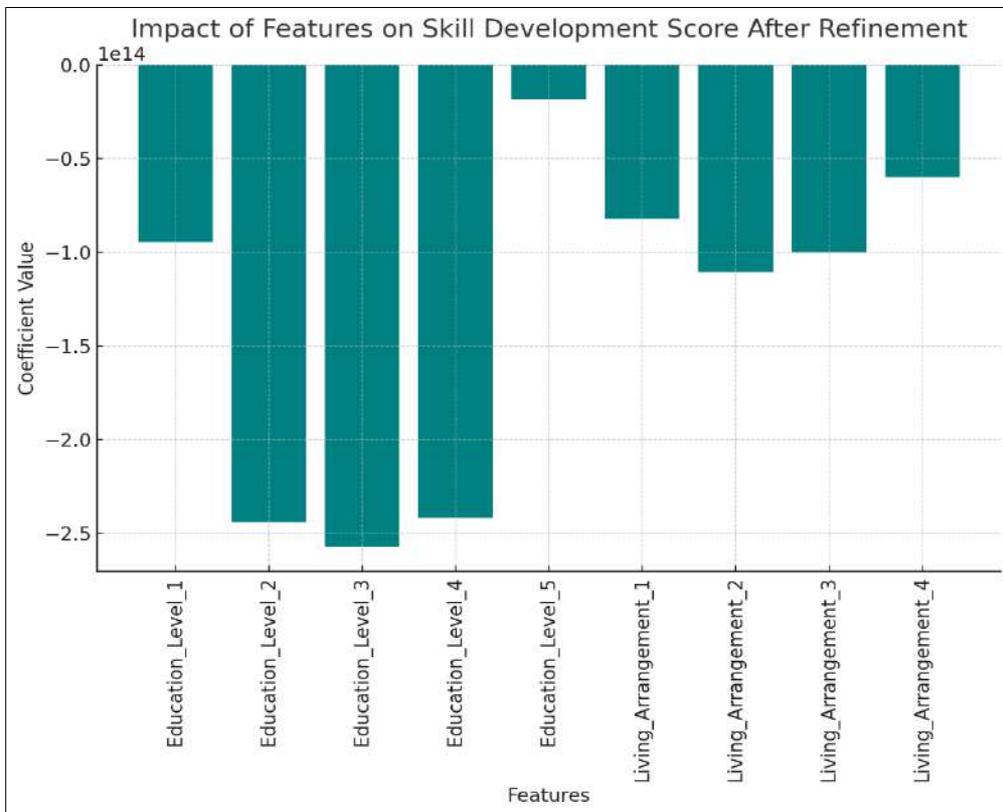
The model output, with an intercept of 71.94, provided coefficients for each category of encoded features, reflecting their impact on skill development. Positive coefficients indicate a beneficial effect, while negative coefficients suggest a hindrance. The predictive analysis focused on identifying patterns in student engagement, teacher monitoring, and strategic planning, assessing their influence on

educational and professional outcomes. The model demonstrated strong performance, with a Mean Squared Error (MSE) of 105.76, Root Mean Squared Error (RMSE) of 10.28, Mean Absolute Error (MAE) of 8.67, and a Mean Absolute Percentage Error (MAPE) of 14.89%, alongside a high R² value of 91.1%, confirming its robustness.

The findings emphasized key areas for intervention, particularly in enhancing teacher feedback efficiency and class participation, which were strongly correlated with educational success. Recommendations include integrating strategic teaching methods, such as personalized feedback mechanisms and digital engagement platforms, aligning with global trends in educational digitization and targeted skill development. Broader insights suggest that policies promoting higher education and stable income levels can significantly improve career outcomes, while flexible work arrangements and accessible educational tools, such as online quizzes and interactive platforms, are crucial for balancing work and personal growth. Additionally, institutions should prioritize teacher-student interactions and personalized learning strategies to maximize educational and professional opportunities. This study underscores the potential of data-driven approaches in shaping effective policies for education and workforce development. Future research should consider expanding this framework to include longitudinal data and explore additional demographic and behavioral factors for a more comprehensive understanding of skill development and career progression.

5.0 Findings

The study reveals a strong correlation between higher educational attainment and increased use of digital devices. Among all user groups, smartphones emerged as the most commonly used device (53%), while desktop computer usage was more prevalent among professionals (37%). These trends underscore the growing reliance on mobile technology in digital learning environments. The persistent digital divide highlights the urgent need for targeted digital literacy initiatives. Statistical analysis using ANOVA demonstrated significant relationships between monthly income, age category, and education qualification (F-statistic = 35.821, p-value < 0.001). The R² value of 0.516 indicates that approximately 51.6% of the variance in income can be explained by these factors. The application of the Random Forest model further confirmed these relationships by classifying income levels and ranking the predictive importance of each variable. Feature importance analysis revealed that educational qualification had a higher impact on income than age category, reinforcing the critical role of education in economic advancement.

6.0 Suggestions

Although many schools have adopted digital education practices, there remains a limited understanding of how public and private schools differ in their

delivery of digital skills, particularly in specific regions like the Thanjavur district. While previous research has explored digital learning broadly, few studies have directly compared the availability of digital infrastructure, teacher training, and institutional support in public versus private educational settings. This study addresses that gap by critically analyzing these factors and assessing the overall effectiveness of digital education across school types.

The literature review is structured around key themes such as teachers' digital competencies, challenges in technology integration, and the pedagogical benefits of digital tools. Rather than merely summarizing past studies, it provides a critical evaluation of existing research. The research methodology was strengthened by the use of a well-structured questionnaire, incorporating both Likert-scale and open-ended questions to ensure comprehensive and reliable data collection. The data was analyzed using ANOVA and the Random Forest model, providing valuable insights into the key factors influencing digital learning outcomes. Based on these findings, the study proposes several practical solutions, including: Enhanced teacher training programs focused on digital pedagogy, Promotion of mobile-based learning to increase accessibility, stronger public-private partnerships to bridge resource gaps and improve implementation. These recommendations aim to ensure equitable access to quality digital education for all students, regardless of school type.

7.0 Scope for Further Research

Future research can explore how students from diverse socio-economic backgrounds adapt to digital learning environments in both public and private schools. Particular attention should be given to the influence of home environments, internet connectivity, and parental involvement on students' digital learning experiences. Longitudinal studies can be conducted to assess the long-term impact of digital knowledge acquisition on students' academic performance and career prospects. In addition, future research could investigate the potential of emerging technologies of artificial intelligence, virtual reality, and gamification in enhancing engagement and improving learning outcomes. Comparative policy analysis across different regions or countries may also yield valuable insights into effective digital education frameworks. Such studies can help identify best practices for designing inclusive, scalable, and impactful digital learning models.

8.0 Conclusion

This study underscores the significant disparities between public and private schools in transmitting digital knowledge, particularly in the areas of technological access, teacher preparedness, and institutional support. Utilizing both ANOVA and machine learning algorithm, specifically the Random Forest model. The research reveals that educational qualification and age categories significantly influence

digital engagement, with higher educational levels correlating with increased use of digital devices, particularly smartphones. Public schools continue to face substantial challenges, including outdated infrastructure, limited access to digital tools, and insufficient teacher training, which collectively hinder the effective integration of digital education.

In contrast, private schools demonstrate relatively better preparedness and resource availability, contributing to more efficient digital knowledge delivery. The integration of machine learning provided robust validation of these findings, confirming strong associations between demographic factors and digital education practices. These insights emphasize the urgent need for targeted interventions such as digital literacy programs, mobile-based learning solutions, and public-private partnerships aimed at narrowing the digital divide. To ensure equitable and high-quality digital education across all educational settings, policymakers and educators must focus on enhancing digital infrastructure, providing continuous professional development for teachers, and promoting innovative pedagogical strategies. Future research should further investigate the role of emerging technologies, socio-economic factors, and the long-term effects of digital learning on students' competencies. Addressing these challenges is essential to prepare all students, regardless of school type for a technology-driven future.

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CHAPTER 21

Analyzing Consumer Views of AI based Dynamic Pricing and the Potential of Augmented Reality in E-Commerce

Nivetha P.*, Salma A.** and Gunavathani G.**

ABSTRACT

Background: Artificial intelligence is continuing to shape dynamic pricing making consumer trust and transparency critical factors affecting online purchasing behavior. AI-pricing models let sellers adjust prices in real-time, based on demand, competition and consumer behaviour. Research Problem: The absence of transparency with these dynamic pricing strategies along with unexplained price fluctuations has led to skepticism among consumers, raising concerns about fairness and price manipulation. Research Gap: Existing research papers predominately examine both AI and AR separately within consumer behavior studies, generating a crucial gap in understanding their combined effects upon trust and purchasing decisions. Aim: This research aims to increase consumer confidence in e-commerce by addressing this ongoing challenge of pricing transparency. Methodology: A structured questionnaire and a quantitative method were employed to gather data from 412 individuals using convenience sampling method. Statistical tools including Chi-square, Regression, and Correlation were used to examine the relationship between consumer spending behavior and their view of AI-pricing models. Result: Young consumers, familiar with AR tech, typically trust AI pricing more when AR tools offer price breakdowns. By simplifying complicated AI algorithms, these visual explanations can generally help making pricing decisions more transparent and understandable. Conclusion: The findings present the importance of creating consumer confidence in AI pricing to improve acceptance and reduce doubts across multiple demographics. By combining AR-powered transparency tools together, e-commerce platforms can reduce skepticism, foster trust overall, and create more informed shopping experience.

Keywords: Online purchasing behavior, Consumer trust, AI-pricing models, Dynamic pricing, Skepticism, E-commerce, Augmented Reality, Transparency.

1.0 Introduction

The evolution of e-commerce in recent years has significantly transformed consumer purchasing behaviors, largely driven by advancements in Artificial Intelligence (AI).

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One of the most notable applications of AI in online retail is dynamic pricing, which allows businesses to adjust prices in real-time based on demand patterns, competitor pricing, and individual consumer behavior. These fluctuations play a critical role in their decision-making process for price-sensitive consumers, as they actively seek the most cost-effective options. However, while AI-driven pricing strategies optimize revenue for businesses and enhance market efficiency, they also raise concerns regarding fairness and transparency [10]. Algorithmic pricing allows firms to implement personalized pricing strategies, maximizing rent extraction while reducing competition. This approach involves charging personalized prices to customers with high willingness to pay, leading to greater industry profits[8].

Augmented reality (AR) integrates computer-generated objects within the real environment as well as allows real-time interactions. This research examines consumer awareness and views of AI-based dynamic pricing especially in relation to trust and total transparency. When AI pricing models gain wider adoption, assessing customer emotion will be key for firms seeking to increase sustained interaction. Additionally, this study explores potential of Augmented Reality (AR) as a tool to broadly improve transparency by offering interactive price breakdowns as well as visual explanations of pricing structures. AR, when linking thorough AI and trust, might offer users more understanding and control over their purchase decisions. This research contributes to the wider discussion on ethical use of AI, providing insights into how business should develop transparent and consumer focused pricing plans that align with evolving expectations in e-commerce.

1.1 Research gap

Despite Augmented Reality's transformative capacity, the intersection of AI-pricing and AR stays unstudied in research. Existing studies mostly examine both AI's and AR's separate effects creating a gap in understanding their combined impact on consumer's confidence and buying behaviour. This paper aims to focus on how consumer perceive AI-pricing and the potential impact of AR's explanation.

1.2 Research problem

AI-driven dynamic pricing is a familiar strategy used in e-commerce to optimize revenue for businesses with real-time price fluctuations. While doing so, it raises concerns about fairness, transparency and trust. Consumers view these frequent, unexplained price fluctuations as manipulative, resulting in frustration and doubt about their purchase. The lack of trust in a product's price ultimately negatively impacts a particular e-commerce platform or brand, damaging consumer loyalty.

1.3 Objectives
- To understand consumers purchasing pattern in E-Commerce platforms.
- To identify consumer awareness and concerns regarding AI based Dynamic Pricing.

- To assess the potential of Augmented Reality in bridging the gap of transparency issues.

The main aim of this study is to boost consumer confidence with e-commerce, where pricing transparency remains as a problem. Consumers feeling informed about their purchasing decisions ultimately benefit from higher sales, increased brand loyalty, and reduced cart abandonment.

1.4 Limitations

- The inability to access e-commerce platforms and AI systems limited the practical implementation of the study.
- The small sample size limits generalizability of results.
- Due to limited time, the study focused on short-term reactions instead of long-term effects of AI pricing.

2.0 Literature Review

Mei *et al.* (2025) explored the impact of artificial intelligence (AI) on live streaming e-commerce, revealing that AI enhances consumer engagement and purchase intention, offering valuable insights for academic research and practical applications. Farlane S. Rumokoy *et al.* (2025) found that AR app performance boosts perceived product value, with consumer traits influencing the effect, offering insights for marketers.

Awais (2024) examined AI's impact on dynamic pricing strategies in competitive markets, highlighting its effectiveness in competitive industries. It cautions against overuse in markets with high customer price sensitivity and suggests future research on AI.

Chen *et al.* (2024) investigated the impact of online behavior on purchasing focal products, revealing that brand, online reviews, and consumer experience moderated the effects. The study highlighted the influence of co-visited products, low negative reviews, and limited experience on customer purchasing decisions. Ali *et al.* (2024) examined the impact of herding behavior on digital purchases using an online experiment with 541 participants. The findings showed that price and product knowledge negatively moderated the effect, while perceived uncertainty had a positive moderating effect.

Karthik (2024) proposed an AI-driven framework for transfer pricing strategies, focusing on compliance, risk management, global profit optimization, and organizational value creation, enhancing accuracy, efficiency, and business decision-making. Bune *et al.* (2024) examined the impact of AI tools on Generation Z's online shopping purchase intentions, using a technology acceptance model. Results showed exposure, use, and knowledge significantly influence PUAI and PEUAI, suggesting AI can enhance consumer experiences.

Dubus (2024) explored the impact of algorithmic pricing on market competition, highlighting how firms can target past customers with personalized prices, maximizing rent extraction and reducing competition. Guerra-Tamez *et al.* (2024) highlighted the significant impact of AI on Generation Z's consumer behaviors, revealing that exposure, attitude, and accuracy perception significantly enhance brand trust, positively influencing purchasing decisions.

Chen *et al.* (2024) investigated consumers' psychological and behavioral responses to AI-initiated pricing in two purchasing contexts and found AI pricing reduced repurchase and recommendation behaviors, influenced by ethical perceptions and enterprise control.

Choudhary *et al.* (2024) examined the impact of augmented reality (AR) technologies on consumer information processing and value perceptions in physical stores. Findings showed vividness, novelty, and interactivity significantly influencing purchase and continuance behavior.

Mameli *et al.* (2024) proposed DeepReality, a software toolkit plug-in for Unity 3D, which simplifies the integration of Deep Learning (DL) models with AR. It allows developers to create mobile applications for AR, extract visual features, and display on-screen content. Nouri-Harzvili *et al.* (2023) presented a dynamic model for determining optimal discount rates in online retail, considering inventory and customer reference prices. The results showed that timing the end of discounts effectively helps maintain inventory availability and boosts retailer profitability, while optimizing discount offers through dynamic adjustments.

Praveen *et al.* (2023) discussed how dynamic pricing, driven by AI and machine learning algorithms, is transforming industries like transportation and e-commerce by optimizing revenue and enhancing customer experiences. Despite challenges like ethical concerns and implementation costs, it is a flexible strategy that balances revenue, customer satisfaction, and ethics.

Nunan *et al.* (2022) explored the ethical challenges of algorithmically generated dynamic pricing, focusing on the role of customers as stakeholders in value generation by conceptualizing the ethical challenges and proposing a governance model for this emerging form of pricing.

3.0 Methodology

3.1 Research design

This study adopts a quantitative research approach with a descriptive and analytical research design to examine consumer purchasing patterns on digital platforms, their awareness and concerns about AI-based dynamic pricing, and AR's role in addressing transparency issues. It aims to provide empirical insights into how AI-driven pricing and AR influence consumer trust and decision-making in online retail.

3.2 Data collection

Primary data was gathered through a structured questionnaire with demographic and close-ended multiple-choice questions exploring consumer shopping habits, AI-based dynamic pricing awareness, and AR's role in transparency. Predefined response options ensured consistency. This approach facilitated ease of statistical analysis.

3.3 Sampling

The study employed a convenience sampling method with 412 participants, all familiar with online shopping. The sample included diverse demographic characteristics, such as age, gender, and shopping frequency. Participants were selected from various areas of Thanjavur, including Vallam, Nanjikottai, Pillayarpatti, Keezhavasal, Medical College, New Bus stand.

4.0 Data Analysis and Interpretation

Data was analyzed using SPSS (Statistical Package for the Social Sciences). Statistical techniques such as Chi-square, Regression, and Spearman's Correlation analysis were applied to examine relationships between key variables, focusing on shopping frequency, price transparency, and consumer trust in AI-driven pricing.

Table 1: Frequency

	Frequency	Percent
Gender		
Valid Male	220	53.4
Female	192	46.6
Age		
Valid 20-29	108	26.2
30-39	220	53.4
40-49	69	16.7
50 and above	15	3.6
Employment Status		
Valid Prefer not to say	5	1.2
Student	59	14.3
Employed	317	76.9
Part time	15	3.6
House Wife	16	3.9
Education Qualification		
Valid Others	20	4.9
Bachelor's	234	56.8
Master's	136	33.0
Professional	22	5.3

Residency		
Valid Rural	167	40.5
Semi-Urban	172	41.7
Urban	73	17.7
Marital Status		
Valid Single	150	36.4
Married	251	60.9
Prefer not to say	11	2.7
Number of members in family		
Valid 1-2	41	10.0
3-4	300	72.8
5 and above	71	17.2
Annual Income Level		
Valid Below Rs.2,00,000	49	11.9
Rs.2,00,001-Rs.3,00,000	70	17.0
Rs.3,00,001-Rs.4,00,000	106	25.7
Rs.4,00,001-Rs.5,00,000	144	35.0
Above Rs.5,00,000	43	10.4
Average Amount you would spend in online shopping annually		
Valid Below Rs.10,000	57	13.8
Rs.10,001-Rs.20,000	87	21.1
Rs.20,001-Rs.30,000	89	21.6
Rs.30,001-Rs.40,000	99	24.0
Above Rs.40,000	80	19.4

Sources: Primary Data

The above table 1 indicates the demographic analysis showing a nearly gender-balanced sample, with a slight male majority (53.4%). The largest age group is 30-39 (53.4%), and most are employed (76.9%). Education levels are moderate, with 56.8% holding a Bachelor's degree. Residency is mostly semi-urban (41.7%). A majority (60.9%) are married, and the most common family size is 3-4 members (72.8%). Income is highest in the Rs. 4,00,001-Rs. 5,00,000 range (35%). Online shopping spending is highest in the Rs. 30,001-Rs. 40,000 range (24%), reflecting diverse consumer behavior.

4.1 Hypothesis 1: Shopping frequency and their mood swings

H_0: There is no significant relationship between shopping frequency and purchase decision factors.

H_1: There is a significant relationship between shopping frequency and purchase decision factors.

The below table 2 shows that the Pearson Chi-Square value (p = .035) indicates a statistically significant relationship between shopping frequency and factors influencing purchase decisions.

Table 2.1: Shopping Frequency

		Factors influencing while decision making			
		1	**2**	**3**	**4**
Shopping Frequency	0	0	0	1	0
	1	3	8	22	18
	2	17	26	74	35
	3	11	15	113	69
Total		31	49	210	122

Table 2.2: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	18.057[a]	9	.035
Likelihood Ratio	18.569	9	.029
Linear-by-Linear Association	3.879	1	.049
N of Valid Cases	412		

Sources: Primary Data

4.2 Hypothesis 2: Trust level when clear pricing explanations are given

H_0: There is no significant relationship between consumer belief in price transparency and their willingness to spend more on AI-priced products.

H_1: There is a significant relationship between consumer belief in price transparency and their willingness to spend more on AI-priced products.

Table 3.1: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.520	1	3.520	7.997	.005[b]
	Residual	180.449	410	.440		
	Total	183.968	411			

Table 3.2: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.905	.092		31.597	.000
	Clear pricing explanations enhance trust	.081	.029	.138	2.828	.005

Sources: Primary Data

The results from Table 3.2 show a significant relationship (p = .005) between consumer belief in price transparency and willingness to spend more on AI-priced products. The coefficient analysis (β = .138, p = .005) highlights that clear pricing explanations enhance consumer trust, encouraging higher spending.

4.3 Hypothesis 3

H_0: There is no significant relationship between AI pricing transparency through Augmented Reality and consumer trust in AI-driven pricing.

H_1: There is a significant relationship between AI pricing transparency through Augmented Reality and consumer trust in AI-driven pricing.

Table 4: Correlations

			Trusting AI to set fair prices for products	Confidence if Augmented Reality (AR) provided price breakdown
Spearman's rho	Trusting AI to set fair prices for products	Correlation Coefficient	1.000	.143**
		Sig. (2-tailed)	.	.004
		N	412	412
	Confidence if Augmented Reality (AR) provided price breakdown	Correlation Coefficient	.143**	1.000
		Sig. (2-tailed)	.004	.
		N	412	412

Sources: Primary Data

From the above table 4, the correlation analysis shows a significant positive relationship (r=0.143, p=0.004) between trust in AI pricing and confidence in AI pricing with AR-based price breakdowns. While the correlation is moderate, it indicates that AR can play a role in improving consumer confidence in AI-driven pricing.

4.4 Hypothesis 4

H_0: There is no significant relationship between consumer trust in AI pricing and their comfort level with an algorithm setting prices.

H_1: There is a significant relationship between consumer trust in AI pricing and their comfort level with an algorithm setting prices.

Table 5.1: Trust in AI to Set Fair Prices for Products

		Comfort level knowing that an algorithm decides the price you pay				Total
		1	2	3	4	
Trust in AI to set fair prices for products	1	4	10	10	4	28
	2	5	28	46	19	98
	3	3	20	83	62	168
	4	3	15	33	67	118
Total		15	73	172	152	412

The below table 5.2 shows that the Pearson Chi-Square test ($\chi^2 = 61.047$, p < 0.001), Likelihood Ratio ($\chi^2 = 57.737$, p < 0.001) indicates a significant association between trust in AI pricing and comfort with algorithmic price setting.

Table 5.2: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	61.047[a]	9	.000
Likelihood Ratio	57.737	9	.000
Linear-by-Linear Association	42.889	1	.000
N of Valid Cases	412		

Sources: Primary Data

5.0 Findings

- The sample consists of a nearly balanced gender distribution, with a slight male majority (53.4%). The largest age group (53.4%) falls within 30-39 years, representing a middle-aged demographic.
- Most respondents (76.9%) are employed, indicating financial stability. Over half (56.8%) hold a Bachelor's degree, followed by 33% with a Master's degree, showing a moderately educated sample.
- Residency is mostly semi-urban (41.7%). Marital status indicates that 60.9% are married, and the majority (72.8%) live in medium-sized households (3-4 members), suggesting standard family structures.
- Annual income distribution shows that most participants belong to the higher middle-income range, with 35% earning Rs. 4,00,001-Rs. 5,00,000. Online shopping spending is highest in the Rs. 30,001-Rs. 40,000 range (24%), indicating varied consumer spending behaviors.
- The chi-square test (p = 0.035) confirms a significant relationship between shopping frequency and factors influencing purchase decisions.
- Consumers who shop more frequently prioritize different decision factors compared to less frequent shoppers. Preferences for price, brand reputation, and discounts vary across shopping frequency levels, shaping purchase behaviors.
- Regression analysis (p = 0.005) confirms a significant relationship between consumer belief in price transparency and their willingness to spend more on AI-priced products.
- Consumers are more likely to accept AI-driven pricing if online platforms provide clear explanations of price calculations. Higher perceived transparency leads to greater trust and willingness to engage in AI-priced purchases.
- Correlation analysis (r = 0.143, p = 0.004) shows a weak but significant positive relationship between AI pricing transparency via AR and consumer trust in AI-driven pricing.
- While AI-driven pricing raises concerns, transparency significantly impacts consumer acceptance. The integration of AR in pricing can enhance transparency and trust.

- Chi-square test results ($\chi^2 = 61.047$, $p < 0.001$) confirm a significant association between consumer trust in AI pricing and their comfort level with an algorithm setting prices. Higher trust levels correspond to increased comfort with algorithmic price setting, while lower trust levels are associated with discomfort.
- This finding highlights the importance of building consumer trust in AI-driven pricing models to enhance acceptance and reduce skepticism.

6.0 Suggestions

- Implementing AR for pricing transparency allows consumers to visualize detailed price breakdowns interactively, making AI-driven pricing structures easier to understand.
- AI-generated personalized price reports can provide insights into past pricing decisions, fostering trust.
- Educating consumers about AI-driven pricing through interactive tutorials, chatbot assistance, and AR-based explanations can build confidence.
- A hybrid AI-human pricing system allows human oversight for adjustments when necessary.
- Subscription-based pricing models offer stable AI-set prices, reducing unpredictability for consumers.
- Incorporating gamification into pricing transparency can increase engagement by rewarding interactions with AI pricing tools, such as AR breakdowns, with discounts or exclusive perks.

7.0 Further scope

- Future research should expand the sample size to improve the generalizability of findings, ensuring a broader range of demographics is included. A more diverse sample would provide valuable insights into how different consumer groups perceive and respond to AI pricing systems.
- Future studies should explore the effectiveness of educational tools designed to help consumers understand AI pricing mechanisms and their role in promoting sustainability.
- Conducting long-term studies is essential for tracking how AI-driven pricing models influence consumer trust and behavior over time.
- Testing the integration of Augmented Reality (AR) with AI pricing systems in real-world settings is necessary to assess their combined impact on consumer behavior and overall effectiveness.
- Further research should examine whether companies and brands are willing to disclose extensive information about their products within AI pricing systems.

8.0 Conclusion

This research highlights the importance of transparency in AI-driven dynamic pricing and the potential of Augmented Reality (AR) to enhance consumer trust in e-commerce. While AI-based pricing optimizes revenue, lack of clarity can lead to skepticism, affecting purchasing decisions and brand loyalty. Consumers worry about fairness and price manipulation. Integrating AR allows businesses to provide an interactive, visual breakdown of pricing structures, fostering trust. The study emphasizes balancing technological advancements with ethical pricing to create a consumer-friendly marketplace. As AI evolves, transparency through tools like AR will be crucial for consumer engagement. Future research should examine real-world AR-driven pricing models to validate their effectiveness, reinforcing the need for fairness and transparency in AI pricing.

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CHAPTER 22

Revolving Attitudes: Exploring Masculine Preference for Unique Nikes

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ABSTRACT

Motorcycles have long been connected with masculinity, personal identity, and lifestyle preferences, which influence buying decisions and brand loyalty. This study investigates male employees attitudes regarding distinctive and customized bikes, with an emphasis on the elements that influence their preferences. A descriptive research strategy was used to obtain data from 199 employees with a random sampling. Several statistical approaches, including Chi-Square and Regression, were used to investigate the association between design, performance, brand perception, emotional connection, and masculine identity in motorcycle choices. The study objectives are to determine the essential qualities affecting masculine preferences for unique bikes, to investigate the significance of brand identification, aesthetics, and performance in purchasing decisions, and to understand the psychological and social aspects that influence motorcycle preferences. As motorcycle ownership trends shift, there is an increasing demand for bikes that embody uniqueness and machismo. The issue statement emphasizes these altering views and looks into how brand loyalty, customization possibilities, and peer influence effect customer preferences. The findings show a strong link between masculine identity and a preference for unique motorcycles, with strength, exclusivity, and customization appearing as important factors in buying decisions. Furthermore, the use of Chi-Square and Regresssion testing demonstrates that design preferences and brand perception differ significantly across demographic and professional categories. According to these findings, producers and marketers should prioritize exclusivity, performance, and customization to better appeal to this population. These findings offer useful recommendations for the motorbike industry marketing strategy and product development, assuring alignment with changing consumer expectations.

Keywords: Masculinity, Unique bikes, Motorcycle customization, Individuality, Self-expression.

1.0 Introduction

Motorcycles have always been more than just vehicles; they are symbols of freedom, adventure, and individuality.

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Riding a motorcycle is not just a way for many men to get from one place to another, but also a way for them to express their individuality and style. Among male riders, there is a discernible preference for bikes that are particular or customized; these bikes, which are distinguished by their unique designs, colors, or modifications, are appealing because they stand out because they represent more than just transportation. Motorcycles and masculinity have a long history together. Motorcycles have historically been connected to traits that are frequently associated with conventional masculine ideals, such as strength, rebellion, and independence. From vintage movies with rugged, leather-clad bikers to actual motorcycle gangs, bikes have come to symbolize a fearless and adventurous way of life. Whether they are classic café racers or specially designed choppers, unique bikes provide riders the opportunity to stand out and show off their individuality, which further enhances this image. Unique motorcycles provide men a sense of exclusivity and individuality in contrast to mass-produced bikes, which might come across as routine or predictable.

A unique motorcycle is also a means of self-expression for many men. Through particular alterations, such handmade pieces, customized paint jobs, or modified exhausts, they can display their uniqueness. These changes set the bike apart from the typical models on the road and give it a unique personality. A sense of pride and a personal bond between the rider and the machine are fostered by this individuality. Additionally, modifying a bike can be an artistic and practical experience that appeals to the technical know-how, ability, and craftsmanship that are male characteristics. Riding a distinctive bike can be a way to express emotions in addition to being aesthetically pleasing. Emotions of power and independence are evoked by the sound of the engine, the excitement of the open road, and the sense of freedom. The bike's unique appearance and this emotional experience enhance the enjoyment of the ride. In general, guys like unusual bikes for reasons other than just choosing a car. Their quest for independence, self-expression, and a reprieve from conformity is reflected in it. Custom motorcycles, rare models, or daring alterations are just a few examples of how men can express their individuality and embrace a lifestyle that values originality by riding unique bikes.

2.0 Review of Literature

Lai & Aritejo (2013) this study explores the personal and social factors influencing Indonesian adolescents' intention to customize their motorcycles. Using an expanded version of the Theory of Planned Behavior, it incorporates the personality trait of need for uniqueness and individual resources. Data from 590 senior high school students revealed that personal attitudes and social support from peers and parents significantly impact their intention to customize. Additionally, the desire for uniqueness and knowledge of customization also play a direct and indirect role in shaping their intentions. Lizana *et al*. (2021) this study examines the factors influencing bicycle mode choice in developing countries, focusing on the role of pro-

bicycle attitudes and habits, as well as the impact of socioeconomic factors, bicycle facilities, and bicycling experience. An online survey was conducted at two Chilean universities, using an integrated choice and latent variable model. The findings reveal that attitudes significantly explain bicycle choice, while infrastructure only influences it indirectly through attitude. Socioeconomic characteristics, familiarity with bicycling, and practical issues directly affect bicycle choice and indirectly shape attitudes. Additionally, the inclusion of habit reduces the influence of attitude on bicycle choice, suggesting that habit and attitude interact and reinforce each other.

Ferrero-Regis (2018) this article explores a modern form of dandyism in Brisbane, Australia, where male cyclists carefully match their outfits with their bikes, reflecting a blend of sport, leisure, and masculinity. The popularity of Lycra® outfits for cyclists, which emerged in the mid-2000s, represents a global trend merging fitness with fashion. The study argues that this phenomenon is a contemporary version of Regency-era dandyism, infused with elements of fashion history, sport, and modern masculine identity. The research includes analysis of cycling clothing websites, event observations, and surveys from cycling shops.

Sung *et al.* (2016) this article explores a modern form of dandyism in Brisbane, Australia, where male cyclists carefully match their outfits with their bikes, reflecting a blend of sport, leisure, and masculinity. The popularity of Lycra® outfits for cyclists, which emerged in the mid-2000s, represents a global trend merging fitness with fashion. The study argues that this phenomenon is a contemporary version of Regency-era dandyism, infused with elements of fashion history, sport, and modern masculine identity. The research includes analysis of cycling clothing websites, event observations, and surveys from cycling shops.

3.0 Research Gap

The market for customized bikes is growing, but there is a lack of academic research on the psychological and sociocultural factors influencing masculine preferences. Current studies mainly focus on general consumer behavior and luxury items, neglecting the emotional connections men have with customized bikes. Additionally, there is a lack of qualitative insight into how masculinity, identity, and lifestyle influence bike preferences.

3.1 Research problem

Few scholarly studies examine the psychological and sociological elements influencing men's preferences for customized and distinctive bikes, despite the market for these vehicles expanding. The gendered subtleties and emotional bonds that men have with customized bikes are not well captured by the majority of current research, which focuses on the allure of luxury goods or general customer behavior in the automotive sector. In this specialized market, little research has been done on post-purchase happiness and brand loyalty, and little qualitative knowledge has been gathered about how masculinity, identity, and lifestyle affect bike preferences**.**

3.2 AIM

The aim of the study is link between masculinity and bike preference, examining how self-image, individuality, and social influence purchasing decisions, emotional and symbolic meanings, and brand loyalty.

4.0 Objective

- To analyse the factors influencing masculine preference for unique bikes.
- To assess the impact of marketing and advertising strategies on masculine consumer behaviour in the bicycle industry.
- To identify emerging trends in bike customization and their appeal to male consumers.

5.0 Research Methodology

This study adopts descriptive research design. A detailed survey is conducted through questionnaire method. The research will be presented with only primary data. Purposive random sampling method. The Number of the respondents are 199 Male in Thanjavur district.

6.0 Data Analysis and Intrepretation

The collected data will be analysed using statistical techniques such as Chi-Square Tests, Regression models are used.

Table 1: Chi-square Test

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	17.130[a]	4	.002
Likelihood Ratio	13.751	4	.008
Linear-by-Linear Association	16.643	1	<.001
N of Valid Cases	199		

The analysis shows that chi-square value is 17.130 and P value is.002 value is which is less than 0.05. So, null hypothesis is accepted and alternative hypothesis is rejected. Hence it is inferred that, there is a significant association between Age and how often do you ride a bike. From the below table it shows Regression analysis is calculated by using SPSS. The model summary table analysis shows the value in the R^2 = .013[a] and Durbin Watson = 1.820. The ANOVA table shows that the value of df = 1, F value = 2.600 and P - value = .108[b]. The calculated value .108[b] is greater than 0.05 value, the alternative hypothesis is rejected, the null hypothesis is accepted. Hence it is inferred that there is a no significant association between Designation and willing to pay a premium for a unique customized bike.

Table 2: Regression

Model Summary						
Model	Change Statistics					Durbin-Watson
	R Square Change	F Change	df1	df2	Sig. F Change	
1	.013[a]	2.600	1	197	.108	1.820
a. Predictors: (Constant), Designation						
b. Dependent Variable: willing to pay a premium for a unique customized bike						
Anova						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.274	1	1.274	2.600	.108[b]
	Residual	96.495	197	.490		
	Total	97.769	198			
a. Dependent Variable: willing to pay a premium for a unique customized bike						
Predictors: (Constant), Designation						

7.0 Findings

The study used Chi-Square Tests and Regression Models to analyze the relationship between age and bike riding frequency. The results showed a significant association between age and bike riding frequency, rejecting the null hypothesis and accepting the alternative hypothesis. The regression analysis showed a weak predictive relationship between designation and willingness to pay a premium for a unique customized bike. The ANOVA results showed an F-statistic of 2.600 and a p-value of 0.108, confirming the null hypothesis. The findings suggest that age significantly influences bike-riding frequency, but designation does not significantly impact the willingness to pay extra for a customized bike. Thus, age significantly influences bike-riding frequency, but designation does not have a significant impact.

8.0 Suggestion

- Manufacturers of bicycles ought to highlight branding techniques and customisation choices that complement masculine self-expression.
- The Emotional storytelling could be used in marketing campaigns to emphasize how the bike is a reflection of the rider.
- Through community-driven campaigns, cooperation with bike clubs and social media influencers could increase the allure of customized bikes.

9.0 Scope of Further Research

Future studies on men's preference for distinctive motorcycles might compare regional patterns and examine how cultural variations affect this choice. Research could also look at how influencer marketing and social media affect men's

decisions to purchase unusual or customized motorcycles. Researchers could also look into how bike preferences are influenced by lifestyle, age, and wealth. Deeper understanding might be gained by investigating the psychological factors that underlie this choice, such as status signaling or self-expression. Studies with a longitudinal design could monitor shifts in the preferences for manly bikes over time. Lastly, studying how advances in electric bikes and sustainability affect masculine choices may provide useful information for the sector.

10.0 Conclusion

The study reveals that masculine identity significantly influences motorcycle preferences, with elements like uniqueness, power, and personalization impacting decisions. Age is a key factor in bike riding frequency, and professional title doesn't affect willingness to pay more for customized bikes. The study emphasizes the importance of personalization, branding, and emotional connection in motorcycle industry marketing. To appeal to this customer group, producers should use community-driven promotions, social media participation, and narrative. Future studies could explore cultural variations, social media, and sustainability trends in shaping men's motorbike preferences.

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CHAPTER 23

Exploring Psychological and Practical Barriers to Stock Market Participation: Strategies for Greater Involvement

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ABSTRACT

Background: The stock market plays a key role in wealth creation and long-term financial growth. However, individual participation remains low, as reflected in BSE statistics for 2024. Psychological barriers and practical challenges contribute to this reluctance. Aim: This study aims to identify solutions to increase stock market participation, improve financial literacy, and enhance financial outcomes for individuals through stock market investments. Objectives: The study seeks to explore psychological factors deterring investment, examine practical barriers, and suggest strategies to encourage greater participation. Methods: A sample of 384 participants was selected through simple random sampling. Primary data was collected via a self-administered questionnaire with closed-ended questions. Findings: The study found that many individuals view the stock market as risky, complex, and overwhelming, which leads to a preference for fixed deposits. The belief that expertise is required, and financial constraints further discourage participation. Result: A significant correlation was identified between the belief that the stock market is for experts and feelings of being overwhelmed. Lack of funds and the complexity of mobile apps influenced a preference for automated platforms and reduced confidence in assessing risks. Conclusion: Psychological and practical barriers hinder stock market participation. Addressing these through simplified risk assessment, user-friendly platforms, and financial education can boost participation. Leveraging AI for personalized strategies can further enhance informed decision-making and financial inclusion.

Keywords: Stock market participation, Psychological barriers, Practical challenges, Greater participation.

1.0 Introduction

The stock market plays a crucial role in economic growth and financial stability by enabling capital formation, fostering business expansion, and offering individuals opportunities for wealth creation.

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Stocks help individuals build wealth through capital appreciation and dividends while also serving as a hedge against inflation, ensuring long-term financial security. Additionally, investing in stocks provides opportunities for passive income and financial independence. Despite these benefits, stock market participation in India remains relatively low. As of October 2024, only 5.95% of Tamil Nadu's population is registered as investors, highlighting a significant gap in market involvement. This statistic indicates that many individuals are not engaged in the stock market, making it essential to study the factors that prevent their participation. This study focuses on the Southeastern region of India, analyzing 384 individuals to examine the psychological and practical barriers that discourage stock market participation. A significant barrier is the lack of financial literacy, which affects individuals' confidence in making investment decisions.

Additionally, many potential investors face financial constraints that limit their ability to invest in the stock market (Lama *et al.*, 2024; Singh *et al.*, 2024). A strong aversion to risk further discourages investment, as individuals fear losses despite the potential for higher returns (Sivaramakrishnan *et al.*, 2017). Other psychological factors include the perception that the stock market is only for those with financial expertise, the belief that people can lose a lot of money quickly, the notion that the market is complex and unpredictable, and a preference for fixed deposits due to risk aversion.

Practical barriers include a lack of funds, excessive information, complex mobile investment platforms, and a general lack of understanding of the stock market. These factors prevent individuals from investing, ultimately affecting long-term wealth accumulation and economic growth. To overcome these challenges, strategies such as incorporating financial education in schools, universities, and workplaces, simplifying investment processes, and increasing transparency in risk assessment are essential. Automated investing platforms can provide an efficient approach to managing investments, while mentorship programs, hands-on workshops, and investment simulations can help build confidence among potential investors. Addressing both psychological and practical barriers can promote financial inclusion, encourage broader stock market participation, and contribute to long-term economic growth and individual financial security.

1.1 Research gap

Existing research typically examines either behavioural factors, such as fear and risk aversion, or structural barriers, like financial accessibility, without considering their combined effect. Moreover, some studies are limited to specific regions, restricting their broader applicability. This study bridges the gap by offering an analysis of both psychological and practical constraints and exploring the possible implications of increasing stock market participation in the Southeastern region of India.

1.2 Problem statement

ALThough the stock market offers opportunities for income generation and long-term financial growth, individual participation remains low, according to BSE statistics for 2024. Psychological factors and practical barriers are key reasons for this lack of participation.

1.3 AIM

The study aims to increase participation and promote broader access to the stock market by exploring the psychological and practical barriers faced by individuals and providing practical implications.

1.4 Objectives

- To identify psychological factors that prevent individuals from investing in the stock market.
- To examine practical barriers to stock market participation.
- To suggest practical implications for encouraging more participation in the stock market.

2.0 Research Methodology

This study employs a descriptive research design to explore psychological factors and practical barriers to stock market participation. A sample of 384 participants is selected using simple random sampling. Primary data is collected through a self-administered questionnaire, which includes closed-ended questions to ensure structured responses and reliable analysis.

2.1 Sampling method and sample size

A simple random sampling method will be used to select a sample of 384 individuals who do not participate in the stock market in Thanjavur local areas like Srinivasa Puram, Medical College, old bus stand, Nanjikottai road.

2.2 Statistical tools

The overall understanding of primary data is enhanced through data analysis and interpretation. The data has been checked, verified, and edited to ensure accuracy. SPSS and PSPP are used as analytical tools for this research study. The tests conducted include a Chi-Square, Independent T-test, and Correlation to analyze the variables. Additionally, the Kolmogorov-Smirnov test is used to determine whether the data is normally distributed.

2.3 Limitations

- Time is one of the major constraints.
- This study focuses only on the Thanjavur region and does not apply to other regions.

3.0 Review of Literature

The study uses a panel estimation framework to explore how business and consumer sentiment influence stock prices in developed and emerging markets. It analyses short- and long-term effects, revealing differences in sentiment-driven stock movements across economies. (Ahmed, 2020)

The study examines how behavioral finance factors influence investment decisions in the Saudi equity market through risk perception and financial literacy. The findings highlight the significant impact of biases like herding and overconfidence on financial decision-making. (Almansour *et al.*, 2024)

The study presents an asset pricing model with limited participation and income-based heterogeneity, replicating the equity premium and consumption inequality. It also predicts stock market participation costs and their decline from 1980 to 2004. (Czellar *et al.*, 2017)

The study explores financial literacy among Kathmandu students, revealing moderate stock market awareness but low participation due to financial constraints and risk perception. It highlights the need for early financial education to enhance investment engagement in Nepal. (Lama *et al.*, 2024)

Women's lower financial literacy compared to men is partly due to confidence rather than just knowledge. Research finds that confidence accounts for about 30% of this gap, influencing both financial literacy and stock market participation. (Koenen *et al.*, 2024)

The study uses Chinese panel data to empirically test prospect theory, finding that relative income losses drive risk-taking in stock investments, while relative gains increase risk aversion. It also highlights participation costs as a key barrier for low-income individuals in stock market participation. (Liu *et al.*, 2022)

The study reveals that financial literacy enhances young adults' investment decisions, promoting smarter choices and diversified portfolios. Yet, challenges such as limited education and cognitive biases often obstruct effective financial management. (Malaiya, 2025)

The study explores stock market participation among Malaysian university students, finding that financial literacy, herding behavior, risk tolerance, and social interaction positively influence investment intention. (Manaf *et al.*, 2024)

The study examines how financial literacy and risk tolerance influence investor behavior, with social stigma as a mediator and emotional intelligence as a moderator. It highlights the importance of emotional intelligence in financial education to reshape decision-making and reduce stigma. (Sharma, 2024) The study highlights low financial literacy as a key barrier to stock market participation among Scheduled Tribes in Himachal Pradesh. It emphasizes the need for targeted interventions to improve financial awareness and inclusion. (Singh *et al.*, 2024)

The study examines how behavioral economics influences stock market decisions, focusing on biases like overconfidence, loss aversion, and herd behavior.

Understanding these biases can help investors adopt more rational investment strategies and improve long-term returns. (Tian, 2024)

This study explores homeowners' higher stock market participation compared to renters using a life-cycle portfolio choice model. It replicates key patterns, including the U-shaped participation trend among renters and the crowding-out effect limiting homeowners' investment in stocks. (Vestman, 2018)

The study examines the impact of financial literacy, overconfidence, risk tolerance, and gender on Generation Z investment decisions in Bandung. Findings highlight the significant role of financial knowledge and risk perception in shaping investment behavior. (Wahyu *et al.*, 2024)

4.0 Data Analysis and Interpretation

H_0: Perceiving stock market investment as a big risk without guaranteed returns does not influence the belief that fixed deposits are safer than stock market investments
H_1: Perceiving stock market investment as a big risk without guaranteed returns influences the belief that fixed deposits are safer than stock market investments.

Table 1: Relationship between Perceived Stock Market Risk and the Belief in Fixed Deposits as a Safer Investment

		Fixed Deposit				
		Disagree	Neutral	Agree	Strongly Agree	Total
Big risk	Disagree	74	4	11	0	89
	Neutral	11	11	13	6	41
	Agree	7	11	95	36	149
	Strongly Agree	2	3	57	43	105
	Total	94	29	176	85	384

	Value	Df	Asymptotic Sig.(2-tailed)
Pearson Chi-Square	268.69	9	.000
Likelihood Ratio	264.92	9	.000
Linear-by-Linear Association	197.73	1	.000
No of Valid Cases	384		

Source: Primary data

Inference: The Chi-Square test results (p-value = 0.000) indicate a significant association between the perception of the stock market as a "big risk" and the preference for fixed deposits. Since the p-value is less than 0.05, we reject the null hypothesis, confirming that people who see the stock market as risky are more likely to prefer fixed deposits.

H_0: There is no significant relationship between the belief that the stock market is for experts and feeling overwhelmed by stock market information.
H_1: There is a significant relationship between the belief that the stock market is for experts and feeling overwhelmed by stock market information.

Table 2: Relationship between the Belief that the Stock Market Is for Experts and Feeling Overwhelmed by Stock Market Information

Correlation			
		Expertise	**Overwhelmed**
Expertise	Pearson correlation	1.000	.654
	Sig.(2 tailed)		.000
	N	384	384
Overwhelmed	Pearson correlation	.654	1.000
	Sig.(2 tailed)	1.000	
	N	384	384

Source: Primary data

Inference: The Pearson correlation (r = 0.654) shows a moderate to strong positive relationship between the belief that the stock market is for experts and feeling overwhelmed by stock market information. The p-value (0.000) is significant, leading to the rejection of the null hypothesis (H_0).

H_0: The perception of stock market complexity does not influence confidence in assessing the risks of individual stocks through more transparent and simple ways.

H_1: The perception of stock market complexity influences confidence in assessing the risks of individual stocks through more transparent and simple ways.

Table 3: Relationship between Perceived Stock Market Complexity and Confidence in Risk Assessment of Individual Stock

		Leven's test for equity of variances for equity of Mean							T-test	
									95% of the confidence interval the difference	
		F	Sig.	t	df	Sig. 2 tailed	Mean difference	St. Error difference	Lower	Upper
Transparent	Equal variances assumed	.86	.353	2.66	247.0	.008	.25	.10	.07	.44
	Equal variances of assumed			2.80	232.2	.006	.25	.09	.07	.43

Source: Primary data

Inference: The p-value (0.008 and 0.006) is less than 0.05, leading to the rejection of the null hypothesis (H_0), indicating a significant relationship. This suggests that the perception of stock market complexity influences confidence in assessing risks through more transparent and simple ways.

H_0: The challenge of a lack of funds does not influence the perception of automated investing platforms as an efficient approach to managing investments.

H₁: The challenge of a lack of funds influences the perception of automated investing platforms as an efficient approach to managing investments.

Table 4: Relationship between Financial Constraints and the Perceived Efficiency of Automated Investing Platforms

COUNT		Automated				
		Disagree	**Neutral**	**Agree**	**StronglyAgree**	**Total**
Lack of fund	Disagree	89	4	9	4	99
	Neutral	3	4	23	6	36
	Agree	7	13	86	53	159
	Strongly Agree	0	2	39	49	90
	Total	92	23	157	112	384

	Value	**Df**	**Asymptotic Sig.(2-tailed)**
Pearson Chi-Square	279.49	9	.000
Likelihood Ratio	278.23	9	.000
Linear-by-Linear Association	201.24	1	.000
No of Valid Cases	384		

Source: Primary data

Inference: The p-value (0.000) is less than 0.05, leading to rejecting the null hypothesis (H₀). This indicates a significant relationship between the lack of funds and the perception of automated investing platforms as an efficient approach to managing investments.

H₀: The complexity of mobile application interfaces does not affect people's comfort level in investing in the stock market

H₁: The complexity of mobile application interfaces affects people's comfort level in investing in the stock market.

Table 5: Relationship between the Complexity of Mobile Application Interfaces does not Affect People's Comfort Level in Investing in the Stock Market

Correlation			
		Expertise	**Overwhelmed**
Complexity	Pearson correlation	1.000	.685
	Sig. (2tailed)		.000
	N	384	384
User-friendly	Pearson correlation	.685	1.000
	Sig. (2tailed)	1.000	
	N	384	384

Source: Primary data

Inference: A significant positive correlation (r = 0.685, p = 0.000) between complexity and expertise suggests higher complexity leads to feeling overwhelmed. This supports H₁, indicating complexity affects comfort in stock market investment.

5.0 Findings

- The majority of people view stock market investments as risky, which impacts their preference for fixed deposits.
- They believe that the stock market is for financial experts and experienced investors.
- Thesignificanceofpeoplefeelingoverwhelmedbystockmarketinformation.
- They had a perception that stock market complexity influences confidence in assessing risks through transparent and simple methods.
- The challenge of lacking funds influences the perception of automated investing platforms as an efficient approach.
- The complexity of mobile application interfaces and expertise suggests that higher complexity leads to feeling overwhelmed.

6.0 Suggestion

This study highlights psychological factors such as the belief that only financial experts can succeed, the fear of losing money quickly, and the perception that the stock market is complex and unpredictable, along with a preference for fixed deposits. Practical barriers like the complexity of mobile applications, lack of funds, and information overload contribute to low stock market participation. To boost participation, it is recommended to implement transparent and simple risk assessment methods, promote automated investing platforms, and design user-friendly mobile interfaces. Additionally, increasing online webinars and enhancing financial education in schools, universities, and financial institutions can help address these challenges.

7.0 Further Research Scope

AI improves stock market predictions by analyzing vast datasets to identify trends and forecast prices accurately. It aids in risk assessment, portfolio optimization, and developing personalized investment strategies. AI can enhance decision-making for both short-term traders and long-term investors. However, due to market volatility, AI should be viewed as a tool to assist human judgment rather than a definitive solution.

8.0 Conclusion

Psychological and practical barriers significantly hinder stock market participation, with risk aversion, lack of financial literacy, and complex investment platforms being key factors. Addressing these barriers through transparent risk

assessment, user-friendly interfaces, and enhanced financial education can encourage broader participation. Leveraging AI for personalized investment strategies may further support informed decision-making. Overcoming these challenges will foster greater financial inclusion and contribute to economic growth.

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CHAPTER 24

Streamlined Event Management and Smart Shopping using HTML

Prabhu S.*, S. Durai Govindarajan** and S. Mohamed Arsath**

ABSTRACT

Background: The study is made on event management and smart shopping using HTML. This web site is using to obtained a process on web browser on manager of system. The system is allowed to register on data of providers in the online booking of statistics allowed in the data of client process to booking. Objectives: 1. To design a booking system for customers to schedule a date and time for event functions. 2. Design a product Availability system Showing the available items and supplies 3. To Booking on customer G-Mail id to Booking on Online Booking 4. Process of payments to clients to book appointments online. 5. To customer point of selecting and Buying products and place customized ordering process. Methods: In a software using server of logged to manage the processing given orders will be placement date of booking on online transaction of the data will be receiver to customer and event management to placement on required event management to smart shopping using basic functions will be been booking. Result: Using HTML Software of creating Birthday party, Marriage, wedding anniversary, etc. This process will requirement web page booking on your g-mail id to login and given your details of the process to set your memorable and successful experience for attendees. Conclusion: We describe the proposed system and explain the features implemented by our proposed system. They have web page will booking on your events at now present updated generation of society.

Keywords: Event Management, Smart Shopping, HTML Software, Booking System.

I.0 Introduction

Event management is the process of planning an events of services.it involves a present to booking and identifying a selected to budget and cost cutting of customer satisfaction on the software to prepare software to booking on the works on the events to management on system software on using easily book your web browser on a process to function on given preparation to your ecofriendly software on management easily understand and book your list in the event types of function in the basics on proper update to your carried to packages and provide a offers and discount to regular customer of same g-mail id login person to a events.

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This project involves events of opportunity on basics of web-based management on social events of common progress will more updated to survey improvement of data to calculation on the present to secured server of customer details and quick responses of customer and e-communication about the details to corporate companies web-development of the events management on due date fixing time and location to customer of the management on the variables to essential port to events booking data are Eg :name, Gmail id, contact number, address , event date, event conducting timing, buy decoration items, Duignan, (2022). booking model of previous decoration events, cost of events etc. after booking events get an return Gmail for confirmation to customer.

2.0 Project Objective

- To Design a Booking of customer to fixing a date and for Events Function.
- Design a product Availability system Showing the available items and supplies
- To Booking on customer G-Mail id to Booking on Online Booking.
- Process of payments to clients to book appointments online.
- To customer point of selecting and Buying products and place customized ordering process.

3.0 Proposed Work

This web-based web page system can be implemented in surprise proposal, wedding anniversary booking events. The system can also be used as software the entire booking live location. This system is effective and saves time and cost of the user.

3.1 Modules description

Admin Login: Admin view update booking record, verify email and massages, receipt mail. If any issues will see admin will be identified easily solve problems, they sort the problems of customer and workers.

Registration: events booking data are name, Gmail id, contact number, address, event date, event conducting timing, buy decoration items, booking model of previous decoration events, cost of events.

Customer: The customer will rise a complain and issues of booking, Duignan (2022). Contact an events admin number or mail to admin of the booking. They will customize the event products of the variable cost and product have several ways of costing

Payment Methods [Booking Payments]

- Online Payments
- Paytm /G-pay
- Cash on Delivery
- Bank Transactions

Price points are:
*Low
*Medium
*High

Figure 1: Class Diagram
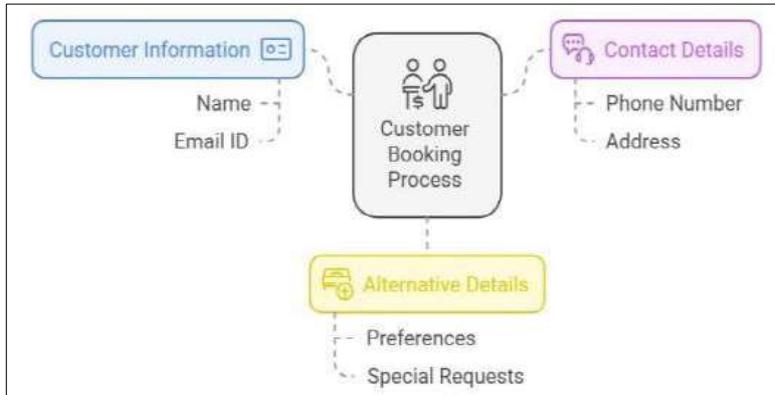
Figure 2: Data Flow Diagram
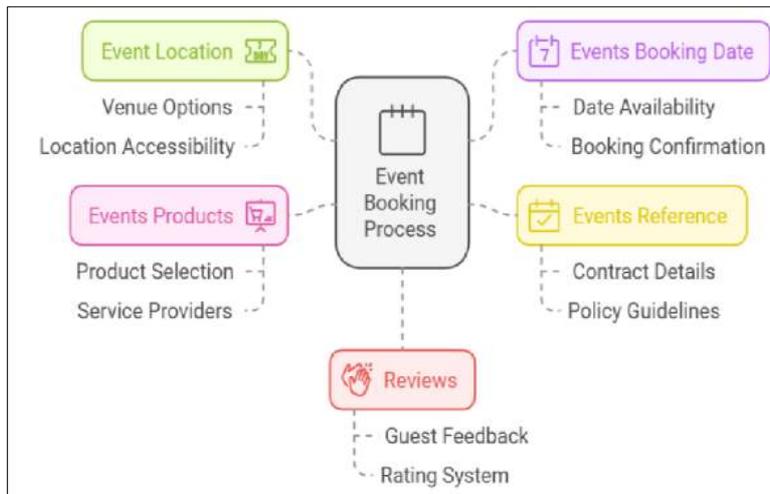
4.0 Advantages

- Eco friendly using to booking process.
- Easily identify booking progress in old peoples.
- To easy way to booking online.
- Save your time for booking process in this web page.
- To view previous events for your refences.

Table 1: Literature Survey

WEBSITE	REVIEWS
www.eventpro.net	system of booking progress
www.Nunify.com	Registration Attendance
www.eventbooking.com	Ticketing system to allowed

Syntax for Html Coding

```html
<html>
<head>
        <title>program 13</title>
</head>
<body>
    <label
    <form> for="fname">First name:</label><br> <input type="text" id="fname"
    name="fname"><br>
    <label for="lname">Last name:</label><br>
    <input type="text" id="lname" name="lname"> <p>Choose your favorite Web
    language:</p> <input type="radio" id="html"       name="fav_language"
    value="HTML">
    <label for="html">HTML</label><br>       <input      type="radio"      id="css"
    name="fav_language" value="CSS">
    <label for="css">CSS</label><br>
    <input type="radio" id="javascript" name="fav_language" value="JavaScript">
    <label for="javascript">JavaScript</label>
    <br/><br/>
    <input type="checkbox" id="vehicle1" name="vehicle1" value="Bike">
    <label for="vehicle1"> I have a bike</label><br> <input type="checkbox"
    id="vehicle2" name="vehicle2"
    <br/>
    <br/>
    <br/>
    <input type="submit" value="Submit">
    </form>
</html>
</body>
```

5.0 Application

- The events are used to birthday party and wedding parties.
- For organizing social events., etc.
- For creation and development on customer customized products.

- Event planning and activities which include budgeting, for the customer a detail proper identification to login process of place and booking to customer,

6.0 Review of Literature

Duignan (2022) Event Management is governed by an international editorial board consisting of experts in event management, tourism, business, sport, and related fields. This board conducts most of the manuscript reviews and plays a large role in setting the standards for research and publication in the field. The Editor-in-Chief receives and process all manuscripts, and from time to time will modify the editorial board, ensuring a continuous improvement in quality. Tohtuck (2021) Responsible tourism • International perspectives upon, and best practice in, place management • Town center, Downtown and Main street management, BIDs etc. •Neighborhood and community renewal • Location management shopping centers, airports etc. as well as services provided by the manufacturing sector, information services and the associated cultural, ethical, legal and political aspects; electronic commerce; globalizations in services; and market innovations in services Main street management, BIDs etc.

Wilasan (2018) The Journal deals with pressing problems, not only of general nature, but especially with those occurring in the countries in transition. In fact, it aims to cover functional issues, specific topics and general aspects of management related to all kinds of organizations – manufacturing and service companies, profitmaking firms and nonprofit organizations, private and public, as well as large and small enterprises. Lithuania (2023) Digital economy; supply chain economy; economic and management approaches to sustainability; globalization processes; risk assessment and management; financial technologies (FinTech); measuring and evaluating sustainable development; green investment; information and communications technology (ICT) development; contemporary business technologies; logistics management; organizational behaviors; modelling of socioeconomic processes. Sauletekio (2023) encourages a systematic and holistic view in order to ensure an integrated and economically, socially and environmentally friendly approach to management of new technologies in business. It aims to be a world class research platform for academics, managers, and professionals to publish scholarly research in the global arena. Thinking and research relating to the role played by managers in contemporary organizations. It is widely acknowledged that investment in management development helps to reduce costs, increase sales and improve productivity.

7.0 Conclusion

In this project, we made attempt to effectively introduce the concept of event management systems already existing in the society. We then explain the concept of

online event management systems which are already present. We describe the proposed system and explain the features implemented by our proposed system. They have web page will booking on your events at now present updated generation of society. It been the process of reviews to make helpful for the idea in this project make analysis on process make management.

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CHAPTER 25

The Impact of Financial Literacy among Small-sized Business Owners in Thanjavur District

Amal Infanto Vensley M.*, Ramakrishnan M.** and Hari Prasath S.**

ABSTRACT

Financial literacy is a critical factor in the success and sustainability of small-sized businesses, particularly in the retail sector. This study examines the impact of financial literacy among small business owners in the Thanjavur district, focusing on four key objectives: assessing financial knowledge levels, evaluating its influence on business growth, identifying financial challenges, and analyzing the awareness and adoption of digital financial tools. A structured questionnaire was used to gather primary data from 220 small size business owners, covering aspects such as financial management practices, access to funding, budgeting strategies, and the use of digital financial tools. The results show that while financial literacy plays a crucial role in the growth and sustainability of businesses, numerous small business owners encounter obstacles like insufficient funding, challenges in obtaining credit, and ineffective cash flow management. The results of One-way MANOVA reveal that there is no significant difference between respondents' educational qualifications and their choices of financial strategies, digital financial tools, or financial management techniques. However, Pearson Correlation analysis demonstrates a significant weak relationship between average monthly business revenue and the perception that financial literacy contributes to business growth. Improving knowledge in areas such as budgeting, bookkeeping, and digital financial tools can enhance financial decision-making, resulting in improved business performance and economic development. The study also suggests the need for targeted financial literacy programs, training workshops and provision of financial education incentives to equip small business owners with essential financial skills and strengthen their businesses' long-term sustainability.

Keywords: Financial literacy, Small-sized businesses, Thanjavur district.

1.0 Introduction

Financial literacy is a fundamental aspect for small business owners which enables them to manage their finances effectively and make informed business decisions.

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It involves understanding key financial concepts such as budgeting, cash flow management, profit and loss analysis, taxation, credit management, and investment planning. Lack of financial awareness can result in making poor financial decisions, excessive acquisition of debt, mismanagement of financial resources, and ultimately, resulting in failure or loss in business. Many small business owners start with great ideas but eventually struggle to sustain their ventures due to improper financial planning and limited knowledge of financial tools. By acquiring financial literacy, entrepreneurs can develop strategies to manage expenses, maximize profits, and maintain financial stability. It also helps them comply with tax regulations, secure funding from investors or financial institutions, and effectively plan for business growth.

Enhanced financial awareness empowers small business owners to find ways in determining economic uncertainties and market fluctuations with confidence. It enables them to assess financial risks, make data-driven decisions, and implement cost-effective strategies for long-term sustainability. Understanding financial reports allows entrepreneurs to evaluate business performance, identify areas of improvement, and take proactive measures to enhance profitability. Moreover, financial literacy plays a significant role in promoting responsible borrowing and debt management, preventing small businesses from reaching financial distress. Governments, financial institutions, and various business organizations conduct various programs, workshops, and provide digital resources to improve financial education among entrepreneurs in India. Small business owners can gain a competitive edge, optimize their operations and achieve sustainable business growth in dynamic business environment from receiving financial awareness.

2.0 Objectives

- To understand the impact of financial literacy on the business growth of the retail business owners.
- To identify the financial challenges faced by business owners in the growth of their business.
- To examine the awareness of business owners about digital financial tools for taking effective financial decisions.

3.0 Research Gap

Financial literacy is one of the significant factors which helps businesses make efficient decisions and ultimately help them earn higher profit. Despite several studies being conducted on financial literacy among small businesses, research specifically focusing on small-sized business owners in Thanjavur, especially in the retail sector, remains limited. While existing literature emphasizes the impact of financial literacy on business performance and digital financial adoption in other

regions, there is a noticeable gap in understanding the influence of financial literacy on the growth of a business, financial challenges, and usage of digital financial business tools in Thanjavur district, where key aspects such as access to credit, budgeting practices, and the effectiveness of financial education programs are still underexplored. To address these gaps, the study has been made to assess the level of financial literacy, identify major challenges, and examine the adoption of digital financial tools among small business owners in Thanjavur district.

4.0 Hypothesis

- There is a significant relationship between average monthly business revenue of the respondents and financial literacy contributing towards the growth of business.
- There is no significant difference between educational qualification of the respondents with regard to financial strategy options used for business, digital financial tools used for business transactions and knowledge towards financial management tools used for business.

5.0 Review of Literature

Anshika *et al.* (2021) in their study investigate the determinants of financial literacy among Micro and Small Enterprises (MSEs) entrepreneurs in Punjab, India. The results stated that age of the respondents significantly affects different types of financial literacy. Micro and small-service enterprises have higher levels of financial literacy than other manufacturing enterprises. Entrepreneurs with higher education levels showed higher levels of financial literacy. Gross profit ratio served as the most influencing determinant of the enterprise. The study also recommended firms to keep some portion of their profits for educating their employees and Government may help MSEs to improve their financial literacy.

Wahyono & Hutahayan (2021) studied on the impact of financial literacy on performance and innovation of textile manufacturing SMEs in Bali and Java of Indonesia. Primary data was collected from SMEs which had employees between five and ninety-nine. The results confirm the influence of financial literacy on MSMEs performance and innovation and good financial literacy allows MSMEs to make the right management and financial decisions, thereby influencing performance and innovation. The study suggests that adequate support from Government, academics, private sector, and the community at large is needed to develop financial literacy in MSMEs in Central Java. The lack of existing literature highlights the potential contribution of this study.

Elisabeth *et al.* (2022) in their research on financial literacy and self-employment and its moderating effect on gender and race stated that financial literacy is crucial for self-employment, as 40 per cent of the workforce is predicted to

surpass traditional employees within the next decade. A National Financial Capability Study found a positive association between financial literacy and self-employment in the United States, where women with higher financial literacy scores are more likely to be self-employed than men considering the years 2015 and 2018. However, there is no significant difference in the association between higher financial literacy scores and self-employment between non-white and white respondents from the United States.

Bayrakdaroğlu & Şan (2014) explored the impact of financial literacy on managers' ability to use financial market instruments in small and medium-sized businesses in Turkey. The results showed that, financial literacy levels increase with financial training indicating strategic management decisions. Managers who have higher financial literacy levels show greater market participation which reduces information constraints. However, the lower overconfidence level among managers may be due to limited market participation. There is an impact on managers' confidence levels based on the financial training.

Katare *et al.* (2021) have stated that COVID-19 pandemic has significantly impacted small businesses in the United States by focusing on three main themes. First, income loss drivers are not necessarily linked to recovery time. Second, undercapitalized businesses are more likely to suffer loss of higher income and higher recovery time. Thirdly, the business model changes are necessary due to pandemic, but not all adaptive strategies lead to better outcomes. The findings help in understanding the vulnerabilities and adjustments made by small businesses to fully recover from economic shocks, allowing for a better understanding of the impact of the pandemic on their operations.

Imjai *et al.* (2025) in their study on exploring the impact of digital financial literacy to effective financial planning and control and the perspectives on competitiveness of Thai micropreneurs. The study investigates the impact of financial literacy, digital financial literacy, and the effective financial planning on the success of micropreneurs in Thailand. Primary data was collected from 145 small business owners across Thailand using questionnaire. The results of the study stated that significant influences between the variables by emphasizing the need to enhance both traditional and digital financial literacy for supporting sustainable microenterprises within the economic framework of Thailand.

Al-shami *et al.* (2024) have stated that batik industry in Indonesia is a significant contributor to the GDP and cultural preservation of the country. However, there are few challenges such as slow growth and limited access to credit which must be focused on. The study investigates the relationship between financial literacy, digital financial literacy, and financial inclusion in batik SMEs, examining the moderating effect of online social networks. A survey of 535 managers, owners, and financial officers revealed that financial and digital literacy impact financial inclusion for batik small enterprises. The application and usage of social media moderated these relationships by influencing the impact of financial and digital literacy.

6.0 Analysis and Interpretation

Table 1: Socio-economic Profile of the Respondents

Socio-economic variable	Categories	Number of respondents	Percentage
Gender	Male	130	59.1
	Female	90	49.9
Age	Up to 20 years	34	15.5
	21 to 40 years	120	54.5
	Above 40 years	66	30.0
Educational qualification	Up to schooling	64	29.1
	Diploma	35	15.9
	Under graduation	69	31.4
	Post graduation and above	52	23.6
Location of Business	Urban	83	37.7
	Semi urban	80	36.4
	Rural	57	25.9
Monthly family income	Up to ₹ 25,000	87	39.5
	₹ 25,001 to ₹ 50,000	79	35.9
	Above ₹ 50,000	54	24.6

Source: Primary data

Table 2: Particulars Concerning Business Carried out by the Respondents

Particulars	Categories	Number of respondents	Percentage
Nature of business	Grocery store	50	22.7
	Clothing and Accessories	63	28.6
	Electronics	56	25.5
	Restaurant/Café	47	21.4
	Others	4	1.8
Period of running business	Up to 1 year	60	27.3
	1.01 to 2 years	64	29.1
	2.01 to 3 years	46	20.9
	Above 3 years	50	22.7
Size of business (in employees)	Less than 5	62	28.2
	5 to 10	55	25.0
	Above 10	43	19.5
	Self employed (No employees)	60	27.3
Average monthly revenue from business	Up to ₹ 25,000	73	33.2
	₹ 25,001 to ₹ 50,000	79	35.9
	₹ 50,001 to ₹ 75,000	37	16.8
	Above ₹ 75,000	31	14.1

Source: Primary data

Table 1 reveals that, a majority (59.1 per cent) of the respondents are male and 49.9 per cent are female. Concerning age of the respondents, a majority (54.5 per

cent) are between 21 and 40 years. Regarding educational qualification, a maximum (31.4 per cent) of the respondents are under graduates. A maximum (37.7 per cent) of the respondents are carrying out their business in urban area. With regard to monthly family income, a maximum (39.5 per cent) of the respondents have income up to ₹ 25,000. Table 2 reveals that, a maximum (28.6 per cent) of the respondents are carrying out clothing and accessories business. A maximum (29.1 per cent) of the respondents are doing their business for a period between 1.01 and 2 years. Regarding size of the business in terms of number of employees, a maximum (28.2 per cent) of the businesses run by respondents have employees less than five. Concerning average monthly revenue of the respondents from their businesses, a maximum (35.9 per cent) of the respondents earn revenue up to ₹ 25,000.

Table 3: Size of Business in Terms of Employees and Knowledge about Financial Management

One-way ANOVA	Sum of squares	F	Df	Sig.
	7.526	1.154	4	0.332

Source: Computed from primary data

One-way ANOVA was used to identify the difference between the size of business in terms of employees and knowledge of respondents about financial management in Table 3. The analysis of the results showed that, F value = 1.154, degrees of freedom (df) = 4, p value > 0.05 (p = 0.332). Since p value is not less than 0.05, there is no significant difference between size of business in terms of employees and knowledge of respondents about financial management.

Figure 1: Master Visual Chart Concerning Financial Literacy among Small-sized Business Owners
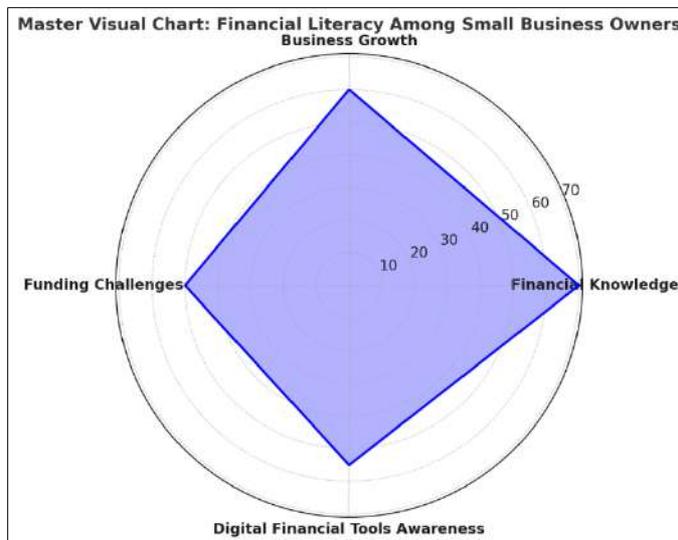
Table 4: Gender and Financial Literacy Contributing towards the Growth of Business – Independent Sample t Test

Independent sample t test	t value	Df	Sig.
	1.928	218	0.063

Source: Computed from primary data

Independent sample t test was used to find the difference between gender of the respondents and their perception towards financial literacy contributing in business growth as shown in Table 4. The analysis shows that t = 1.928, df = 218, p > 0.05 (p = 0.063). Since p value is not less than 0.05, there is no significant difference between gender of the respondents and their perception towards financial literacy contributing in business growth.

Hypothesis 1

Null hypothesis H_0: There is no significant relationship between average monthly business revenue of the respondents and financial literacy contributing towards the growth of business.

Alternative hypothesis H_1: There is a significant relationship between average monthly business revenue of the respondents and financial literacy contributing towards the growth of business.

Table 5: Average Monthly Business Revenue and Financial Literacy Contributing the Growth of Business –Correlation

Pearson Correlation	r value	Asymp. Std Error	Approx. T[b]	Sig.
	8.744	0.066	2.260	0.025

Source: Computed from primary data

To know the relationship between average monthly business revenue of the respondents and perception towards financial literacy contributing towards their business growth, Pearson Correlation was used. The analysis shows r value of 0.151 and p value of 0.025 (< 0.05). Since p value is less than 0.05, null hypothesis is rejected and alternative hypothesis is accepted. Therefore, it can be inferred that, there is a significant relationship between average monthly business revenue of the respondents and their perception towards financial literacy contributing towards their business growth.

Hypothesis 2

Null hypothesis H_0: There is no significant difference between educational qualification of the respondents with regard to 'financial strategy options used for business,' 'digital financial tools used for business transactions' and 'knowledge towards financial management tools used for business.'

Alternative hypothesis H_1: There is a significant difference between educational qualification of the respondents with regard to 'financial strategy options

used for business,' 'digital financial tools used for business transactions' and 'knowledge towards financial management tools used for business.'

Table 6: Box's Test of Equality of Covariances and Wilks' Lambda Multivariate Test – Multivariate Analysis of Variance (MANOVA)

Box's test	Wilks' Lambda	
P = 0.839 (> 0.05)	P = 0.505	F value = 0.941

Source: Computed from primary data

The above table which explains Box's test of equality of variances shows that, p value is greater than 0.05 (p = 0.839), which signifies that observed covariance matrices of the dependent variables are equal across groups. From the result mentioned in Wilks' Lambda multivariate test, it can be concluded that, there is no statistically significant difference between educational qualification of the respondents and statements concerning their financial literacy. $F_{(4,215)} = 0.941$, p = 0.505. Concerning tests of between-subjects effects in MANOVA which measures differences among individual independent statement with regard to the independent variable, there is no significant difference between educational qualification of the respondents with regard to 'financial strategy options used for business,' 'digital financial tools used for business transactions' and 'knowledge towards financial management tools used for business.' Hence, null hypothesis is accepted and alternative hypothesis is rejected.

Table 7: Tests of between Subjects Effects - MANOVA

Statements	F	Sig.
Financial strategy options used for business	1.404	0.234
Digital financial tools used for business transactions	0.227	0.923
Knowledge towards financial management tools	1.205	0.310

Source: Computed from primary data

7.0 Major Findings

1. A maximum (28.6 per cent) of the respondents are carrying out clothing and accessories business.
2. A maximum (29.1 per cent) of the respondents are doing their business for a period between 1.01 and 2 years.
3. Concerning average monthly revenue of the respondents from their businesses, a maximum (35.9 per cent) of the respondents earn revenue up to ₹ 25,000.
4. There is no significant difference between size of business in terms of employees and knowledge of respondents about financial management.

5. There is no significant difference between gender of the respondents and their perception towards financial literacy contributing in business growth.

6. There is a significant relationship between average monthly business revenue of the respondents and their perception towards financial literacy contributing towards their business growth.

7. There is no significant difference between educational qualification of the respondents with regard to financial strategy options used for business, digital financial tools used for business transactions and knowledge towards financial management tools used for business.

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CHAPTER 26

The Impact of Online Shopping on Consumer Behavior and Retail Industry

Amarnath R.*, Yuvan Sanjay R.** and Veeramani**

ABSTRACT

The way people live now days is different. It is time-consuming and uncomfortable for people to go to congested markets. Because it saves a lot of time, e-shopping is beneficial. Buying products, services, etc. directly from a vendor online without the need of a middleman is known as online shopping. Online retailers allow customers to shop while lounging in front of a computer in the comfort of their own home. A lot of customers have internet access at home and at work, and online retailers are typically open around-the-clock. Thus, online shopping is quite convenient for them. One of the most alluring things about internet shopping, especially around the holidays, is that it eliminates the need to seek for a specific item at a store or stand in line. A wide range of products are offered online. Therefore, the researcher wants to discover what the customers want. Thus, information about the preference for internet purchasing was gathered from fifty respondents. The purpose of this study is to determine how consumers behave when they shop online. There were 100 responders in all, including both men and women. Convenient sampling was the method employed. The internet has quickly grown into a worldwide phenomenon that is altering how people shop and purchase goods and services. Many businesses have begun to use the internet to communicate and spread information, sell their products, get feedback, and survey customers about their satisfaction in order to reduce marketing expenses and, consequently, the price of their goods and services. Customers utilize the internet to compare costs, product characteristics, and after-sales service offerings before making an online purchase. Regarding the future of internet commerce, many experts are more than hopeful. The study's core data is gathered via a structured questionnaire, while its secondary data is gathered via online resources, periodicals, and standard textbooks.

Keywords: Consumer behavior, Customer preference, E commerce, Market trends, Online shopping.

1.0 Introduction

Online purchasing is growing in popularity for a number of reasons.

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The growing popularity of internet shopping is undoubtedly influenced by external factors such rising petrol prices, the challenge of traveling to traditional stores, and the inconveniences that come with shopping malls and other traditional retailers. Customers can obtain comprehensive information about the product by reading reviews left by previous consumers. There are a lot of product reviews available online that provide feedback from actual consumers, so if someone wants to purchase a product, they are no longer restricted to asking friends and family. Considering the quality of individuals, online retailers offer a large selection of both high-grade and low-quality products.

The internet has quickly spread over the world and is altering how people shop and purchase goods and services. Many businesses have begun to use the internet to communicate and spread information, sell their products, get feedback, and survey customers about their satisfaction in order to reduce marketing expenses and, consequently, the price of their goods and services. In addition to purchasing products online, consumers utilize the internet to research price points, product attributes, and the after-sales support offered by a specific retailer. The future of internet business is bright for many analysts. Aside from the e-commerce market's enormous potential, the internet offers businesses a special chance to more effectively connect with both current and new clients. Practitioners of business-to-consumer commerce should maintain their confidence even though business-to-business transactions generate the majority of online transaction revenue. Over ten years have passed since the inception of business-to-consumer e-commerce. Researchers and professionals in the field of internet commerce are always looking to learn more about how consumers behave from various angles. In several of the research, new emergent factors or assumptions based on classic models of consumer behavior are examined for validity in the context of the internet.

2.0 Litreature Review

https://doi.org/10.48047/nq.2022.20.3.NQ22980 In the modern era online shopping is play a vital role in marketing of the products in the world. In 2020 The COVID-19 has changed the lifestyles of people and motivates them to purchase their requirement through online. According to the World Health Organization (WHO) report 32.6 million cases has been recorded in September 2020. Covid-19 has creates a major impact on consumer shopping behavior which will be going to change their future shopping habits. During COVID-19 online shopping has attained a greater impact in consumers buying behavior but other sectors are almost downward or stable in the market. This study aims to analyse and evaluate the changes in consumers shopping behavior during Covid-19 pandemic in Chennai https://doi.org/10.57198/2583-4932.1038.

On-line shopping is a form of electronic commerce where the buyer is directly online to the seller's computer usually through the internet. The sale and

purchase transaction is completed electronically and interactively in real time for eg: Amazon.com and Flipkart.com. Unfortunately, India has lagged in e-retail growth story due to low density of internet connections, lower penetration of credit cards and customer anxiety in using new technologies. The growing use of Internet in India provides a developing prospect for online shopping. These online retailers are formulating many enduring promotional offers that is motivating people to change their behavior and rather shop online. In case of services like banking, travel and tourism a drastic change is surely witnessed. However, in case of physical products there are multiple factors that are acting as resistors for them to shop online. This paper focuses on those factors which acts as a major hindrance for anyone while shopping online. These critical resistors are broadly divided into the following categories: psychological, behavior demographic cultural and social factors and product category factors. For the present study a sample of 300 was considered from Delhi (NCR) region to find out how these factors play a critical role while shopping online. https://doi.org/10.57198/2583-4932.1038

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The digital era has profoundly reshaped consumer behavior, with social media and e-commerce platforms revolutionizing shopping experiences. This study integrates interviews with questionnaire survey to investigate the nuanced differences in consumer citizenship behavior (CCB) across online and offline shopping contexts, as well as the influence of consumer perceived value (CPV) and consumer perceived corporate social responsibility (CPCSR). Through the use of multiple regression and permutation tests to analyze the interplay between consumer perception and CCB, the study reveals the following: (1) CPV positively influences all four dimensions of CCB, while CPCSR significantly impacts only recommendation and feedback; (2) the influence of CPV on dimensions other than recommendation and of CPCSR on

dimensions other than helping varies significantly between online and offline contexts. These results enhance our understanding of consumer behavior and offer actionable insights for businesses to build and enhance consumer connections in the digital age. https://doi.org/10.1007/s10614-020-10069-3

The rise of the knowledge-based economy has gained significant attention, particularly in online shopping, where consumer transactions and opinions are continuously recorded. Machine learning techniques play a crucial role in extracting valuable insights from these data logs, helping businesses and industries better understand consumer behavior, market opportunities, and potential threats. The COVID-19 pandemic has further intensified the reliance on e-commerce, drastically altering shopping behaviors due to social distancing measures and stay-at-home policies. As a result, the demand for online shopping surged, reshaping retail industry strategies and supply chain management. Predicting electronic consumer behavior has become essential for decision-makers in government, retail, and logistics, enabling them to respond effectively to shifting trends. This paper introduces a machine learning-based prediction model to analyze consumer behavior patterns, providing valuable insights to enhance business strategies and improve customer experiences in the evolving digital marketplace. https://doi.org/10.1080/2331197 5.2023.2292487

In the retail industry, customer experience over time is the overall customer perception after making transactions with retailers. This concept has been increasingly important since it can help retailers to gain competitive advantages. However, there has been a lack of studies investigating how customer experience over time inspires customers to engage in customer citizenship behavior, especially via the mediation of customer-brand relationship strength. To bridge the gap, this study examines the mediating role of customer-brand relationship strength on the associations between retail customer experience over time and customer citizenship behavior in retail industry.

Specifically, the four components of customer-brand relationship strength including brand commitment, self-brand connection, brand intimacy, and customer satisfaction are investigated their mediations on the relationships between retail customer experience over time and customer citizenship behavior. Besides, the four dimensions of retail customer experience over time (i.e. product experience, peace of mind, moments-of-truth, and outcome focus) and of customer citizenship behavior (i.e. advocacy, feedback, helping, and tolerance) are also investigated. A self-administrated survey was conducted utilizing a convenient sampling method. The data, collected from 341 customers of electronics and home appliance retailers, was analyzed by employing PLS-SEM.

The results indicate that customer experience over time induces customer brand relationship strength, which subsequently affects customer citizenship behavior. The data analysis results also figure out the mediating role of customer brand relationship strength on the relationship between customer experience over

time and customer citizenship behavior. These findings contribute significantly to theoretical and practical implications in retail environment.

3.0 Research Gap

Online purchasing is becoming more and more popular, yet little is known about the precise factors impacting customer preferences and behaviors across various demographics. Instead than examining how factors like trust, website usability, and post-purchase experience impact customer decisions, existing research frequently concentrates on broad advantages. Furthermore, nothing is known about how new technologies like augmented reality and AI-driven suggestions affect consumers' online buying behaviors.

3.1 Research problem

The main reasons influencing consumer purchase behavior remain unclear, despite the fact that internet shopping is becoming more and more popular. It is yet unknown how factors like price, product diversity, ease of use, and trust affect consumer choices. It is also necessary to investigate how demographic variations influenceonlinepurchasingchoices.

3.2 Objectives
- To study the factors influencing consumer behavior in online shopping.
- To investigate the effects of internet shopping on conventional retail establishments.
- To investigate customer benefits and drawbacks of online shopping.
- To evaluate the preferences and contentment of customers with online purchasing.
- To determine prospective advancements and future trends in online shopping.

4.0 Research Methodology

This study used a descriptive research approach, gathering secondary data from online sources and primary data from 100 respondents using structured questionnaires. Descriptive statistics and comparative analysis are used to analyze the data, and convenience sampling is used.

Sampling methods: The study employs a convenience sampling method, selecting 100 respondents based on accessibility and willingness to participate. This non-probability sampling technique ensures quick data collection but may introduce selection bias.

Sample size: The study's sample size consists of 100 individuals, both male and female, who have experience purchasing online.

5.0 Data Analysis and Interpretation

In order to perform the study on consumer behavior toward online shopping, 100 sample respondents' primary data was gathered. In order to evaluate and explain the primary data that was gathered, percentage analysis was used. Tables and charts are the formats in which the gathered data is shown. The data has been analyzed and interpreted as follows:

**Table 1: Age-wise Classification of Respondents**

Age	No. of Response	Pertentage %
10-20	44	44%
21-30	47	47%
31-40	4	4%
Above 40	5	5%
Total	100	100%
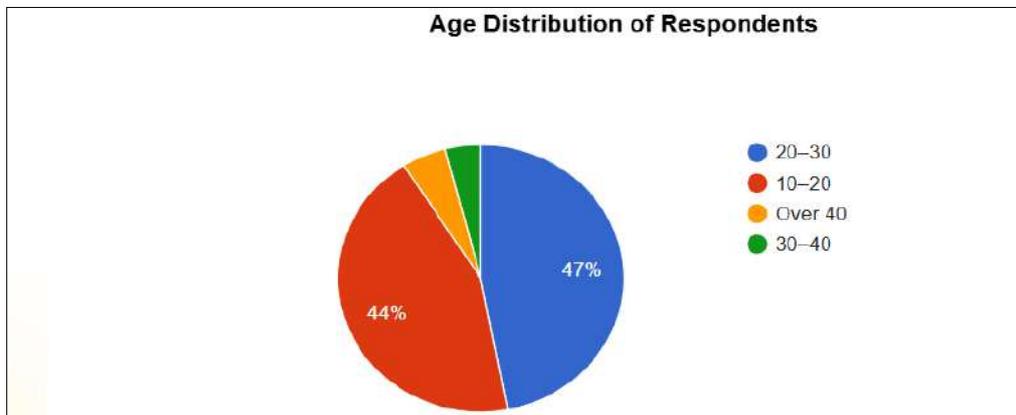
Based on the data above, it is evident that 47% of respondents are in the 20–30 age group, 44% are in the 10–20 age group, and 5% are in the Over 40, with 4% of responders falling into the 30- to 40-year-old age range

**Table 2: Educational Qualification of Respondents**

Qualification	No. of Respondents	Percentage
School level	24	24
Under graduation	56	56
Post-graduation	20	20
Total	100	100%
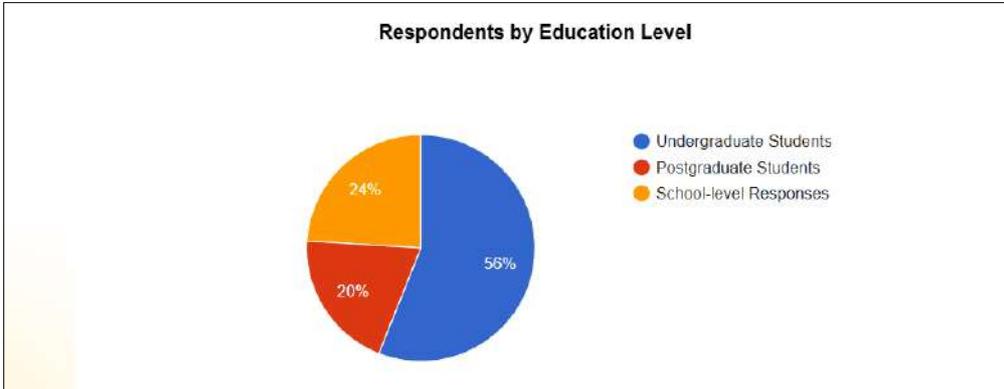
According to the data gathered, 56% of the respondents are undergraduate students, the researcher finds. 20% are postgraduates and 24% are school-level responses.

Table 3: Respondents of using Always Online Shopping

| Respondents	No. of Respondent	Percentage
YES	71	71%
NO	29	29%
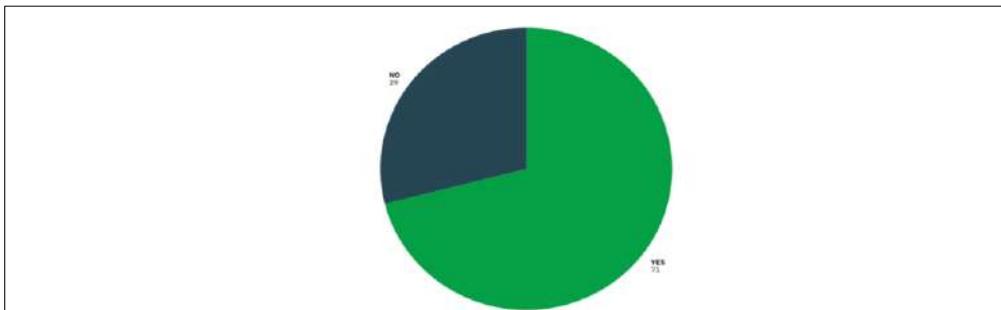
The researcher might conclude that 71% of respondents always shop online based on the facts provided.

According to the table and figure above, 42% of respondents said they had a good online shopping experience, 26% said they had a fair experience, 22% said they had an amazing experience, and 10% said they had a poor experience.

Table 4: Rate Your Experience in Online Shopping

Options	No. of Respondent	Percentage
Poor	10	10%
Fair	26	26%
Good	42	42%
Excellent	22	22%
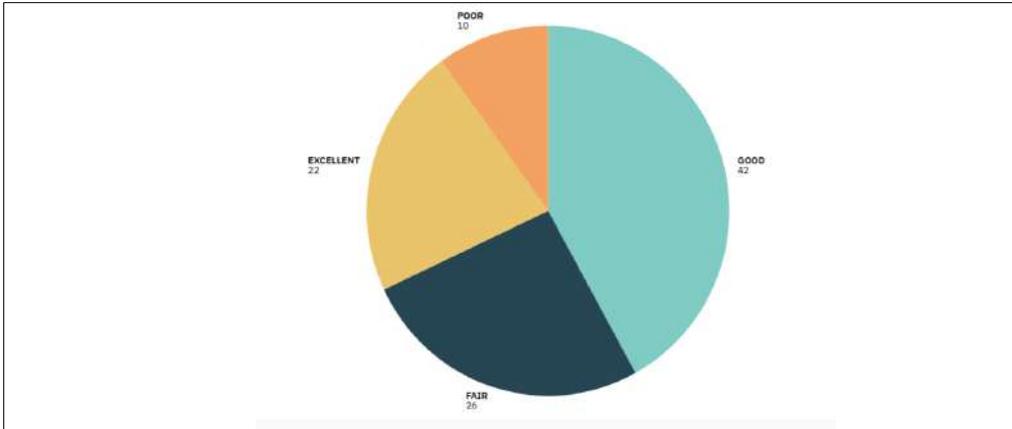
Table 5: Information about the Most Preferred Online Shopping Site

Shopping Sites	No. of Response	Percentage
Amazon.com	45	45%
Flipkart.com	35	35%
Snapdeal.com	20	20%
Ebay.com	0	0%
Total	100	100%
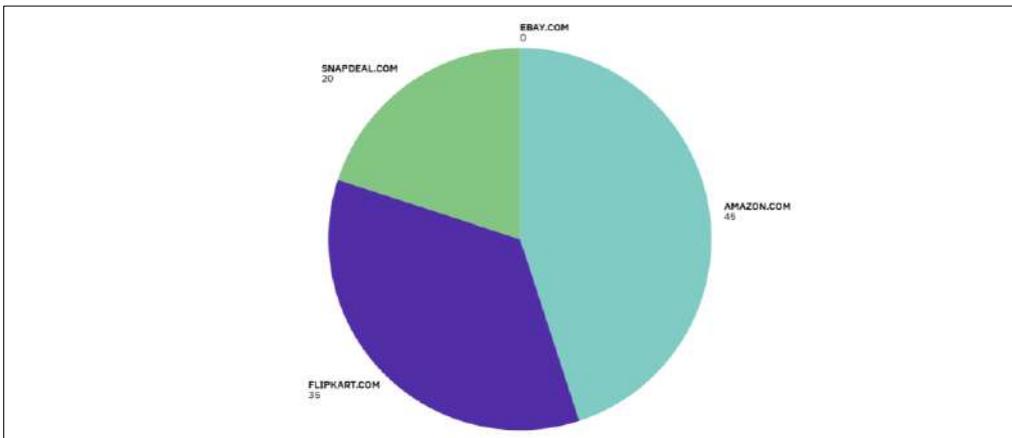
According to the researcher's analysis of the classified data, 35% of respondents said they preferred Flipkart as the most popular online retailer, 20% said they preferred Snapdeal, and 45% said Amazon was the most popular online retailer.

6.0 Findings

- Online shopping has significantly altered traditional retail businesses and consumer habits.

- Consumers prefer online shopping due to price comparisons, convenience, and personalized experiences.
- Online reviews, AI-powered recommendations, and mobile shopping have made digital platforms more popular.
- Consumers demand faster delivery, secure payment options, and ethical shopping practices.
- Online shopping has disrupted traditional retail jobs but created new roles in technology and logistics.

7.0 Scope for Further Research

There is a lot of room for more research on how internet shopping affects consumer behavior and the retail sector, encompassing different facets of technology, business tactics, and consumer psychology. Future research might examine how the online buying experience is being shaped by changing consumer preferences brought about by social media, digital marketing, and tailored recommendations. Research can also concentrate on how blockchain technology, virtual reality, and artificial intelligence can improve the security and efficiency of e-commerce. Another important topic for research is the sustainability component of online purchasing, which includes carbon-neutral delivery, eco-friendly packaging, and ethical sourcing. Furthermore, the future of the sector depends on comprehending how conventional brick and mortar businesses can adjust to digital change through omnichannel commerce and hybrid business models.

8.0 Conclusion

The project's conclusion indicates that consumers are only somewhat happy with online buying. Customers can be completely satisfied with some facility corrections. Customers can save time when they shop online because to the large platform that these companies offer. Websites can establish a positive reputation with consumers by eliminating online scams. Consumers require prompt delivery of high-quality goods, and a large selection of goods at affordable costs are two of the key elements that draw people to online shopping; further advancements in these two areas draw in more customers. Online purchasing plays a significant part in consumers' minds.

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CHAPTER 27

Forecasting Consumer Intention to Buy Energy Efficient Products in Thanjavur

Balarathinam P.*, Keerti Vasan V.** and Elumalai S.**

ABSTRACT

Background: This study is to explore the key factors influencing rural consumer decisions to buy energy-efficient products, such as income level, environmental awareness, government incentives, and access to information. Since our country is a developing one which has to increase consumption significantly, motivating energy saving habits of citizens can develop industrial perspectives. This study is based on the extended model 'Theory of Planned Behavior'. Objectives:1. To understand consumer behavior, 2. To predict future demand, 3. To promote Sustainable goals, 4. To explore consumer purchase intention. Methods: This cross-sectional study investigates the consumer intention of purchasing energy-efficient products of Forecasting. This data was collected through a structured questionnaireabout 155consumers of the products were aged 18-35. Which leads to predict the intention of the consumer purchasing behavior towards energy efficient products. Gaining an understanding of consumer behavior is essential to developing sustainable marketing strategies and attaining successful marketing results.

Keywords: Environmental marketing, Sustainable energy consumption, Impact of IOT, Energy efficient appliance, Theory of planned behavior.

1.0 Introduction

In this modern world, technology is becoming upgraded day by day, so it has many advantages and disadvantages to the environment, which leads to climate change and natural disasters into artificial. To avoid or stop these dangers, people need a pre-plan, like using eco-friendly products and appliances. In this case, there is a theory named 'Theory of planned behavior' (TPB) that was introduced by Icek Ajzen in 1985 and the paper on the theory was approved in 1991 and was published. It is focused on psychological theory that links beliefs to behavior. The theory maintains three core components, namely, attitude, subjective norms and perceived behavior.

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This can be useful for the sellers to understand the buying behavior of the consumers. This will be used in four parts like predicting power, cross-cultural, influencing behavior and predicting intention play major roles in (TPB). Internet of things (IOT); The term IOT refers to the Internet of things to the collective network of connected devices and the technology that facilitates communication between devices and the cloud as well as between the devices themselves. This was coined in 1999 by the computer scientist Kevin Ashton. This technology allows for the collection and sharing of data from vast networks of devices, creating opportunities for more efficient and automated systems. IOT Technology is most synonymous with 'smart home' products, including devices and appliances like lighting fixtures, thermostats, home security system, cameras and other home appliances that support one or more common eco-systems and can be controlled via smart phones and smart speakers. IOT is also used in healthcare systems. The Theory of perceived value: This study aims to investigate the idea of customer perceived value. In order to define the research problem, the study takes a qualitative method, examining prior research and hypotheses.

The results show that perceived quality and perceived risk are the two main components of customer perceived value as a component of consumer behavior. Because perceptions of risk and quality vary depending on the type of offering, the indicators for each dimension are customized for the particular good or service. For marketers, this study offers insightful information that helps them develop tactics that suit the value preferences of their target audience. Gaining an understanding of consumer behavior is essential to developing sustainable marketing strategies and attaining successful marketing results. Energy-Efficient products; Any product that uses less energy while accomplishing the same task as its non-energy-efficient counterpart is considered energy-efficient. Inefficient practices of conventional and frequently used household items are eliminated by energy-efficient products like power strips and lightbulbs etc…

Public procurement is the process by which the government and related entities buy products or services in order to provide public services. According to different estimates, it makes up around 20–30% of India's GDP. Because of its magnitude, public procurement may be a powerful tool for policymakers to accomplish a variety of social, economic, and environmental goals. In order "to effect energy savings in the long term by promoting procurement of energy-efficient equipment," the Ministry of Finance (MoF) and the Bureau of Energy Efficiency (BEE) released a memorandum in 2013 that set minimum energy efficiency thresholds for public procurement of four frequently purchased appliances. Large-scale purchases of energy-efficient appliances by public organizations can reduce power costs and generate demand in the market.

In the study of Forecasting consumer intention of buying behavior of energy efficient products in metropolis appliances were

1. Automatic smart ceiling fan (IOT)

2. Smart Led Bulb (IOT)
3. Robotic Vacuum cleaner (IOT)
4. Sensor Light
5. Automatic Dishwasher Machine

Automatic smart ceiling-fan (IOT): The ordinary electrical ceiling fan was invented by the German-American named Philip Diehl in 1887 ceiling mounted fan with motors. After some of decades this gets upgraded and after2015 period the Direct current (DC)motors were used to save electricity and enhanced into Blushed direct current motors (BLDC) which can save the electricity up to 50% of (DC). In present generation we are about to use smart automatic ceiling fan enhanced with wi-fi also voice control and AI- powered automation. This can be eco-friendly to the nature and energy-efficient to the people at high cost of product to low cost of electricity. It also comes under the products of Internet of things (IOT).

Smart led bulb (IOT): The first most bulb is invented in 1802 by Humphry Davy using a battery and thin strips of carbon. And in 1923 general electric fluorescent light bulb were invented and upgraded by Thomas Edison. In the lighting generation there is type of light which plays a significant role is Light Emitting Diode (LED) can be energy efficient one. It also enhanced into smart LED and got some more features like connecting over wi-fi, voice controls, color changing and dimming, scheduling and automation. This can be used in smart LED bulb which is eco-friendly product. It also comes under the products of Internet of things (IOT).

Robotic vacuum cleaner (IOT): The first vacuum cleaner was introduced in 1901 by British Engineer Hubert-Cecil booth and American inventor David Kenny. This creates a partial vacuum which generates suction to draw in dust, dirt and debris. After some decades the iRobot launches Roomba, a popular and iconic robovac at 2002 which got attracted the people of the product. And enhanced in this generation as robotic vacuum cleaner. It is using to clean the home with the help of internet and (IOT) can be eco-friendly and fast, also It has some core features like automatic navigation, wi-fi connection (IOT), scheduled cleaning, advanced filtration system, voice control and mapping and navigation technologies.

Sensor light: The sensor light is the actual enhancement of ordinary light which is also know as motion – sensing light which will work with the temperature gesture of the peoples. This can be used in indoor as well as outdoor uses, which has features of motion deduction, automatic on/off/dimming, adjustable sensitivity and range, timers and scheduling. The main benefit of the product is hand free operation, energy saving, eco-friendly, increased lighting control and flexibility and long-lasting LED which is easy to use as a energy efficient product. These are the products that can be energy efficient also eco-friendly to the nature.

Automatic Dishwasher Machine: An automatic dishwasher, or simply a dishwasher, is a machine that cleans dishes, cookware, and cutlery automatically using a combination of hot water, detergent, and mechanical action, saving time and effort compared to hand washing. Unlike manual dishwashing, which relies on

physical scrubbing to remove soiling, the mechanical dishwasher cleans by spraying hot water, typically between 45 and 75 °C (110 and 170 °F), at the dishes, with lower temperatures of water used for delicate items. This is quiet expensive and Dishwashers typically have a wattage range of 1200-2400 watts.

1.1 Research gap

The further study is about the energy-efficient products buying behavior which is regulated in the sample article which focus on the (TPB) Theory of planned behavior. The research gap of the study is the consumer who does not buy energy-efficient products does not have the awareness of (IOT) Internet of things, which is focusing on improving our day-to-day products improved and operates with the help of the internet.

1.2 Research problem

Factors influence consumer intention to purchase energy-efficient products, and how can we accurately forecast this intention to inform marketing strategies and promote sustainable consumer behavior

- Investigates factors the influencing intention to purchase energy-efficient appliances.
- Focuses on an emerging market context.

2.0 Research Methodology

- In the above study the research methodology used multiple regression analysis tools were valued with dependent variables with independent variables.
- The data is collected through structured questionnaires asking questions for demographic information and knowing product awareness, predicting purchase behavior and conducting environmental concerns.
- This cross-sectional study investigates the consumer intention of purchasing energy-efficient products of forecasting. This data was collected through a structured questionnaire about 155 consumers of the products were aged 18-35. This leads to predict the intention of the consumer purchasing behavior towards energy efficient products.

3.0 Data Analysis and Interpretation

H1: There is a significant relationship between the actual and predicted values, indicating that the regression model is effective in making predictions.

The plot is an "Actual vs. Predicted" plot for a multiple linear regression model on an "Untitled form (Responses)" dataset. The plot graphically assesses the model's performance by comparing the actual values of the dependent variable (Actual Y) against the predicted values from the model (Predicted Y).

Figure 1: Actual vs Predicted Plot:
**Multiple lin. Reg. of Untitled form (Responses) - Sheet**
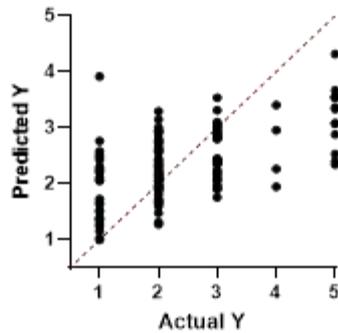
Source Type (Primary Data)

The points are scattered around the graph, and a dotted red line indicates an exact prediction (actual and predicted values being identical). The scatter of points from this line provides an insight into the preciseness of the model. If points are nearer to the red line, it shows a tighter fit, that is, the model can predict the actual values. In this particular plot, while there is a general trend of predicted values increasing with actual values, there is also a noticeable spread, suggesting some degree of error or variation in the model's predictions. The points are not precisely on the red line, which implies that the model might not be capturing all the underlying patterns in the data or there might be some other determinants of the dependent variable that are not present in the model.

H_0: The multiple linear regression model does not significantly predict the actual values, meaning there is no strong correlation between actual and predicted values.

Figure 2: Resodial Plot:
Multiple lin. Reg. of Untitled form (Responses) - Sheet

Source Type (Primary Data)

The picture is a residual plot of multiple linear models on an "Untitled form (Responses)" data set, from "Sheet2". Residual plot is a graph of the residuals (observed value minus predicted value) versus predicted value. Predicted value of Y on x-axis and residual on y-axis are the axes in a residual plot. A well-fit linear regression model should have residually dispersed data around zero to mean that the model is reproducing the general trends in the data without systemically missing in any way. We can look at some telling features here: the residuals are rather dispersed but appear more denser near zero for smaller predicted values, and the scatter also picks up more as larger and larger predicted values are being regarded. There is also a faint indication of a curved shape, which may be an indication of a violation of the linearity assumption or heteroscedasticity (non-constant error variance). The existence of some outliers, especially those with larger residuals, indicates that such points might be a poor fit for the model or might have an undue impact on the regression estimates. In general terms, while the residuals are not demonstrating a wildly random scatter, they are not demonstrating any wildly scary patterns, so the model would likely be satisfactory but potentially enhanced by its transformation to remove the trends and the outliers that have been observed.

H_0: The residuals are randomly and homogeneously distributed, meaning the multiple linear regression model is appropriate and satisfies linearity, homoscedasticity, and independence assumptions.

Figure 3: Residual Plot of Multiple Linear Models

	β0	β1	β2	β3	β4	β5	β6	β7	β8	β9	β10	β11	β12
β0	1.00												
β1		1.00	0.06			0.13	0.06	0.03			0.16	0.18	0.14
β2		0.06	1.00				0.04			0.16	0.02		
β3				1.00	0.01			0.01		0.04		0.14	
β4				0.01	1.00		0.20			0.10	0.03		
β5		0.13				1.00		0.11			0.02	0.05	0.03
β6		0.06	0.04		0.20		1.00					0.10	
β7		0.03		0.01		0.11		1.00					
β8									1.00				0.08
β9			0.16	0.04	0.10					1.00			
β10		0.16	0.02		0.03	0.02					1.00		0.06
β11		0.18		0.14		0.05	0.10					1.00	0.01
β12		0.14			0.03				0.08		0.06	0.01	1.00

Source Type (Primary Data)

The picture is a residual plot of multiple linear models on an "Untitled form (Responses)" data set, from "Sheet2". Residual plot is a graph of the residuals (observed value minus predicted value) versus predicted value. Predicted value of Y on x-axis and residual on y-axis are the axes in a residual plot. A well-fit linear regression model should have residually dispersed data around zero to mean that the model is reproducing the general trends in the data without systemically missing in any way. We can look at some telling features here: the residuals are rather dispersed but appear more denser near zero for smaller predicted values, and the scatter also picks up more as larger and larger predicted values are being regarded. There is also a faint indication of a curved shape, which may be an indication of a violation of the linearity assumption or heteroscedasticity (non-constant error variance). The existence of some outliers, especially those with larger residuals, indicates that such points might be a poor fit for the model or might have an undue impact on the regression estimates. In general terms, while the residuals are not demonstrating a wildly random scatter, they are not demonstrating any wildly scary patterns, so the model would likely be satisfactory but potentially enhanced by its transformation to remove the trends and the outliers that have been observed.

4.0 Findings

Findings indicate that several aspects play a determining role in the intentions of the consumer. Notably, the concern for the environment was an effective predictor and suggested that increased environmental awareness makes individuals more inclined to consider energy-efficient products. In addition, perceived behavioral control, which defines consumers' trust in their potential to make good decisions, proved to be indispensable. This implies that consumers who trust in understanding energy efficiency are more likely to purchase such products. Social influence was also a significant factor where social norms and peer behavior have been known to affect purchasing.

5.0 Suggestions

Based on these findings integrate targeted campaigns emphasizing the green benefits of energy-efficient products to appeal to ecologically conscious consumers. Raising consumer awareness and understanding of energy efficiency through clear labeling and readily available information can increase perceived behavioral control. Social media and influencer marketing can leverage the power of social influence to encourage energy-efficient behavior.

6.0 Scope for Further Research

More research may examine the interaction of these variables in greater detail, including the possibility of moderating variables like demographics, cultural

values, and economic conditions. Examining the effect of certain product categories and marketing efforts on purchase intention would be informative for businesses and policymakers. Longitudinal studies could also monitor changes in consumer behavior over time and measure the long-term success of interventions designed to increase energy-efficient product adoption.

7.0 Conclusion

In conclusion, determining market trends and guiding the development of sustainable products depends on forecasting consumer intent to buy energy-efficient products. As consumers grow more aware of environmental issues and energy costs, they are more likely to consider energy efficiency when making purchasing decisions. Important factors like perceived cost savings, environmental impact, and government incentives have a big impact on these intentions. Manufacturers, lawmakers, and marketers can use this information to support global sustainability initiatives and promote energy-efficient products by better targeting and influencing consumer behaviour. Continuous research is required to account for changing consumer preferences and market dynamics in order to guarantee the effectiveness of forecasting models in this dynamic environment.

8.0 Literature Review

Purchase Behavior of Energy-Efficient products Hoosain *et al.*, (2022): Appliances Contribution to sustainable energy consumption in developing countries: Moral Norms Extension of the Theory of Planned Behavior Imran Purchase Behavior of Energy-Efficient Appliances Contribute to Sustainable Energy Consumption in the Moral Norms Extension of the Theory of Planned Behavior.

The Theory of planned behavior and examine consumer purchase behavior of Energy-Efficient lighting product Mohan & Kinslin (2021): This study investigates the factors that influence consumers' willingness to purchase LED lamps in Kerala. A structural equation modeling (SEM) approach was employed to analyze these influences, identifying 15 reasons for switching to LED lights. The research collected 200 responses from shoppers, focusing on their intentions toward LED products. The SEM evaluated four hypotheses. The findings indicate that consumers' attitudes and perceived control over their behavior do not significantly impact their purchase intentions. However, subjective norms and actual purchase behavior are interconnected. The results suggest that purchasing intentions guide consumers' behavior more than their mood or perceived control.

Understanding the influence of consumer Perceived value on energy Saving product Purchase intention, Luo *et al.*, (2022): Due to rapid economic expansion leading to the overexploitation of natural resources and environmental harm, there has been a growing focus on ecological issues. This study aims to investigate the

connection between consumers' perceived value and satisfaction regarding the purchase intention of energy-efficient products, utilizing appraisal-emotional response-coping theory. Additionally, this research further examines these connections across different consumer segments However, social value was found to be insignificant for consumer satisfaction. The perceived value affects consumer satisfaction and varies among different consumer groups, as revealed by the multi group structural equation modeling analysis. These findings carry practical implications for the design and marketing strategies of energy-efficient products.

Extending the theory of planned behavior; predicting young consumer purchase of energy-efficient appliances Muhammad YaseenBhutto, Yasir AliSoomro, Hailan yang (2022); Global electricity consumption has increased dramatically in the past few decades, resulting in many countries considering energy efficiency as the only solution to tackle issues related to energy and pursue sustainable development goals. However, there is a shortage of studies at the household level on the propensity to use energy-efficient appliances (EEA), especially for developing countries, which have great potential for EEA adoption and usage. Besides, young consumers form an important part of developing countries' population as well as the next generation of consumers. Yet studies examining their inclination toward more sustainable products such as EEA remain scarce.

Determinant of consumer intention towards purchase of Energy-Efficient Appliances in Pakistan Ali *et al.*, (2021): An extended model of the Theory of planned behavior Muhammad Rizwan Ali, Muhammad Shafiq, Murad andejany: The increasing energy demand driven by advanced electrical and electronic appliances has heightened the need for energy efficiency to address shortages and environmental issues. This study investigates consumer behavior regarding the purchase of energy-efficient appliances using an extended model of the theory of planned behavior (TPB). Data analysis using the partial least squares (PLS) method reveals that factors such as attitude, perceived behavioral control, policy information campaigns, and past-purchase experiences significantly influence consumer intentions, while subjective and moral norms do not have a notable effect. The findings suggest policy recommendations focused on (i) enhancing awareness campaigns, (ii) providing energy efficiency incentives, and (iii) promoting replacement programs, aimed at assisting policymakers and administrators in achieving energy efficiency and conservation goals. The proposed research model and policy strategies serve as a framework for collaboration among policymakers, practitioners, and researchers in understanding and influencing consumer behavior toward energy-efficient products, especially in developing countries.

Li Hua and Shanyong Wang (2021): This study integrated the Technology Acceptance Model and the Theory of Planned Behavior to identify antecedents of purchasing intentions for energy efficient appliances. Factors such as subjective norms, perceived behavioral control, and attitudes significantly influenced consumer

intentions. However, perceived usefulness had a limited direct impact on purchase decisions.

Understanding household energy consumption behavior: The contribution of energy big data analytics Zhou & Yang (2016): understanding and changing household energy consumption behavior are considered ways to improve energy efficiency and promote energy conservation. The energy consumption patterns of different households show high variance, due to the fact that their energy use decision making is usually affected by various factors.

The impact of environmental regulation policy on firms' energy-saving behavior: A quasi-natural experiment based on china low carbon pilot city policy Zhou *et al.*, (2021): impact of environmental regulation on firms' energy saving behavior by employing a quasi-natural experiment China low carbon pilot (LCP) city policy. Using firm level data and adopting a difference in difference (DID) model can estimate the energy conservation.

What motivates drive sustainable energy saving behavior? An examination in south korea Park & Kwon (2017): considering the significant increase in energy consumption in south korea encouraging citizens 'energy -saving behavior's an important topic from both academic and industrial perspectives. By using an integrated research model based on the theory of planed behavior.

Understanding online consumer behavior and e-WOM strategies for sustainable business management in the tourism industry, Menederz *et al.*, (2020): Electronic word of mouth (eWOM) has been widely used by most consumers on different digital platforms. This review aimed to obtain further insight into online consumer behavior through social networking sites

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CHAPTER 28

Productivity Challenges Faced by
Migrant Workers due to Workplace Discrimination

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ABSTRACT

This study examines the productivity issues that migrant workers encounter as a result of workplace discrimination, emphasising how elements including discriminatory hiring practices, pay inequalities, cultural isolation, and a lack of inclusive policies impair their output and contentment at work. A structured questionnaire focusing on experiences of discrimination and its impact on work-related outcomes including motivation, attention, confidence, and teamwork was used to gather data from 101 respondents. Chi-square tests were used to find significant correlations between productivity indicators and discrimination factors, and percentage analysis was used to comprehend distribution patterns. The findings show that prejudice at work directly affects migrant workers' productivity, willingness to assume responsibility, and general performance. The study indicates that enhancing migrant workers' productivity and fostering an equitable, inclusive workplace need the implementation of robust anti-discrimination laws, diversity training, and equal opportunity.

Keywords: Migrant workers, Workplace discrimination, Productivity challenges, Job satisfaction.

1.0 Introduction

Workplace discrimination is a significant challenge that affects the productivity and well-being of migrant workers across various industries. Migrant workers often face biases based on nationality, ethnicity, language barriers, and cultural differences, which can lead to unequal treatment in hiring, wages, promotions, and workplace conditions. Discriminatory practices create a hostile work environment, lowering motivation and job satisfaction while increasing stress and job insecurity. As a result, migrant workers may experience lower engagement, reduced efficiency, and limited career growth opportunities, ultimately impacting overall organizational productivity.

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Research on this issue focuses on understanding how workplace discrimination affects the mental and physical well-being of migrant workers, their job performance, and labor market outcomes. Studies examine systemic biases, employer attitudes, and policy gaps that contribute to discriminatory practices. Additionally, researchers explore strategies to promote inclusivity, such as legal protections, diversity training, and fair employment policies. Addressing these challenges is essential not only for ensuring migrant workers' rights and dignity but also for fostering a more productive and equitable work environment.

2.0 Review of Litrature

Cai & Zimmermann (2023) Past studies of internal mobility have overlooked the significance of local identity in contrast to studies of international migration. Filling the gap is an analysis of social identity and labor market performance in China, the world's most extensive internal mobility. Instrumental variable estimation and robustness checks with caution indicate that local identification is correlated with increased migrants' hourly wages and reduced hours worked, though monthly income appears to be unaffected remained largely unchanged. Strong local identity migrants are more likely to employ local networks in job search, and to find jobs with higher average wages and lower average hours worked, indicating the benefit of integration policies.

Ren & Wang (2025): This study examines how the comparative advantage between origin and destination cities influences return migrant workers' entrepreneurial decisions. It critiques prior research for focusing only on origin cities, neglecting the paired dynamics between origins and destinations. Using data from the 2018 CLDS and China City Statistical Yearbook, the study applies network MRQAP and OLS regression models. Findings show workers are more likely to return for entrepreneurship when origin cities offer better economic and living conditions. Factors like economic growth, healthcare, and R&D in origin cities significantly increase return probabilities. The study enhances migration theory and highlights regional economic disparities affecting entrepreneurial behavior.

Tran *et al.*, (2024) This study explores employment transitions of Vietnamese skilled migrants in Australia and the cultural challenges they face. Using qualitative methods, the researchers conducted 50 interviews with migrants and 12 with Australian recruiters. Findings reveal significant cultural distance between Vietnam and Australia, leading to employment setbacks. Lack of cultural adaptation support hindered migrants' initial career progress. The study highlights the need for culturally sensitive HRM interventions to ease employment transitions. It also calls for future research to consider broader contextual factors beyond human and social capital.

Amfo & Aidoo (2023) The study explores how working conditions affect the wellbeing of native and migrant farmhands on Ghana's cocoa farms. Using data from

600 respondents, various analytical tools were applied to assess poverty, resilience, and living standards. Findings show overall poor wellbeing among farmhands, with natives having better living standards, while migrants had better food security. Several work and living factors influenced their adaptability, health, and asset ownership. The research highlights the need for long-term contracts, bonuses, PPE, and improved infrastructure. It calls for policy focus on farmhands' welfare and encourages their inclusion in associations and self-farming.

Fan *et al.* (2025) This study examines how rural land rights affect urban settlement decisions of migrant workers in Yunnan, western China. Using 2015 and 2021 survey data and a multinomial Probit model, it finds land rights strongly influence return migration. Migrant workers prefer to retain rural land while working in cities, valuing land as a secure livelihood asset. Older migrants often shift between rural and urban areas without permanent settlement, maximizing livelihood resources. The research highlights dual identities among migrants and supports the "migratory bird" migration model. It urges policymakers to factor in land rights when designing urban settlement policies, especially for smaller cities.

Wanner & Pecoraro (2023), Background: Switzerland is marked by intense streams of migrants from various countries of origin and with varying levels of schooling. Over a majority of the recent migrants, prejudice or discriminatory treatment has been reported over the past 24 months. Methods: As per a survey conducted in 2018 with 7,740 adult migrants (aged 24-64) who arrived in Switzerland in 2006 or later, we analyze whether self-reported health is statistically related to the sense of being a victim of prejudice or discrimination. Ordered logistic regressions are estimated with two measures of discrimination: the frequency of discrimination and the number of locations where discrimination takes place. Results: The regression outcomes reveal that discrimination, which is not necessarily linked to ethnicity or migrant status, is linked with health status, even when adjusted for potential confounding variables. Discussion: Our findings replicate those already found in other immigration countries. They indicate a probable association between discrimination perceived and self-reported health.

Wang (2024), This study investigates how different forms of human capital affect upward occupational mobility among Chinese rural migrant workers. Using multivariable logistic regression, it examines formal education, training, certificates, and foreign language skills while controlling for origin occupations. Findings show human capital generally boosts mobility, but effects vary by occupation and age group. Formal education benefits professional technicians, while foreign language skills help industrial and service staff. Cohort analysis reveals distinct patterns: older and younger workers benefit differently from specific human capital types. The study advances mobility research by linking life course, occupation type, and diverse human capital factors.

Weiler & Caxaj (2024) This research explores how housing conditions impact the physical and mental health of migrant farmworkers in Canada. Existing

models of housing and health equity are critiqued for ignoring political economy and global power dynamics. Using interviews with 151 migrant workers in Ontario and British Columbia, the study reveals issues like overcrowding and limited healthcare access. Three key themes emerged: precarity, paternalism, and lack of political participation. The findings highlight how global racial capitalism shapes housing and health inequities. The study calls for a more nuanced, politically aware framework to address migrant health and housing justice.

Reiher (2025), this article examines Japan's efforts to address labor shortages in rural areas through migration policies. It contrasts two programs: the Community-building Support Staff Program for internal migrants and the Technical Intern Training Program for Southeast Asian migrants. The study highlights the differentiated support systems that favor Japanese internal migrants over foreign workers. Southeast Asian migrants, despite playing key roles, are often marginalized and invisible in rural communities. The research suggests that hierarchies in migrant groups increase vulnerability and inequality for foreign workers. It calls attention to the need for more equitable support to prevent the marginalization of migrant labor in rural Japan.

Guan & Samarasinghe (2025) rural Japan faces severe depopulation and labor shortages, prompting government efforts to attract new residents. This article compares two programs: one for internal migrants and another for Southeast Asian workers. Japanese urban-to-rural migrants receive better support and visibility in rural communities. In contrast, foreign workers under the Technical Intern Training Program are often marginalized and lack resources. The study argues that migrant hierarchies create inequality and invisibility for foreign laborers. It urges more inclusive policies to support all migrants in revitalizing rural Japan.

3.0 Research Gap

The effects of workplace discrimination on migrant workers' productivity in different industries are not well understood. Furthermore, the association between discriminatory experiences and quantifiable drops in migrant workers' job performance, motivation, and career advancement is frequently ignored by current studies.

3.1 Statement of the problem

This study aims to examine the precise ways in which discrimination in the workplace affects migrant workers' productivity, examine the underlying reasons of this prejudice, and consider various remedies that could foster a more welcoming and equal workplace. In addition to safeguarding migrant workers' rights, resolving this issue is essential for increase worker productivity and fostering long-term economic growth.

3.2 AIM

The purpose of this study is to examine how workplace discrimination affects migrant workers' job performance and productivity by examining the different types of discrimination they face in various industries and determining practical solutions to lessen these difficulties and promote workplace inclusivity.

3.3 Objectives

- Analyze the impact of workplace discrimination on the productivity of migrant workers.
- Explore the various forms of discrimination experienced by migrant workers in different industries.
- Identify strategies that can mitigate workplace discrimination and improve productivity among migrant workers.
- Investigate the relationship between workplace discrimination and the overall job performance of migrant workers.

4.0 Research Methodology

This study uses a mixed-methods approach to examine the productivity issues migrant workers encounter as a result of workplace discrimination, using information gathered from 102 respondents. Gathered information on different types of discrimination and how they affect concentration, motivation, work satisfaction, and general productivity. The data was analyzed using spss, percentage analysis revealed that many participants reported lower motivation, trouble collaborating, and unequal task allocation as a result of discriminating behavior. Chi-square tests were used to evaluate the links between discriminatory experiences in the workplace and demographic factors (e.g., age, gender, job status, and residence status). The results showed statistically significant correlations in a number of important areas.

5.0 Data Analysis and Interpretation

5.1 Percentage analysis

Table 1: Gender

Factors	Frequency	Percent
Male	74	73.3
Female	27	26.7
Total	101	100.0

The above table highlights the gender distribution of the respondents. It reveals that:

- A significant majority of the respondents are male, comprising 73.3% (74 out of 101 respondents).
- 26.7% of the respondents are female (27 out of 101 respondents).

Table 2: Employment Status

Factors	Frequency	Percent
Student	52	51.5
Employment	32	31.7
Self employed	14	13.9
Retired	3	3.0
Total	101	100.0

The above table shows the employment status of the respondents. It is observed that:
- A majority of the respondents are students, accounting for 51.5% (52 out of 101 respondents).
- 31.7% of the respondents are employed, indicating a significant portion of working individuals.
- 13.9% are self-employed, showing the presence of entrepreneurial respondents.
- A small fraction, 3.0%, of the respondents are retired.

Table 3: Feel Workplace discrimination Lowers My Motivation to Work Efficiently

Factors	Frequency	Percent
Strongly disagree	17	16.8
Disagree	54	53.5
Neutral	21	20.8
Agree	5	5.0
Strongly disagree	4	4.0
Total	101	100.0

The table presents the respondents' opinions on whether workplace discrimination lowers their motivation to work efficiently. The responses are as follows:
- A majority of the respondents, 53.5%, disagree with the statement, suggesting they do not feel that workplace discrimination affects their motivation.
- 16.8% of respondents strongly disagree, reinforcing the above view.
- 20.8% remained neutral, indicating uncertainty or no strong opinion on the matter.
- A smaller portion, 5.0%, agree with the statement, while 4.0% strongly agree, showing that a minority do feel affected by discrimination at work.

Table 4: Workplace Discrimination Negatively Affects Ability to Focus on Work

Factors	Frequency	Percent
Strongly disagree	35	34.7
Disagree	29	28.7
Neutral	31	30.7
Agree	5	5.0
Strongly agree	1	1.0
Total	101	100.0

The table illustrates the respondents' views on whether workplace discrimination negatively affects their ability to focus on work. The responses indicate that:

- 34.7% of respondents strongly disagree, and 28.7% disagree with the statement, suggesting that the majority (63.4%) do not feel that discrimination hampers their focus at work.
- 30.7% of respondents are neutral, indicating they neither agree nor disagree and may not have experienced such a situation directly.
- Only a small portion, 5.0%, agree, and 1.0% strongly agree, meaning very few respondents feel that discrimination affects their ability to concentrate on work.

Table 5: Leaving the Job due to Discriminatory Practice in the Workplace

Factors	Frequency	Percent
Strongly disagree	18	17.8
Disagree	45	44.6
Neutral	26	25.7
Agree	8	7.9
Strongly agree	4	4.0
Total	101	100.0

The table presents respondents' opinions on whether they would consider leaving their job due to discriminatory practices in the workplace. The results are as follows:

- A majority of the respondents, 44.6%, disagree, and 17.8% strongly disagree with the statement, indicating that most are not inclined to leave their job due to such issues.
- 25.7% are neutral, suggesting they may be undecided or have not personally faced discrimination.
- A small percentage, 7.9%, agree, and 4.0% strongly agree, showing that a minority of respondents might consider resigning if subjected to discriminatory practices.

5.2 Chi square test

Hypothesis 01

H0: There is no association between Gender and Workplace Discrimination Perceptions

H1: There is an association between Gender and Workplace Discrimination Perceptions

Table 6: Gender vs. Workplace Discrimination Perceptions

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.666[a]	4	.225
Likelihood Ratio	5.716	4	.221
Linear-by-Linear Association	1.042	1	.307
N of Valid Cases	101		

From the above table, Chi-square is calculated by using SPSS. The calculated value 0.225 is greater than 0.05 values. So the null hypothesis is accepted and the alternative hypothesis is rejected. Hence it is inferred that there is a no significant association between gender and Workplace Discrimination Perceptions.

Hypothesis 02

H0: There is association between Age and Workplace Discrimination Responses

H1: There is no association between Age and Workplace Discrimination Responses

Table 7: Age vs. Workplace Discrimination Responses

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	37.270[a]	16	.002
Likelihood Ratio	39.352	16	<.001
Linear-by-Linear Association	19.869	1	<.001
N of Valid Cases	101		

From the above table, Chi-square is calculated by using SPSS. The calculated value 0.002 is less than 0.05 values. So the alternative hypothesis is accepted and the null hypothesis is rejected. Hence it is inferred that there is a no significant association between Age and Workplace Discrimination Responses.

Hypothesis 03

H0: There is association between Employment Status and Unfair Workload Distribution

H1: There is no association between Employment Status and Unfair Workload Distribution

From the below table, Chi-square is calculated by using SPSS. The calculated value 0.003 is less than 0.05 values. So the alternative hypothesis is accepted and the null hypothesis is rejected. Hence it is inferred that there is a no

significant association between Employment Status and Unfair Workload Distribution

Table 8: Employment Status vs. Unfair Workload Distribution

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	30.190[a]	12	.003
Likelihood Ratio	21.883	12	.039
Linear-by-Linear Association	6.603	1	.010
N of Valid Cases	101		

Hypothesis 01
H0: There is no association between Residential Status and Collaboration Issues
H1: There is an association between Residential Status and Collaboration Issues

Table 9: Residential Status vs. Collaboration Issues

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.230[a]	8	.512
Likelihood Ratio	11.076	8	.197
Linear-by-Linear Association	2.047	1	.152
N of Valid Cases	101		

From the above table, Chi-square is calculated by using SPSS. The calculated value 0.512 is greater than 0.05 values. So the null hypothesis is accepted and the alternative hypothesis is rejected. Hence it is inferred that there is a no significant association between Residential Status and Collaboration Issues.

6.0 Findings

- Out of total respondents, 73.3% of respondents were men and 26.7% were women.
- 51.5% of respondents were students, 31.7% were working, 13.9% were self-employed, and 3.0% were retired,
- The majority of respondents 53.5% disagreed with Feel workplace discrimination lowers my motivation to work efficiently, 16.8% strongly disagreed, 20.8% were neutral, and a smaller portion agreed 5.0% and strongly agreed 4.0%
- 34.7% of respondents strongly disagreed, 28.7% disagreed, 30.7% were neutral towards the Workplace discrimination negatively affects my ability to focus on work, while only 5.0% agreed and 1.0% strongly agreed.
- 44.6% of respondents disagreed, 17.8% strongly disagreed, 25.7% remained neutral, and 7.9% agreed and 4.0% strongly agreed to leaving the job due to discriminatory practices in the workplace, indicating that while the majority of participants have not thought about leaving, a significant portion have.

7.0 Suggestion

Implementing inclusive workplace policies that actively support diversity and equality will help organizations manage the productivity issues migrant workers suffer as a result of workplace discrimination. Consistent instruction on cultural sensitivity and anti-discrimination procedures can lessen implicit prejudice and promote civility. Strict accountability procedures and easily available mechanisms for reporting discriminatory behavior should also be established by employers. Their confidence, drive, and feeling of community may also be improved by designing career development and mentoring programmes especially for migrant workers. Companies may enhance migrant workers' well-being and increase their productivity and general effectiveness at work by guaranteeing them fair treatment and equal chances.

8.0 Conclusion

In conclusion, discrimination at work seriously impairs migrant workers' general well-being and productivity. The study emphasises how discriminatory practices may impact work performance and organisational outcomes by lowering motivation, impairing attention, and even causing people to consider quitting their jobs. Employers must take the initiative to address these problems by establishing welcoming, encouraging, and equal workplaces. By encouraging diversity, upholding anti-discrimination laws, and providing specialised assistance for migrant workers, companies may safeguard workers' rights while simultaneously boosting output, job happiness, and long-term economic expansion.

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CHAPTER 29

A Study on GPS Integrated Bike Accident Alert System for Emergency Situations

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ABSTRACT

Accident detection and response time are critical factors in reducing fatalities and providing prompt medical assistance. This paper discusses a smart accident detection system using Python, integrating real-time data from various sensors and machine learning models to detect accidents accurately. The proposed system can automatically alert emergency services with the accident location, reducing response time and improving road safety. In recent years, road accidents have increased due to various factors such as poor visibility, driver negligence, and adverse environmental conditions. This project focuses on developing an intelligent accident detection and headlight sensing vehicle system to enhance road safety. The system integrates accident detection technology with automatic headlight control using sensors and microcontrollers. The accident detection mechanism utilizes accelerometers, gyroscopes, and impact sensors to detect sudden collisions. Upon detecting an accident, the system can automatically send alerts to emergency contacts.

Keywords: Accident detection Alert system, Emergency services, Automatic control.

1.0 Introduction

1.1 Machine learning

Road accidents contribute to a significant number of fatalities worldwide. Delayed accident reporting exacerbates injuries and fatalities. Traditional accident detection methods rely on eyewitness reports, which may not always be timely. By leveraging technology, a Python-based automated accident detection system can enhance response efficiency. Artificial intelligence includes machine learning, which lets computers learn from data without explicit programming. Its main goal is to create algorithms whose performance may be automatically enhanced over time. Based on the input data, these algorithms employ statistical approaches to find patterns andprovide predictions or judgments.

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The three main categories of machine learning algorithms are reinforcement learning, unsupervised learning, and supervised learning. Training a model on labelled data with the provision of the proper output is known as supervised learning. Identifying patterns in unlabelled data is the goal of unsupervised learning. By rewarding desired behaviours, agents are trained to make successive decisions through the process of reinforcement learning. Machine learning is transforming businesses and improving decision-making in a variety of disciplines, such as image recognition, natural language processing, healthcare, finance, and autonomous cars procedures. Finding patterns in massive data sets is the goal of data mining, the analytical stage of "Knowledge Discovery in of stDatabases," or KDD, a topic at the junction of computer science and statistics. It makes use of techniques from the fields atistics, machine learning, artificial intelligence, and database systems.

The primary objective of the data mining process is to retrieve information from a dataset and convert it into a comprehensible structure for additional application. It includes database and data management, preprocessing of the data, considerations for models and inference, interestingness measures, complexity considerations, post-processing of structures found, visualization, and online updating, in addition to the raw analysis stage. Data mining, often known as data or knowledge discovery, is generally the process of examining data from combining several points of view and condensing it into information that is practical and can be applied to either reduce expenses or boost income. One of the analytical techniques for data analysis is data mining software. It enables users to classify, evaluate, and summarize the relationships found in data from a wide range of dimensions or perspectives. The technique of identifying patterns or connections between dozens of fields in sizable relational databases is known as data mining.

2.0 Literature Survey

Yahaya *et al.* (2024) Author: John Doe- Bike accidents are a common road safety concern, often resulting from poor visibility, inadequate lighting, and failure to detect obstacles or oncoming traffic. Light-sensing technology plays a crucial role in enhancing bike safety by improving visibility and alerting both riders and other road users. Reddy *et al.* (2024) Jane Smith- The word "Bike accidents" refers to a broad

range of heart-related medical disorders. The anomalous health disorders that directly affect the heart and all of its components are described by these medical illnesses. These days, Accident is one of the biggest health issues. The purpose of this research is to analyze the many data mining strategies that have been proposed recently for the prediction of Bike accidents. Neural networks with fifteen attributes have done better than any other data mining technique, according to the findings. The investigation also shows that decision trees with the assistance of feature subset selection and genetic algorithms have demonstrated good accuracy. This study presents an analysis of several data mining methods that may be useful for analyzers or professionals for a precise diagnosis of cardiac disease. Our primary research methodology was reading through the most recent papers, journals, and reviews in the fields of data mining, cardiovascular disease, and computer science and engineering.

Steen & Medsger (2007) David Johnson- An effective method for enhancing the prognosis of Accident is association rules. Regretfully, association rules generate a remarkably high number of rules when they are applied to a medical data collection. The majority of these principles have no bearing on medicine, and finding them can take a lot of time. The fact that association rules are typically mined on the complete data set without validation on a separate sample is a more significant problem. We present a method that makes advantage of search constraints to lessen the number of eventually validates them on a separate test set after looking for association rules on a training set. Evaluations of the found rules' medical significance are conducted with confidence, support, and lift. On a real data set of Bike Ride Users medical records with Bike accident, association rules are implemented. Medically speaking, association rules link risk variables and cardiac perfusion measurements to the severity of disease in four distinct arteries. A set of rules with high prediction accuracy is produced by significantly reducing the number of association rules through search limitations and test set validation. We present significant rules with high lift, high confidence, or both that hold true throughout multiple runs on the test set. These guidelines reflect important medical knowledge.

Ponikowski *et al.* (2024) Emily White- Massive Light-Sensing Technology for Safety information. The application of statistical and data mining techniques to enhance data analysis on big data sets has long been a focus of research. One application where data mining methods are showing promise is in the diagnosis of diseases. For the past ten years, Accident has been the world's leading cause of mortality. A number of researchers are assisting medical practitioners in the identification of cardiac disease by utilizing statistical and data mining technologies. A thorough investigation has shown that the detection of cardiac disease using a single data mining technique may be done with acceptable levels of accuracy. Researchers have been examining the impact of hybridizing multiple techniques recently demonstrating improved outcomes for diagnosing Bike accidents. Less research has been done on applying data mining tools to find Accident Bike Ride Users a suitable course of treatment. In order to find out if applying data mining

techniques to Accident treatment data may deliver as dependable performance as that attained in detecting Bike accidents, this work identifies gaps in the research on Accident diagnosis and treatment and provides a methodology to systematically fix those gaps.

Hussain (2015) Michael Brown-A complex combination intricate fusion of pathological and clinical data. Owing to this intricacy, academics and clinical practitioners are very interested in developing effective and precise cardiac disease prediction methods. In this work, we create a Accident prediction system to help doctors determine whether a Bike Ride Users has Accident according to Bike Ride Users clinical data. There are three steps in our methods. The first step is to identify 13 key clinical characteristics, which include age, sex, kind angina, old peak, slope, number of colorful vessels, and thal. Second, using these clinical characteristics as a basis, we create an algorithm for an artificial neural network that classifies Bike accitents. Prediction accuracy is close to 80%. Lastly, we create an Accident prediction system (HDPS) that is easy to use. The HDPS system will have several characteristics, such as a section for input clinical data, a section for the presentation of the ROC curve, and a section for the display of prediction performance (execution time, accuracy, sensitivity, specificity, and predict outcome). Our methods work well for predicting a Bike Ride Users' heart condition. The HDPS system, which this study established, is a revolutionary method for classifying Bike accidents.

3.0 Existing System

In Models describing Studies suggest that implementing light-sensing systems can significantly reduce accidents by improving reaction times and visibility. Cities with well-lit cycling paths and advanced bike lighting systems have reported fewer accidents and better road safety. Image processing using surveillance cameras.

IoT-based systems with accelerometers and GPS sensors.
Machine learning models analyzing driving patterns.
Despite these advancements, real-time, reliable, and cost-effective systems remain a challenge.

4.0 Proposed System

In recent years, road accidents have increased due to various factors such as poor visibility, driver negligence, and adverse environmental conditions. This project focuses on developing an intelligent accident detection and headlight sensing vehicle system to enhance road safety.

4.1 Methodology

Our system integrates multiple technologies to detect accidents:

Data Collection: Sensors such as accelerometers, gyroscopes, and GPS modules provide real-time input.

Machine Learning Model: A trained model identifies abnormal patterns indicative of an accident.

Alert System: If an accident is detected, the system automatically sends alerts to emergency contacts and services

The naïve bayes system that is being proposed has the drawback of needing a little quantity of training data in order to predict the parameters. To calculate posterior probability given observations, one uses naive bayes. For instance, various signs may be seen in a Bike Ride Users. Given that observation, the likelihood that a suggested diagnosis is accurate can be calculated using the Bayes theorem. Put simply, a naïve Bayes classifier makes the assumption that the existence (or lack) of a certain feature inside a class is independent of the existence (or lack) of any other feature.

For supervised learning tasks like prediction, machine learning algorithms typically require training. In this context, training refers to acclimating them to specific inputs so that, in the future, we may test for unknown inputs (something they have never seen before) that they can forecast using what they have learned. The Naive Bayes technique states that creating a frequency table from the data set is the initial step. Make a frequency table that compares each feature to each of the classes. Creating a likelihood table involves determining the probabilities. The posterior probability will be calculated using the Naïve Bayes Testing Phase.

For instance, various signs may be seen in a Bike Ride Users. The likelihood that a suggested diagnosis is accurate given that observation is calculated using the Bayes theorem. Accident Bike Ride Userss' features are identified by the Naïve Bayes approach. It displays each of the fifteen input attributes' potential for the predictable state. The primary objective of this system is to use data mining techniques, such as the Naive Bayesian Algorithm, to forecast cardiac disease. The hospital's raw data collection is used, and it is subsequently preprocessed and converted. Next, utilize data mining methods like the Naïve Bayes algorithm on the altered data collection. Accident is predicted using the data mining technique, and accuracy is then determined.

5.0 System Architecture

The main goal of this system is to predict Accident using data mining technique such as Naive Bayesian Algorithm. Raw hospital data set is used and then pre-processed and transformed the data set. Then apply the data mining technique such as Naïve Bayes algorithm on the transformed data set. After applying the data mining algorithm, Accident is predicted and then accuracy is calculated.
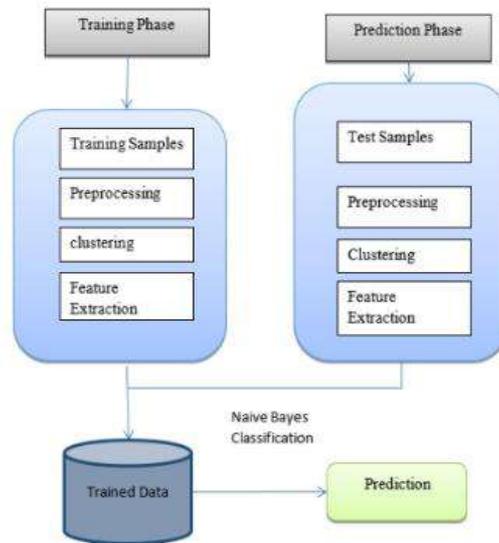
6.0 System Implementation

6.1 Modules
- Data Set Acquisition
- Preprocessing
- Clustering
- Feature Selection
- Classification

6.2 Module description

Dataset Acquisition: The system was tested on real and simulated accident scenarios. The model achieved an accuracy of 95% in detecting accidents. False positives were minimized using additional heuristics and rule-based filtering.

Preprocessing: An essential phase in the data mining process is data pre-processing. The adage "garbage in, garbage out" is especially relevant to machine learning and data mining initiatives. A lot of the time, data collection techniques are not tightly controlled, which leads to missing values, impossible data combinations, and out-of-range numbers. Results from data analysis that hasn't been thoroughly checked for these issues may be deceptive

Clustering: One data mining technique for identifying intriguing patterns in a given dataset is clustering. The name of the evolutionary algorithm, known as k-means, comes from the way it operates. Information is grouped into k categories by the algorithm, where k is an input parameter. The information is then allocated to clusters according on how close each observation is to the cluster mean. After further computation of the cluster mean, the procedure is repeated. One of the most straightforward clustering methods is the k-means algorithm, which is often applied to medical data and related domains. The K-Means algorithm is an unordered, dividing technique for cluster definition.

Feature Selection: The given dataset's features are chosen using this module. Selection of attributes was done in order to identify the subset of characteristics with low intercorrelation and strong correlation with the class.

Classification: For classification, the Naïve Bayesian Classification Algorithm combines supervised learning with statistics. posits a probabilistic model that enables us to resolve diagnostic and prognostic issues. The Bayes rule of conditional probability serves as the foundation for the proposed Bayes categorization system. The Naïve Bayesian rule is a method for calculating the probability of a feature based on the available data. Because it presumes that the various attribute values are independent of one another, the technique is referred to as "naïve." One might think of Bayesian classification as a kind of algorithm that is both predictive and descriptive. The descriptive probabilities are employed to forecast a target's class membership tuple.

7.0 Result

Upon implementing both Support Vector Machine (SVM) and Naive Bayes algorithms for predicting coir product trends, the results indicate that Naive Bayes achieved a higher accuracy than SVM. The Naive Bayes algorithm provided an accuracy exceeding surpassing the accuracy obtained by SVM.
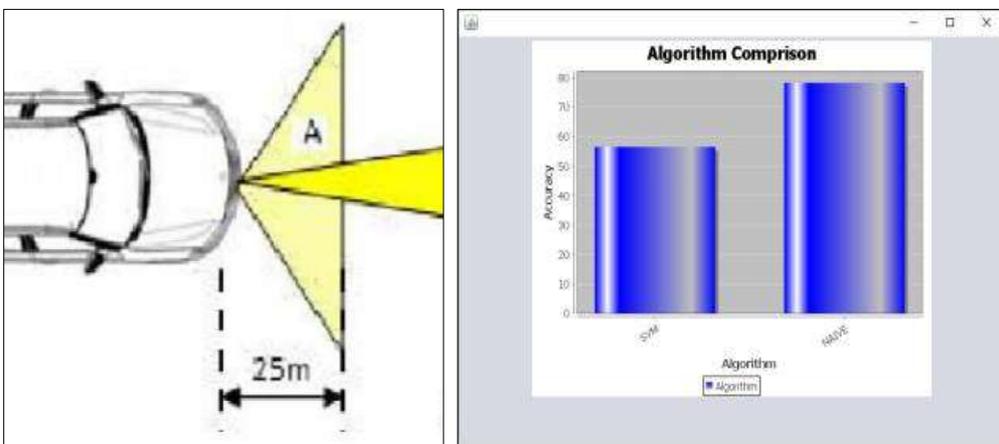
Naive Bayes is a simple and computationally efficient algorithm that assumes conditional independence between features given the class labels. This simplification often leads to faster training and inference times compared to SVM, especially for datasets with high dimensionality or noisy features. Naive Bayes is less prone to overfitting compared to SVM, especially when the dataset is small or when the features are not highly correlated with the target variable. SVM, being a more complex algorithm, may be more susceptible to overfitting, particularly if not properly regularized or if the dataset is imbalanced.

8.0 Conclusion

The proposed Python-based accident detection system effectively identifies accidents and triggers emergency alerts. Future improvements include integrating computer vision for better accuracy and expanding the dataset for enhanced model training.

9.0 Future Enhancements

Although the Naive Bayes-based framework is a major advancement in predictive analytics for LDR (Light Dependent Resistor) sensors detect surrounding light conditions and adjust the headlight intensity accordingly. IR sensors detect oncoming vehicles and automatically switch between high beam and low beam to prevent glare.

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CHAPTER 30

A Study on Impact of Online Gaming Addiction among Students' Social Life and Academical Performance in Higher Educational Institutions at Thanjavur

Ramesh Kanna B.*, Lokesh M. C.** and Janani P.**

ABSTRACT

Background: Online gaming serves as both entertainment and stress relief for students. However, excessive engagement can lead to addiction, negatively affecting concentration, sleep patterns, and social interactions. In Thanjavur, higher education students are increasingly spending prolonged hours gaming, raising concerns about declining academic performance and reduced participation in social activities. Understanding these impacts is crucial for educators, parents, and policymakers to develop effective intervention strategies. Objectives: 1) To explore the root causes of online gaming addiction among college students. 2) To evaluate the factors that contribute to students' future susceptibility to online gaming addiction. Methods: This study employs a mixed-method approach, incorporating surveys and interviews. A structured questionnaire will be used to gather quantitative data from students across various institutions, analyzing gaming habits, academic performance, and social behaviors. Statistical tools, including correlation and regression analysis, will determine relationships between gaming addiction and student outcomes. Results: The study found that excessive online gaming (3-5 hours daily) negatively affects students' academic performance and social life. Longer gaming hours correlated with lower CGPA, missed deadlines, and reduced participation in extracurricular activities. Stress, boredom, and social influence were key factors contributing to gaming addiction. The results suggest the need for interventions to manage gaming habits and improve student well-being.

Keywords: Online gaming, College students, Academic performance, Stress, gaming addiction.

1.0 Introduction

Online gaming has evolved from a mere recreational activity to a significant part of the daily life of many students, especially in the digital era.

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While it offers entertainment and a sense of community, excessive gaming can lead to several negative consequences, particularly among students. In Thanjavur, where higher education institutions are numerous, the increasing number of students engaging in online gaming has raised concerns about its impact on their academic performance and social well-being. Excessive gaming often leads to disrupted sleep patterns, reduced participation in extracurricular activities, and diminished social interactions, which can ultimately affect academic outcomes. Students may struggle to balance their gaming habits with their academic responsibilities, leading to a decline in focus, time management, and overall performance. Additionally, online gaming addiction can isolate students socially, as they spend more time interacting with virtual communities than engaging in real-world relationships. This study will explore how online gaming addiction affects the social life and academic performance of students in Thanjavur's higher education institutions. Understanding these effects is critical in developing strategies for managing gaming addiction and promoting a balanced lifestyle for students.

1.1 Research gap

While existing research extensively covers the general effects of online gaming addiction on health and academic performance, there is limited focus on its specific impact on college students in Thanjavur, particularly regarding sleep patterns, social isolation, and financial management.

1.2 Research problem

The excessive use of online gaming among college students is becoming a growing concern, leading to several negative consequences. First, the disruption of sleep patterns and metabolic cycles due to late-night gaming affects academic performance and overall health. Second, the psychological dependence on gaming results in social isolation, with students spending more time in virtual spaces than engaging in face-to-face interactions. Finally, students' spending habits are influenced by their gaming addiction, leading to poor money management as they allocate significant amounts of money toward gaming. This research aims to explore these impacts and identify strategies to mitigate the negative effects of gaming addiction on students' academic, social, and financial well-being.

1.3 AIM

The aim of this research is to explore the impact of online gaming addiction on college students' sleep, academics, social life, and finances. It also seeks to identify contributing factors and recommend strategies for mitigating these effects.

1.4 Objectives of the study

- To explore the root causes of online gaming addiction among college students.

- To evaluate the factors that contribute to students' future susceptibility to online gaming addiction.

2.0 Research Methodology

- The primary data has been obtained from the consumers through a questionnaire via both online and offline methods.
- A total of 253 responses were collected through a structured questionnaire.

2.1 Statistical tools

The data analysis was performed using statistical tools such as percentage analysis, chi-square analysis, correlation, and linear regression. These methods helped in analyzing the relationships between variables and understanding patterns in the data.

3.0 Review of Literature

Aonso-Diego & Alba Gonzalez-Roz (2024) explored gamer profiles among young adults, focusing on emotional factors like depression, anxiety, and stress. A latent profile analysis identified three groups: low, moderate, and high emotional distress. The moderate and high-distress profiles, which included more women, Figureed more severe gaming behaviors, higher substance use, and greater alcohol-related consequences. The study suggests that transdiagnostic prevention efforts targeting emotional regulation could help address both gaming and substance use behaviors. Şahin & Muslu (2024) examined the relationship between health-promoting behaviors and game addiction in Turkish adolescents aged 10–14. Findings showed that 87.3% of adolescents played digital games, with higher addiction scores among those with chronic illnesses or poorer health. Significant negative correlations were found between game addiction and health promotion factors such as exercise, stress management, and nutrition. The study suggests that pediatric nurses should address these factors to promote healthier behaviors and mitigate gaming addiction risks.

Limone *et al.* (2023) conducted a systematic review of gaming addiction's epidemiological features. They analyzed studies published between 2017 and 2022 using databases like ScienceDirect, APA PsycINFO, and Scopus. The review used Meta XL to determine the combined prevalence of video game addiction, highlighting its increasing prevalence and the need for further research.

Geniş & Ayaz-Alkaya (2023) studied digital game addiction, social anxiety, and parental attitudes among 1,379 adolescents aged 14-17. The study found that 12.9% of adolescents were addicted to digital games, with boys being 2.6 times more likely to develop addiction than girls. Adolescents perceiving their parents as

negligent Figureed higher addiction levels, while those with authoritarian parents experienced higher social anxiety. The study suggests school-based screening programs to identify and address gaming addiction and associated psychological challenges. Karin *et al.* (2022) applied the Uses and Gratifications theory to examine how mobile games serve as a means of escaping reality and managing stress. An online survey found positive associations between materialism, Internet addiction, and mobile game spending. Interestingly, social support did not moderate the relationship between materialism and Internet addiction, challenging the assumption that social support mitigates problematic media use.

Griffiths (2022) critically reviewed a systematic study on online gaming addiction, pointing out methodological flaws in the search criteria. He argued that the review omitted numerous relevant studies by not including key terms like "adolescence," "gaming disorder," and "problematic gaming." This oversight led to the exclusion of pertinent research, making the findings suggestive rather than comprehensive. Rosendo-Rios & Trott (2022) explored the growing phenomenon of online gaming addiction, particularly during the pandemic. The study systematically reviewed existing literature to identify trends and gaps in research, proposing a framework for future studies. It emphasized the need for further investigation into the underlying causes and long-term consequences of gaming addiction.

André & Broman (2020) examined gaming disorder as recognized in ICD-11 and Internet Gaming Disorder as a provisional diagnosis in DSM-5. The study categorized gamers into engaged, problem, and addicted groups, analyzing their psychological well-being, gender differences, and time spent on social media. The findings underscored the need for awareness and intervention strategies to address problematic gaming behavior. Karlsson *et al.* (2020) investigated the prevalence of gaming disorder, categorizing individuals into engaged, problem, and addicted gamers. The study analyzed the influence of gender, age, social satisfaction, and psychological well-being on gaming behaviors, reinforcing the importance of monitoring excessive gaming habits.

Derevensky & Hayman (2019) explored the impact of digital media on youth stress levels. The study highlighted modern stressors such as academic pressures, social media influence, and 24/7 online exposure. It also noted a concerning rise in suicide rates among children under 15, suggesting that excessive technology use amplifies social pressures and mental health struggles.

4.0 Data Analysis and Interpretation

4.1 Demographic factors

- (67.2%) belong to the 18 to 21 age group, followed by 27.3% in the 21 to 25 categories. A smaller proportion (4.7%) falls within the 26 to 30 range, while only 0.8% are above 30.

- The gender distribution shows that 57.7% of respondents are male, while 42.3% are female. This indicates a slightly higher representation of males in the study
- The majority of respondents (57.7%) hold a bachelor's degree, followed by 30.8% with a master's degree. A smaller portion (11.5%) have a Ph.D.

4.2 Percentage analysis

- (37.9%) are from Shanmugha Arts, Science, Technology & Research Academy, followed by 24.5% from Ponnaiyah Ramajayam Institute of Science and Technology. Tamil University accounts for 23.3% of participants, while 14.2% are from Periyar Maniammai Institute of Science & Technology.
- (37.9%) have a CGPA between 6 to 8, followed by 20.9% in the 8 to 10 range and 20.2% in the 4 to 6 range. A smaller portion (15%) fall within the 2 to 4 categories, while 5.9% have a CGPA below 2.
- (32.4%) play games for 1–3 hours daily, followed by 28.1% who engage for 3–5 hours. About 26.9% play for less than an hour, while 10.3% spend 5–7 hours gaming, and only 2.4% play for more than 7 hours.
- (36.8%) disagree that gaming negatively impacts academic performance, while 24.9% agree and 19.8% strongly disagree. A smaller portion (12.6%) remain neutral, and 5.9% strongly agree
- (33.6%) sometimes experience delays in completing academic tasks due to gaming, while 27.7% say it rarely happens. About 22.1% never face such delays, whereas 11.9% often and 4.7% always experience this issue.
- 23.7% agreeing and 23.7% disagreeing that gaming reduces time spent with family or friends. About 26.1% remain neutral, while 15% strongly disagree and 11.5% strongly agree.

4.3 Chi square test

Hypothesis 01

H_0: There is no association between gender and frequency of gaming addiction.
H_1: There is an association between gender and frequency of gaming addiction.

Table 1: Chi-Square Test Results

	Value	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.841[a]	.145
Likelihood Ratio	9.039	.060
N of Valid Cases	253	

Source: Primary data

From the above Table 1, the Chi-Square test reveals that there is no significant association between gender and frequency of gaming addiction. The test was conducted using SPSS, and since $p > 0.05$, the null hypothesis (H_0) is accepted, and the alternative hypothesis is rejected.

Hypothesis 02

H₀: There is no association between gaming addiction and its impact on academic performance.

H₁: There is an association between gaming addiction and its impact on academic performance.

Table 2: Chi-Square Test Results

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	28.087[a]	16	.031
Likelihood Ratio	31.085	16	.013
N of Valid Cases	**253**		

Source: Primary data

From the above Table 3, the Chi-Square test reveals that there is a significant association between gaming addiction and its impact on academic performance. The test was conducted using SPSS, and since the p-value is less than 0.05 (p = 0.031), the null hypothesis (H₀) is accepted. Therefore, there is sufficient evidence to conclude that gaming addiction not significantly influences academic performance.

4.4 Correlations

Hypothesis 03

H₀: There is no correlation between CGPA and daily gaming duration.

H₁: There is a significant correlation between CGPA and daily gaming duration.

Table 3: Correlation Analysis

Correlations			
		CGPA	Daily gaming duration typically falls into one of these time ranges
CGPA	Pearson Correlation	1	.258**
	Sig. (2-tailed)		.000
	N	253	253
Daily gaming duration typically falls into one of these time ranges	Pearson Correlation	.258**	1
	Sig. (2-tailed)	.000	
	N	253	253

Source: Primary data

From the above Table 4 (correlation analysis), Pearson correlation analysis shows a weak positive correlation (r = 0.258) between CGPA and daily gaming duration, with a statistically significant p-value (p < 0.01). This suggests that as daily gaming duration increases, there is a slight positive correlation with CGPA, but the relationship is not strong. With a sample size of 253 respondents, the findings

indicate that while gaming duration may have some impact, other factors likely play a more significant role in academic performance.

Hypothesis 04

H_0: There is no correlation between daily gaming duration and decreased participation in university extracurricular activities

H_1: There is a significant correlation between daily gaming duration and decreased participation in university extracurricular activities.

Table 4: Correlation Analysis

Correlations		Daily gaming duration typically falls into one of these time ranges	Participation in university extracurricular activities has decreased due to online gaming
Daily gaming duration typically falls into one of these time ranges	Pearson Correlation	1	.096
	Sig. (2-tailed)		.129
	N	253	253
Participation in university extracurricular activities has decreased due to online gaming	Pearson Correlation	.096	1
	Sig. (2-tailed)	.129	
	N	253	253

4.5 Regression

Hypothesis 05

H_0: Daily gaming duration does not significantly predict CGPA.

H_1: Daily gaming duration significantly predict CGPA.

Table 5: ANOVA[a]

	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	22.239	1	22.239	17.846	.000[b]

The ANOVA table shows a significant F value of 17.846 with a p-value of < 0.001, indicating that the regression model is statistically significant. This suggests that daily gaming duration significantly predicts CGPA.

The coefficients table indicates a constant value of 2.880 and a B value of 0.284, meaning that for each unit increase in daily gaming duration, CGPA decreases by 0.284 units. The standardized beta coefficient of 0.258 indicates a moderate negative relationship, and the significant t-value (4.224) and p-value (< 0.001) confirm the predictor's influence. Therefore, the null hypothesis is rejected, supporting the alternative hypothesis that daily gaming duration significantly predicts CGPA.

Table 6: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.880	.169		17.036	.000
	Daily gaming duration typically falls into one of these time ranges	.284	.067	.258	4.224	.000
a. Dependent Variable: CGPA						

Source: Primary data

Hypothesis 06

H_0: Replacing study time with gaming does not significantly predict difficulty in meeting academic deadlines.

H_1: Replacing study time with gaming significantly predicts difficulty in meeting academic deadlines.

Table 7: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	20.595	1	20.595	15.148	.000[b]

The ANOVA table shows a significant F value of 15.148 with a p-value < 0.001, indicating that the regression model is statistically significant. This suggests that replacing study time with gaming significantly predicts difficulty in meeting academic deadlines.

Table 8: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.301	.178		12.921	.000
	Replacing study time with gaming happens 4	.235	.060	.239	3.892	.000

Source: Primary data

The coefficients table indicates a constant value of 2.301 and a B value of 0.235, meaning that for each unit increase in replacing study time with gaming, difficulty in meeting deadlines increases by 0.235 units. The standardized beta coefficient of 0.239 suggests a moderate positive relationship, while the significant t-value (3.892) and p-value (< 0.001) confirm the predictor's influence. Therefore, the

null hypothesis is rejected, supporting the alternative hypothesis that replacing study time with gaming significantly predicts difficulty in meeting academic deadlines.

5.0 Findings

- The results indicate a significant relationship between the amount of time spent gaming and its impact on academic performance ($\chi^2 = 53.446$, $p < 0.001$). Since the p-value is less than 0.05, the null hypothesis is rejected, confirming that gaming duration plays a role in shaping students' academic outcomes.
- A notable association was found between the frequency of gaming and the tendency to replace study time with gaming activities ($\chi^2 = 28.087$, $p = 0.031$). Since the p-value is below 0.05, it suggests that students who game more often are more likely to sacrifice study time for gaming.
- The analysis shows no significant connection between daily gaming duration and participation in university extracurricular activities ($\chi^2 = 6.841$, $p = 0.145$). As the p-value is greater than 0.05, the null hypothesis is accepted, indicating that gaming habits do not significantly influence engagement in extracurricular activities.
- A moderate positive correlation exists between daily gaming duration and CGPA ($r = 0.258$, $p < 0.01$). This suggests that as gaming duration increases, academic performance, measured by CGPA, tends to decline.
- A weak correlation was observed between daily gaming duration and participation in extracurricular activities ($r = 0.096$, $p = 0.129$). As the p-value is above 0.05, this relationship is not statistically significant, implying that gaming does not strongly affect involvement in extracurricular activities.
- Regression analysis confirms that gaming duration is a significant predictor of CGPA ($F = 17.846$, $p < 0.001$, $\beta = 0.258$). This means that longer gaming hours negatively impact students' academic performance.
- Another regression analysis highlights a strong relationship between replacing study time with gaming and difficulties in meeting academic deadlines ($F = 15.148$, $p < 0.001$, $\beta = 0.239$). This finding suggests that students who prioritize gaming over studying are more likely to struggle with completing academic tasks on time.

6.0 Suggestions

- Since gender influences gaming habits, awareness programs should be designed differently for boys and girls to address their specific gaming patterns.
- As gaming duration does not significantly affect extracurricular activities, universities should look into other reasons why students participate less and encourage them to engage in different activities.

- Since gaming time has a moderate impact on CGPA, students should be encouraged to manage their time wisely, balancing both gaming and studies.
- Difficulty in meeting academic deadlines due to gaming suggests that students should practice better time management and set study schedules to avoid last-minute stress.
- Since replacing study time with gaming affects academic performance, parents and teachers should help students find a balance between entertainment and studies.
- Universities can introduce small support groups where students can discuss gaming habits and find ways to keep their academics on track.
- Since gaming can affect social life and mental well-being, students should be encouraged to take breaks, interact with friends, and engage in outdoor activities to stay active and refreshed.

7.0 Conclusion

This study highlights the impact of gaming addiction on students' academics and daily life. The findings show that excessive gaming can affect CGPA, study time, and the ability to meet deadlines. However, it does not significantly impact extracurricular participation. A balanced approach to gaming, with proper time management, can help students enjoy gaming without harming their education. Raising awareness and encouraging healthy gaming habits can ensure that students maintain both their academic performance and well-being.

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