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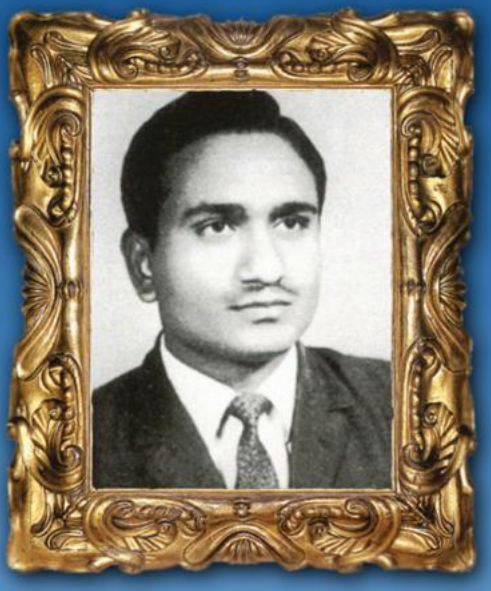
A TRUE VISIONARY

"You see things and you say **Why***? But I dream of things that never were and say* **Why** *not?"*

- George Bernard Shaw



Shri Jagannath Gupta
(1950 - 1980)

Also a true visionary...who dared to dream!
He lives no more but his dreams live on....and on!

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And more dreams to come!

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Editor's Desk

Emerging Perspectives in Business, Technology, and Sustainability

The contemporary business landscape is undergoing a profound transformation, driven by rapid technological advancement and an urgent global focus on sustainability. No longer can organizations afford to view profitability, innovation, and social responsibility as separate pursuits. Instead, the convergence of business strategy, technology, and sustainability has emerged as a defining paradigm of modern enterprise.

Technology has become a powerful enabler of this shift. Artificial intelligence, data analytics, automation, and digital platforms are reshaping how businesses operate, make decisions, and engage with stakeholders. Beyond efficiency and scale, these technologies are increasingly being leveraged to address complex societal challenges—optimizing resource use, reducing waste, improving supply chain transparency, and enabling inclusive access to services.

At the same time, sustainability has evolved from a compliance-driven obligation to a strategic imperative. Climate change, resource scarcity, and social inequities are compelling organizations to rethink value creation itself. Investors, consumers, regulators, and employees now expect businesses to demonstrate measurable environmental and social impact alongside financial performance. Concepts such as ESG, circular economy, and shared value are no longer peripheral; they are central to long-term resilience and competitiveness.

Emerging perspectives emphasize integration rather than trade-offs. Businesses that successfully align technological innovation with sustainable goals are better positioned to drive responsible growth. This integration calls for new leadership mindsets, interdisciplinary skills, and educational models that prepare future managers to navigate uncertainty with ethical clarity and strategic foresight.

As we move forward, the challenge lies not merely in adopting new technologies or sustainability frameworks, but in embedding them into the core purpose of organizations. The future belongs to enterprises that view innovation as a means to create enduring value—for businesses, society, and the planet alike.

Ram Kumar Mishra

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AI-DRIVEN TRANSFORMATION IN HIGHER EDUCATION: A QUANTITATIVE ANALYSIS USING SEM

Dr. Kanishka Sethi* Dr. Nidhi Gupta Mr. Nitin Goel*****

The rapid proliferation of Artificial Intelligence (AI) is fundamentally reshaping the Indian higher education landscape, moving institutional adoption from a strategic advantage to a systemic necessity. This study investigates the intricate socio-technical dynamics governing AI integration by utilizing Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyse data from 582 stakeholders across diverse Indian HEIs. The research evaluates a multi-stage causal framework, emphasizing how Performance Expectancy (PE) and Effort Expectancy (EE) significantly cultivate positive stakeholder attitudes. Findings reveal that while Attitude (ATT) and Behavioural Intention (BI) serve as powerful determinants for the actual Adoption of Academic Higher Education technology (AAHE), Perceived Risk (PR) and Facilitating Conditions (FC) exert surprisingly minimal direct influence on user sentiment. Furthermore, the analysis identifies Age and Job Description as critical moderators, suggesting that targeted professional development and demographic-specific interventions are essential for scaling AI. These empirical insights offer a strategic roadmap for policymakers to bridge the gap between AI's theoretical potential and its practical realization.

Keywords : Artificial Intelligence , Behavioural Intention, Educational Transformation, Higher Education Institutions (HEIs), PLS-SEM, Technology Acceptance Model (TAM)
JEL Code: *I21, I23 , O33*

I. Introduction

Artificial Intelligence (AI) has emerged as a transformative force across various industries, redefining processes, decision-making, and user experiences. The domain of higher education is increasingly influenced by AI, with institutions worldwide adopting AI-driven solutions to enhance administrative efficiency, personalize learning, and improve institutional decision-making (Dwivedi et al., 2021). In the Indian higher education landscape, which serves a vast and diverse student population, the adoption of AI is not merely an option but an imperative to ensure that institutions remain competitive, relevant, and aligned with global educational standards. However, the adoption and integration of AI in Indian higher education institutions (HEIs) present unique challenges shaped by economic constraints, digital infrastructure, stakeholder attitudes, and policy frameworks.

This study aims to explore AI's transformative potential within Indian higher education and examine the critical factors influencing its adoption. Specifically, it investigates three interrelated research questions: (1) How would AI applications impact India's higher education system? (2) What are the antecedents impacting stakeholders' attitudes toward AI adoption in Indian HEIs? (3) Can stakeholders' behavioral intentions influence AI adoption? The study employs a robust quantitative methodology using Structural Equation Modeling (SEM) to provide empirical insights into the relationships between these variables. The findings have significant implications for policymakers, institutional leaders, and academic stakeholders, offering a roadmap for AI adoption in Indian higher education.

1.1. The Imperative of AI Adoption in Indian Higher Education

The Indian higher education system, one of the largest in the world, comprises over 1,000 universities and 40,000 colleges, catering to millions of students across diverse disciplines (Joshi et al., 2023). The system, however, faces persistent challenges, including faculty shortages, outdated pedagogical

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practices, administrative inefficiencies, and limited access to quality education in rural and semi-urban areas. AI has the potential to address these challenges by introducing intelligent automation, data-driven decision-making, and personalized learning experiences (Zawacki-Richter et al., 2019). AI-powered solutions such as intelligent tutoring systems, automated grading, predictive analytics for student performance, and AI-enabled virtual assistants are already gaining traction in global education markets and are gradually making their way into Indian HEIs (Holmes et al., 2022).

Despite these advancements, AI adoption in India remains sporadic and largely limited to premier institutions with access to better funding and technological resources (Sharma & Saini, 2021). The integration of AI at scale requires an in-depth understanding of stakeholder attitudes and behavioral intentions, as their acceptance and willingness to engage with AI-driven educational tools play a crucial role in successful implementation. This study, therefore, aims to provide an empirical understanding of these dynamics, helping bridge the gap between AI's potential and its practical realization in Indian HEIs.

1.2. AI's Transformative Impact on Higher Education: A Theoretical Perspective

The potential of AI to revolutionize education is well documented in literature, with researchers highlighting its role in enhancing teaching efficiency, student engagement, and institutional decision-making (Dwivedi et al., 2021). The Technology Acceptance Model (TAM) (Davis, 1989) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) offer theoretical frameworks to examine how individuals perceive and adopt AI technologies in education. According to these models, factors such as perceived usefulness, perceived ease of use, social influence, and facilitating conditions significantly impact technology adoption.

In the Indian context, additional factors such as cultural attitudes toward automation, regulatory frameworks, and institutional readiness must be considered (Kumar et al., 2022). Moreover, ethical concerns related to data privacy, AI bias, and the potential displacement of human educators further complicate the discourse on AI adoption in higher education (Sharma & Saini, 2021). This study seeks to extend existing theoretical models by incorporating these contextual variables, offering a more nuanced understanding of AI adoption in Indian HEIs.

1.3. Stakeholder Attitudes and Their Role in AI Adoption

The successful implementation of AI in higher education depends significantly on the attitudes of key stakeholders, including faculty members, administrators, and students. Faculty members, who play a crucial role in teaching and curriculum design, often exhibit mixed reactions toward AI-driven educational tools. While some view AI as an enabler that can reduce workload and improve pedagogical outcomes, others fear job displacement and loss of academic autonomy (Goyal et al., 2020). Similarly, administrative staff may perceive AI as a means to streamline operations but may also resist change due to concerns about job security and implementation costs.

Students, as primary beneficiaries of AI applications, generally demonstrate higher acceptance rates, especially for AI-powered learning assistants, personalized tutoring, and automated grading systems (Holmes et al., 2022). However, their concerns about AI-driven surveillance, data privacy, and potential biases in AI decision-making must be addressed to ensure ethical implementation (Joshi et al., 2023). Understanding these stakeholder perspectives is essential for designing AI policies that align with the interests and concerns of all involved parties.

1.4. Behavioral Intention and Its Impact on AI Adoption in HEIs

Behavioral intention is a key predictor of actual technology adoption, as established in various adoption theories, including the Theory of Planned Behavior (Ajzen, 1991). The extent to which stakeholders intend to use AI in education depends on their perceived benefits, institutional support, and external influences such as peer adoption and regulatory incentives (Fishbein & Ajzen, 1975). In Indian HEIs, behavioral intention is further influenced by factors such as institutional digital maturity, government policies, and the presence of AI training programs (Kumar et al., 2022).

By employing SEM, this study aims to establish causal relationships between behavioral intention and AI adoption, offering data-driven insights into how institutions can foster AI readiness among their stakeholders. The results will provide actionable recommendations for higher education

policymakers, helping them design targeted interventions to accelerate AI adoption in Indian HEIs.

II. Literature Review

I. Perceived Risk (PR) and AI Adoption

Perceived risk is a critical factor influencing technology adoption in educational settings. Studies indicate that faculty and administrators often fear AI-induced job displacement, data security threats, and ethical dilemmas (Dwivedi et al., 2023). Further, concerns regarding algorithmic bias and data privacy regulations impact AI integration (Kshetri, 2022). Research suggests that institutions implementing transparent AI policies and risk mitigation strategies experience higher acceptance rates (Sharma et al., 2024).

ii. Performance Expectancy (PE) and AI Adoption

Performance expectancy reflects stakeholders' perceptions of AI's ability to enhance teaching, learning, and administrative efficiency. AI-driven tools such as intelligent tutoring systems and predictive analytics improve student outcomes, increasing their desirability among educators (Huang et al., 2023). However, a gap remains in aligning AI capabilities with traditional pedagogical models, leading to varied adoption rates (Chen & Lee, 2022).

iii. Effort Expectancy (EE) and AI Adoption

Effort expectancy pertains to the ease of use and learning curve associated with AI applications. Studies highlight that intuitive AI interfaces foster higher adoption rates among faculty and students (Venkatesh et al., 2023). However, resistance emerges when AI tools require significant technical proficiency or when insufficient training is provided (Alamri et al., 2023). Universities that integrate AI literacy programs report increased adoption rates (Zhang & Zhang, 2022).

iv. Facilitating Conditions (FC) and AI Adoption

Facilitating conditions encompass institutional support, IT infrastructure, and regulatory frameworks. Well-funded HEIs with robust digital ecosystems exhibit higher AI adoption rates (Rana et al., 2023). Conversely, resource-constrained institutions face adoption challenges due to inadequate infrastructure and lack of regulatory clarity (Agarwal & Joshi, 2022). Research emphasizes the importance of government-backed AI initiatives in fostering widespread adoption (Gupta et al., 2024).

v. Attitude (ATT) and Behavioral Intention (BI) Toward AI

Attitude towards AI significantly influences behavioral intention. Positive attitudes stem from AI's potential to enhance educational quality, while negative perceptions arise due to fears of depersonalized learning (Dwivedi et al., 2023). Behavioral intention, shaped by attitudes and perceived usefulness, serves as a strong predictor of AI adoption (Park & Shin, 2023). Institutions fostering a culture of AI acceptance through training and incentives report higher AI integration rates (Kumar et al., 2023).

vi. Behavioral Intention (BI) and Adoption of AI in Higher Education (AAHE)

Behavioral intention is the final determinant leading to AI adoption. Empirical evidence suggests that stakeholders who perceive AI as beneficial and easy to use are more likely to adopt it in higher education (Sun et al., 2023). Additionally, leadership commitment and institutional AI policies play a crucial role in translating behavioral intention into actual adoption (Chatterjee et al., 2023). Future research should explore longitudinal trends in AI adoption to assess its sustained impact on academic performance.

III. Research Methodology

Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to evaluate the relationships among the key constructs, assess reliability and validity, examine the structural model, and test both mediation and moderation effects. The study aimed to determine the direct and indirect effects of Behavioral Intention (BI) and Attitude (ATT) on Adoption of Advanced Higher Education (AAHE), along with the moderating roles of Age and Job Description. The findings provide crucial insights into how these variables interact within the model and contribute to the

understanding of technology adoption in higher education settings.

3.1. Research Design

A quantitative research design is used to examine the impact of key factors, including perceived risk, performance expectancy, effort expectancy, facilitating conditions, attitude, and behavioral intention on AI adoption in higher education.

3.2. Data Collection

• Population & Sample: The study targeted faculty members, students, and administrative staff from Indian HEIs, ensuring a diverse representation across disciplines and institution types.

• Sampling Technique: A stratified random sampling approach is employed to capture variations across different institutional categories (government, private, and autonomous universities).

• Sample Size: 582fully filled questionnaires were received, which is considered adequate for SEM analysis (Hair et al., 2021).

3.3. Conceptual Model

The diagram,Figure 1, represents a structural equation model (SEM) with latent constructs and their observed indicators. It depicts a multi-stage causal framework, likely estimated using Partial Least Squares Structural Equation Modeling (PLS-SEM). The model consists of multiple latent variables, including PR (Perceived Risk), PE (Perceived Ease), EE (Effort Expectancy), FC (Facilitating Conditions), ATT (Attitude), BI (Behavioral Intention), and AAHE (Adoption of Academic Higher Education technology).

Each latent variable is measured by multiple indicators (e.g., PR1–PR4 for PR, ATT1–ATT5 for ATT). The arrows from indicators to constructs indicate a reflective measurement model, meaning the indicators are manifestations of the underlying construct.

The exogenous variables (PR, PE, EE, FC) impact ATT (Attitude), which then influences BI (Behavioral Intention).BI acts as a mediator between ATT and AAHE, suggesting that user attitude and behavioral intention collectively determine the final adoption behavior.FC (Facilitating Conditions) also directly impacts BI, though previous results indicate this path is not significant.

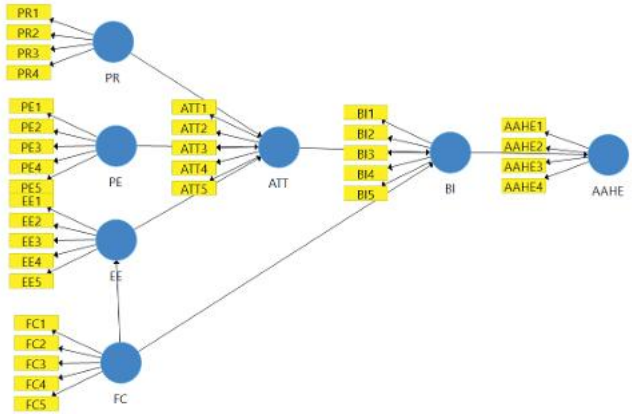

Figure 1: Conceptual Model

3.4. Measurement Instruments

A structured questionnaire is developed based on validated scales from previous studies:

• Perceived Risk (PR) (Dwivedi et al., 2023)

• Performance Expectancy (PE) (Huang et al., 2023)

• Effort Expectancy (EE) (Venkatesh et al., 2023)

• Facilitating Conditions (FC) (Rana et al., 2023)

• Attitude (ATT) & Behavioral Intention (BI) (Park & Shin, 2023)

• AI Adoption in Higher Education (AAHE) (Sun et al., 2023)

Responses are measured using a 5-point Likert scale (1= Strongly Disagree to 5 = Strongly Agree).

IV. Results and Analysis

4.1. Descriptive Statistics

Descriptive statistics indicated that all constructs had mean values ranging from 3.8 to 4.2, suggesting moderately high

perceptions regarding the measured variables. The standard deviations ranged between 0.9 and 1.1, reflecting a reasonable level of variance among responses. Additionally, skewness and kurtosis values were within the acceptable range (between -2 and +2), indicating normal distribution of the data, which supports the appropriateness of using PLS-SEM.

4.2. Measurement Model Assessment

(i) Reliability and Validity Analysis

The reliability analysis indicates that AAHE (α = 0.805, CR = 0.872, AVE = 0.632) and PR (α = 0.811, CR = 0.872, AVE = 0.638) have strong internal consistency and good construct validity. ATT (α = 0.634, AVE = 0.444) and BI (α = 0.613, AVE = 0.424) show moderate reliability but weaker convergent validity. EE (α = 0.533, AVE = 0.200) has low reliability and poor validity, indicating a weak measurement model. FC (α = 0.711, AVE = 0.494) and PE_ (α = 0.501, AVE = 0.361) have acceptable but lower reliability and validity, suggesting the need for potential improvement in measurement items.

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
AAHE	0.805	0.815	0.872	0.632
ATT	0.634	0.762	0.771	0.444
BI	0.613	0.756	0.754	0.424
EE	0.533	-0.063	0.380	0.200
FC	0.711	0.775	0.819	0.494
PE_	0.501	0.597	0.652	0.361
PR	0.811	0.887	0.872	0.638

Table 1: Evaluation of Internal Consistency

(ii) Discriminant Validity

Discriminant validity was assessed using the Heterotrait-Monotrait (HTMT) ratio as shown in Table 2 below. All HTMT values were below 0.85 except few pertaining to Attitude and Facilitating conditions, confirming that the constructs are distinct from one another and measuring different aspects of the model.

	AAHE	ATT	BI	EE	FC	PE_
ATT	1.009					
BI	1.004	1.319				
EE	0.702	0.995	1.033			
FC	0.722	0.914	0.830	0.588		
PE_	0.785	0.914	0.864	0.852	0.969	
PR	0.469	0.446	0.601	0.635	0.369	0.599

Table 2: Evaluation of Discriminant Validity

4.3. Structural Model Assessment

(i) Path Coefficients and Hypothesis Testing

The paths as shown in Table 3, ATT → BI (β = 0.958, p = 0.000) and BI → AAHE (β = 0.739, p = 0.000) are highly significant, indicating a strong influence of ATT on BI and BI on AAHE. EE → ATT (β = 0.668, p = 0.000) and FC → EE (β = 0.597, p = 0.000) also show significant relationships, emphasizing the role of EE and FC in shaping ATT. However, PR → ATT (β = 0.023, p = 0.864) and FC → BI (β = -0.123, p = 0.313) are insignificant, suggesting that PR and FC have minimal direct impact on ATT and BI.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
ATT -> BI	0.958	0.963	0.097	9.907	0.000
BI -> AAHE	0.739	0.749	0.082	8.990	0.000
EE -> ATT	0.668	0.570	0.162	4.116	0.000
FC -> BI	-0.123	-0.109	0.122	1.010	0.313
FC -> EE	0.597	0.628	0.114	5.258	0.000
PE_ -> ATT	0.271	0.321	0.135	2.016	0.044
PR -> ATT	0.023	0.063	0.136	0.171	0.864

Table 3: Bootstrapping results

(ii) Coefficient of Determination (R^2)

The R^2 values provide insights into the predictive power of the model as depicted in Table 4:

- ATT: $R^2 = 0.728$ (Substantial)

• BI: $R^2 = 0.780$ (Substantial)

• AAHE: $R^2 = 0.546$ (Moderate)

• EE: $R^2 = 0.356$ (Weak)

These values are all significant as the p values are less than 0.05,indicating that the model explains a substantial proportion of variance in Attitude and a moderate proportion in AAHE, suggesting a strong theoretical framework.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
AAHE	0.546	0.568	0.118	4.629	0.000
ATT	0.728	0.717	0.111	6.567	0.000
BI	0.780	0.802	0.071	10.916	0.000
EE	0.356	0.407	0.121	2.938	0.003

Table 4: Evaluation of R square of Dependent Variables in the model

(iii) Predictive Relevance (Q^2)

Q^2 values obtained through blindfolding were greater than zero (AAHE= 0.305, ATT = 0.181, BI = 0.238, EE = 0.036), confirming that the model has predictive relevance and contributes meaningful insights.

	SSO	SSE	Q^2 (=1-SSE/SSO)
AAHE	144.000	100.045	0.305
ATT	180.000	147.443	0.181
BI	180.000	137.189	0.238
EE	180.000	186.495	0.036
FC	180.000	180.000	
PE_	180.000	180.000	
PR	144.000	144.000	

Table 5: Evaluation of blindfolding for predictive relevance of the model

(iv) Model fit

The saturated model's original sample value is 0.156, as shown in Table 6, with a sample mean of 0.121 and confidence intervals of [0.146, 0.161] at 95% and 99% levels. The estimated model has an original sample value of 0.167, a sample mean of 0.134, and confidence intervals of [0.163, 0.179]. These results indicate that the estimated model exhibits a slightly higher original sample value and a broader confidence range than the saturated model, indicating model fitness.

	Original Sample (O)	Sample Mean (M)	95%	99%
Saturated Model	0.156	0.121	0.146	0.161
Estimated Model	0.167	0.134	0.163	0.179

Table 6: Evaluation of Model fit using SRMR

4.4. Mediation Analysis

The path EE → ATT → BI → AAHE (β = 0.473, p = 0.000) and ATT → BI → AAHE (β = 0.708, p = 0.000) show strong and significant relationships, while FC → EE → ATT (β = 0.399, p = 0.001) and FC → EE → ATT → BI (β = 0.382, p = 0.003) also exhibit notable influence. PE_ → ATT → BI (β = 0.260, p = 0.052) is marginally significant, whereas PR → ATT → BI → AAHE (β = 0.017, p = 0.865) and FC → BI → AAHE (β = -0.091, p = 0.315) are insignificant. These findings indicate that EE and ATT play critical roles in influencing BI and AAHE, while PR and FC have weaker effects.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
EE -> ATT -> BI -> AAHE	0.473	0.413	0.135	3.506	0.000
FC -> EE -> ATT -> BI -> AAHE	0.282	0.264	0.102	2.758	0.006
PE_ -> ATT -> BI -> AAHE	0.192	0.235	0.110	1.740	0.083
ATT -> BI -> AAHE	0.708	0.723	0.115	6.164	0.000
PR -> ATT -> BI -> AAHE	0.017	0.043	0.097	0.171	0.865
FC -> BI -> AAHE	-0.091	-0.082	0.090	1.005	0.315
FC -> EE -> ATT	0.399	0.361	0.118	3.376	0.001
EE -> ATT -> BI	0.641	0.552	0.169	3.798	0.000
FC -> EE -> ATT -> BI	0.382	0.352	0.128	2.982	0.003
PE_ -> ATT -> BI	0.260	0.309	0.134	1.947	0.052
PR -> ATT -> BI	0.022	0.059	0.128	0.174	0.862

Table 7: Mediation Analysis using Specific Indirect Effects

V. Theoretical and Practical Implications

5.1. Theoretical Contributions

The study contributes to the Unified Theory of Technology Acceptance by highlighting the mediating role of attitude in behavioral intention and adoption. It also extends previous

research by introducing age and job description as moderators, providing a nuanced understanding of technology adoption.

5.2. Managerial Implications

For policymakers and educational institutions, the findings suggest that younger individuals and those in education-focused roles are more likely to adopt advanced education technologies. Strategies to increase adoption should include:

• Targeted Awareness Campaigns for older demographics.

• Professional Development Programs for educators to enhance digital readiness.

• Customization of Digital Learning Platforms based on job roles and user experience.

5.3. Limitations and Future Research

Despite robust findings, the study has limitations:

• Cross-sectional data limits causal inference.

• Cultural and regional factors were not explicitly examined.

• Future research should explore longitudinal data and other moderators such as technological literacy.

VI. Conclusion

AI has the potential to revolutionize Indian higher education, but its successful adoption requires a deep understanding of stakeholder attitudes, behavioral intentions, and institutional readiness. This study addresses these critical issues by employing a quantitative SEM approach to analyze the relationships between AI impact, stakeholder attitudes, and behavioral intention. The insights derived will not only contribute to academic literature but also provide a strategic roadmap for policymakers and institutional leaders aiming to integrate AI into Indian HEIs effectively.The study successfully applied PLS-SEM to examine the adoption of advanced higher education technology, confirming the roles of behavioral intention and attitude, and moderating the effects of age and job description. The results offer valuable theoretical and practical contributions, guiding future research and policy implementation in digital education.

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WATER CONSERVATION PRACTICES IN THE UNORGANIZED AUTOMOBILE SERVICE SECTOR – CHALLENGES AND FUTURE PROSPECTS

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Purpose: *The case study explores the growing demand for water in India and describes the measures taken to recycle wastewater, with a special focus on the automobile service sector. The major objectives of this case study are to examine the penetration of water recycling practices among unorganized automobile service providers, assess their awareness of the benefits of implementing such practices, and evaluate their willingness to adopt them.*

Methodology/ Approach: *Apart from analyzing secondary data, the study also incorporates primary data collected from the unorganized automobile service sector. The researchers conducted interviews with 48 automobile service centers located in Coimbatore and the nearby districts of Salem, Namakkal, Erode, Karur, and Trichy. Studying is primarily qualitative in nature.*

Findings:*The descriptive analysis indicates that, despite the growing demand for water, the unorganized sector remains largely unconcerned with wastewater disposal and recycling due to factors such as high capital investment requirements and minimal regulations on industrial water usage. However, the analysis also reveals increasing awareness of the long-term benefits of implementing water recycling practices among automobile service sectors. The study suggests that new low-cost interventions, along with supportive government policies and incentives, could enhance sustainable water management practices in the sector.*

Originality /Value: *The case study contributes to understanding water conservation challenges in the unorganized automobile service sector, a relatively underexplored area. By linking industry practices to Theory of Planned Behavior' and the 'Natural-Resource-Based View' of the Firm, the case provides fresh insights into how mindset, awareness, and organizational factors can drive the adoption of water recycling practices, offering both managerial and policy implications.*

Keywords : Water scarcity, Water Recycling practices, Automobile Service Sectors, Car wash centers
JEL Code: *Q25 Water*

1. Significance of water resources

Water is a precious natural resource that has gained increased significance in recent times due to scarcity in many parts of the world. According to World bank, 2023, India is largely populated country bearing 18 percent of the global populace. As per the World Institute (WRI, 2023), India has meagre access to 4 percent of world water sources resulting in highly water stressed region.

Source: World Resource Institute- Top 25 countries facing Extremely High-Water Stress

Beyond the main water bodies like rivers and streams, the ground water resources relentlessly overused primarily for irrigation purposes. Groundwater levels in northern India are particularly affected, declining by more than 8 cm annually (WRI). Meanwhile, the growing population, increased agricultural needs, industrial water usage, and water demands for electricity production further contribute to rising pressure on water resources. Published sources also indicate that the urban population is estimated to nearly

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double by 2050 (Nico Saporiti 2021), which will further increase the demand for water resources in urban areas.

2. Challenges and Opportunities in Water Recycling in India

Increasing agricultural efficiency, investing in gray-green infrastructure, and recycling used water are among the remedial measures recommended by the Water Resources Institute (WRI, 2023) to address the existing water crisis. Used water can be recycled and reused for various domestic and industrial purposes. However, NDTV media report released during 2021, indicate that only 30% of water in India is recycled and the rest stays highly polluted with no proper treatment. India is indexed very low with a rank of 120 out of 122 countries indicating very poor global water quality. In addition to this, wastewater from industries is often discharged directly into surface water without any treatment Major challenges to implementing water recycling practices include existence of only costly wastewater recycling methods, refusal perceptions about wastewater recycling and dearth of recognition on technology availability and skilled manpower, weak enforcement of regulations and policies, and the fragmented nature of the market (Hans India, 2024).

3.Water usage across various sectors

The water requirement across all the sectors including agriculture, Industry, energy and other sector is expected to increase due to growing population size. In 2010 the irrigation sector consumed more water (688BCM) and is expected to remain leading in water consumption in the upcoming years too. The water requirement for the industry segment in 2010 is found to be 12BCM and is expected to raise 23BCM in 2025.

4. Overview of Automobile industry in India:

As per Modor Intelligence report 2024, the Indian Automobile industry is reckoned to USD126.67 Billion and expected to grow to USD187.85 billion by 2029 with a CAGR of 8.2% between 2024 and 2029. The annual production of automobiles in India for the financial year 2023 is reported to be 25.9 million vehicles. India Brand Equity Foundation anticipated the car market segment at USD 32.7 billion for the year 2021 and USD 54.84 billion for the year 2027.

Factors such as rising middle-class income, a large youth population, changing lifestyles, increased corporate interest in tapping into the rural market, growth in the logistics and transportation sectors, and affordability through easy EMIs and a wide variety of sizes and brands contribute to substantial vehicle sales. Considering the growth of the automobile industry, production levels will be high, leading to increased utilization of water resources. The requirement for water does not stop with the production process but continues at service centers in the future. A single car wash at service centers requires an average of 150 liters of water (Isaac Monney, 2020).

5. Do car wash centers do recycle used water?

The researchers have conducted a preliminary study to understand the water management practices adopted by the unorganized automobile car washing centers. (Shivakumar, The Indian Express 2024) As per the report shared by the world bank there are almost 21 districts listed in Tamil Nadu faces severe water shortage. Salem, Namakkal, Erode and Trichy are listed among these 21. The report further claims that almost 48% of urban Tamil Nadu further faces issues on water availability. Considering these statistics the researcher has conducted a qualitative study with the operators of small-scale automobile workshops located in Coimbatore and other districts facing water crisis including Salem, Namakkal, Erode, Karur and Trichy.

The study is basically qualitative intended to understand the awareness and challenges associated with adopting water conservation practices. The researchers have approached almost eight small scale operators in each district for data collection. The findings revealed that 46% of the centers are aware of the importance of adopting water conservation practices. A few centers, particularly in Trichy, Erode, and Salem, expressed deep interest in adopting water recycling systems. However, they are limited by budget constraints, as 29% (Table 1) are willing to invest only up to Rs. 1,00,000 and most prefer to spend less than Rs. 100,000 on adopting and maintaining water recycling practices. However, discussions with water recycling plant (WRP) experts revealed that the technologies currently available in the market are expensive, ranging from Rs. 1,000,000 to Rs. 2,000,000, making them feasible primarily for large-scale operations. For unorganized service centers, this level of investment is challenging, as their total business capital may not exceed Rs. 500,000.

Table 1: Descriptive statistics on the responses received from the automobile workshop service center

Nature of water usage		
Particulars	Frequency	Percentage
Bore Water	40	83
Corporation Water	8	17
Awareness on the benefits of adopting water recycling practices		
Not Aware	26	54
Somewhat aware	19	40
Fully aware	03	06
Interest in adopting Water Recycling practices		
Not willing currently	34	71
Somewhat willing	13	27
Very much willing	1	02
Budget they are willing to allocate for implementing Water recycling practices and ongoing maintenance		
<Rs.1,00,000	13	27
Between 1 to 5 Lakhs	03	06
unable to commit to a specific budget	32	67

Source: Created by the authors

In General, the disposal and recycling of used water is not much concentrated in the car wash unit in larger way due to multiple reasons like huge capital investments, less limitations for industrial water utilization and feeble legal restrictions and additional efforts required for disposal of chemical wastes. Though many mechanisms are available in recent times for disposal of waste, the car wash centers generally don't adopt proper methods to recycle water and dispose the chemical waste.

6.Consequence of releasing the used water into the environment

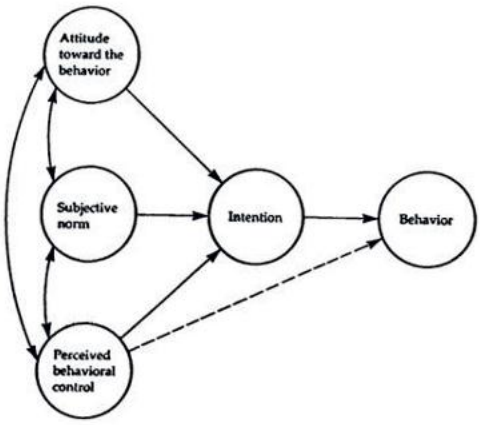
Isaac Monney (2020) states that the car wash industry emits wastewater loaded with grease, oils, heavy metals and detergents, which often flow into waterways, polluting ecosystems. Detergents in wastewater reduce oxygen levels, damaging fish and aquatic life, while oils can coat fish gills, obstructing reoxygenation and stunting growth. Intense alloys from brake linings, tires and engine oils may accumulate in sea foods, entering the food chain and impacting human health. This excessive water used in carwashes undermines water security, particularly in urban areas. In response, developed countries have implemented regulations to mitigate these environmental impacts.

7.Theoretical frameworks : Theory of Planned Behavior & Pro Environmental Planned Behavior (PEPB)

During 1991, Icek Ajzen proposed the theory of planned behavior emphasizes its utility in understanding and predicting human behavior. The model highlights that attitudes, subjective norms, and perceived behavioral control are the three independent determinants that influence behavioral intentions which in turn impact actual behavior. Attitude towards behavior refers to the degree to which a person has a favorable or unfavorable appraisal of a behavior in question. While subjective norms refer to the perceived social pressure which influences exhibiting or not to exhibit certain behavior. Perceived behavior control describes the perceived ease or difficulty in performing the behavior.

Another theory known as Pro Environmental planned behavior (PEPB) proposed by Nadlifatin et al., 2015) is the extension of theory of planned behavior and includes two more additional variables namely Perceived government support (PGS) refers to support required from authorities in the form of regulations, policy and procedures to implement sustainable activities. Perceived Environmental concern (PEC) refers to Individual or group to be highly aware of environmental issues, reflecting their perception of environmental impact.

Figure 2 : Theory of Planned behavior



Source: Icek Ajzen 1991

Application of Theory of Planned Behavior and Pro Environmental Planned behavior for adopting water conservation practices

Many researchers in the past have applied Planned behavior theory to test its impact in adopting water conservation practices among the business service providers. Palamuleni (2024), has applied theory of planned behavior to assess the model impact on adopting Water preservation practices by the supervisors at workplace. Researchers have collected the data from 72 staff resources including the executives of the

North-West University Mahikeng, South Africa through Self-Administered instrument which included Attitude, Subjective norms and perceived behavioral control. The implications of the study highlighted that managers actively report water leakages in pipes and toilet sinks to the concerned authorities and ensure that taps not in use are closed. The authors reported a positive correlation between duration of service and coaching on water related issues intended to create an awareness on water scarcity with the dependent variable attitude and behavior. Women exhibited high water conservation behavior which in turn influence by their experience and social norms than men. The manager perceived behavior control is influenced by the knowledge secured through training, workplace policies and resources.

Theodosia Yunita Durman, Reny Nadlifatin (2024) have conducted research to explore the influence of Pro environmental planned behavior on the adaptation of green innovation among small and medium scale enterprises of tourism sector. Based on the response received from 405 SME's executing green practices, the researchers have found that 71% of the intention to adopt green innovation through the model. Perceived authority support was found to be the strongest predictor. The authors also conducted a qualitative interview with the SME's and found that Government incentives such as tax benefits, low-interest loans, funding access, and green certification awards encouraged SMEs to adopt sustainable practices. Government mass awareness campaigns further increased environmental consciousness among business owners. SMS's also has stated that collaboration with the ecofriendly supplier, support received from NGO's and the educational institutions, level of enthusiasm and the positive feedback received from their customers also motivated them to adapt green initiatives.

8. Theory of A Natural Resource Based view of the firm

During 1995, Stuart L.Hart proposed this theory which has three interconnected strategies that supports the firm to gain competitive advantage which includes pollution prevention, product stewardship and sustainable development.

The theory highlights that the pollution prevention factor attempts to incorporate continuous efforts by firms to control the emissions which are people intensive and require tactical skill development of employees. Such measures taken by the firm support not only reducing emissions but also in reducing capital expenditure for pollution control. Publishing such efforts taken by corporate and its impact in emission control in the form of environmental reports aid in improving the corporate image.

The second factor, Product Stewardship, refers to every activity taken as a part of value chain starting from sourcing raw materials, manufacturing and disposition of used products which is essential to minimize the life cycle ecological cost. The organization ability in involving major stakeholders like environmentalist, Societal leaders and regulators of mass media on designing and development of product supporting substantially for the strategy to become socially legitimate becomes vital. Adopting such environmentally friendly practices in early stages aids the organization in preempting the competitors and gaining competitive advantage.

The third factor Sustainable development describes the long-term efforts taken by the organization in developing low environmental impact technologies and shared vision in securing internal commitment, dedication, innovation and change for a compelling future vision and the involvement of public and private collaboration for systematic change.

Application of Natural resource-based theory

Toyota Kirloskar Motor (TKM) (Online car India 2018) introduced Eco friendly car wash services which support to save 95% of the water used in traditional car washing. The organization has implemented this car wash services in more than 100+ dealers in India. Eco car wash services use water-based formulation which is effective in cleaning the dirt and grim from the vehicle painted surface without affecting the vehicle surface. The service also supports delivering cleaner vehicles at no extra cost and time. This initiative by TKM aids in saving up to 253 million liters of ground water across their dealership. Toyota India has been declared as a model plant in Asia Pacific for their commitment to reducing carbon footprint and minimum water consumption. The customers (Motor world India 2018) acquiring the eco wash services has appreciated the efforts taken by TKM as the initiatives not only offered better cleanliness also for providing an opportunity to take in eco conscious project. The Confederation of Indian Industries (CII) in the Third Water Summit, Delhi recognized TKM, Bangalore with the excellence in water management and conservation practices in manufacturing and supply chain activities which is noteworthy. TKM has received this award for implementing water conservation practices in Manufacturing operations

and supply chain activities in one the plant located near Bangalore.

Magdalena Węglarz (2024) explored how sustainability innovations, knowledge application, and environmental awareness influence entrepreneurial success among SMEs in Turkey. The study adopted the Dynamic Capability perspective along with the Resource-Based View (RBV) to examine their impact on SME performance. Dynamic capability refers to a firm's ability to adapt, integrate, and reconfigure its resources and competencies in response to rapid environmental changes. Based on a survey of 403 SMEs, the researchers concluded that firms that develop dynamic capabilities and possess valuable, rare, and non-substitutable resources are more likely to achieve growth, perform better, and secure a competitive advantage. The article also highlighted that the lack of management skills and difficulty in adapting to changing business environments are major challenges faced by SMEs. The study suggests that government support, knowledge-sharing networks, and training initiatives can help SMEs to enhance their capabilities.

9. Questions for Discussions

1. Devise strategies to improvise the adoption of water conservation practices among automobile service providers

2. How can theory "The Natural-Resource-Based View (NRBV) of the Firm" drive the automobile service providers to adapt water conservation practices to gain sustainable competitive advantage?

3. Are the variables outlined in the "Theory of Planned Behavior" sufficient to drive water-conserving attitudes and behaviors, or would incorporating additional variables yield better results? If so, suggest relevant variables and justify their inclusion

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Teaching Note

Pedagogical Objectives

CASE POSITIONING AND SETTING

The case builds around the application of sustainable strategies and their role in reducing operational costs while securing a competitive advantage. It addresses the awareness levels of car service centers in the unorganized segment and the challenges they face in adopting best water management practices. The case explores the role and application of two theories—the Theory of Planned Behavior and the Natural-Resource-Based View—and seeks suggestions to influence car service providers to adopt better water management practices. This case is suitable for courses on Sustainable Management, Business Ethics, and Corporate Social Responsibility.

Questions for Discussions

1. Devise strategies to improvise the adoption of water conservation practices among automobile service providers

- Industries working on water recycling plants along with the central and state governments can take initiative to promote awareness of the benefits of adopting best practices in water management and implementing water recycling plants
- Unorganized segments run their operations at small scale and affording high budget for purchase and maintenance may prohibit them in adapting best water management practices. R&D efforts to be taken to optimize the WRP which is feasible and affordable.
- Government rules must be strict, and more awareness must be spread across vehicle washing centers regarding water scarcity and the existence of WRP products. Awareness to be created on the existing rules imposed by the government and pollution control board and as well the penalty that the firm undertake for not adhering to the rules
- Subsidies could be given to encourage the unorganized sectors to adopt water recycling practices.

2. How can theory "The Natural-Resource-Based View (NRBV) of the Firm" drive the automobile service providers to adapt water conservation practices to gain sustainable competitive advantage?

The initiative taken by TKM serves as an example of how the NRBV supports securing brand recognition and a competitive edge. TKM's efforts to reduce carbon emissions, minimize water consumption in manufacturing operations and supply chain activities, and use of biodegradable agents in the Eco Wash initiative to reduce environmental impact contribute to pollution control. Implementing the Eco Wash initiative across 100+ dealers in India demonstrate the organization's ability to implement green initiatives across the value chain. Large firms adopt water recycling for compliance and branding, whereas small-scale workshops

can use affordable recycling methods to cut water costs, avoid penalties, and create a competitive USP. The government, higher education institutions, and NGOs can host capacity-building programs to support unorganized service providers in improving their skills and capabilities for adopting water conservation practices.

3. Are the variables outlined in the "Theory of Planned Behavior" sufficient to drive water-conserving attitudes and behaviors, or would incorporating additional variables yield better results? If so, suggest relevant variables and justify their inclusion

Many researchers in the past have demonstrated the influence of TPB constructs in shaping water conservation intentions and behaviors. The case study also highlights the importance of other variables, including demographic factors, awareness, and training programs, in determining individual attitudes. Awareness sessions on exhibiting environmentally friendly behavior and understanding the essence of water conservation practices, along with details on the incentives and subsidies available for small-scale operators from the government, could be included as part of the training program.

The government can encourage academicians and research institutions to develop affordable water recycling solutions that help reduce water procurement costs and offer tangible benefits for small-scale operators by sponsoring research and development initiatives. As highlighted by researchers Theodosia Yunita Durman and Reny Nadlifatin (2024), it is also meaningful to connect interested service providers with NGOs working on water conservation practices to secure mutual benefits.

STATE BANK OF INDIA'S ESG LEADERSHIP: PIONEERING SUSTAINABLE BANKING IN INDIA

Dr. Dilpreet Kaur*

Sustainability in banking has emerged as a critical aspect of responsible finance, with leading institutions incorporating ESG (environmental, social, and governance) concepts into their main plans. The biggest lender in the nation, State Bank of India (SBI), has been at the forefront of sustainable banking, aligning its operations with global and national climate goals. This case study explores SBI's sustainability initiatives, including the establishment of the ESG & Climate Finance Unit, green financing mechanisms, operational sustainability measures, and community engagement programs. By examining SBI's journey towards achieving net-zero emissions and its commitment to sustainable development, this case study provides insights into how financial institutions can drive meaningful environmental impact while ensuring business growth.

Keywords : Environmental, Social and Governance (ESG), Sustainable Banking, Green Finance, Public Sector Banks, Financial Inclusion
JEL Code: *G21, Q56, G28, O16, Q01*

I. Introduction

Significant progress has been made by State Bank of India (SBI) in incorporating sustainability into its banking operations. Being the biggest bank in India's public sector, SBI has demonstrated leadership in green banking initiatives, responsible lending, and environmental stewardship. With a dedicated ESG & Climate Finance Unit (ESG & CFU) and a commitment to achieving net-zero emissions, the bank has positioned itself as a pioneer in sustainable finance. This case study examines SBI's sustainability framework, key initiatives, and their impact on environmental conservation and financial inclusion. State Bank of India (SBI) has structured its sustainability strategy around key pillars that align with global Environmental, Social, and Governance (ESG) principles as well as India's national sustainability goals. The bank's framework prioritizes green financing, carbon footprint reduction, social and environmental risk management, sustainable infrastructure development, and financial inclusion. Under its green financing initiatives, SBI actively promotes loans and investments in renewable energy projects, electric mobility, and industries committed to sustainability. In an effort to reduce its operational carbon footprint, the bank has transitioned toward energy-efficient technologies, increased reliance on renewable energy sources, and adopted sustainable practices across its branches and offices. Additionally, ESG factors are incorporated into SBI's financing decisions, ensuring that its financing activities align with environmental and social responsibility. The bank has also invested in sustainable infrastructure, including green-certified buildings, solar-powered ATMs, and paperless banking solutions to minimize resource consumption. As part of its financial inclusion efforts, SBI leverages digital banking and microfinance programs to expand banking access to marginalized and rural communities. To streamline and drive these initiatives, SBI launched the **ESG & Climate Finance Unit (ESG & CFU)** in FY2024, setting ambitious targets such as achieving **net-zero emissions by 2055 for Scopes 1, 2, and 3, and by 2030 for Scopes 1 and 2.**

The bank has also committed to ensuring that at least **By 2030, 7.5%** of its domestic loan portfolio will be used for **green advances** reinforcing its role as a leader in sustainable finance.

II. SBI's ESG & Climate Finance Unit

Figure 1: ESG Scores components

Source: Islam et. al., 2025

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Environmental, Social, and Governance (ESG) scores serve as a critical measure of a company's sustainability performance, evaluating its commitment to responsible business practices across three key areas. The **Environmental** component assesses an organization's efforts in reducing carbon emissions, managing natural resources, and mitigating environmental risks. The **Social** aspect evaluates a company's impact on stakeholders, including employee welfare, diversity and inclusion, customer relations, and community engagement. The **Governance** dimension focuses on corporate ethics, transparency, risk management, and leadership accountability. Investors, regulators, and stakeholders increasingly rely on ESG scores to assess an organization's long-term sustainability, financial resilience, and alignment with global environmental and social goals. In recent years. The figure 1 exhibits components of ESG scores in detail. Higher ESG scores indicate strong environmental stewardship, social responsibility, and governance ethics, which attract sustainable investors and enhance brand reputation. For banks like SBI, a robust ESG framework ensures compliance with global climate commitments, facilitates green financing, and strengthens risk management by incorporating sustainability factors into credit assessments. As ESG considerations gain prominence in regulatory frameworks and investor expectations, banks worldwide, including SBI, are integrating ESG assessments into their decision-making to drive long-term value creation while contributing to global sustainability efforts. In FY2024, SBI established a specialised ESG & Climate Finance Unit (ESG & CFU) to house its ESG and climate finance operations. The key objectives of this unit include:

- Achieving **net-zero emissions by 2030 for Scope 1 and 2, and by 2055 for Scope 1, 2, and 3** coinciding with SBI's centenary year.
- Ensuring that **at least by 2030,** green advances will account for 7.5 percent of its domestic credit portfolio.
- Aligning SBI's financing strategies with sustainable development goals and global climate targets

III. Green Financing Initiatives

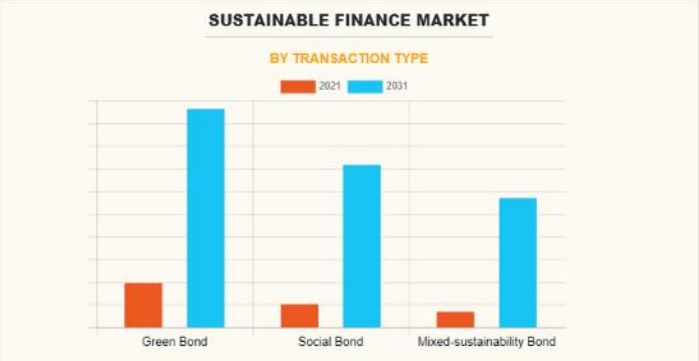
SBI has been proactive in funding renewable energy projects and promoting green financial products, ensuring that its lending practices support India's transition to a low-carbon economy. Key initiatives include:

• Renewable Energy Financing

As of March 2024, SBI reaffirmed its commitment to the adoption of clean energy by authorising loans of ₹47,419 crore for renewable energy projects. SBI has played a pivotal role in financing India's transition to renewable energy, recognizing the sector's potential to drive sustainable economic growth. As of March 2024, loans totalling ₹47,419 crore had been approved for renewable energy projects, the bank has reinforced its commitment to clean energy adoption. These funds have supported the development of solar, wind, and hydroelectric power projects, contributing to India's aggressive goals for renewable energy and lowering dependency on fossil fuels.

• Green Bonds

Figure 2: Future of Green Bonds in India



Source: https://www.alliedmarketresearch.com

Through its ESG finance framework, SBI raised $250 million in green bonds in FY2024 ensuring that proceeds finance projects with environmental benefits. This initiative strengthens the bank's commitment to sustainable finance, supporting clean energy, energy efficiency, and climate-resilient infrastructure projects.

• Green Term Deposits

SBI introduced **Green Term Deposits**, enabling depositors to contribute directly to environmentally sustainable projects.

• Green Car Loan Scheme

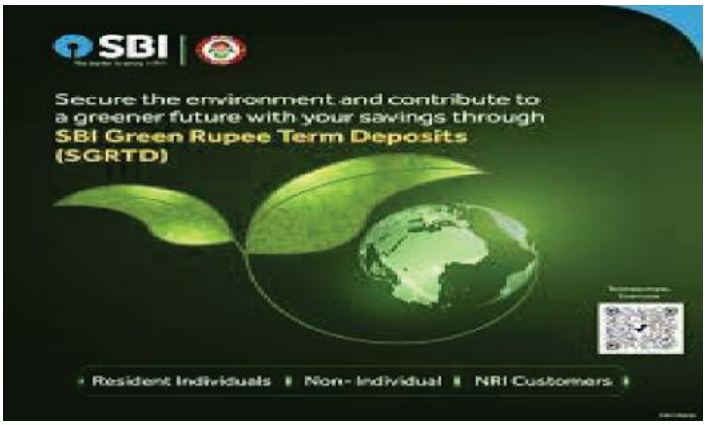
SBI offers loans for electric vehicles with a **25-basis points concession** compared to standard car loans and an **extended repayment period of eight years**, incentivizing cleaner transportation choices.

IV. Sustainable Operations and Infrastructure

SBI has implemented various measures to reduce its operational carbon footprint, focusing on energy efficiency, renewable energy adoption, and sustainable infrastructure development.

SBI has made substantial progress in integrating renewable energy and sustainability initiatives into its operations, demonstrating its commitment to reducing its carbon footprint. The bank has installed over 26 MW of solar capacity and owns 15 MW of wind energy capacity, enabling a transition to cleaner energy sources. Notably, 18 large buildings, including the Corporate Office in Mumbai, have shifted to 100% renewable energy, collectively offsetting approximately 17.4 million electrical units annually. To further enhance its sustainability efforts, SBI continues to invest in energy-efficient infrastructure, obtaining 13 building certificates from the Indian Green Building Council (IGBC) in FY2024, increasing the overall number of green-certified structures to 45. Furthermore, 151 new rooftop solar plants totalling 4.20 MWp were erected by the bank, increasing the number of solarized buildings to 795. It has also taken the initiative to solar-power 3,534 ATMs across India, reducing reliance on conventional energy sources.

Figure 3: New Initiative by SBI launched on Feb 6, 2025



Source: https://bank.sbi/web/personal-banking/investments-deposits/deposits/sbi-green-rupee-term-deposit

Beyond infrastructure, SBI promotes sustainable banking practices through various initiatives. The Green Marathon Project raises awareness about environmental conservation and encourages community participation in sustainability efforts. SBI is also part of the Carbon Disclosure Project (CDP), ensuring transparent reporting of its environmental impact. The bank has implemented electronic annual reports to minimize paper consumption and launched the Green Channel Counter, which facilitates paperless banking transactions to reduce waste. Additionally, SBI is actively supporting electric mobility by installing 48 electric vehicle (EV) charging stations across its owned buildings, promoting cleaner transportation options among employees and customers. These initiatives collectively reflect SBI's holistic approach to integrating sustainability into its operations, reinforcing its leadership in responsible banking.

V. Environmental Conservation Efforts

SBI's sustainability commitment extends beyond banking operations to environmental conservation and community engagement initiatives. In **FY2024**, the bank planted **over 750,000 trees**, supporting biodiversity conservation and ecosystem restoration. To enhance water resource management, SBI implemented 37 sewage treatment facilities and 454 rainwater harvesting systems are located across its premises. Additionally, in its fight against plastic waste, the bank installed **20 PET bottle crushing machines** across India. SBI also actively promotes sustainability awareness through community engagement programs. The **Green Club Program**, launched in **1,242 offices**, encourages employees and branches to participate in eco-friendly activities and drive local sustainability efforts. Furthermore, SBI organized **nationwide town hall meetings on December 5, 2023**, which were attended by **over 21,000 customers and 5,000 staff members**, focusing on digital banking awareness and sustainable finance. Through these initiatives, SBI continues to foster a culture of environmental responsibility and social impact.

VI. Conclusion

SBI has set a benchmark in sustainable banking by integrating ESG principles into its operations and financing strategies. Its commitment to green financing, operational sustainability, and community engagement demonstrates a holistic approach to environmental responsibility. As SBI advances towards its net-zero targets, its leadership in sustainability serves as a model for other financial institutions in India and beyond. This case study highlights how banks can align profitability with purpose, fostering

long-term economic and environmental resilience.

SBI has set clear sustainability targets and reported measurable outcomes to track its progress.

• Green Loan Portfolio

By 2030, it wants 7.5% of its domestic loan portfolio to be environmentally friendly. SBI's overall loan book stood at ₹37.67 trillion as of the end of FY2024.

• Carbon Emission Reduction

Achieved a 9.13% reduction in Scope 2 greenhouse gas emissions. Planted approximately 90,000 tree saplings across India during FY2018-19.

SBI's sustainability journey underscores the critical role of financial institutions in driving environmental stewardship and responsible banking. By aligning its business strategy with global sustainability goals, the bank not only mitigates environmental risks but also creates long-term value for stakeholders. As it continues to innovate and expand its green initiatives, SBI is well-positioned to shape the future of sustainable finance, inspiring other banks to adopt similar practices for a greener and more resilient economy.

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FINDING MIRAGE EFFECT OF FRAUDULENT FINANCIAL STATEMENTS THROUGH RED FLAGS: A COMPARATIVE ANALYSIS OF NEURAL NETWORK & LOGISTIC REGRESSION

Dr. Aarti Gupta* Dr. Swati Bhatia**

Financial statement fraud (FSF) seems to be the order of the day nowadays. The aim of conducting financial statement fraud is to deceive the investors and make them a fool by showing a mirage image to the public. Today's investor necessarily needs any tool or technique that can advocate for them to find this mirage effect which wrongfully convinces them to invest their hard- earned savings. The techniques we are discussing here are two data mining techniques that are vitally used and gained paramount importance nowadays. These are Neural Network (NN) and Logistic Regression (LR). This study particularly demonstrates the superiority of these techniques which can, to a greater extent, accurately classify fraudulent and non-fraudulent companies based on information available in a company's financial statement. The objectives of this study are also to find red flags of fraudulent financial statements and compare the accuracy levels of both techniques i.e. up to which extent they can classify the companies as fraud and non-fraud using the red flags as input vectors.

This study is conducted with a sample of 168 Indian companies identified by SFIO (Serious Fraud Investigation Office) and the PROWESS database.[i] *Based on past literature, 48 variables in the form of financial ratios and corporate governance variables are found as predictive indicators of financial statement fraud. Assuming the significant variables as red flags and input vectors, the Multilayer Perceptron (MLP) method of Neural Network and Logistic Regression technique is applied using SPSS. After applying the methods, the study compares the Neural Network results with Logistic Regression (LR) output. As a result of this study, red flags are identified to find the mirage effect. Both techniques are equally efficient in finding the mirage effect in fraudulent financial statements and classifying fraud and non-fraud companies with up to 100% accuracy. A predictive equation through Logistic Regression is also formed. In this way, we can contribute to the fast development of society by producing an early warning system for investors, bankers, government, medical practitioners, and other professionals.* [ii] *The application of data mining techniques will surely prove to be one of the most important, practical, and fruitful endeavors in finance and other areas in the future decade.*

Keywords : Financial Statement Fraud, Mirage effect, Serious Fraud Investigation Office, PROWESS, Neural Network, Input Vectors, Multilayer Perceptron, Logistic Regression, Red Flags.
JEL Code: *M41, M42, G34*

DATA MINING (DM)

[iii]Data mining is about exploratory and in-depth analysis of large quantities of data. Data mining mainly aims to determine trends and patterns to forecast, detect, and predict. There are several data mining techniques available for classification, clustering, prediction, patternrecognition, image recognition, estimation, etc. [iv]Data mining techniques are interdisciplinary and borrowed from several disciplines such as statistics, artificial intelligence, computer science machine learning algorithms, etc. Data mining (DM) can be used in two types of essences- directed DM and undirected Data mining. [v]Directed DM deals with the categorization of target fields while undirected data mining attempts to find trends, patterns, or similarities among groups (Berry & Layoff, 2011). The problem in our hand is related to the directed data mining in which the target fields i.e. sample companies are to be categorized into two classes; fraudulent and non-fraudulent. Moreover, with the help of data mining, we can also build robust models. The most admired data mining model- building techniques are Logistic Regression, Neural Network, and Decision Tree. Some researchers have presented a very systematic review of prior studies as well as a conceptual framework of data mining techniques category-wise. [vi]Here, a graphical and conceptual framework was presented by the researcher (Sharma and Panigrahi, 2012).

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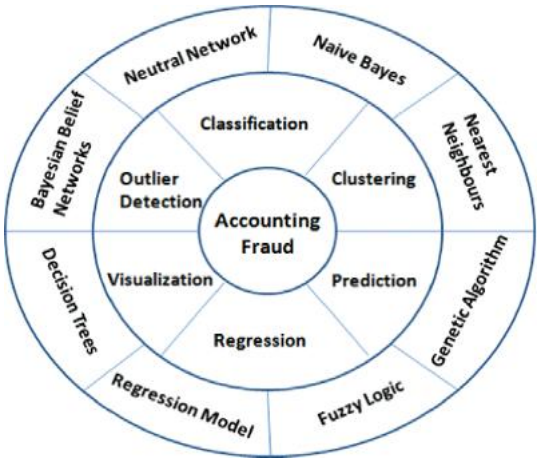

Fig. 1: Conceptual Framework of Data Mining Techniques

NEURAL NETWORK (NN)

[vii]Neural network has an interesting history with computer science which is inspired by the functionality of neurons in our mind. The original work on the functioning of neurons took place in the 1930s and 1940s when digital computers didn't even exist. In 1943, Warren McCulloch, a neurophysiologist at Yale University, and Walter Pitts, a logician formulated a simple model to explain how biological neurons work. NN is a very powerful technique of the biological kind which is learned through experience. The neural network became popular in the 1980s due to its marvelous benefits. First, computing power is strong. Second, a known statistical background is required. Third, it works on the historical database. Fourth, it is a branch of artificial intelligence. Fifth, input and output are well understood. Sixth, known cases are used to train the model. In short, we can say, that a [viii]neural network mimics the brain and the number of neurons or nodes and layers derives its strength (Sivanandam, Sumathi, & Deepa, 2014). The similarity between neural networks and human mining can be easily understood by comparing both of the neurons. Neurons in the human mind are of biological kind while neurons in neural networks can be called artificial neurons.

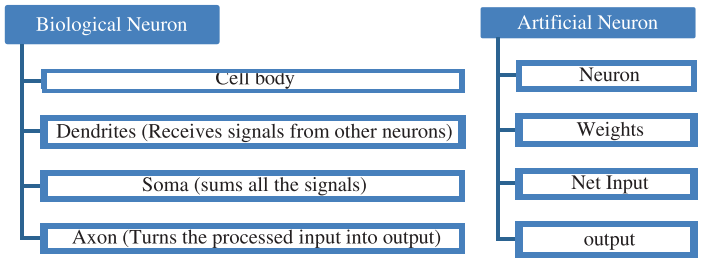

Fig. 2: Similarities between Biological Neuron and Artificial Neuron

Along with the above similarities, artificial neurons also have superiorities over biological neurons, such as; artificial neurons are faster in processing, almost in nanoseconds. A control unit in the neural net monitors all computing activities. On the contrary, biological neural networks have no specific control mechanism. If we converse about the limitations of artificial neurons, the storage nature can be discussed. If we store new information in the same location, the old one would be destroyed contrary to the biological neuron where new information is added by adjusting the interconnection weights, without destroying the old information.

LOGISTIC REGRESSION (LR)

LR is also a prominent data mining technique used to predict a categorical variable based on some predictor variables. In this study, the researcher has attempted to apply LR on the same data sheets and then compare the results with the results of NN outputs to check whether there is a significant difference between the outputs of both techniques. An extraordinary quality of LR which makes it superior to other data mining techniques is that it can form predictive equations. In the present study, we also formed predictive equations to predict FSF in companies.

OBJECTIVES OF THE STUDY

The following specific objectives will be focused in this study:

1. To identify the mirage effect by classifying companies as fraud or non-fraud.

2. To indicate red flags, and major financial and corporate governance factors to detect financial statement fraud.

3. To perform comparative analysis on accuracy levels of NN & LR.

RESEARCH METHODOLOGY

This part is divided into four sections. The first section tells about the hypothesis to be tested in the study, the second section shows the sample selection and collection of data, the third section highlights variables taken and the fourth section presents the tools and techniques that are used to test the hypothesis.

A. HYPOTHESES

Ho1: Financial and corporate governance indicators are not significantly effective in detecting FSF.

Ho2: NN is not significantly effective in classifying the selected companies as fraud or non-fraud.

Ho3: There is no significant difference between the accuracy level of NN and Logistic Regression (LR) in the detection of FSF.

B. SAMPLE SELECTION

For the study, a sample of 168 Indian companies adopting the Judgmental Sampling method from around 50 sectors such as asset financing services, security investment services, computer software, banking trade and manufacturing, etc. is selected. The sample is divided into two parts. The first (target group) consists of 84 fraudulent companies and the other part (control group) would consist of 84 non-fraudulent companies matched with the first group in terms of various bases such as industry, size, age group, year of incorporation, ownership, and entity type of the company. Here, a company would be categorized as fraudulent if it has been declared fraudulent by the Serious Fraud Investigation Office (SFIO)[ix].

C. VARIABLES

Based on the literature reviewed, we compiled 48 financial and non-financial indicators under six categories: liquidity, solvency, leverage, efficiency, profitability, corporate governance, and company indicators. For data collection, the Prowess database was used which is the most reliable and authenticated database for extracting financial and non-financial information about the Indian companies. The following table presents the list of variables taken as possible predictive indicators for further analysis.

SR. NO.	POSSIBLE PREDICTIVE INDICATORS	Code	SR. NO.	POSSIBLE PREDICTIVE INDICATORS	Code
LIQUIDITY INDICATORS					
1	Current Ratio	CR	5	Cash & Cash Equivalent/ Total Assets	CCEQUTA
2	Quick Ratio	QR	6	Current Assets / Total Assets	CATA
3	Inventory / Current Assets	INVCA	7	Working Capital/ Total Assets	WCTA
4	Inventory / Current Liabilities &Provisions	INVCL	8	Current Liabilities / Revenue	CLREV
			9	Interest Coverage Ratio	INCOVRAGE
SOLVENCY INDICATORS					
10	Debt / EBITDA	DEBTEBITDA	13	Financial Leverage	FINLEAV
11	Total Liabilities of Outsiders/ Total Assets	TOLTA	14	Fixed Assets / Long-Term Liability	FALLL
12	Debt / Equity	DEBTEQUITY	15	Equity/ Total Assets	EQUITYTA

EFFICIENCY INDICATORS					
16	Inventory Turnover	INVTURN	24	Accounts Payable Turnover	APTURN
17	Fixed Assets Turnover	FATO	25	Change of Efficiency of Fixed Assets / Change In Sales	CHFEFCHFS
18	Total Assets Turnover	TATO	26	Receivable / Revenue	RECREV
19	Inventory / Total Assets	INVTA	27	Equity Turnover	EQUTYTO
20	Receivables / Total Assets	RECTA	28	Total Liabilities / Revenue	TLREV
21	Fixed Assets / Total Assets	FATA	29	Account Receivable /Accounts Receivable Of Last Year	ARARFLAST
22	Plant & Equipment / Total Assets	PLEQUTA	30	Total Assets / Total Assets Of Last Year	TATAFLAST
23	Accounts Receivable Turnover	ARTURN	31	Sales Growth Ratio	SALGROWTH
			32	Altman Z Score	ALTMAN
PROFITABILITY INDICATORS					
33	Total Assets / Capital & Reserves	TACR	36	Return on Sale	ROS
34	Retained Earnings / Total Assets	RTERTA	37	Return on Asset	ROA
35	Return on Equity	ROE	38	Gross Profit Margin	GPMARGIN
			39	Net Profit Margin	NPMARGIN
CORPORATE GOVERNANCE INDICATORS					
40	Chairperson Also As CEO	CHAIRCEO	42	Existence Of A Compensation Committee	COMPCOM
41	Existence Of An Audit Committee	AUDITCOM	43	Having The President As Treasurer	PRESITRSURE
COMPANY INDICATORS					
44	Age of The Company	AGE	47	Size of the Company based on Revenue	REVSIZE
45	Board Size	BOARDSIZE	48	The Decile Size of the company	SIZE
46	Size of the Company Based on Assets	ASSSIZE			

Table 1: Predictive Indicators Possible

D. TOOLS AND TECHNIQUES FOR DATA ANALYSIS

For data analysis, the following tools and techniques are applied:

a. To extract significant factors, Mann Whitney U test is applied to scaled variables. The variables with p-value < 0.05 are considered to be significant.

b. On categorical variables, factor analysis is applied to extract the significant factors.

c. Using these significant factors, Neural Network is applied to check the accuracy level of the technique to classify the fraud and non-fraud companies.

d. On the same data sheets, Logistic Regression is also applied to compare the results with those of neural networks.

Variable Name	Recoded Name	Categories Assigned										
Age of the company	Age Recoded	1 – 10 > 1	11-20 > 2	21-30 > 3	31- 40 > 4	41-50 > 5	51- 80 > 6					
Board size of the company	Board Size Recoded	1– 5 > 1	6 – 10 > 2	11- 15 > 3	16 - 20 > 4	21- 25 > 5						
Asset size of the company	Asset Size Recoded	0–500 > 1	501-1000 > 2	1001-2000 > 3	2001 - 5000 > 4	5001 - 10000 > 5	10001 – 20000 > 6	20001 – 30000 >7	30001-50000 >8	50001-100000 >9	100001 – 200000 >10	200001 – 300000 >11
Revenue size of the company	Revenue size Recoded	0–500 > 1	501-1000 > 2	1001-2000 > 3	2001 - 5000 > 4	5001 - 10000 > 5	10001 – 20000 > 6	20001 – 40000 >7	40001-50000 >8	50001-100000 >9	100001 – 200000 >10	200001 – 300000 >11
Size of the company in deciles	Size Recoded	1 – 5 > 1					6- 10 > 2					
Chairperson also as CEO	NA	1 > Yes					0 > No					
Existence Of An Audit Committee	NA	1 > Yes					0 > No					
Existence of a Compensation Committee	NA	1 > Yes					0 > No					
Having The President As Treasurer	NA	1 > Yes					0 > No					

Table 2: Categories assigned for categorical variables in Factor Analysis

*In the case of 9 categorical variables, a data reduction technique i.e. factor analysis is applied. The values of some variables are too high to interpret the categories. Therefore, some of the variables are recoded into autonomous categories to make the analysis easy to interpret. As we can see the age, board size, asset size, revenue size, and size of the company have been recoding into categories.

APPLICATION OF MANN WHITNEY U TEST ON SCALED VARIABLES

Test Statistics

	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)		Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
CR	2425.500	5746.500	-2.974	***.003***	APTURN	1698.500	3843.500	-1.939	.053
QR	2728.500	6049.500	-1.968	***.049***	CHFEFCHFS	964.000	2189.000	-.879	.379
INVCA	2960.000	6281.000	-.971	.332	***ROE***	2504.500	5825.500	-2.767	***.006***
INVCL	1433.000	3449.000	-2.449	***.014***	RECREV	2324.000	4880.000	-.938	.348
INTCOV	1555.000	3446.000	-1.141	.254	CATA	3159.000	6729.000	-1.047	.295
DEBTEBITDA	2778.000	5628.000	-.130	.896	WCTA	3255.000	6825.000	-.866	.386
TOLTA	3445.500	7015.500	-.130	.897	***EQUITYTO***	2489.500	5649.500	-2.212	***.027***
INVTURN	510.000	1071.000	-.443	.657	CLREV	2769.000	5695.000	-.162	.872
DEBTEQUITY	2673.000	6076.000	-2.219	***.026***	ROS	2270.000	4826.000	-.315	.752
FINLEV	2616.000	5937.000	-2.230	***.026***	TLREV	2828.500	5831.500	-.356	.722
FATO	2290.500	4991.500	-1.727	.084	ROA	2889.500	6292.500	-1.556	.120
TATO	2122.000	5125.000	-3.047	***.002***	GPMARGIN	2230.500	4786.500	-1.318	.187
INVTA	1633.000	3844.000	-2.373	***.018***	NPMARGIN	2319.000	4597.000	-.393	.694
RECTA	2238.500	5478.500	-3.185	***.001***	ARARFLAST	1608.500	3561.500	-1.430	.153
FATA	3219.000	6540.000	-.206	.837	TATAFLAST	2909.000	5912.000	-.201	.841
FALLL	2657.000	5285.000	-.168	.867	SALGROWTH	1834.000	4045.000	-1.701	.089
TACR	2791.000	6277.000	-2.111	***.035***	***ALTMAN***	2858.000	6428.000	-2.125	***.034***
CCEQUTA	2794.000	6197.000	-1.985	***.047***	AGE	3522.000	7092.000	-.019	.985
PLEQUTA	1959.000	4305.000	-1.540	.124	BOARDSIZE	537.500	1033.500	-.624	.532
RETERTA	2730.000	6051.000	-1.846	.065	ASSSIZE	3268.000	6838.000	-.166	.868
EQUITYTA	3221.000	6791.000	-.974	.330	REVSIZE	2888.000	6374.000	-1.916	.055
ARTURN	1720.500	3800.500	-1.298	.194	SIZE	1908.500	3504.500	-1.919	.055

a. Grouping Variable: Nature of the company

DATA ANALYSIS AND INTERPRETATION

Here, we have a database of 168 Indian companies with values of 48 indicators for three consecutive years i.e. T, T-1, and T+1 for each company. To extract significant indicators, we have to apply statistical tests. The researcher first applied the Kolmogorov-Srinovtest to check the normality of the data. As the data was not found normal, the Mann-Whitney U test was applied to scale variables. The variables having a P value less than 0.05 were selected as predictive indicators as input covariates for Neural Networks. Factor analysis was applied to categorical variables, which were used as independent factors for NN. By using these significant scaled and categorical variables, we applied NN and LR. There were some missing values. The cases having missing values have been ignored by SPSS by default. The missing values are shown by digits 99. xiAfter applying NN, we also attempted to compare the results of NN with LR. From this analysis, it can be concluded that the following scaled variables are found to be statistically significant.

CR	QR	INVCL	DEBTEQUITY	FINLEV	TATO	INVTA
RECTA	TACR	CCEQUTA	ROE	EQITYTO	ALTMAN	-

Likewise, for every sheet, Mann Whitney U test is applied. Each sheet carries two tables i.e. rank table and test statistics table. In the test statistics table, the variables found statically significant are shown in **BOLD** plus ***ITALIC*** font.

ABBREVIATIONS USED FOR CATEGORICAL VARIABLES

Name of the Variable	Abbreviation Used	Name of the Variable	Abbreviation Used
Age Recoded	AGE1	Chairperson also as CEO	CHAIRCEO
Board Size Recoded	BS1	Existence Of An Audit Committee	AUDITCOM
Asset Size Recoded	AS1	The existence of a Compensation Committee	COMPCOM
Revenue size Recoded	RS1	Having The President As Treasurer	PRESITRSURE

Table 2: Abbreviations Used

APPLICATION OF FACTOR ANALYSIS ON CATEGORICAL VARIABLES

Correlation Matrix

		CHAIRCEO	AUDITCOM	COMPCOM	PRESITRSURE	AGE1	BS1	AS1	RS1	SIZE
Correlation	CHAIRCEO	1.000	-.137	-.041	.487	.135	-.331	-.111	-.154	.000
	AUDITCOM	-.137	1.000	.221	-.159	.066	.142	.098	.121	.057
	COMP COM	-.041	.221	1.000	-.051	-.002	.298	.347	.340	-.323
	PRESITRSURE	.487	-.159	-.051	1.000	.053	-.268	-.217	-.273	-.043
	AGE1	.135	.066	-.002	.053	1.000	.052	.105	.153	.234
	BS1	-.331	.142	.298	-.268	.052	1.000	.514	.547	-.246
	AS1	-.111	.098	.347	-.217	.105	.514	1.000	.865	-.403
	RS1	-.154	.121	.340	-.273	.153	.547	.865	1.000	-.281
	SIZE	.000	.057	-.323	-.043	.234	-.246	-.403	-.281	1.000

a. Determinant = .056

The KMO statistic in the following table is 0.682 which is above 0.5 which indicates that factor analysis has extracted distinct and reliable factors. Bartlett's test of sphericity tests the null hypothesis that the correlation matrix is an identity matrix. Therefore, the researcher wants this test to be significant i.e. the value should be less than 0.05 ($p < 0.05$). As we can see, the significance value for the above table is 0.000. Hence, we can say the factor analysis is appropriate. The total variance explained table presents the Eigen-values associated with each component (variable).

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.682
Bartlett's Test of Sphericity	Approx. Chi-Square	141.730
	df	36
	Si	.000

Rotated Component Matrix

	Component			
	1	2	3	4
Asset Size Recoded	.917			
Revenue size Recoded	.905			
Board Size Recoded	.669			
Chairperson Also As CEO		.842		
Having The President As Treasurer		.804		
Age Recoded			.835	
Size Recoded			.679	
Existence Of An Audit Committee				.884
Existence of a Compensation Committee				.606

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization. [a]
a. Rotation converged in 6 iterations.

From the above table, we can choose those factors that have the highest factor loadings such as asset size recoded, chairperson also as CEO, age recoded, and existence of audit committee.

APPLICATION OF NEURAL NETWORK

Case Processing Summary

		N	Percent
Sample	Training	43	81.1%
	Testing	10	18.9%
Valid		53	100.0%
Excluded		115	
Total		168	

The case processing summary provides information about how many cases are valid and how many are excluded. N is the number of cases further subdivided into valid, excluded, and total. Percent is the division of valid samples into training and testing. With the multi-layer perceptron approach, the data is divided data into training and testing sets. The training set is used to estimate the network parameters. The testing set is used to prevent overtraining. As is seen 81.1% of the total sample is assigned to training and 18.9% is kept for testing. By default, SPSS Neural Networks excludes those cases that have missing values for even one variable. The total number of valid cases is 53 while 115 cases are excluded from the analysis due to missing value effect.

Network Information

Input Layer	Factors	1	Asset size Recoded
		2	Age Recoded
		3	Size
	Covariates	1	Chairperson Also As CEO
		2	Existence of An Audit Committee
		3	Debt / Equity
		4	Financial Leverage
		5	Total Assets Turnover
		6	Inventory / Total Assets
		7	Receivables / Total Assets
		8	Total Assets/capital & reserves
		9	Return on Equity
		10	Equity Turnover
		11	ALTMAN
	Number of Units		35
	Rescaling Method for Covariates		Standardized
Hidden Layer(s)	Number of Hidden Layers		2
	Number of Units in Hidden Layer 1[a]		1
	Number of Units in Hidden Layer 2[a]		1
	Activation Function		Hyperbolic tangent
Output Layer	Dependent Variables	1	Nature of the company
	Number of Units		2
	Activation Function		Softmax
	Error Function		Cross-entropy

a. Excluding the bias unit

The model summary provides information about the results of training and testing the final network. Cross entropy error is the error function that the network tries to minimize during training and testing. In training cross entropy error is 6.954 and during testing, it is 0.480. The percentage of incorrect predictions is 0.0%. The final result of the application of neural networks is shown in the classification table. It shows the practical results of applying the network. During training, 20 fraud companies are correctly predicted as fraud while 21 non-fraud companies are correctly predicted as non-fraud. 2 non- fraud companies are wrongly predicted as fraud. Overall, 95.3 % of the training cases are classified correctly. During the testing; 100 % accuracy is attained.

Classification

Sample	Observed	Predicted		
		Fraud company	Non- Fraud company	Percent Correct
Training	Fraud company	20	0	100.0%
	Non- Fraud company	2	21	91.3%
	Overall Percent	51.2%	48.8%	95.3%
Testing	Fraud company	5	0	100.0%
	Non- Fraud company	0	5	100.0%
	Overall Percent	50.0%	50.0%	100.0%

Dependent Variable: Nature of the company

APPLICATION OF LOGISTIC REGRESSION

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	62	36.9
	Missing Cases	106	63.1
	Total	168	100.0
Unselected Cases		0	.0
Total		168	100.0

a. If weight is in effect, see the classification table for the total number of cases.

In the above table showing the case processing summary, N describes the total number of cases included in the analysis as well as missing cases. The last column on the right shows the percentage of cases in each category. The first row gives the number and percent of cases that were included in the analysis while the second row gives information about the number and percent of missing cases in the data set. While applying logistic regression in SPSS, it performs a list-wise deletion of missing data by default. It means if there is any missing value for any variable in the data set, the entire case will be excluded from the analysis. The third row is the sum of the cases that were included in the study and the missing cases i.e. 62+106= 168.

There are zero unselected cases in the study, therefore total number of cases corresponds with selected cases. The tables have two columns, observed and predicted, further divided into sub-columns. Observed indicates the number of 1's and 2's that are observed in the dependent variable i.e. nature of the company as fraud or non-fraud respectively. Predicted are the predicted values of the dependent variable based on the full logistic regression model.

The classification table shows how many cases are correctly predicted (25 cases are observed to be 1 and are correctly predicted to be 1 while 31 cases are observed to be 2 and are correctly predicted to be 2), and how many cases are not correctly predicted (4 cases are observed to be 1 but are predicted to be 2 while 2 cases are observed to be 2 but are predicted to be 1). Overall percentage gives the overall percent of cases that are correctly predicted by the model. As we can see, this percentage is 90.3 for the full model.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
	DEBTEQUITY	.458	.570	.646	1	.422	1.581	.517	4.834
	FINLEAV	1.546	.973	2.527	1	.112	4.694	.697	31.597
	TATO	-1.219	2.321	.276	1	.599	.296	.003	27.934
	RECTA	-1.296	2.497	.270	1	.604	.274	.002	36.483
	TACR	-.819	.555	2.177	1	.140	.441	.149	1.309
	ROE	.183	.516	.126	1	.723	1.201	.437	3.299
	EQUITYTO	.840	.830	1.024	1	.312	2.315	.455	11.775
	ALTMAN	.567	.568	.997	1	.318	1.762	.579	5.360
	CHAIRCEO(1)	2.135	1.276	2.799	1	.094	8.453	.693	103.032
	AUDITCOM(1)	-15.013	13466.008	.000	1	.999	.000	.000	.
	SIZE	.118	.421	.079	1	.779	1.125	.493	2.569
	AGE1			2.091	5	.836			
	AGE1(1)	-.953	108075.876	.000	1	1.000	.386	.000	.
	AGE1(2)	-1.908	108075.876	.000	1	1.000	.148	.000	.
Step 1[a]	AGE1(3)	-.137	108075.876	.000	1	1.000	.872	.000	.
	AGE1(4)	3.395	108075.876	.000	1	1.000	29.812	.000	.
	AGE1(5)	4.667	115256.878	.000	1	1.000	106.366	.000	.
	AS1			4.347	10	.930			
		5.211	5.471	.907	1	.341	183.262	.004	8318229
	AS1(2)	40.691	19043.811	.000	1	.998	4695826	.000	.
	AS1(3)	1.812	5.448	.111	1	.739	6.120	.000	265397.6
	AS1(4)	1.458	4.952	.087	1	.769	4.295	.000	70530.42
	AS1(5)	1.934	4.938	.153	1	.695	6.920	.000	110562.3
	AS1(6)	35.767	22234.543	.000	1	.999	3415359	.000	.
	AS1(7)	23.382	26990.059	.000	1	.999	1428114	.000	.
	AS1(8)	8.871	6.467	1.882	1	.170	7122.04	.022	22772603
	AS1(9)	-21.911	13832.050	.000	1	.999	.000	.000	.
	AS1(10)	-22.598	26990.058	.000	1	.999	.000	.000	.
	Constant	-5.005	108075.876	.000	1	1.000	.007		

Classification Table[a]

	Observed		Predicted		
			Nature of the company		Percentage Correct
			Fraud company	Non- Fraud company	
Step 1	Nature of the company	Fraud company	25	4	86.2
		Non- Fraud company	2	31	93.9
	Overall Percentage				90.3

a. The cut value is .500

The table displays the variables to form the predictive equation. B depicts the beta values for all the variables for the logistic regression equation for predicting the dependent variable from the independent variable. The prediction equation is as follows:

Log (p/1-p) = b0 + b1 x1 + b2 x2 + b3 x3 + b3 x3+b4 x4…….

Expressed in terms of the variables used in the study, the logistic regression equation for predicting FSF is:

log(p/1-p) = -5.005 + 0.458 DEBTEQUITY + 1.546 FINLEAV -1.219 TATO -1.296 RECTA -0.819 TACR+ 0.183

ROE + 0.840 EQUITYTO+ 0.567 ALTMAN + 2.135 CHAIRCEO (1) -15.013 AUDITCOM (1) + 0.118 SIZE - 0.953

AGE1(1) -1.908 AGE1(2) -0.137 AGE1(3) + 3.395 AGE1(4) + 4.667 AGE1(5) + 5.211 AS1(1) + 40.691 AS1(2) + 1.812 AS1(3) + 1.458 AS1(4) + 1.934 AS1(5) + 35.767 AS1(6) + 23.382 AS1(7) + 8.871 AS1(8) - 21.911AS1(9) - 5.005 AS1(10)

COMPARISON BETWEEN NN OUTPUT AND LR OUTPUT

Classification through NN

Sample	Observed	Predicted		
		Fraud company	Non- Fraud company	Percent Correct
Training	Fraud company	20	0	100.0%
	Non- Fraud company	2	21	91.3%
	Overall Percent	51.2%	48.8%	95.3%
Testing	Fraud company	5	0	100.0%
	Non- Fraud company	0	5	100.0%
	Overall Percent	50.0%	50.0%	100.0%

Dependent Variable: Nature of the company

Classification through LR

	Observed		Predicted		
			Nature of the company		Percentage Correct
			Fraud company	Non- Fraud company	
Step 1	Nature of the company	Fraud company	25	4	86.2
		Non- Fraud company	2	31	93.9
	Overall Percentage				90.3

a. The cut value is .500

CONCLUSION

If we recall the classification tables of both of the techniques, then we found that in year A (T) i.e. fraud year, the overall accuracy level of NN (100.0%) is more than the accuracy level of LR (90.3%). As per the first objective of the study; the study is conducted to demonstrate the power of Neural Networks in classifying fraud and non-fraud companies. This has been proven that the technique has an amazing quality to detect fraud based on some significant financial ratios and categorical factors. The highest accuracy of NN achieved during the study is 100.0% and the minimum accuracy level is 90.0%. Hence, the first and second hypotheses were **rejected** which were "*Financial and corporate governance indicators are not significantly effective on detecting FSF*" and *"Neural Network (NN) is not significantly effective on predicting FSF"*. The second objective of the study is to indicate red flags to prevent FSF. The followingtable shows the major financial ratios and categorical factors that can be used as predictive indicators or red flags for detecting FSF.

The third objective of the study consists of two questions. The first question is about the accuracy level of LR. Based on the previous analysis, we can conclude that LR is also equally efficient in detecting and predicting FSF. The predictive equations formed in the LR analysis provide evidence for it. The second question is about comparing the superiority of both of the techniques. The third and last hypothesis of the study "*There is no significant difference between the accuracy level of NN and Logistic Regression (LR) in the detection of FSF*" asks the same question. To check this hypothesis; we applied Paired Sample T-test in SPSS 21. The following tables display the results.

SCALE VARIABLES			
DEBTEQUITY	TATURN	ALTMAN	ARTURN
FINLEV	INVTA	RETERTA	APTURN
CR	RECTA	GPMARGIN	INVCA
INVCL	TACR	CATA	REVSIZE
INTCOV	ROE	WCTA	TATAFLAST
ARARFLAST	EQUITYTO	INVTURN	CCEQUTA
DEBTEBITDA	RECREV	CHFEFCHFS	FATO
ROS	ROA		
CATEGORICAL VARIABLES			
ASSSIZE	SIZE	CHAIRCEO	AGE
REVSIZE	PRESITRSURE	AUDITCOM	

Table: Red Flags Identified

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	NN	96.0000	5	5.47723	2.44949
	LR	95.0000	5	7.07107	3.16228

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	NN - LR	1.00000	7.41620	3.31662	-8.20843	10.20843	.302	4	.778

Here we can see that the mean of both outputs is almost the same. If we check the significance value (p-value) of the T-test which is 0.778; we will conclude that the hypothesis is **accepted**. Hence, there is no significant difference between the accuracy level of NN and Logistic Regression (LR) in the detection of FSF.

CONCLUDING REMARKS

An ounce of prevention is worth a pound of cure. In a few other business contexts is as true as with financial statement fraud (Young 2000). It would be impossible to cover the total range of applications for which neural networks have provided outstanding solutions. This paper tried to explain different applications of neural networks as a classifier and also attempted to set a basic framework for financial statement fraud detection. Due to the rapid growth of information technology including the Internet and software, we are now enabling to deal with large volumes of data and reach a productive outcome. In this way, we can contribute to the fast development of society by producing an early warning system for investors, bankers, government, medical practitioners, and other professionals. Prevention and detection of financial statement fraud through neural networks would be of great value to organizations worldwide. The development of neural networks may prove to be one of the most important, practical, and fruitful endeavors in finance and other areas in the present decade. Hence, we can conclude that a neural network is certainly a good technique for solving classification problems.

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DATABASE

CMIE-Prowess

ENDNOTES

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WOMEN'S EDUCATION AS A DRIVER OF ECONOMIC GROWTH: EVIDENCE FROM UTTAR PRADESH

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Education is a fundamental pillar of national development and environmental progress, serving as the primary driver of economic growth, improved quality of life, and human resource development. It fosters creativity, foresight, and transformative change, steering societies away from traditional backwardness, poverty, and overpopulation towards enlightenment, prosperity, and well-being. Women in India have played a crucial role in societal development, making significant direct and indirect contributions. Their active participation in economic and social activities is essential for overall national progress.

This study seeks to analyze women's education and empowerment in both rural and urban areas of Hathras District and Aligarh, specifically in Satoha, Raghaniya, Sasni, Laadhpur, Lakhnu, and Nagla Hema. The objective is to establish a correlation between women's education levels and economic growth while identifying key challenges affecting women's education in Uttar Pradesh (UP). Through this research, we aim to highlight the critical barriers to women's educational advancement and explore potential strategies for fostering gender equality and empowerment.

Keywords : Women's Education, Development, Quality of Life, Economic Growth.
JEL Code: *I24, J16, O15*

I. Introduction

Education for women is very important for the country to develop fully. It is like an effective medicine to completely cure a patient and restore their health. Education for women is a great opportunity for India to develop socially and economically. Educated women are the weapon to positively impact Indian society through their contribution at home and at work. They are the reason for an improved economy in the country as well as in society. An educated woman can master her personal and professional life. Female education in ancient India was quite good, but it deteriorated in the Middle Ages due to many restrictions placed on women. However, it is getting better and better every day as the modern people of India understand that the development of the country is impossible without the growth and development of women. Equal growth of both sexes will indeed increase economic and social development in all areas of the country. Women should be given the same educational opportunities as men and they should not be isolated from development activities. Women cover almost half of the country's population, which means that if women are uneducated, then half the country is uneducated, resulting in a poor socio-economic situation. The education of women accelerates social and economic development in India. To spread the meaning and raise the level of women's education across the country, nationwide national propaganda, and awareness programs.

If a woman is uneducated, the future of the country would also be uneducated. Female education was a problem in middle-aged India, but it has now been largely resolved. Women's education has been given high priority in India as well as men's education to bring about some positive changes in the country's social and economic status. In the past, women were not allowed to leave their homes. They were limited only to housework as their education. Raja Ram Mohan Ray and Iswara Chandra Vidyasagar were some famous social reformers during British rule in India who turned their attention to women's education. Both males and females cover half of the country's population. They are like two sides of the same coin and therefore need equal opportunities to participate in the country's development. One cannot exist without the other, for women are everything in giving birth to the future generation. If they were well educated, they would produce an educated future generation and hence a healthy social and economic situation in India.

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II. Women: Historical Perspective

The historical background of Indian society shows that in Vedic times a woman was held in high esteem. There is an old saying: where women are honored, their gods dwell. She was known as Ardhangini, one-half of her husband's body. At the time of marriage, as a bride, she had the right to take certain solemn vows to the groom in front of the ritual fire. A man's religious ceremony could not bear fruit without her participation. As a mother, wife, and sister, she held a place of honor. She is the epitome of courage and boldness, love and affection, sacrifice and suffering. However, throughout history, women lost their place of honor due to social, economic, and political factors. Evil customs such as sati, purdah, child marriage, forced widowhood, and the dowry system crept into society and this led to a decline in the status of women both inside and outside the home. In recent years, sexual harassment in the workplace, early evening teasing, kidnapping, and murder of female fetuses have lent an inclination to the horrific patterns of behavior prevalent in society. Most women live a life of dependency that has no identity of its own. The struggle for equality, justice, and parity between women and men continue, and more and more literature on women's empowerment is appearing.

They have been deliberately denied opportunities for growth in the name of religion and sociocultural practices. Before independence, women were victims of many vile customs, traditional rigidities, and vices that shattered their status in society and left their situation utterly desolate. They were victims of widespread illiteracy, segregation in the dark and dingy rooms in the name of Purdah, forced child marriage, indefinite widowhood, the rigidity of fidelity, and resistance to widows' remarriage, leading many of them to become prostitutes, polygamy, Female infanticide, violence, and violence led to a compulsion to follow sati and a complete denial of individuality. Add to this economic dependency, early tutelage of husbands and in-laws, heavy domestic work that was unpaid and unrecognized, lack of career and mobility, non-recognition of their economic contribution, poor working conditions and wages, and monotonous jobs that men generally refused to do also responsible for their miserable conditions. On a socio-political level, women suffered from denial of freedom in their homes, oppression and unnatural indoctrination, unequal and subordinate status, rigid caste hierarchy, and untouchability. As a result, most women were reduced to dumb cattle which led to inhuman beast lives.

The Status of women in Uttar Pradesh

Although the state of Uttar Pradesh is rich in human and natural resources, economic growth has stalled in recent years as the state failed to capitalize on the opportunities created by economic liberalization. It is also the most populous state in the country with a population of 175 million people making up 16.4 percent of the country's population. It is the fourth largest state in the geographical area of the country, covers 94,411 square kilometers, and consists of 83 districts, 901 apartment blocks, and 112,804 inhabited villages. The population density of the state is 173 people per square kilometer versus 274 in the country. Rural poverty makes up 80 percent of the state's population, making it one of the most disadvantaged economies. An estimated 8 percent of the world's poor live in the state. The economy of Uttar Pradesh is one of the most disadvantaged economies in the world and that equates to one of the most disadvantaged countries like Ghana.

Uttar Pradesh is characterized by enormous disparities and unequal distribution of wealth and resources. One of the main reasons for this inequality is the caste system, which commits injustice; Abuse, and exploitation of the vast majority of the disadvantaged who have been completely marginalized. Uttar Pradesh is characterized by wide disparities in gender, caste, and the distribution of wealth and resources. The villages in Uttar Pradesh are heterogeneous and consist of different castes and social groups. They are a collection of hamlets representing a particular caste with a distinct social and economic character. In particular, the Dalits are the most disadvantaged group, oppressed by the caste system, untouchability, Zamindari system, etc. Many Dalits or untouchable souls, regardless of whether they are male or female, remained subordinate citizens for several centuries. The status of Dalit women is bleak and they face not only gender prejudice but also humiliation stemming from the age-old tradition of untouchability. They are treated worse than stray animals through no fault of their own.

The economy of Uttar Pradesh is one of the most disadvantaged economies in the world and that equates to one of the most disadvantaged countries like Ghana. Uttar Pradesh is characterized by enormous disparities and unequal distribution of wealth and resources. One of the main reasons for this inequality is the caste system, which commits injustice; Abuse, and exploitation of most of the disadvantaged who have been completely marginalized. Among the rich and poor, the status of women is much lower

than that of men. Among all major Indian states, Uttar Pradesh has the highest under-five mortality rate, the second highest crude mortality rate, and the third lowest life expectancy. The number of maternal deaths per 10,000 live births in Uttar Pradesh was estimated at 931 in the mid-1930s. Only five countries in the world for which official figures are available had higher estimated maternal mortality rates at the time: Somalia, Bhutan, Ghana, Gambia, and Congo. The reason for the disadvantaged position of women is the extreme social restriction of freedom of movement and activities. Women are socially and physically oppressed. They are confined to the household domain and suffer from various restrictions even within that domain. The low participation of women in education is one aspect of this general pattern of women's limited interaction with the outside world. Women's limited ability to acquire education and information will inevitably impair their ability. It inferences that accounts for slow social progress in UP is the apathy of the state but an equally important factor is the failure of civil society to challenge oppressive patterns of caste, class, and gender relations.

A strong patriarchal society with deep-rooted sociocultural values continues to have an impact on gender equality and women's empowerment. Despite the provisions of the Constitution and the 73rd Amendment, women continue to be treated as inferior human beings regardless of caste, creed, or religion. There is persistent gender discrimination against women in education, mainly due to certain stereotypes and beliefs deeply ingrained in society. The girl is someone else's property, so she should stay indoors to do chores. The boy is favored because of the patriarchal values attached to the boy in performing the last rites and as insurance against old age. Girls are not favored because of the financial burden they would incur from the prevailing dowry system. This is how women are treated as commodities.

There are feticides, infanticides, and discrimination in feeding and nutrition that adversely affect the natural sex ratio. Due to the socio-cultural factors, women do not have a say in decision-making, resulting in a lack of control over their own bodies, sexuality, and reproduction. Early marriage and reduced marital decision-making capacity, early motherhood, repeated pregnancies, and lack of access to family planning services affect a woman's health and even life expectancy.

Women are systematically denied access to public and private property. In Uttar Pradesh, a woman must spend an average of 5 to 6 hours a day fetching firewood or food or drinking water, which is also on a girl's way to school or even her share of the cooked food. Men generally own family wealth and women have no say in buying, selling, and owning land, as our field study shows. The remarriage of widows to their husband's brother serves solely to preserve the property claim. Male relatives rarely use coercion when women own property. While women contribute significantly to the household and family livelihood, their mobility is controlled. There is a gender division of labor and women are expected to assume the reproductive role. The burden of household chores and the responsibility for making a living leave few opportunities for a productive role. Lack of skills and knowledge limits their access to the labor market

III About Uttar Pradesh:

UP is a state in northern India with a population of over 190 million people. It is India's most populous state as well as the most populous sub-national entity in the world. If it were a separate nation, Uttar Pradesh would be the sixth most populous country in the world.

Uttar Pradesh is the second largest state economy in India, contributing 8.17% of India's total GDP between 2004 and 2009. Covering an area of 93,933 square miles (243,290 km), Uttar Pradesh covers much of the extremely fertile and densely populated highland Genetic Plain. It shares an international border with Nepal to the north along with the Indian state of Uttarakhand, Himachal Pradesh to the northwest, Haryana, Delhi, and Rajasthan to the west, Madhya Pradesh to the south, Chhattisgarh and Jharkhand to the southeast, and Bihar to the east. The administrative and legislative capital of Uttar Pradesh is Lucknow and the financial and industrial capital is Kanpur. The state Supreme Court is based in Allahabad with a bank in the state capital, Lucknow. It is home to many historic cities including Allahabad, Varanasi and Agra. Kanpur is its largest city; other major cities are Gorakhpur, Meerut, Agra, Aligarh, Bareilly, Ghaziabad, and Noida. Uttar Pradesh holds an important place in the culture of India; It is considered the birthplace of Hinduism, was the ancient seat of Hindu religion, learning, and culture, and has many important Hindu pilgrimage sites.

The exploitation of Women: A woman in Indian society has been the victim of humiliation, torture, and exploitation. There are many episodes such as rape, murder, dowry, arson, wife beating and discrimination in socioeconomic and

educational fields. Indian society is predominantly male-dominated, so women are victims of male dominance in their respective areas of life; especially in economic life, for example when making decisions about resources, the use of their income, and their bodies. Therefore, a woman's life lies between joys at one end and dangers at the other. In everyday life, women are routinely defined by gender and are potential victims of kidnapping and rape. The human species has made significant advances in several areas of life. But man has not yet grown enough to overcome the self-imposed spiritual slavery of the laws of the jungle. The laws of physical strength have always thrived at the expense of the weak and have made women the primary underdogs of an exploitative society. In the lower socioeconomic strata of society, women perform more dangerous manual labour than men.

Women do more than half of the agricultural work in India. Men are still considered breadwinners. This sense of inferiority in women is passed down from generation to generation through psychological conditioning. The most widespread and dehumanizing forms of discrimination and abuse against women occur at the psychological level. The female psyche is already destroyed in childhood. The female psyche is brutalized long before physical violence is inflicted on it. They are conditioned to accept inferior positions in society. From childhood, women go through a slow unconscious process of destruction or denial of their self-worth. Society, through a process of conditioning girls at home and at school, creates thought patterns that attribute a subordinate status to the female gender. Also, society gradually trains them to embrace this value system. Usually, little girls are given bangles, anklets, etc., giving a sense of fragility.

Another result of social conditioning is that the man acts as either a father; Brother or husband who sees women as a socio-economic gift from their household. A woman's worth is judged not so much by her value as a person with rights and dignity but by her usefulness to man. Expression of this mentality can be found in different languages and societies. For example, in Hindi, a girl is called parayadhan and a boy is called apanadhan.

IV: Reason to dropout

(According to India today, around 9.9 per cent of girls drop out of school every year in UP)

1. Early marriage: Too often marriage is given a higher priority than education. The low value placed on girls' education means they have few other options. Boys can be affected, but most victims of child marriage are girls. After their marriage, they leave the education system and tend to live with their families in poverty due to lower educational skills.

2. Early Pregnancy: In many parts of the world, pregnant girls are excluded from school regardless of their circumstances. Many do not return after childbirth due to these rules, stigma, fees, lack of childcare, and unavailability of flexible school programmers. About 16 million girls aged 15-19 and about 1 million girls under 15 give birth each year, most in low- and middle-income countries

3. Violence at school: This is not only a violation of their human rights but also one of the most common reasons girls drop out of school. A toxic cocktail of conservative patriarchal attitudes, rising male intolerance, and delinquency appears to be contributing heavily to Uttar Pradesh's dropout crisis, an India Today investigation has found.

4. Lack of funding: Funding is a major issue when it comes to why girls are out of school. Girls' education is often the lowest budget priority in many countries. Daughters are considered less valuable once educated and are less likely to do as their father, brother, or husband wills. Male siblings are often given the opportunity to attend school instead.

5. Child labour/domestic labour: Girls often stay at home, take care of younger siblings, and shoulder the brunt of the housework. While raising a boy is seen as a wise investment, sometimes for girls, it is seen as a waste of time. Many girls start working at the age of five - mainly in agriculture or in homes as domestic workers. Child domestic workers are particularly vulnerable to human trafficking, forced labor, sexual violence, and many health problems.

6. Poor sanitation: In many parts of the world, raising your hand and asking to go to the bathroom is not that easy. Many girls, especially menstruating adolescents, do not attend school due to a lack of privacy, sanitation, and water shortages. Many girls are also afraid of sexual advances from boys in mixed toilets.

7. Natural disasters: Unforeseen events such as earthquakes, floods, and diseases can affect the education of millions of girls. In humanitarian emergencies, including natural disasters, increased poverty for families, and a lack of job opportunities, girls are at greater risk of early marriage or

ending up in prostitution. Even if the schools are still standing, families whose livelihoods have been destroyed may no longer be able to afford to send their daughters to school.

8. Because they are girls: Often girls are marginalized and do not go to school just because they are girls and it is not the cultural norm. Their chances of getting quality education are even lower if they come from poor families, live in rural areas, or have a disability. Girls are four times more likely to be out of school than boys from the same background.

***Factors accentuate the negative self-image that the women have inherited along the way.**

- Women are considered Shudras (According to four varnas).
- Menstrual blood is dirty and polluting.
- Late marriage begets shame for her family.
- Women's sexuality is dangerous to society.
- It is a woman's fault if she gives birth to a girl child.
- In addition, early signs of illness are neglected.

Women are generally deprived of intangible resources such as information knowledge; Skills, confidence, and articulation are essential elements in gaining access to material resources and asserting their rights. There are certain innate qualities such as self-confidence, self-worth, communication skills, etc. that are culturally repressed and not encouraged in women by patriarchal society. Women enter the political system with many gender-based disabilities such as illiteracy, responsibility for housework, childcare, social and family resistance to their participation in public life, poor self-image, lack of self-confidence, and ignorance of the political system.

Thus in spite of the 73rd and 74th amendments (Sanyogita, Scholar), 2020) participation of women in the local government of parliament always remained less than 10 percent. There are certain key areas where women are perpetually marginalized, and hence need to be empowered:

- Lack of access and control over public resources and institutions.
- Lack of access and control over community affairs.
- Lack of control over the political process and decision-making in households.
- Lack of access and control over income.
- Lack of control over their bodies.

Lack of access to intangible resources such as information and influence.

V. Literature review

Available literature stated that there is a close relationship between early marriage and school dropout of females as Dr. Syed Waseem A. Ashraf and Ayaz Ahmad (2012) say that**, the** education of women is having supreme power for the development of individuality. It is also an instrument for strengthening socially useful skills, habits, and attitudes of common citizenship. Education of rural women also assumes great importance to enable them to get the fullest benefit of globalization.

The vulnerability of women in rural India and that too in Uttar Pradesh is worse compared to all India levels. Of course, there are certain initiatives in the country, especially after the Independence towards raising the status of women. However, there are miles to go to reach the goal of gender equality.

Susan Marlow (2006) states that the experience of small business ownership, from inception to daily management experiences, will be influenced by the gender of the owner. From a review of existing literature, it emerges that while there are a number of similarities between men and women small firm owners, there are significant differences in their approach to, and experience of, self-employment.

D. Radha Devi (1993) in her study 'Status of Women in India, a Comparison by State' finds that there is a direct relationship between status and development; many of the status indicators are reflections of overall development. Hence, these States (14 States having a population of 10 million or more) need special attention to raise them up to the level of the other States in terms of development

It is found that social status generally coincides with economic status. In other words, both are more or less overlapping. In simple terms, a theoretical definition of women's status could be the ranking, in terms of prestige, power, or esteem, according to the position of women in comparison with or relative to 'ranking', also in terms of prestige, power or esteem give to the position of men.

[SudhirVerma,1991]. Sekhar (2014) conducted a research study in the Madhurai district to find out the impact of education on women there and came out with the findings that educational qualifications played a significant role in women's behaviour anr empowerment. Pattnaik and Nagaraju Gundemeda (2016) through their empirical study on two villages of rural Odisha inferred two sets of factors influencing girls' dropouts from schools one is infrastructural shortcomings like non-availability of high schools within the village or nearby villages, and other institutional problems like helping in domestic chores, taking care of younger siblings, earning for parents ask child labour, etc. All of these affect girls' education and despite several government programs, obstacles to girls' schooling could not be eradicated. There is a need to move holistically to overcome institutional and infrastructural barriers.

According to Kumar and Sefali Roy (2012) women's position in society cannot be improved unless they are imparted formal and informal education along with skill and vocational training. Women empowerment does not require only dynamic laws but also changes in the mental setup of people living in society. The provision of basic infrastructural facilities in the school is not sufficient. Parents of girls need to be made aware of the fact that a girl's education is more profitable in the long run than sending her to domestic work to earn little money.

Research Question and Objective of Study:

H1 Education is affecting women's growth.

H2 Earning financial status is going to affect their social status.

H3 Family is responsible for education and economic status.

H4 Do early marriages affect women's education and status?

To study the status of women's education and women empowerment in Uttar Pradesh and to identify the problems faced by women in Uttar Pradesh. This study defines the growth and development of women in Uttar Pradesh and recognizes the root level of complicacies faced by women in Uttar Pradesh.

VI. Research Mythology:

This research aims to explore the perspectives of respondents on the social status and educational challenges faced by women in Uttar Pradesh. Through analysis and interpretation, the study seeks to identify key decision-making issues and opinions regarding gender equality and women's empowerment. To achieve this, both **primary and secondary data** sources were utilized. Primary data was collected through **face-to-face interviews** using a **structured questionnaire** with **closed-ended questions** to ensure clarity and consistency in responses. The study focused on **women from both rural and urban areas** of Aligarh district, with a sample comprising **80 urban women, 104 rural women, and 20 child workers (girls)** from different districts. **Convenience sampling** was used, considering the availability and willingness of respondents to participate.

Secondary data was sourced from **various publications, research papers, reports, and online sources**, all of which are cited in the bibliography. The research covered a **geographically diverse** area, including villages such as **Ruheri, Satoha, Raghaniya, Lakhnu, Ladhpur, and Nagla Hema**, along with urban centers like **Aligarh and Hathras**. A **descriptive research approach** was adopted, incorporating three key methods. The **observational method** was used to document respondents' behaviors in their natural settings without direct interaction. The **case study method** enabled an in-depth exploration of select individuals or small groups to gain deeper insights into their educational, social, and economic conditions. The **survey method** involved structured surveys and interviews to gather information on women's education, early school dropout, and empowerment issues.

For **data analysis**, the collected data was processed using the **Statistical Package for the Social Sciences (SPSS)** to identify **patterns, trends, and relationships** among various factors influencing women's education and empowerment. This research methodology ensures a **systematic and comprehensive** approach to understanding the challenges and opportunities related to women's social status and education in Uttar Pradesh.

VII: Data Analysis and Finding:

As we analyzed the data from Uttar Pradesh and from different villages in the Aligarh district. Data collection is

based on both primary and secondary research. This analysis helps us to find out the main problem of women. The data clearly show that family structure, household income, and the status of women are related to women's participation in decision-making.

1. Reliability Test: According to the reliability test we can depict that our data is reliable according to Cronbach's approach as the value is .927.

2. Demographic Profile:

Demographic Profile of Respondent (Frequency Test): Table no-1

Sl.No	Items	Response	No of Respondent	%
1	Age of the respondent	14 – 18 years	11	5.4
		18 – 22 years	79	38.7
		22 – 28 years	39	19.1
		28 – 35 years	33	16.2
		35 and above	41	20.1
2	Educational Qualifications	Primary Level	53	26.0
		Intermediate Level	30	14.7
		Graduate level	68	33.3
		Postgraduate level	29	14.2
		Technically qualified	24	11.8
3	Marital status	Married	75	36.8
		Un –Married	121	59.3
		Widow	8	3.9
4	Members of the family	2-4 members	65	31.9
		5 to 7	98	48.0
		7 and above	41	20.1
5	Level of employment	Employed	51	25.0
		Unemployed	16	7.8
		Housewife	49	24.0
		Student	86	42.2
		Any other	2	1.0
6	Type of Family	Joint	87	42.6
		Nuclear	117	57.4
		Any other	2	1.0
7	Economic status	Joint	87	42.6
		Nuclear	117	57.4

Interpretation- According to Table No. 1, 39% of women are 18-22 years old, 20% are 22-28 years old and only 33.2% have college degrees, 2% of them women are technically qualified and 24.4% have postgraduate degrees. 59.5% are unmarried and 36.6% are married women, 47.8% of women have 5-7 family members, 31.7% have 2-4 family members, and 20.5% have more than 7 family members. 42.4% are students, 24.9% are employed, 23.9% are housewives, 7.8% are unemployed and 1% is for any other type of family 82.9% of women have their own house and, 17, 1% a rented house

3. Economic Profile: Crosstab between Economic profile and household earning:

Table 2

	N	Mean	Std. Deviation
Economic Profile	204	1.17	.378
Household Earnings	204	4.08	1.434

Table no 3

Educational Qualification * Household earnings Cross tabulation							
		Household earnings					Total
		Cultivators	Agricultural labour	Non-Agricultural Labour	service	Business and others	
Educational Qualification	Primary level	2	24	8	14	5	53
	Intermediate level	2	4	1	14	9	30
	Graduate level	2	6	1	38	21	68
	Postgraduate level	0	0	0	14	15	29
	technically Qualified	0	0	0	18	6	24
Total		6	34	10	98	56	204

Interpretation- This table depicts that there is a cross-tabulation between the earnings of the family and the qualification of the girl child, we can easily predict that if the family is in the service sector then those family girls have taken education up to graduate level.

4. Have you ever faced problems in your education

Table no 4

Sl.No	Items	No of respondent	Frequency/percentage
1	Those who faced problems in education	104	50.7%
2	Those who haven't faced any problem	100	49.3%

Interpretation- Table 4 shows that there are 50.7% of women have problems getting an education and 49.3% of women have no problems getting an education.

If yes then what type of problem?

Table no 5

Sl.No	Items	No of respondent	Frequency/percentage
1	Transport	25	22.1%
2	Safety	15	13.3%
3	Children	3	2.7%
4	Family	30	27.4%
5	Any other	39	34.5%

Interpretation: Table 5 shows that 2.7% of women had problems because of their children, 13.3% had problems because of security, 22.1% had problems because of

transport, 27.4% of women had problems because of their families, and 34.5% of women there are facing other problems.

3: Part I

I Your opinion on the role of parent's consciousness in women's education.

Table 6

Descriptive Statistics									
Sl.No	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Lack of funding	204	1	5	3.08	1.270	.017	.170	-1.032	.339
illiteracy of parents	204	1	5	3.33	1.363	-.318	.170	-1.113	.339
Rural atmosphere	204	1	5	3.52	1.221	-.598	.170	-.549	.339
Negligence of parents	204	1	5	3.40	1.391	-.439	.170	-1.053	.339
Family Atmosphere	204	1	5	3.69	1.199	-.620	.170	-.484	.339

Interpretation -According to Table no 6 the opinion the role of Family Consciousness in women's education is very important.

II.Women Facing Problems (Table no 7)

Sl.No	Items	N	Mean	Std. Deviation	Skewness	
		Statistic	Statistic	Statistic	Statistic	Std. Error
1	Sibling Care	204	3.00	1.226	.169	.170
2	Not good in monetary terms	204	3.06	1.289	.001	.170
3	Household work	204	3.33	1.238	-.280	.170
4	Family constraint	204	3.39	1.272	-.354	.170
5	Social Pressure	204	3.39	1.280	-.316	.170

Interpretation-According to the table no 7 these are the problems faced by women's education all the factors are important sibling care, monetary problems, they have to do lots of household work and family constraints, and social pressure but social pressure and family constraints play a vital role.

III.Role of Learner's Interest (Table no-8)

Sl.No	Items	No of respondent	Ranking
1	The female child had no interest in receiving an education	102	1
2	No educational institution near the residence	48	4
3	Female children preferred going to school rather than staying at home	69	2
4	Parents and society did not encourage for educating the female	58	3

Interpretation According to Table No. 8, we represented the role of learners' interests in the ranking technique. Rank 1 is that the female child has no interest in receiving an education, Rank 2. female children are preferred to go to school in their place of residence, Rank 3. parents and society are not encouraged to educate the female child, and Rank 4. is no educational institution near living place so many problems there for female children in UP.

IV- Why females drop out from school/colleges

(Table no 9) Factor Analysis

Correlation Matrix											
		Early marriage	Pregnancy	Lack of sanitation	Because of distance	Child labour	lack of funding	Poverty	Parent decision	Lack of school infrastructure	Lack of Awareness
Correlation	Early marriage	1.000	.657	.419	.694	.138	.140	.155	.034	.516	.584
	Pregnancy	.657	1.000	.563	.594	.204	.241	.171	.064	.428	.539
	Lack of sanitation	.419	.563	1.000	.594	.514	.444	.380	.258	.425	.558
	Because of distance	.694	.594	.594	1.000	.318	.226	.255	.142	.579	.717
	Child labour	.138	.204	.514	.318	1.000	.668	.535	.573	.441	.367
	lack of funding	.140	.241	.444	.226	.668	1.000	.506	.628	.322	.232
	Poverty	.155	.171	.380	.255	.535	.506	1.000	.705	.413	.345
	Parent decision	.034	.064	.258	.142	.573	.628	.705	1.000	.382	.174
	Lack of school infrastructure	.516	.428	.425	.579	.441	.322	.413	.382	1.000	.561
	Lack of Awareness	.584	.539	.558	.717	.367	.232	.345	.174	.561	1.000

Interpretation -Table no 10

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.846
Bartlett's Test of Sphericity	Approx. Chi-Square	1154.486
	Df	45
	Sig.	.000

Table no 11

Total Variance Explained									
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	4.722	47.225	47.225	4.722	47.225	47.225	3.727	37.267	37.267
2	2.109	21.088	68.312	2.109	21.088	68.312	3.105	31.045	68.312
3	.735	7.347	75.659						
4	.547	5.470	81.129						
5	.493	4.928	86.057						
6	.367	3.672	89.729						
7	.306	3.057	92.786						
8	.276	2.761	95.547						
9	.242	2.415	97.962						
10	.204	2.038	100.000						
Extraction Method: Principal Component Analysis.									

Is education bringing some improvement to marriage? **(Table no 12)**

	Rotated Component Matrix		
Sl. No	Items	Component	
		1	2
1	Because of distance	.873	
2	Early marriage	.855	
3	Pregnancy	.808	
4	Lack of Awareness	.803	
5	Lack of sanitation	.654	
6	Lack of school infrastructure	.634	
7	Parent decision		.880
8	lack of funding		.808
9	Child labour		.802
10	Poverty		.796

Interpretation – According to the study out of 204 there are 138 respondent who feels that education will surely bring some improvement in their after-marriage life.

VIII: Findings of the Study:

The study highlights several key strategies to address the issue of **girls' early school leaving**, emphasizing the need for **alternative education programs** tailored to support children particularly girls who have dropped out due to **early pregnancy, child marriage, safety concerns, or financial constraints**. Such programs can provide **a second chance at education**, ensuring that girls do not suffer **social exclusion** from their peers. Additionally, the study underscores the importance of **psychosocial and mentoring programs**, as well as the **integration of life skills, civic education, and peace education** into school curricula to foster **holistic development**. Establishing **vocational and technical schools** is also recommended to equip girls who are unable to continue formal education with **practical skills for sustainable livelihoods**. Furthermore, **government and education stakeholders** should ensure the provision of **educational materials**, such as textbooks and stationery, to facilitate **learning continuity**. The **school feeding program** is identified as another critical strategy for reducing dropout rates, as it encourages **higher enrollment and retention** among children. Moreover, the study highlights the need for **more teacher training institutes** to enhance **the quality of education**. Lastly, the government must prioritize **gender mainstreaming initiatives** across all educational institutions to create an **inclusive learning environment**, ensuring equal opportunities for girls and fostering **long-term educational and societal empowerment**.

4o

IX. The Social Status of Women in Aligarh District: Challenges and Recommendations

The social status of women in Aligarh District reflects a deeply entrenched **male-dominated cultural framework** that restricts their autonomy and opportunities. Issues such as **high dropout rates after elementary education, early marriages, and the dependence of self-help group (SHG) women on male accountants** for financial matters indicate this scenario. Women, from birth to old age, often face **systemic violence and deprivation**, with their vulnerability being more pronounced in **rural areas of Uttar Pradesh** compared to the national average.

While significant **initiatives and reforms** have been undertaken, particularly after **India's independence**, the goal of **gender equality remains distant**. Although a majority of respondents acknowledged the existence of gender equality in theory, they reported **limited freedom of expression** in critical aspects of life, such as **voting rights, mobility without spousal permission, household financial decisions, and child healthcare**.

The Role of Education in Women's Empowerment

Education is the **most crucial factor** in the development of women in Uttar Pradesh. To address this issue, **parents, families, government bodies, and political stakeholders** must prioritize **women's education and overall development**. Young girls in **rural villages and towns** must receive **adequate financial support** to ensure **equal access to education, safety, and opportunities**.The most pressing challenges affecting women's education in Uttar Pradesh include **child marriages, early pregnancies, inadequate hygiene facilities, lack of awareness, poverty, and insufficient school infrastructure**. Many talented women, particularly those in **rural communities**, are **denied educational and employment opportunities**. Early marriage and motherhood negatively impact their **physical health, cognitive abilities, and long-term aspirations**. However, **even minimal education and awareness can bring transformative changes**, enabling women to secure **a better quality of life and financial independence**.

X. Limitations of the Study

The study faced **time constraints** in data collection. Many women were **reluctant to share personal information** regarding their education and socio-economic struggles. Additionally, the research was conducted within **a limited geographic region and sample size**, making it challenging to capture the **full scope of diverse socio-cultural and economic factors** influencing women's status. Given that **each individual has unique behavioral values and life experiences**, not all influential aspects could be included in this study.

Recommendations for Policy and Social Reforms

To improve the social and educational status of women, the following measures are recommended:

1. **Monitoring School Enrollment**: The enrollment of girls in schools should be **closely tracked at the Panchayat level** to minimize dropout rates.

2. **Parental Counseling**: Parents must be **sensitized** about the **long-term benefits of girls' education** for their personal and professional growth.

3. **Accessible Schooling**: Schools for girls should be **established within reachable distances**, equipped with **essential infrastructure such as hygienic toilets and safety measures**.

4. **Quality Education & Female Teachers**: Schools should ensure **regular, high-quality education** by **appointing more female teachers** to create a **supportive learning environment**.

5. **Financial Assistance**: Scholarships and **financial aid for higher education** should be **increased** to **encourage girls to pursue advanced studies**.

6. **Technical & Vocational Training**: **Computer literacy, technical training, and skill development programs** should be introduced to **prepare young women for global job markets**.

7. **Safe Accommodation & Security**: Secure **residential facilities for girls and women** should be established **every two to three villages** to provide a safe environment for higher education.

8. **Lifelong Learning Opportunities**: The government should **establish adult education programs** for older women who **wish to resume their education**.

9. **Employment & Independence**: Women must be provided **adequate skills, education, and vocational training**, not just for employment, but as an essential **prerequisite for their independence, freedom, and holistic social and cultural development**.

XI. Conclusion

Empowering women through **education and skill development** is essential to breaking the cycle of gender-based limitations. Comprehensive **policy implementation, financial support, and community awareness** are crucial to ensuring that **women in Aligarh District and across Uttar Pradesh** have **equal opportunities to thrive in all aspects of life**. Bridging the **gender gap in education and employment** will not only uplift women but will also contribute to **the overall socio-economic growth of the nation**.

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DIMENSIONS OF MALL ATTRACTIVENESS: THEIR INFLUENCE ON UNIVERSITY STUDENTS' SHOPPING EXPERIENCE

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The study examined the dimensions of mall attractiveness and their impact on university students' shopping experience using survey data from 310 private university students in Bhubaneswar. Exploratory factor analysis identified five key attractiveness dimensions viz., tenant mix & retail diversity, location & convenience, entertainment & events, technology integration and marketing & promotion which multiple regression analysis confirmed as having a positive and significant influence on students' overall shopping experience.

Keywords : Concept of Shopping Mall, Dimensions of Mall Attractiveness, Shopping Experience, Factor Analysis, Multiple Regression Analysis
JEL Code: *L81*

I. Introduction

Research since the 1960s shows that malls have evolved from purely transactional spaces into experiential destinations, where shoppers seek enjoyment and consume the environment as much as the products themselves (Haseki, 2013; Nsairi, 2012). Consequently, scholars stress the importance of multiple attractiveness dimensions, as mall choice is relative and these factors significantly influence repeat visits, evaluations, and word-of-mouth recommendations (Singh & Sahay, 2012; Saarijärvi et al., 2013).

Young consumers, especially students, are a key target group for shopping centres and are widely regarded as the future of the retail market due to their increasing mall patronage (Haytko & Baker, 2004; Crutsinger et al., 2010). Their strong connection to malls stems from familiarity and a sense of belonging, viewing them as "consumer habitats" and important leisure spaces, although preferences differ across cultures and levels of retail development (Bloch et al., 1994; Wilhelm & Mottner, 2005, as cited in Can et al., 2016; Gentina et al., 2014; Dębek, 2015; Rochmińska, 2011).

Changing lifestyles among young consumers highlight the need to better understand their evolving expectations from malls, particularly the attractions that motivate visits (Wulandari, Suryaningsih & Abriana, 2021; Gupta et al., 2020). Focusing on customer experience helps explain why millennials frequent malls and identifies key environmental factors that can enhance shopper attraction, profitability, and competitiveness in India's dense retail landscape (Anushree et al., 2016).

Bhubaneswar is rapidly emerging as an urban hub, with shopping malls becoming important drivers of both economic activity and social life. Leading malls such as Esplanade One, DN Regalia, BMC Bhawani Mall, Utkal Kanika Galleria, and Forum Mart have become multifunctional spaces that facilitate retail, entertainment, and social interaction. Understanding consumer behaviour in these contexts is therefore increasingly important (Dhal & Majhi, 2024).

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Previous studies show that young consumers are attracted to malls with convenient locations, entertainment options, and clean environments, while preferences are also shaped by loyalty programs, accessibility, parking, surrounding area quality, and the profile of other visitors (Haytko & Baker, 2004; Jackson et al., 2011, in Can et al., 2016; Can et al., 2016). However, existing research has largely overlooked how multiple attractiveness dimensions interact and has not examined the combined effects of tenant mix, convenience, entertainment, technology integration, and marketing on the overall mall experience, particularly among university students in Bhubaneswar. This paper addresses that gap by investigating the factors that attract young university shoppers in Bhubaneswar and exploring how these dimensions shape their mall experiences.

Objectives of the Study

- To identify the dimensions of mall attractiveness that influence university students' shopping experiences
- To examine the relationship between dimensions of mall attractiveness and university students' shopping behaviour
- To determine the relative importance of different dimensions of mall attractiveness in influencing university students' shopping experiences

II. Literature Review

A pool of discussion is gathered from the existing literature review on mall attractiveness dimensions and shopping experience and is refined to suit the context of the study. Table 1 lists the summary of the literature.

Items and Supporting Literature

Author & Year	Discussion
	Tenant Mix & Diversity
Yim and Xu (2012)	Highlighted the importance of tenant mix for shoppers, retailers, and mall managers, noting its ability to generate a synergistic effect.
Calvo-Porral and Lévy-Mangín (2018)	Emphasized that shopping centres with extensive trade areas, offering a wide range of store types within one location, can attract a diverse consumer base and enhance a mall's attractiveness by enriching the overall shopping experience.
Ali (2013)	Explored the elements contributing to mall attractiveness and their influence on consumer decision-making. The study revealed that both the variety of tenants and the mall's physical environment are significant determinants in attracting shoppers and shaping their mall preferences.
	Location & Convenience
Jaravaza and Chitando (2013)	Consumers tend to frequent the shopping mall that is most conveniently located. The strategic importance of location lies in its potential to offer a sustainable competitive edge
Levy et al., (2012)	A retailer situated in a prime, customer-friendly location forces competitors to settle for less desirable spots
Aliagha et al. (2015)	Indicated that physical aspects such as cleanliness, infrastructure quality (including ATMs, restrooms, and parking), and accessibility (via roads and public transport) all play a substantial role in influencing customer loyalty.

	Entertainment & Events
Choy (2018)	One key benefit of entertainment-focused events held in malls is their capacity to deliver pleasurable, hedonistic experiences to consumers. These events provide opportunities for relaxation, enjoyment, and shared social experiences with family, friends, and the broader public
Babin and Harris (2015)	The experiential nature of interactive entertainment events can subtly encourage purchases, particularly among experiential shoppers driven by feelings of boredom or loneliness
	Technology Integration
Hoyer et al., (2020) Willems et al., (2017)	Expressed that, technological advancements are playing an increasingly influential role in shaping consumer shopping experiences
Rangaswamy et al., (2020) Pantano and Viassone (2014)	Highlighted that to stay competitive in the digital era, retailers need to adopt innovation and integrate these technologies into their operational strategies
	Marketing & Promotion
Anselmsson (2006)	Opined that, the mall ownership and management groups have acknowledged the importance of effective marketing particularly since many regional malls share similar store compositions and product selections.
	Shopping Experience
Dube and Helkkula (2015)	Expressed that, in retail research, the concept of the "shopping experience" is commonly used to describe a customer's personal and subjective experience during the shopping process.
Tynan and McKechnie (2009)	Highlighted the importance of experience in influencing consumer behaviour
Helkkula et al., (2012)	Revealed that, experience should be understood holistically, covering all phases—before, during, and after the service interaction—as well as imagined or expected encounters

Hypotheses of the Study

Hypothesis 1: There is a significant and positive correlation between mall attractiveness dimensions and university students' shopping experience

Hypothesis 2: The dimensions of mall attractiveness have a significant influence on university students' shopping experience

III. Research Methodology

The study used descriptive and exploratory research methods, collecting primary data through a structured questionnaire and secondary data from academic and online sources. A convenience-based shopper-intercept survey conducted between January and February 2025 at major malls viz., Esplanade One, D.N. Regalia Mall, Utkal Kanika Galleria, Forum Mart, and BMC Keshari Mall in Bhubaneswar and gathered 310 valid responses from frequent student visitors.

An empirical analysis was undertaken based on the structured questionnaire, with measurement items for five exogenous variables—tenant mix & retail diversity, location & convenience, entertainment & events, technology integration, and marketing & promotion—and one endogenous variable, shopping experience, adapted from established literature (Yim & Xu, 2012; Calvo-Porral & Levy-Mangin, 2018; Jarayaza & Chitando, 2013; Choy, 2018; Hoyer et al., 2020; Dube & Helkkula, 2015).

In total, 24 items were developed to operationalize these dimensions: six for tenant mix & retail diversity, four for location & convenience, four for entertainment & events, six for technology integration, four for marketing & promotion, and four for shopping experience. Each item was rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A pilot test involving fifty participants—including neighbours, friends, and colleagues—was conducted to evaluate the clarity and structure of the questionnaire, leading to the rewording of certain items based on feedback.

Reliability and predictive validity were assessed using Cronbach's alpha and Factor Analysis. Correlation and multiple regression analyses were performed to evaluate the study's objectives and hypotheses, with all statistical procedures carried out using SPSS version 26.0.

Data Analysis & Interpretation

Table- 2: Reliability Statistics

Cronbach's Alpha	Number of Items	No of Cases
0.812	24	310

Source: Primary Data & Authors Calculation

The table-2 shows the result of reliability analysis on the data collected. The Cronbach's Alpha value of 0.812 which is higher than 0.70 for 24 items and 310 sample size reveals that both instrument and the date collected are consistent to be used for further analysis (Nunally, 1978).

Table- 3: KMO and Bartlett's Test of Sphericity

Constructs		KMO	Bartlett's Test of Sphericity
Mall Attractiveness	Tenant Mix & Reliability	.771	.000
	Location & Convenience	.780	.000
	Entertainment & Events	.802	.000
	Technology Integration	.710	.000
	Marketing & Promotion	.721	.000
University Students' Shopping Experience		.791	.000

Source: Primary Data & Authors Calculation

The table-3 revealed that the KMO measured between 0.710 and 0.802. This suggests that the data is suitable for Exploratory Factor Analysis EFA (Kaiser, 1974). Similarly, for the Bartlett's Test of Sphericity, the significance value is $p< 0.05$ (Bartlett, 1937).

Exploratory Factor Analysis

A factor loading is a simple correlation coefficient or regression coefficient. Typically, a loading of an absolute value of more than .60 was taken as an indicator. Out of a total of 35 items used in the study only 24 indicators remained for final analysis. Principal Component Analysis (PCA) with a varimax rotation was performed on these remaining 24 indicators to outline the mall attractiveness dimensions and are silently loaded within five domains.

Communalities

Table-4: Communalities

Sl.No	Statements	Initial	Extraction
1.	The mall has reputed anchorstore(s)	1.000	.866
2.	The stores in the mall offer agood choice of brands.	1.000	.799
3.	The mall has good range ofproducts.	1.000	.745
4.	Stores within the mall stock mypreferred brands.	1.000	.744
5.	There is a large variety ofstores in the mall.	1.000	.832
6.	Mall has a food court inside themall.	1.000	.773
7.	Mall is close to my home	1.000	.783
8.	Roads leading to mall are in good condition.	1.000	.767
9.	Mall provides adequate parkingspace.	1.000	.751
10.	There is a good transportation facility to reach to my nearest shopping mall	1.000	.769
11.	The mall has entertainment facilities for the kids, children, and the young ones.	1.000	.770
12.	The mall regularly hosts events such as live programmes to enthrall the audience	1.000	.708
13.	Regular seasonal and as well off-seasonal activities are held in the mall	1.000	.790
14.	The mall has specific venue forentertainment (i.e. Multiplex and game zones)	1.000	.712
15.	The mall has the facilities such mobile applications for efficient navigation	1.000	.641
16.	The interactive kiosks for finding information and directions are really helpful	1.000	.764

17.	The mall's payment methods are convenient and secure	1.000	.794
18.	The checkout process in the malls is efficient and hassle-free	1.000	.689
19.	Overall, the mall's technology infrastructure is well-maintained	1.000	.787
20.	The mall provides online shopping facilities with the adoption of contactless payment methods	1.000	.751
21.	I would prefer a mall which provides promotional schemes offering special rebates, including loyalty programmeswhen I shop.	1.000	.739
22.	How effective were the promotions you saw in influencing your decision to visit the mall	1.000	.745
23.	The mall's marketing efforts align with my expectations	1.000	.794
24.	Regular promotional activities using social media and email marketing draw me to the mall	1.000	.744

Source: Primary Data & Authors Calculation

Extraction Method: Principal Component Analysis (PCA)

Table-4 reveals that a wide range of communalities exist between .641 to .866. The analysis clearly indicates that all the indicators relating to the variables of mall attractiveness dimensions are commonly associated and there is a strong interrelationship among the variables.

Factor Analysis, Eigen values, Variance

Table - 5 represents the output related to the factor loadings, Eigen values, and variance percentage. Any individual indicator with factor loadings of more than .6 was accepted to make interpretation of the results easier and simple. The five factors are classified as tenant mix & retail diversity, location & convenience, entertainment & events, technology integration and marketing & promotion. All the five factors with Eigen values equal to or greater than 1 explained 76.846 per cent of variance in the dataset.

Tenant Mix & Retail Diversity

This factor includes six indicators and represents the variety of tenants and retail options, including emerging brands, dining outlets, and entertainment venues. It has an Eigenvalue of 9.323 and explains 37.727% of the total variance, with a Cronbach's alpha of .939 and factor loadings ranging from .855 to .899 (Table-5). The high variance contribution of this factor highlights the importance of tenant mix as a key element influencing mall attractiveness.

Location & Convenience

The second significant factor pertains to the mall's location and convenience, such as visibility, accessibility, and proximity to residential areas, workplaces, and transportation hubs. Factor loadings range from .863 to .911, with an Eigenvalue of 6.213 and an alpha score of .889 (Table-5). It accounts for 15.245% of total variance and contributes to a cumulative variance of 59.22%. This underscores the role of location and convenience in mall selection, particularly among university students.

Entertainment & Events

The third factor focuses on the presence of entertainment options and events within the mall that enhance the shopping experience and attract more visitors. It explains 9.654% of the total variance, with an Eigenvalue of 4.565, factor loadings between .838 and .889, and a Cronbach's alpha of .838 (Table-5). This suggests that activities like live shows, seasonal events, and promotions appeal strongly to younger audiences, boosting footfall and overall business.

Technology Integration

This factor comprises six indicators that reflect the integration of technology into the shopping experience. It includes mobile app navigation, online shopping features, and contactless payment options. With an Eigenvalue of 3.749, it explains 7.989% of the total variance and brings the cumulative variance to 70.615%. Factor loadings range from .840 to .876, with a reliability score of .804 (Table-5). These results indicate that young shoppers value technological advancements, enhancing their shopping satisfaction.

Marketing & Promotion

The fifth factor relates to marketing and promotional strategies, including advertising, social media interaction, email campaigns, and loyalty programs. This factor has four indicators with loadings from .865 to .877, an Eigenvalue of 2.764, and an alpha score of .778 (Table-5). It accounts for 6.231% of total variance and raises the cumulative variance to 76.846%. The findings imply that continuous promotional activities significantly enhance mall visibility and attract student shoppers through various engagement tactics.

Table-5: Factor Loading, Eigen Values and Variance

Name of Factors	Indicators	Factor Loadings	Eigen Values	Var %	Cum %	Alpha
Tenant Mix & Retail Diversity	The mall has reputed anchorstore(s)	.855	9.323	37.727	37.727	.939
	The stores in the mall offer agood choice of brands.	.899				
	The mall has good range ofproducts.	.868				
	Stores within the mall stock my preferred brands.	.870				
	There is a large variety ofstores in the mall.	.871				
	Mall has a food court inside themall.	.868				
Location & Convenience	Mall is close to my home	.911	6.213	15.245	52.972	.889
	Roads leading to mall are in good condition.	.878				
	Mall provides adequate parkingspace.	.844				
	There is a good transportation facility to reach to my nearest shopping mall	.863				
Entertainment & Events	The mall has entertainment facilities for the kids, children, and the young ones.	.852	4.565	9.654	62.626	.838
	The mall regularly hosts events such as live programmes to enthrall the audience	.889				
	Regular seasonal and as well off-seasonal activities are held in the mall	.845				
	The mall has specific venue forentertainment (i.e. Multiplex and game zones)	.838				

Technology Integration	The mall has the facilities such mobile applications for efficient navigation	.841	3.749	7.989	70.615	.804
	The interactive kiosks for finding information and directions are really helpful	.876				
	The mall's payment methods are convenient and secure	.867				
	The checkout process in the malls is efficient and hassle-free	.840				
	Overall, the mall's technology infrastructure is well-maintained	.865				
	The mall provides online shopping facilities with the adoption of contactless payment methods	.866				
Marketing & Promotion	I would prefer a mall which provides promotional schemes offering special rebates, including loyalty programmeswhen I shop.	.873	2.764	6.231	76.846	.778
	How effective were the promotions you saw in influencing your decision to visit the mall	.869				
	The mall's marketing efforts align with my expectations	.877				
	Regular promotional activities using social media and email marketing draw me to the mall	.865				

Source: Primary Data & Authors Calculation

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 5 iterations.

Table- 6: Correlation Analysis

Dimension	Pearson Correlation	TMRD	LC	EE	TI	MP	USSE
TMRD	Correlation	1	0.62**	0.66**	0.59**	0.64**	0.64**
	Sig. (2-tailed)		0.00	0.00	0.00	0.00	0.00
LC	Correlation	0.62**	1	0.70**	0.60**	0.61**	0.61**
	Sig. (2-tailed)	0.00		0.00	0.00	0.00	0.00
EE	Correlation	0.66**	0.70**	1	0.58**	0.66**	0.71**
	Sig. (2-tailed)	0.00	0.00		0.00	0.00	0.00
TI	Correlation	0.59**	0.60**	0.58**	1	0.56**	0.61**
	Sig. (2-tailed)	0.00	0.00	0.00		0.00	0.00
MP	Correlation	0.64**	0.61**	0.66**	0.56**	1	0.55**
	Sig. (2-tailed)	0.00	0.00	0.00	0.00		0.00
USSE	Correlation	0.64**	0.61**	0.71**	0.61**	0.55**	1
	Sig. (2-tailed)	0.00	0.00	0.00	0.00	0.00	

Source: Primary Data & Authors Calculation

**Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

Tenant Mix & Retail Diversity: TMRD; Location & Convenience: LC; Entertainment & Events: EE; Technology Integration: TI; Marketing & Promotion: MP; University Students' Shopping Experience: USSE

From the correlation analysis, it is inferred that all the coefficients are positive which suggest that the relationship between the dimensions of mall attractiveness and university students' shopping experience is positive and significant (table -6).

Regression Analysis

The results of multiple regression analysis are revealed in Table – 7a and it shows Model Summary. The R square for this regression model is .831. In this case, determinants of mall account for 83.1 per cent of the total variation in shopping experience.

Table- 7a: Model Summary of Regression Coefficient

Model	R	R Square	Adjusted RSquare	Std. Errorof the Estimates
1	.912	.831	.828	.21769

Source: Primary Data & Authors Calculation

a. Predictors: (Constant): Tenant Mix & Retail Diversity, Location & Convenience, Entertainment & Events, Technology Integration, Marketing & Promotion

b. Dependent Variable: University Students' Shopping experience

The ANOVA Table - 7b shows F-ratio for the regression model that indicates the statistical significance of the overall regression model. The variance in dimensions of mall attractiveness is associated with university students' shopping experience which is referred to as explained variables. In this particular analysis, the F ratio 423.095 which is significant at the .000 level.

Table- 7b: ANOVA

Model		Sum ofSquare	df.	Mean Square	F	Sig.
1	Regression	154.432	5	30.886	423.095	.000
	Residual	22.444	304	.073		
	Total	176.876	309			

Source: Primary Data & Authors Calculation

a. Predictors: (Constant): Tenant Mix & Retail Diversity, Location & Convenience, Entertainment & Events, Technology Integration, Marketing & Promotion

b. Dependent Variable: University Students' Shopping experience

The Table- 7c, shows the standardized coefficient values of the Independent Variables: Tenant Mix & Retail Diversity, Location & Convenience, Entertainment & Events, Technology Integration, Marketing & Promotion significant at $p < 0.05$. The overall analysis confirms that there is a significant impact of dimensions of mall attractiveness on university students' shopping experience.

Table- 7c: Coefficients

**Dependent->Independent	Unstandardized Coefficient	Standardized Coefficient			
	B	Std. Error	Beta	t	Sig.
University Students' Shopping experience->Tenant mix & Retail Diversity	.691	.021	.712	15.343	.000
University Students' Shopping experience ->Location & Convenience	.687	.018	.693	13.131	.000
University Students' Shopping experience ->Entertainment & Events	.633	.019	.646	11.214	.000
University Students' Shopping experience ->Technology Integration	.622	.026	.641	9.134	.000
University Students' Shopping experience ->Marketing & Promotion	.582	.022	.610	8.232	.000

Source: Primary Data & Authors Calculation

** Dependent Variable: Shopping Experience

IV. Findings & Discussion

This study aimed to identify the key dimensions of mall attractiveness among private university students in Bhubaneswar and examine their influence on the overall shopping experience. To address the first research objective, factor analysis was conducted which revealed five significant dimensions—tenant mix and retail diversity, location and convenience, entertainment and events, technology integration, and marketing and promotion—that shape students' mall visitation and purchasing behaviour (Table 5).

To explore the relationship between these dimensions of mall attractiveness and students' shopping experiences, aligned with the second objective and Hypothesis 1, Pearson Correlation Analysis was employed. The results revealed a significant and positive correlation between each construct

and the overall shopping experience, thereby affirming the strength of the relationships and supporting Hypothesis 1 (Table 6).

The third objective, which corresponds to the second hypothesis, involved evaluating whether the identified dimensions of mall attractiveness significantly impact students' shopping experiences. Findings from the multiple regression analysis demonstrated that all five dimensions exert a significant and positive influence on the shopping experience, thus validating Hypothesis 2 (Tables 7a and 7b).

The regression analysis further indicated that the Tenant Mix & Retail Diversity factor had the most substantial influence on students' shopping experience, with a coefficient of 0.691 at $p < 0.05$ (Table 7c). This aligns with the findings of Yim and Xu (2012) who highlighted the importance of tenant mix and retail diversity for shoppers, retailers, and mall managers, noting its ability to generate a synergistic effect.

Similarly, the Location & Convenience factor was found to have a strong and statistically significant impact on the shopping experience, with a coefficient of 0.687 at $p < 0.05$ (Table 7c). This outcome supports prior research by Jaravaza and Chitando (2013), Levy et al. (2012) who emphasized that strategic location and accessibility are critical indicators of a mall's long-term competitive advantage and serve as key factors in consumer decisions related to supermarket shopping.

The study also revealed that the Entertainment & Events construct, with a standardized coefficient of 0.633 at $p < 0.05$ (Table 7c), positively and significantly affects students' shopping experiences. This supports Choy's (2018) assertion that entertainment-oriented events provide opportunities for relaxation, enjoyment, and shared social interaction.

Additionally, the Technology Integration factor, with a standardized coefficient of 0.622 at $p < 0.05$ (Table 7c), was found to significantly shape students' shopping experiences. This result echoes the findings of Hoyer et al. (2020), Willems et al. (2017) and Rangaswamy et al. (2020) who highlighted the growing role of technology in shaping consumer retail experiences.

Finally, the Marketing & Promotion factor showed a positive effect on shopping experience, with a coefficient of 0.582 at $p < 0.05$ (Table 7c). This is consistent with the research of Anselmsson (2006) who observed that mall management increasingly recognizes the importance of marketing and promotional efforts to stay competitive.

V. Managerial Implications and Conclusions

Shopping behaviour has shifted from a purely functional process to one driven by consumers' emotions, personalities, and motives, which strongly influence mall patronage (Banytė et al., 2015). In a highly competitive mall environment, consumers prefer centres that offer greater attractiveness and variety, making it essential for mall managers to enhance appeal through engaging experiences that deliver both utilitarian and hedonic value while supporting tenant sales.

The study identifies five key determinants of mall attractiveness for university students—tenant mix and retail diversity, location and convenience, entertainment and events, technology integration, and marketing and promotion. Focusing on these factors can help mall stakeholders align strategies with student preferences, close service gaps, and improve profitability, particularly by strengthening entertainment offerings, events, and technological integration.

In conclusion, it is essential for shopping malls in Bhubaneswar to adopt integrated quality strategies centred on these five determinants, with the goal of boosting foot traffic and cultivating a more satisfying shopping experience.

Scope for Future Research

- The topic of mall management—particularly in understanding the factors that influence consumer purchasing behaviour and overall shopping experience—remains a critical concern for mall administrators. Exploring how mall location and marketing strategies align with the demographic characteristics of surrounding communities presents a promising area for future research.

- Additionally, it would be valuable to examine whether the current model shifts when applied to different demographic groups. Since shopping experience represents just one facet of the broader retail environment, further studies could investigate how this experience varies across different demographic segments.

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ZOMATO AND BLINKIT ACQUISITION: A STRATEGIC MOVE OR A MERE ANOTHER ACQUISITION?

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Zomato announced the acquisition of Blinkit on June 24, 2022, for a total price of $568 million (Rs. 4447 crore) in equity. The company's valuation was reportedly around $800 million before the acquisition. Shareholders of Blinkit will receive one Zomato share for every ten Blinkit shares. Zomato made a $100 million investment in Blinkit (formerly known as Grofers) earlier in March 2022 in exchange for a stake of over 10%.

According to the deal terms, Blinkit's largest shareholder SoftBank will receive 28.71 crore shares of Zomato, Tiger Global will take home 12.34 crore shares, BCCL will get 1.5 crore shares, and South Korean investor DAOL will get 3.66 crore shares of the food delivery major.

The success in quick commerce is heavily dependent on an efficient hyperlocal delivery network. Zomato has a natural advantage here given the millions of food orders that it deliver. The acquisition marks a significant milestone in the quick delivery start-up industry.

This acquisition paves a milestone in quick delivery start-up system.

The case raises an important strategic question: should bigger companies buy lossmaking company for long term financial gains? Will you do the same for your business too?

Keywords : Acquisition, Quick commerce delivery, supply chain, logistics, Strategic Management
JEL Code: *M 10*

1. Introduction

Deepinder Goyal and Pankaj Chaddah started Zomato, an Indian restaurant aggregator and food delivery business, in 2008. The company increased its operations over time in 23 countries, including India. Despite being a startup, the Company has bought 14 businesses since 2008.

Albinder Dhindsa and Saurabh Kumar founded Blinkit, formerly known as Grofers, in December 2013 as a platform for immediate grocery delivery services.

Deepinder Goyal and Albinder Dhindsa were friends from their student days at IIT-Delhi. Albinder Dhindsa led Zomato's global operations for a few years before venturing out to start Grofers in 2013. Zomato CEO Deepinder Goyal was an angel investor in Blinkit. In June 2021, Zomato and Tiger Global invested in Grofers, and it turned unicorn at a valuation of $1 billion. In September 2021, Zomato cut its e-grocery arm and gave more backing to Grofers. In December 2021, Grofers rebranded to Blinkit and shut down operations where it can't deliver in 10 minutes. In March 2022, Zomato rescues Blinkit by extending a loan of $150 million to help it overcome the cash crunch. And finally, in June 2022, Zomato acquired Blinkit in an all-stock deal.

Zomato's acquisition of Blinkit in 2022, a game-changing $568 million all-stock deal, has reshaped their trajectory.

Financial Impact: Zomato's bold move to buy Blinkit initially meant swallowing some hefty losses due to Blinkit's steep customer acquisition costs (around $1,240 per user) and rapid expansion of dark stores. But by mid-2025, Blinkit's outpacing Zomato's food delivery in order value, boasting a 50% market share. Revenue for Q1 FY26 soared to $113 million, up 2.4x year-on-year, and Zomato's now in the black. Analysts like those at Emkay are bullish, raising price targets to ₹330 per share, fuelled by Blinkit's 120% growth. A quick DCF model (5% discount rate, 20% growth) suggests a $2 billion-plus value boost by 2030.

Integration Challenges: Blending Blinkit wasn't all smooth sailing. Early on, Zomato grappled with delayed supplier payments and paused synergy plans to focus on building "super brands." Regulatory scrutiny during the merger process added complexity, but scaling to over 500 dark stores has since streamlined operations.

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Long-Term Outlook: Industry watchers, like Morgan Stanley, predict India's quick commerce market could hit $57 billion by 2030, growing at a 40% CAGR. Experts at UBS highlight Blinkit's role in diversifying Zomato's portfolio, though sustaining this growth is a concern. Still, this move positions Zomato as a powerhouse in a $4.35 billion market by 2030.

2. Zomato's motive behind the acquisition of Blinkit

2.1 The quick commerce industry

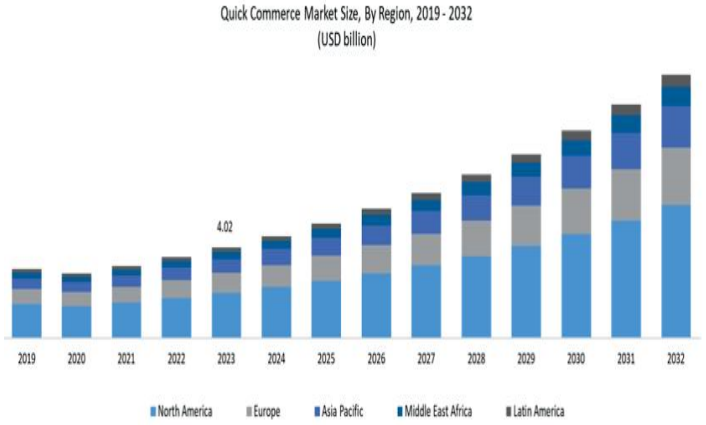
Zomato sought to challenge the dominance of companies such as Amazon Pantry, Big Basket, Grofers, Swiggy, and others in the e-commerce grocery business. The firm, which is already a significant global restaurant and food delivery aggregator, made repeated attempts but was unsuccessful in breaking into the market for rapid commerce groceries and basic delivery. Zomato introduced a 45-minute grocery delivery service in April 2020 to alleviate the problem caused by the COVID-19-induced lockdown, which forced all restaurants to close their doors. But after the lockout was lifted, the company resumed its meal delivery services. Zomato quit the market in September 2021 due to logistical challenges after returning in July 2021. By acquiring Blinkit, Zomato got a competitive advantage.

The USD5.5 billion quick commerce segment is roughly 1% of the USD620 billion domestic grocery market. Redseer predicts a 10-15x growth rate by 2025, resulting in an addressable market size of USD45 billion. Additionally, compared to its competitors, India is embracing the rapid commerce sector more quickly. Redseer estimates that India has a rapid commerce penetration of 13% compared to 7%-3% in China and the EU, respectively.

Fig 1: Quick commerce has a substantial market

Source: finshots.in

Fig 2: India is leading in Quick Commerce penetration



Source: polarisresearch.com

2.2 Share of customer wallet

Zomato will increase its portion of client wallets after purchasing Blinkit. The company wants to incorporate a Blinkit tab and a Hyperpure tab to its app so that customers may get groceries and other needs there in addition to traditional meal orders from restaurants and Zomato's Hyperpure, a B2B supplier for eateries. To control the consumer base, Zomato has been working hard to consolidate all of its subsidiary sites under one roof.

2.3 Reduction in delivery costs

Zomato will be able to reduce its delivery costs if both companies decide to combine their delivery fleets. quickly propelled by business Blinkit has a set timetable for delivery times, unlike Zomato's typical meal deliveries, which are highly dependent on factors like location and quality control. Due to the time-bound delivery, more orders are placed every hour compared to regular meal delivery orders. The business hopes to invest in improving the ecosystem that underpins the food delivery sector so that over time, the cost of running a better sector would decline.

2.4 Blinkit's Revenue Model

Partner Commissions: Blinkit collaborates with local shops, earning 8–15% per order, a key driver of their revenue, by linking merchants to customers.

Delivery Fees: Customers pay a fee for each delivery, forming a significant portion of Blinkit's income to support its fast delivery network.

Marketplace Revenue: Online orders generate 54% of revenue, with suppliers paying for product placement to boost visibility on the platform.

Warehousing Fees: Blinkit charges suppliers for storage and marketing, adding another layer to its revenue while promoting partner products.

3. How does Zomato benefit from acquiring Blinkit?

The BlinkIt acquisition will assist Zomato in the following ways: -

1. Utilisation of the asset (delivery fleet): With the inclusion of a grocery delivery service, Zomato should be able to access a greater range of products (offerings) and use cases over a longer period of time. Food delivery peaks around meals, on weekends, etc., while grocery delivery has its own peak and off-peak hours. As a result, profitability and asset (fleet) utilization increase, which strengthens the cost-benefit analysis.

2. Benefits of "15-minute delivery" Blinkit's monthly order frequency was 3.5 times higher than Zomato's meal delivery in May 2022. Customer metrics have demonstrated clear patterns indicating that customers are motivated to shop as a result of the ease of "15-minute delivery."

3. Build vs. Buy: Blinkit has created crucial infrastructures like a reliable technology platform, solid partnerships with outside parties, a complex dark-storage network, and a company that has attained a respectable level of scale. Now, Zomato would have to spend a significant amount of time, money, and energy creating something akin to Blinkit. Consequently, Zomato opted to forego building and instead pursued the established route of purchasing. The two main factors that would have driven Zomato to do this seem to be team and speed. Furthermore, the acquisition of Blinkit adds a staff that is already operational and has the necessary experience, rather than adding to the burden on resources that would have been needed to handle the grocery delivery business.

4. Synergistic: According to Zomato's executive team, hyperlocal delivery alone cannot guarantee quick-commerce success. Blinkit would complement Zomato's enormous hyperlocal delivery network with its in-depth knowledge of supply-chain networks, sizable customer base, intricate dark-store network, connections with vendors and sellers, and robust tech stack.

5. Ad Money: According to Zomato, Blinkit has a bigger potential for generating ad revenue than it does, which is a crucial source of income for businesses like this. Zomato contends that quick commerce generates more advertising money than food delivery because restaurants and cloud kitchens spend substantially less on digital media than consumer brands and packaged items.

6. Numbers for BlinkIt: In January 2022, Blinkit switched to quick commerce. Its GOV (gross order value) increased by 35% by May 2022. Zomato's statistics indicates that Blinkit's revenue increased by more than 160 percent. These figures have led Zomato to conclude that the merger is likely to succeed.

4. Shares Division

On June 24, 2022, Zomato announced plans to purchase Blinkit for a total of Rs 4,447 crores in equity. For every ten Blinkit shares, shareholders will earn one Zomato share. In March 2022, Zomato invested $100 million in Blinkit in exchange for a stake of more than 10%.

The board has authorized the purchase of up to 33,018 equity shares of Blink Commerce Pvt. Ltd.'s (BCPL) from its shareholders for a total purchase price of $4,447.48 crore, or $13.45 lakh per equity share, according to the statement. In a letter to shareholders, Zomato Founder & CEO Deepinder Goyal stated that "Quick commerce has been our stated strategic focus during the previous one year" in order to justify the company's planned acquisition of Blinkit. SoftBank, which was the biggest shareholder of blinkit 51.9% will be having a 3.38 % share in Zomato. In total Blinkit shareholders will get a 6.9% stake in Zomato post-acquisition.

In accordance with the terms of the agreement, SoftBank, the largest shareholder in Blinkit, would receive 28.71 crore of Zomato shares, followed by Tiger Global with 12.34 crore, BCCL with 1.5 crore, and South Korean investor DAOL with 3.66 crore. Sequoia will receive 4.51 crore additional shares in Zomato, increasing its ownership in the company from 1.33 crore to 5.84 crore shares.

5. Stock Prices

From the below stock price chart of Zomato, it is clear that the acquisition of Blinkit worked perfectly and there is substantial growth in company's performance.

Fig 3 – Last 5 years Zomato Stock price

6. Financials

Data indicates Blinkit is the leader in India's quick commerce market, holding a 44% market share in FY25. The company's revenue has grown significantly, with Q1 FY25 revenue surging to ₹2,400 crore, and net order value (NOV) increasing 127% year-on-year to ₹9,203 crore. This progress is supported by a large network of "dark stores" in over 28 cities and a focus on improving unit economics and customer experience.

7. Way Forward:

Blinkit's Market Position & Scale:

- **Market Share:** Blinkit holds the top position in India's quick commerce sector, with a 44% market share in the financial year 2025.
- **Geographic Reach:** The company operates in more than 28 cities across India.
- **Network:** A significant increase in "dark stores" has contributed to Blinkit's growth and operational efficiency.

Financial & Operational Progress:

- **Revenue Growth:**

  Blinkit's revenue in the first quarter of FY25 reached ₹2,400 crore, surpassing Zomato's food delivery revenue for the same period.

- **Net Order Value (NOV):**

  NOV saw a substantial year-on-year increase of 127%, reaching ₹9,203 crore.

- **Efficiency:**

  The company has focused on improving its unit economics and efficiency at scale.

Factors Driving Progress:

- **Focus on Unit Economics:** After raising funds, Blinkit prioritized improving its cost-effectiveness.
- **Customer Experience:** The company has worked to improve the customer experience, addressing issues with order fulfilment.
- **Data and Technology:** Blinkit's data team has grown, supporting optimization, growth, and efficiency efforts.

8. Discussion Questions:

1. Investigate how Blinkit and Zomato can complement one another toward the strategic growth of the company after the acquisition.
2. Do the business environment analysis of Zomato and suggest the feasible strategies with respect to TOWS analysis.

3. Zomato was a loss-making company, and Blinkit was also operating at a loss. Assume that you were hired as a Merger and Acquisition advisor prior to the acquisition of Blinkit. What would be your argument to acquire the same?

(Prepare a presentation and assume that you need to present the same in front of the Zomato CEO.)

9. Conclusion

A successful hyperlocal delivery network is essential for rapid commerce success. Given that it delivers millions of food orders, Zomato has a clear advantage here. However, hyperlocal delivery cannot succeed in rapid commerce on its own. This is where Blinkit steps in with its in-depth knowledge of product supply chains, which include warehousing, the transfer of goods from warehouses to dark stores, the observation of inventory kept in numerous locations, and the optimisation of order picking and packing, among other things. Zomato and Blinkit may work well together to create a profitable rapid commerce play. Yes, there is a lot of competition, but there is also a giant market.

Additionally, compared to the food delivery company, its user base is potentially greater, and its retention rates are likewise higher. However, the unit economics is comparable to the food delivery industry. The top participants in the Indian q-commerce market, which constitutes about 80% of the business, include Swiggy, Instamart, Zepto, Zomato, and Blinkit. Given India's current low level of online commerce adoption, fierce competition is beneficial. It will be great to investigate how Blinkit and Zomato can complement one another.

It will be vital to keep the Blinkit app and brand distinct from Zomato. Customers identify the Zomato brand with all things "food," but Blinkit is working to establish itself as a name they associate with groceries and other necessities. The Blinkit team, led by Albinder, continuing to operate the company is a truly excellent decision.

Recommendations: Efficient and effective shipping may result from purchasing products directly from the manufacturer or source. Easy ordering and payment options, price breaks and promotions, a large selection of products, and organizing staff all play key roles. Upskilling and educating the personnel is crucial, especially in this market.

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To prepare and equip students with requisite skills to face the corporate world, Personality Development sessions are organised to help build self-awareness and develop a positive attitude amongst students to cope with time and stress issues.

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