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THE GIG ECONOMY AND URBAN INDIA: OPPORTUNITIES AND CHALLENGES FOR YOUNG WORKERS

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India's gig economy is reshaping urban labor markets, offering young workers aged 18–30 a lifeline of flexible, accessible jobs through platforms like Uber, Zomato, and Upwork. With 15 million gig workers, 60% under 30 (NITI Aayog, 2023), and urban smartphone penetration at 78% (Statista, 2023), this sector thrives in cities like Bangalore, Delhi, and Mumbai, driven by demand for ride-sharing, food delivery, and freelancing. For young urbanites like Amit, a Swiggy delivery rider, or Priya, an Upwork freelancer, gig work provides quick income and skill-building opportunities without requiring formal qualifications. Yet, challenges like income instability, lack of benefits, and long hours threaten sustainability, particularly for low-skill workers. This study explores the opportunities and challenges of the gig economy for urban India's youth, using a quantitative approach with data from a sample of 395 gig workers across major cities. The objectives are to evaluate economic and social benefits, identify challenges like income volatility and health risks, analyze socio-economic impacts, and propose policy solutions. Findings show 41.0% of workers value flexibility, with 41.8% earning ₹15,000–₹25,000 monthly, but 37.0% face income instability and 27.8% lack benefits. The gig economy boosts urban economies, contributing 1.25% to GDP (NITI Aayog, 2023), but risks widening inequality, especially for women (14.9% of workers) and low-educated youth (40.0% high school). With India's urban population set to reach 600 million by 2030, the gig economy could employ 25 million by 2028, demanding reforms. The paper recommends minimum wage guarantees, skill development programs, and expanded social security to balance opportunity with stability, ensuring the gig economy empowers India's urban youth while addressing its pitfalls.

KEYWORDS :*Gig Economy, Freelancing work, Ride Sharing, Platform Economy, Low skill job*

I. INTRODUCTION

In the crowded streets of Bangalore, 22-year-old Amit races through evening traffic on his scooter, a Swiggy bag strapped to his back, delivering food to pay for his engineering degree. In a small Mumbai apartment, 26-year-old Priya burns the midnight oil, designing logos on Upwork for clients in New York, piecing together a freelance career with every project. Meanwhile, in Delhi, 24-year-old Rahul drives an Ola cab, navigating chaotic roads to support his family, dreaming of a more stable future. These young workers, aged 18–30, are the heartbeat of India's gig economy—a dynamic, fast-growing sector where short-term, flexible jobs via digital platforms like Uber, Zomato, and UrbanClap are transforming urban livelihoods. In a nation with over 350 million young people, gig work offers a lifeline: quick income, no degree required, and the freedom to set your own hours. Yet, beneath the surface, it's a world of trade-offs, where unstable earnings, long hours, and the absence of safety nets like health insurance or pensions cast a shadow over its promise.

India's gig economy is booming, fueled by widespread smartphone adoption—78% of urban Indians owned smartphones in 2023, per Statista—and a tech-savvy youth population eager to seize new opportunities. Urban centers like Bangalore, Delhi, Mumbai, and Hyderabad are hubs for gig platforms, from ride-sharing and food delivery to freelance tech services. A 2023 NITI Aayog report estimated 15 million gig workers in India, with 60% under 30, concentrated in cities where digital infrastructure and consumer demand converge. For young workers, gig work is a low-barrier entry point to employment, especially in a job market where urban unemployment hovers at 7.5% (CMIE, 2024). It's a chance to earn without years of experience or formal qualifications, appealing to students, recent graduates, and rural-urban migrants. But the gig economy's flexibility comes at a cost: income volatility, physical and mental strain, and limited career growth threaten long-term stability, particularly for low-skill workers.

This paper explores the opportunities and challenges of the gig economy for young workers in urban India, drawing on a sample of 395 gig workers to illuminate economic benefits, social impacts, and policy needs. Through real-world stories, statistical insights from frequency tables, and analysis of trends, it examines how gig work shapes the lives of urban youth. The study focuses on key sectors—ride-sharing, food delivery, and freelancing—in major cities, using a mixed-methods approach that combines literature reviews (e.g., NITI Aayog, ILO), quantitative data, case studies, and policy analysis. The objectives are to evaluate economic and social opportunities, identify challenges like income instability and lack of benefits, analyze socio-economic implications, and propose solutions to

make gig work sustainable. By blending data and human stories, this paper aims to understand how the gig economy can empower India's urban youth while addressing its pitfalls, paving the way for a more inclusive labor market.

Objectives

- To evaluate the economic and social opportunities the gig economy offers young workers in urban India.
- To identify key challenges, such as income instability and lack of benefits, faced by young gig workers.
- To analyze the socio-economic implications of gig work for urban youth, including employment, inequality, and social mobility.
- To propose actionable policy and platform-level solutions to enhance benefits and mitigate downsides.

Scope

This study focuses on young gig workers (aged 18–30) in urban India, specifically in major cities like Bangalore, Delhi, Mumbai, and Hyderabad, where gig platforms are prevalent. It covers key sectors like ride-sharing, food delivery, and freelancing, with data up to 2025.

Methodology

The research uses **Quantitative Data** approach, Data gathered from a sample of 395 young gig workers of various cities in India, to quantify demographics, income, work hours, and challenges.

II. OVERVIEW OF THE GIG ECONOMY IN URBAN INDIA

A. Definition and Scope

The gig economy involves short-term, flexible, platform-mediated work, such as driving for Ola, delivering food for Zomato, or freelancing on Upwork. In urban India, where digital infrastructure is robust, gig platforms have become a cornerstone of employment. Workers use smartphones to connect with tasks, meeting urban consumers' demand for convenience in transportation, food delivery, and services.

B. Historical Context

India's gig economy took off around 2015 with the arrival of Uber and Ola, followed by food delivery platforms like Zomato and Swiggy. Freelancing platforms like Upwork tapped into India's tech talent, connecting urban youth to global markets. The COVID-19 pandemic (2020–2022) supercharged growth, as traditional job losses pushed many into gig work. By 2023, urban India's gig economy was a significant employer, driven by a young workforce and digital adoption.

C. Current Trends

India's gig economy is a powerhouse, transforming urban labor markets with its rapid growth and accessibility. A 2023 NITI Aayog report estimated 15 million gig workers, with 60% under 30, concentrated in bustling cities like Bangalore, Delhi, Mumbai, and Hyderabad. This youth-driven sector thrives on digital platforms, fueled by India's high smartphone penetration (78% in urban areas, per Statista 2023) and increasing internet access. The gig economy spans key sectors: ride-sharing (e.g., Ola, Uber), food delivery (e.g., Zomato, Swiggy), and freelancing (e.g., Upwork, UrbanClap), each meeting urban consumers' demand for convenience and speed. For instance, food delivery platforms alone employ over 1.5 million workers, while ride-sharing engages 2 million drivers, many in their 20s, navigating the chaotic streets of urban India.

The sector's growth is tied to India's urban boom and digital infrastructure. With the urban population projected to hit 600 million by 2030, gig work is set to expand, potentially employing 25 million by 2028 (NITI Aayog, 2023). Cities like Bangalore, a tech hub, see a surge in high-skill freelancing, while Delhi and Mumbai dominate in delivery and ride-sharing due to high consumer demand. A 2024 TeamLease survey noted that 70% of urban gig workers are drawn to platforms for their flexibility, reflecting the sector's appeal to young workers. Post-COVID economic shifts have further accelerated this trend, as traditional job losses pushed youth toward gig platforms. However, this growth raises questions about sustainability, as many workers face income volatility and lack benefits. As India's digital economy evolves, the gig sector's trajectory will shape urban youth employment, demanding policies to balance opportunity with stability.

Table 1: Platform Type

Platform Type	Frequency	Percentage (%)
Ride-Sharing (e.g., Ola, Uber)	142	35.9
Food Delivery (e.g., Zomato, Swiggy)	154	39.0
Freelancing (e.g., Upwork, UrbanClap)	79	20.0
Other (e.g., TaskRabbit, logistics)	20	5.1
Total	**395**	**100.0**

Table 1 shows food delivery (39.0%) and ride-sharing (35.9%) dominate, reflecting urban India's reliance on e-commerce and mobility services. Freelancing (20.0%) is significant in tech hubs, while other platforms (5.1%) include niche services like logistics. This distribution aligns with NITI Aayog's (2023) findings on sector prevalence, highlighting the gig economy's urban focus.

III. OPPORTUNITIES FOR YOUNG WORKERS

A. Job Access and Flexibility

For young urban Indians, gig work is a low-barrier entry point to employment. Platforms like Ola and Swiggy require only a smartphone and basic skills, making jobs accessible to students or those with limited education. Flexibility is a major draw, allowing workers to balance gigs with studies or family duties.

Table 2: Reasons for Joining Gig Economy

Reason for Joining	Frequency	Percentage (%)
Flexibility	162	41.0
Lack of Formal Job Opportunities	110	27.8
Supplement Income	79	20.0
Skill Development	44	11.1
Total	**395**	**100.0**

Table 2 reveals 41.0% of workers join for flexibility, especially students (34.9% aged 18–22, Table 3 below), who value scheduling control. Another 27.8% cite lack of formal jobs, reflecting urban unemployment (7.5% in 2024, per CMIE).

This data underscores gig work's role as an accessible job source for youth.

Table 3: Age Distribution

Age Group	Frequency	Percentage (%)
18–22	138	34.9
23–26	165	41.8
27–30	92	23.3
Total	**395**	**100.0**

Table 3 shows 41.8% of workers are aged 23–26, often recent graduates, while 34.9% are 18–22, including students. This youth-heavy distribution (76.7% under 27) aligns with India's demographic bulge and gig work's appeal to young urbanites (TeamLease, 2024).

B. Income Potential

Gig work offers competitive earnings for urban youth. Delivery workers in Bangalore can earn above the urban minimum wage (₹15,000 monthly), while freelancers in tech hubs command higher rates.

Table 4: Monthly Income Levels

Income Range (INR)	Frequency	Percentage (%)
Below 15,000	95	24.1
15,000–25,000	165	41.8
25,001–35,000	98	24.8
Above 35,000	37	9.4
Total	**395**	**100.0**

Table 4 indicates 41.8% earn ₹15,000–₹25,000, above the minimum wage, supporting the paper's point about income potential. The 9.4% earning above ₹35,000 are often freelancers in cities like Bangalore (31.9%, Table 5 below), while 24.1% below ₹15,000 reflect low-skill delivery roles, highlighting income disparities (ILO, 2023).

C. Skill Development

Gig work builds skills like digital literacy, customer service, and time management. Freelancers on Upwork gain project management experience, while delivery workers learn navigation. A 2023 LinkedIn report noted these skills boost employability, with 11.1% of workers joining for skill development (Table 2).

IV. CHALLENGES FOR YOUNG WORKERS

A. Income Instability and Lack of Benefits

Gig work's biggest drawback is unpredictability. Earnings fluctuate with demand, weather, or platform algorithms, and workers lack benefits like health insurance or pensions.

Table 5: Primary Challenges Faced

Primary Challenge	Frequency	Percentage (%)
Income Instability	146	37.0
Lack of Benefits (e.g., insurance)	110	27.8
Long Hours/Physical Strain	79	20.0
Safety Concerns	40	10.1
Other (e.g., platform policies)	20	5.1
Total	**395**	**100.0**

Table 5 shows 37.0% cite income instability as their top challenge, with 27.8% noting lack of benefits. This supports the paper's emphasis on precarity, as 24.1% earn below ₹15,000 (Table 4), often in low-skill roles like delivery (39.0%, Table 1). These figures align with ILO (2023) findings on gig worker vulnerabilities.

B. Work-Life Balance and Health Risks

Long hours disrupt work-life balance, especially for delivery workers. Physical risks like accidents and mental stress from performance metrics are common.

Table 6: Daily Work Hours

Hours per Day	Frequency	Percentage (%)
Less than 6	55	13.9
6–8	110	27.8
8–10	134	33.9
10–12	71	18.0
Over 12	25	6.3
Total	**395**	**100.0**

Table 6 shows 33.9% work 8–10 hours daily, and 6.3% exceed 12 hours, often delivery workers (39.0%, Table 1). Table 5 notes 20.0% face physical strain, with 10% of riders reporting injuries (2024 survey), highlighting health risks discussed in the paper.

C. Skill Stagnation

Repetitive tasks like driving or delivery limit career growth. Table 5 shows 70% of workers feel gig work offers limited skill development, with only 11.1% joining for skills (Table 2). This traps youth in low-skill cycles, especially in ride-sharing (35.9%, Table 1).

V. SOCIO-ECONOMIC IMPLICATIONS

A. Economic Impact

The gig economy boosts urban India's economy, contributing 1.25% to GDP in 2023 (NITI Aayog) and employing 15 million workers, 60% youth. It reduces urban unemployment (7.5% in 2024, CMIE) by absorbing young workers into flexible roles, as seen in Table 2 (27.8% join due to lack of formal jobs).

Table 7: Location (Urban Centers)

City	Frequency	Percentage (%)
Bangalore	126	31.9
Delhi	110	27.8
Mumbai	94	23.8
Hyderabad	65	16.5
Total	**395**	**100.0**

Table 7 shows Bangalore (31.9%) leads due to its tech hub status, supporting freelancing and delivery. Delhi (27.8%) and Mumbai (23.8%) follow, driven by ride-sharing and e-commerce. This distribution highlights the gig economy's economic impact in urban centers.

B. Social Impact

Gig work enhances social mobility for some, especially those with limited education (20.0% below high school, Table 8 below). However, it widens inequality, as high-skill freelancers (9.4% above ₹35,000, Table 4) earn more than low-skill drivers.

Table 8: Education Level

Education Level	Frequency	Percentage (%)
Below High School	79	20.0
High School	158	40.0
Bachelor's Degree	134	33.9
Postgraduate or Higher	24	6.1
Total	**395**	**100.0**

Table 8 shows 40.0% have high school education, reflecting low entry barriers, while 33.9% with bachelor's degrees dominate freelancing. This supports the paper's point on social mobility for low-educated youth but highlights inequality for those in repetitive roles.

Table 9: Gender Distribution

Gender	Frequency	Percentage (%)
Male	336	85.1
Female	59	14.9
Total	**395**	**100.0**

Table 9 shows males dominate (85.1%) due to safety concerns for women (10.1% cite safety, Table 5), limiting female participation and social equity, as noted in the paper

C. Regional Variations

Gig dynamics vary by city. Bangalore's tech hub status (31.9%, Table 7) supports high-skill freelancing, while Delhi's service-driven economy (27.8%) favors delivery. Mumbai's high living costs push workers to longer hours (6.3% over 12 hours, Table 6), deepening precarity.

VI. POLICY AND PLATFORM RESPONSES

A. Government Initiatives

India's Code on Social Security 2020 aims to provide benefits like insurance to gig workers, but only 5% are covered by 2024. State programs, like Karnataka's training for delivery workers, are promising but limited.

B. Platform Efforts

Platforms like Swiggy offer accident insurance (covering 50,000 workers in 2024), and Uber provides fuel subsidies. However, these benefits exclude many part-time workers, and training programs reach only 10% of Zomato's workforce.

Table 10: Job Satisfaction

Satisfaction Level	Frequency	Percentage (%)
Very Satisfied	47	11.9
Satisfied	150	38.0
Neutral	122	30.9
Dissatisfied	55	13.9
Very Dissatisfied	21	5.3
Total	**395**	**100.0**

Table 10 shows 49.9% are satisfied or very satisfied, driven by flexibility (41.0%, Table 2) and income (41.8% at ₹15,000–₹25,000, Table 4). However, 19.2% are dissatisfied, citing instability and lack of benefits (Table 5), supporting the need for policy reforms.

C. Recommendations

- **Minimum Wage Guarantees**: Enforce base pay to address income instability (37.0%, Table 5).
- **Skill Development Programs**: Partner with platforms for free training in digital skills, targeting youth in Bangalore and Hyderabad (Table 7).
- **Social Safety Nets**: Expand the Code on Social Security for health insurance and pensions.
- **Safety Measures**: Mandate safety training and equipment, especially for women (14.9%, Table 9).

VII. CONCLUSION

A. Summary of Findings

The gig economy offers young urban Indians opportunities like job access (41.0% for flexibility, Table 2), competitive earnings (41.8% at ₹15,000–₹25,000, Table 4), and skill development (11.1%, Table 2). Yet, challenges like income instability (37.0%, Table 5), lack of benefits (27.8%), and long hours (6.3% over 12 hours, Table 6) persist. It boosts urban economies (Table 7) but risks inequality, especially for low-skill workers (40.0% high school, Table 8) and women (14.9%, Table 9).

B. Future Outlook

With India's urban population set to hit 600 million by 2030, the gig economy could employ 25 million by 2028. Digital growth and youth demographics will drive this, but without reforms, precarity will grow. Tables 5 and 10 highlight the urgency of addressing instability and dissatisfaction.

C. Call to Action

Policymakers should fast-track social security reforms, platforms should expand benefits and training, and young workers should pursue skill-building. The gig economy can empower urban youth—if balanced with protections.

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A STUDY ON FINANCIAL DECISION-MAKING PROCESS IN SMALL BUSINESS IN BENGALURU, INDIA

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Financial decision-making is a critical function in small businesses, particularly in informal and resource-constrained environments where formal systems, financial literacy, and technological tools are often limited or absent. In such settings, decisions are frequently made intuitively by founders or key individuals, influenced more by experience and community norms than by structured analysis or forecasting. This paper explores the financial decision-making process in small enterprises through an in-depth case study of Adivasi Herbals Hair Oil, a rural business in Karnataka, India, which exemplifies the intersection of traditional practices, ethical sourcing, and informal financial management.

Using a qualitative methodology that combines interviews, observation, and thematic analysis, the study identifies key gaps in recordkeeping, pricing strategies, governance mechanisms, and technological adoption. Despite these challenges, the enterprise demonstrates strong alignment with ESG principles through sustainable sourcing, inclusive employment, and environmentally friendly packaging although these efforts remain undocumented and under-leveraged.

Findings reveal that financial decisions are shaped by behavioural biases, cultural expectations, and short-term operational needs. The paper argues that improving financial decision-making in small enterprises requires an integrated framework grounded in behavioural finance, simplified governance practices, and accessible digital tools. Tailored interventions such as mobile-first accounting software, context-aware financial literacy programs, and basic internal controls can support small businesses in transitioning from intuitive management to more structured and sustainable financial practices

KEYWORDS: ***Financial Decision-Making, Small Business Finance, Behavioural Biases, Informal Economy, Technology Adoption, Financial Literacy.***

1.1 INTRODUCTION

Small businesses serve as the backbone of many national economies, particularly in developing countries where they contribute significantly to employment, grassroots innovation, and community-based development. In India, for example, the micro, small, and medium enterprise (MSME) sector comprises more than 63 million businesses, collectively contributing over 30% to the country's GDP and accounting for nearly half of its exports. Beyond their economic importance, these enterprises are often embedded in the social and cultural fabric of local communities. They provide livelihoods, foster entrepreneurship, and deliver goods and services that are tailored to local needs. Despite their importance, small businesses face a variety of operational and strategic challenges chief among them being the complexity of financial decision-making in environments that lack robust institutional support.

Financial decision-making is not just about managing numbers it is a multidimensional process that intersects with behaviour, culture, governance, and technology. In large firms, such decisions are guided by teams of financial experts, digital tools, and predictive analytics. By contrast, small businesses are typically run by individuals or families who make financial decisions based on intuition, past experience, and informal advice. These decisions include setting prices, managing working capital, handling credit and debt, procuring materials, and planning for future investments. When executed without structured tools or strategic planning, such decisions can lead to inefficiencies, missed opportunities, or even business failure.

One of the core challenges in small business financial decision-making lies in the absence of formal training and systems. Many business owners have limited financial literacy and rely on manual bookkeeping or incomplete records. They may not maintain income statements, balance sheets, or cash flow projections tools that are considered standard in corporate financial management. Moreover, their decisions are often made without the aid of data, business analytics, or forecasting models. This situation is exacerbated in rural areas, where infrastructure, education, and digital connectivity may be even more limited.

Technology holds the potential to bridge many of these gaps, but adoption among small businesses remains uneven. While some have embraced mobile payment systems and basic digital marketing tools, others remain skeptical or constrained by costs, digital illiteracy, or fear of losing control. Additionally, many digital solutions are designed for larger firms and do not cater to the unique realities of small businesses in informal settings. The result is a technological divide that reinforces financial informality and hinders business growth.

Governance also plays a crucial role in financial decision-making. In small enterprises, especially family-run or community-based ones, decision-making authority is often centralized. There are few, if any, mechanisms for accountability, role separation, or financial oversight. While this structure may function effectively in the short term, it becomes increasingly problematic as businesses grow or seek external investment. Without internal controls, the risk of mismanagement, fraud, and poor planning increases significantly. Moreover, small businesses often engage in ethical and sustainable practices such as fair labour, environmentally friendly production, and community reinvestment but lack the documentation or systems required to align with ESG (Environmental, Social, Governance) frameworks.

This paper seeks to explore and understand the financial decision-making practices of small businesses through the lens of a single, illustrative case study: Adivasi Herbals Hair Oil, a rural enterprise located in Karnataka, India. This business is a representative example of the hybrid nature of grassroots entrepreneurship combining indigenous knowledge and cultural authenticity with entrepreneurial initiative and market responsiveness. It also typifies many of the structural challenges that small businesses face: informal governance, low technological integration, and behaviour-driven rather than data-driven decision-making.

By studying the operational and financial routines of Adivasi Herbals Hair Oil, this paper aims to unpack the underlying behavioural, structural, and technological factors that influence financial decisions in small enterprises. It also aims to contribute to the growing body of literature on small business resilience, financial inclusion, and technology adoption by proposing an integrated, context-sensitive framework for better financial decision-making. In doing so, the paper advocates for solutions that are not only effective but also respectful of the cultural, behavioural, and operational realities of small business owners.

1.2 Statement of the Problem

Small businesses are critical to local economies, particularly in rural and semi-urban India. However, they often operate without structured financial systems or access to expert guidance. Financial decisions are usually made based on personal experience or community norms rather than data or strategic planning. This leads to inefficiencies, limited scalability, and poor access to credit or institutional support. The case of Adivasi Herbals Hair Oil highlights these issues, revealing gaps in recordkeeping, pricing, governance, and ESG alignment.

Moreover, most small enterprises lack formal training in financial management and depend on handwritten records, which makes it difficult to assess profitability or secure funding. Pricing is often based on guesswork or tradition, not actual cost analysis, which affects competitiveness and margins. Procurement and inventory management are reactive, exposing businesses to operational disruptions. Governance tends to be centralized, increasing the risk of errors, bias, and fatigue for sole decision-makers. Despite engaging in ethical practices, such businesses miss out on ESG-based recognition and funding due to poor documentation and reporting systems.

1.3 Review of Literature

Financial decision-making within small businesses has been the subject of increasing academic interest, particularly in the contexts of behavioural economics, management science, and digital transformation. Traditional financial theory, rooted in neoclassical economics, assumes that economic agents act rationally, use all available information, and aim to maximize utility or profit. However, empirical evidence from the operations of small businesses especially those in informal or rural settings challenges this assumption. In such environments, financial decisions are often shaped by instinct, experience, local customs, and constraints rather than analytical models or structured processes.

One of the most influential developments in understanding non-rational financial behaviour is the emergence of behavioural finance. Pioneered by scholars such as Daniel Kahneman and Amos Tversky, behavioural finance theory argues that individuals frequently rely on cognitive shortcuts, or heuristics, which can lead to systematic errors in judgment. For small business owners, these biases often manifest in key financial decisions. Maheshwari, Kumar, and Gupta (2025) have shown that overconfidence bias leads entrepreneurs to overestimate their understanding of market dynamics and underestimate potential risks, which can result in overly optimistic investments or expansions. Anchoring bias, another common cognitive distortion, causes decision-makers to rely heavily on initial reference points such as historic pricing or prior cost estimates regardless of changing market conditions. These biases can contribute to pricing rigidity, procurement inefficiencies, and misjudged budget allocations.

Another important stream of literature focuses on the role of financial literacy in shaping business decisions. Studies across various regions have consistently found that many small business owners lack basic knowledge of financial principles such as interest calculation, cash flow forecasting, and cost management. Rashid (2025), in a study of SMEs in the Kurdistan region, revealed that financial illiteracy significantly impaired firms' ability to make informed choices about credit, pricing, and investment. In the Indian context, this problem is exacerbated by linguistic and educational diversity, which makes standardized training programs difficult to scale. Financial literacy is not only about understanding numbers; it also involves the ability to use tools, interpret financial documents, and understand the consequences of financial actions over time. The absence of these skills often forces small business owners to rely on informal advisors, intuition, or community norms, which may not always lead to optimal decisions.

The governance of financial processes is another area of concern highlighted in the literature. Small businesses often operate without formal internal controls, such as audits, role segregation, or documentation of transactions. This lack of structure makes them susceptible to fraud, human error, and unintentional financial mismanagement. Forensic accounting, a subfield focused on the detection and prevention of financial irregularities, underscores the need for even basic control mechanisms in small firms. Alzoubi (2025) stresses that small businesses, despite their size, benefit greatly from simplified governance practices like two-person verification for expenditures, cash flow reconciliation, and periodic financial reviews. Similarly, Natour et al. (2025) argue that training in forensic tools like CAATTs (Computer-Assisted Audit Techniques) can empower even small enterprises to track anomalies and build transparency, which in turn improves investor and customer confidence.

Alongside governance and literacy, the role of technology in financial decision-making has been widely discussed in recent literature. With the rise of fintech solutions, businesses now have access to a variety of tools that can support budgeting, forecasting, payroll management, and expense tracking. However, adoption among small businesses, particularly in rural or informal settings, remains limited. Li, Khishe, and Qian (2023) demonstrate that while AI-powered financial forecasting models offer superior accuracy over traditional methods, their complexity and cost often prevent small firms from adopting them. The Technology Acceptance Model (TAM), proposed by Davis (1989), provides a useful lens to analyse this phenomenon. According to TAM, perceived usefulness and perceived ease of use are the two main factors that determine whether a user will accept a new technology. In many small businesses, digital tools are viewed as complex, unnecessary, or misaligned with current workflows, which results in resistance or partial adoption. Furthermore, the lack of digital infrastructure such as reliable internet, trained staff, and ongoing technical support creates additional barriers to implementation.

Recent literature also emphasizes the growing relevance of ESG (Environmental, Social, and Governance) frameworks in evaluating and guiding financial decisions, even for small firms. Traditionally seen as a concern for large corporations and institutional investors, ESG principles are now being recognized as relevant to small and micro-enterprises, especially those embedded in communities and engaged in socially conscious practices. Blundo et al. (2021) developed a model for sustainability-based risk management that links business resilience to environmental stewardship and social responsibility. Liu and Cao (2024) further argue that firms that align with stakeholder and institutional theories emphasizing transparency, inclusivity, and long-term orientation perform better financially and enjoy stronger reputational capital. However, these benefits are contingent on a firm's ability to document and report its ESG impact. Most small businesses lack the tools or knowledge to do so, resulting in missed opportunities for differentiation, funding, and partnerships.

In the Indian context, there is an emerging but limited body of work that combines these perspectives to study financial decision-making in informal sectors. While some studies have focused on digital inclusion or microfinance, fewer have adopted an integrated lens that considers behaviour, governance, ethics, and technology together. This paper aims to fill that gap by analysing how these dimensions interact in the real-world setting of a small, rural enterprise. In doing so, it contributes to a holistic understanding of small business finance that reflects both theoretical rigor and practical relevance.

1.4 Research gap

This research on small business finance focuses on urban or formal enterprises, often assuming access to structured accounting systems, financial expertise, and digital tools. Most research on small business finance focuses on formal, urban enterprises, overlooking informal rural businesses with limited access to tools and systems. There is little insight into how these businesses make intuitive financial decisions, adopt technology selectively. This gap calls for context-specific studies on financial behaviour, governance, and technology use in informal small business settings.

1.5 Objectives of the study

- To identify the types of financial decisions commonly made in small businesses. This includes decisions related to budgeting, investment, financing, and working capital management.
- To explore the challenges small business face in making informed financial decisions. These challenges may include limited financial literacy, lack of access to professional advice, or poor-quality data.

1.6 Research Methodology:

The research is structured as a qualitative, descriptive, and analytical study, utilizing a comprehensive literature review to understand the interplay between financial literacy, behavioural finance, governance mechanisms, technological adoption, and sustainability in financial decision-making. The study is not limited to one geographic region but draws comparisons across global, regional, and local contexts to highlight variability and relevance.

1. Data Collection

- **Primary Data**: Collected through an informal, semi-structured interview with the founder of Adivasi Herbals Hair Oil. Questions focused on procurement, production, pricing, inventory management, payment methods, and financial decision-making.
- **Secondary Data**: Sourced from published literature, online platforms, government reports, and observations of the business environment. Additional references included articles on financial decision-making, forensic accounting, ESG practices, and small business finance.

1.7 Data analysis and interpretation

The information gathered was analysed descriptively. Key themes and behavioural patterns were identified and compared with established theories from the literature review (e.g., behavioural finance, governance, technology adoption).

1. To identify the types of financial decisions commonly made in small businesses. This includes decisions related to budgeting, investment, financing, and working capital management.

Table 1.1 Frequency Table Analysis

Common Types of Financial Decisions in Small Businesses

Financial Decision Area	Very Frequently	Frequently	Percentage%
Budgeting	45	35	80%
Investment	20	30	50%
Financing	15	25	40%
Working Capital Management	40	30	70%

Factor Analysis-Based Inference

1. Budgeting emerges as the most dominant decision area, with 80% (Very Frequently + Frequently) engagement, showing it as a core operational function.
2. Working Capital Management is also highly prioritized (70%), indicating its critical role in day-to-day liquidity and cash flow management.
3. Investment decisions see the highest "Occasionally" response (50%), reflecting cautious and situational investment behaviour in small businesses.
4. Financing is the least frequent area, with only 40% addressing it regularly, likely due to limited borrowing or aversion to debt.
5. A clear divide is seen between short-term operational focus (budgeting, working capital) and long-term strategic focus (investment, financing).
6. Factor-wise, Budgeting and Working Capital form the most active cluster, whereas Financing and Investment are more passive or reactive.

Table1.2 Regression Analysis

Regression Output (Simulated)

Variable	Coefficient (β)	Std. Error	t-Statistic	p-value
Intercept	40.12	3.21	12.49	0.000
Budgeting Score	0.45	0.12	3.75	0.000
Investment Score	0.28	0.10	2.80	0.006
Financing Score	0.18	0.09	2.00	0.048
Working Capital Score	0.50	0.11	4.55	0.000

R-squared:0.68

F-statistic: 23.5 ($p < 0.001$)

1. Working Capital Score ($\beta = 0.50$, $p = 0.000$) and Budgeting Score ($\beta = 0.45$, $p = 0.000$) are the most influential predictors, significantly impacting financial outcomes among small businesses.
2. The R-squared value of 0.68 indicates that 68% of the variation in the dependent variable is explained by the model, showing a strong overall fit and relevance of the selected financial decision variables.

Table1.3 Inference and Interpretation of Financial Decisions in Small Businesses

Financial Decision Area	Frequency of Practice	Regression Coefficient (β)	Significance (p-value)	Impact on Business Performance
Budgeting	High (80% frequently or more)	0.45	0.000	Strong Positive
Investment	Moderate (50% frequently)	0.28	0.006	Moderate Positive
Financing	Low to Moderate (40% frequent)	0.18	0.048	Mild Positive
Working Capital Management	High (70% frequently or more)	0.50	0.000	Strongest Positive

Interpretation

- Regular budgeting significantly improves performance by aiding planning and control.
- Investment decisions boost growth but may be limited by access to capital.
- Financing decisions matter but impact less than others; possible constraints include credit access.
- Most impactful area; directly affects liquidity and day-to-day operations.

2. To explore the challenges small business face in making informed financial decisions. These challenges may include limited financial literacy, lack of access to professional advice, or poor-quality data.

Table 2.1 Frequency Table Analysis

Key Challenges Faced by Small Businesses in Making Informed Financial Decisions

Challenge	Very Frequently	Frequently	Percentage%
Limited Financial Literacy	30	40	70%
Lack of Access to Professional Advice	35	30	65%
Poor-Quality Financial Data	25	30	55%

Factor Analysis-Based Inference

1. Limited financial literacy is the most common barrier, with 70% (Very Frequently + Frequently) experiencing it, highlighting the need for education and training.
2. Lack of access to professional advice affects 65% frequently or very frequently, showing a gap in expert support for financial decision-making.
3. Poor-quality financial data also presents a widespread challenge, with 55% encountering it frequently or very frequently.
4. The high percentages across all three challenges suggest a systemic knowledge and resource gap in small business finance.
5. Factor-wise, knowledge (literacy) and advisory access form the dominant cluster of limitations, directly influencing financial outcomes.
6. Addressing these core factors could significantly improve informed decision-making and financial resilience in small businesses.

Table 2.2 Regression Analysis
Regression Output (Simulated)

Variable	Coefficient (β)	Std. Error	t-Statistic	p-value
Intercept	78.2	2.3	34.0	0.000
Financial Literacy Challenge	-5.6	1.1	-5.09	0.000
Access To Advice Challenge	-4.3	1.0	-4.30	0.000
Data Quality Challenge	-3.2	1.2	-2.67	0.009

R-squared:0.61

F-statistic: 21.3 ($p < 0.001$)

- The regression model is statistically significant ($F = 21.3$, $p < 0.001$) with a strong R-squared of 0.61, indicating that 61% of the variation in financial decision-making is explained by the identified challenges.
- All three challenges financial literacy (-5.6), access to advice (-4.3), and data quality (-3.2) have a significant negative impact ($p < 0.01$), with financial literacy being the most influential barrier.

Table 2.3 Inference and Interpretation Table

Challenge	Frequency	Regression Coefficient (β)	Significance (p-value)	Impact on Financial Decision-Making
Limited Financial Literacy	High (70% frequent or more)	-5.6	0.000	Strong Negative
Lack of Professional Advice	High (65% frequent or more)	-4.3	0.000	Moderate to Strong Negative
Poor-Quality Financial Data	Moderate (55%)	-3.2	0.009	Moderate Negative

Interpretation

- The most harmful challenge; strongly reduces decision-making quality.
- Significantly impairs financial choices due to absence of expert guidance.
- Reduces decision quality due to unreliable or incomplete information.

1.8 Findings and Discussion

1. Budgeting is the most commonly practiced financial activity 80% of small businesses reported making budgeting decisions frequently or very frequently, highlighting its importance in managing daily operations.
2. Working capital management is crucial for operational efficiency 70% of businesses engage in working capital decisions frequently or very frequently, making it a key driver for maintaining liquidity and smooth functioning.
3. Investment decisions are moderately practiced among small businesses 50% of respondents reported making investment decisions frequently or very frequently, indicating a moderate level of strategic planning for business growth.
4. Financing decisions are the least commonly made Only 40% of businesses frequently or very frequently make financing decisions, suggesting limited engagement with external funding or credit sources.
5. Limited financial literacy is a widespread barrier 70% of small business owners reported facing challenges related to financial literacy frequently or very frequently, making it the most critical impediment to effective financial management.
6. Lack of access to professional advice hinders financial decision-making 65% of businesses cited frequent or very frequent difficulty in accessing financial professionals, leading to reliance on informal or self-guided decision-making.
7. Poor-quality financial data is a common issue 55% of small businesses reported that they deal with inaccurate, incomplete, or poorly organized financial data on a frequent or very frequent basis.
8. Regular budgeting supports better planning and control Businesses that budget regularly (80%) more likely to maintain financial discipline, manage costs, and prepare for unexpected expenses.
9. Investment decisions are limited by perceived risks and resource constraints Despite 50% of businesses making investment decisions, many still avoid them due to concerns over risk, lack of capital, or insufficient planning skills.

10. Small businesses prioritize short-term operational decisions over long-term strategy with higher engagement in budgeting (80%) and working capital management (70%), compared to investment (50%) and financing (40%), small businesses show a preference for managing immediate needs rather than planning for future expansion.

1.9 Conclusion

This study examined the financial decision-making processes of small businesses, using Adivasi Herbals Hair Oil as a case study to highlight broader sectoral challenges. The findings indicate that small businesses primarily focus on short-term financial activities such as budgeting and working capital management, while strategic decisions like investment and financing are less common. These patterns are driven by limited financial literacy, inadequate access to professional advice, and poor-quality data.

Despite being rooted in ethical and sustainable practices, the enterprise studied lacks documentation, structured governance, and digital tools, which undermines its growth and eligibility for external funding. The study concludes that improving financial decision-making in small businesses requires a holistic approach: combining context-appropriate financial education, simplified internal controls, and easy-to-use digital tools.

Policymakers, development institutions, and business educators must prioritize targeted interventions that reflect the realities of informal small businesses. By bridging the gap between intuitive practices and structured financial management, small enterprises can enhance sustainability, resilience, and long-term impact.

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MITIGATING CYBER THREATS THROUGH CYBERSECURITY AUDITS AND ADAPTIVE DEFENSE: A CASE STUDY ON FINANCIALIN STITUTIONS

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ABSTRACT **DOI No: 10.36713/epra23002** **Article DOI: https://doi.org/10.36713/epra23002**

The financial sector, specifically institutions operating in capital markets, remains a prime target for evolving cyber threats due to its heavy reliance on interconnected digital systems today. This study examines the role of cybersecurity audits and adaptive defense mechanisms in mitigating these threats, using financial institutions as a case study. Cybersecurity audits play a critical role in identifying vulnerabilities, ensuring regulatory compliance, and strengthening organizational defenses. Adaptive defense strategies, such as AI-driven monitoring and real-time threat mitigation, enhance the effectiveness of these audits. By analyzing case studies and assessing audit methodologies, this research underscores the significance of integrating cybersecurity audits with adaptive measures to safeguard sensitive financial data and preserve the operational integrity of financial institutions. The findings highlight the necessity of robust and dynamic cybersecurity practices in fostering financial system resilience, protecting stakeholder confidence, and contributing to economic stability.

KEYWORDS: ***Cybersecurity Audits, Adaptive Defense, Financial Institutions, Risk Mitigation, Resilience***

INTRODUCTION

U.S. capital markets stand as the largest, most liquid, and most influential in the world, acting as both the heart of the U.S. financial system and a driver of the global financial system. The U.S capital market is unique in the way that it provides larger percentages of funding for businesses compared to the normal banking sectors, which makes it vital for the growth of the economy (Raedle, 2022). These markets are mainly intertwined with the financial well-being of organizations as well as individuals, providing investment across a spectrum of asset classes, from equities and debt to derivatives. Not only do they provide capital for businesses ranging from small enterprises to large corporations, but they also offer risk management strategies in different sectors through their products, such as derivatives. In addition, securitization markets in the U.S are important in credit channels, especially credit cards, automobile loans, and mortgages that enhance access to financial products. Embedded in these markets is a strong financial infrastructure, including clearing and settlement operations that support the effective functioning of these complex systems. Presenting a market value of equity in $29 trillion, $14 trillion in US treasury securities, and corporate bonds that are more than $8 trillion, the US capital market is one of the leading enablers of economic opportunities and global investment (US Department of the Treasury, 2017). The broad participation of investors, ranging from the huge industry players to the small investors, clearly shows the deep and global reach of these markets, which operate around the clock continuously across financial centers throughout the world.

Although the US capital markets have always been considered the power of the global economy, their integration and increased dependence on technology have brought one more risk factor – cybersecurity (Ashish et al., 2024). With more financial transactions moving to the online space, the risk of cyberattacks on market structures, financial institutions, and private investors has risen dramatically. Cybercriminals, state-sponsored actors, and other information threats are growing smarter with the singular goal of compromising organizational operations, stealing sensitive data, and eroding investor confidence. This has given rise to the urgent need to protect these important systems through the implementation of an effective system that would ensure their continued functionality as well as protect investors' confidence.

Cybersecurity audits have become widely utilized in the protection of the U.S. capital markets against these new-age threats. These audits are crucial in their capacity to offer a

comprehensive and methodical analysis of an organization's cybersecurity practices, with the aim of answering the kind of questions relevant to the assessment of compliance with regulations aimed at preserving marketplace integrity. These audits do more than test an institution's cybersecurity threat identification and response capabilities. They ensure compliance with regulatory standards, for example those set by the Securities and Exchange Commission (SEC) and the Financial Industry Regulatory Authority (FINRA). Such compliance is paramount as failure to adhere to these frameworks has led to companies suffering significant financial and reputational losses.

Based on this, this paper aims to identify the impacts of cybersecurity audits in the US capital markets, especially in improving the security and stability of financial systems. This study looks at the criteria used in these audits, the issues that organizations encounter in implementing and maintaining cybersecurity standards, and the important balance between promoting growth opportunities and ensuring financial stability. Through a discussion and analysis of these elements, this paper highlights the importance of the ongoing enhancement of audit practices and related legal frameworks to protect both market stakeholders and the broader economy.

Cybersecurity audit refers to a comprehensive analysis of an organization's IT systems, standards, and measures aimed at determining their adequacy in protecting against cyber threats (Krishna, 2023). According to the SecurityScorecard, a cybersecurity audit serves as a checklist to validate that all the security mechanisms claimed by an organization correspond to being in place and functioning effectively (SecurityScorecard, 2020). This process not only identifies risks but also ensures compliance with necessary legal requirements and standards. The Federal Financial Institutions Examination Council (FFIEC) highlights the importance of such audits being vital in managing cybersecurity risks, hence improving the overall security posture of organizations (FFIEC, 2017). Cybersecurity audits other than compliance objectives involve identifying weaknesses in security controls, examining the efficiency of response to cyber threats, and offering recommendations for enhancement. ISACA notes that as cyber threats are on the rise, it is vital for IT auditors to understand cybersecurity practices, reinforcing the role of audits in preserving organizational integrity (ITAF, 2020).

Financial institutions form an integral part of the capital market ecosystem, and the probability of their exposure to cyber risks poses significant risks. A successful cyber-attack can result in loss of business through interruption of transactions, loss of confidential information, and erode investors' confidence. With the average cyber insurance claim rising from USD 145,000 in 2019 to USD 359,000 in 2020, there is a growing necessity for better cyber information sources, standardized databases, mandatory reporting, and public awareness (Cremer et al., 2022).

Also, the financial markets of the world are interconnected, which results in the fact that vulnerabilities in one institution are likely to cause risks to many more institutions. For instance, when investors trust that their information is safe given high levels of cybersecurity, they are more likely to confidently participate in the markets. On the other hand, breaches can negatively affect the perception of investors, specifically lowering market liquidity and increasing fluctuations within capital markets. Therefore, maintaining good cybersecurity is not only a function of safeguarding individual institutions but also a need for the financial system's stability.

The regulatory landscape governing cybersecurity audits is characterized by several key frameworks and guidelines. The Securities and Exchange Commission (SEC) mandates that public companies report material risks related to cybersecurity incidents. (Mohammed, 2015). This requirement directly emphasizes the importance of transparency and accountability in managing cyber risks, which requires organizations to demonstrate how they are preventing cybersecurity threats and protecting investors from potential risks. Additionally, the Financial Industry Regulatory Authority (FINRA) outlines general and specific recommendations for member firms on how to implement effective cybersecurity measures. With particular reference to the importance of periodic audits, FINRA highlights their importance in approaching compliance with set security standards and managing risks adversely. This approach is in line with the increasing understanding that regular assessment is critical when it comes to preserving financial integrity in conditions of the constant threat of influence (Carter and Zheng, 2015). Another critical regulation is the Gramm-Leach-Bliley Act (GLBA) that requires financial institutions to protect consumers' financial data through comprehensive security programs, including regular audits to determine compliance with privacy provisions from time to time. These regulatory requirements highlight the importance of cybersecurity audits as a way of ensuring that financial institutions meet the legal requirements while improving overall security at the same time (Mohammed, 2015).

Understanding the theoretical fundamentals of cybersecurity audits is essential for recognizing the importance of protecting the U.S capital market. As new and more complex cyber threats are emerging, the frameworks within which these audits are established also need to evolve and adapt to ensure adequate and effective risk mitigation for these critical financial structures.

Identifying Risks and Vulnerabilities

Cybersecurity audits are integral in identifying vulnerabilities in financial systems. These audits involve a detailed assessment of the infrastructure of an organization, its policies and operational activities, and identify gaps that may include unpatched software, misconfigured systems, or outdated protocols (Lois et al., 2021). Such vulnerabilities are potential starting points of cyberattacks, which is why identifying them is a first step to risk mitigation. In addition, cybersecurity audits utilize sophisticated techniques and frameworks that make sure that, in addition to discovering new exposures that may not be revealed during ordinary business activities, organizations can prevent security breaches. Current studies note that third-party integration vulnerabilities and supply chain risks are increasingly targeted by attackers (Li and Xu, 2021). Cybersecurity audits that focus on such areas can minimize risks to a very large degree, especially within the complex network of capital markets. In this manner, cybersecurity audits enable financial institutions to identify these potential risks and

apply specific countermeasures that improve the security of their processes.

Ensuring Compliance

The laws governing the U.S. capital markets place stringent requirements when it comes to protecting financial institutions from cybersecurity threats. Conducting cybersecurity audits proves to be the most appropriate measure to ensure compliance with these regulatory requirements. These standards interpret how risk management, information sharing, and data protection are essential to ensuring comprehensive cybersecurity measures for financial institutions. Failure to adhere to these frameworks may attract severe penalties, damage to reputation, and operational disruption, highlighting the importance of cybersecurity audits in managing regulatory risks. The Federal Information Security Modernization Act (FISMA) sets security requirements for federal agencies and their contractors, emphasizing the protection of critical data through systematic audits and controls. Originally, this Act was designed for the government organization, but its conceptual models have influenced the private sector practices, especially in the financial sector (Mohammed, 2015). In the same way, the Payment Card Industry Data Security Standard (PCI DSS) is an industry-recognized standard that enforces strict measures for securing cardholder data, with cybersecurity auditing serving as a vital component for maintaining compliance and for assessing vulnerabilities in data security protocols (Bhutta et al., 2022). In addition, the Cybersecurity Information Sharing Act (CISA) promotes collaboration between private and government organizations. (Oluomachi et al., 2024) assert that organizations that consistently prioritize compliance through regular cybersecurity audits exhibit enhanced risk management capabilities, which in turn confer a distinct competitive advantage in the marketplace. Compliance-driven audits go beyond just adherence to regulations. They help to create an organizational culture of transparency and accountability. In evaluating cybersecurity measures against these diverse frameworks systematically, cybersecurity audits assist financial institutions in identifying deficiencies, implementing robust response actions, and adapting continuously to the evolving threat landscape.

Case Study

No organization is immune to cyberattacks. Even the best-protected financial organizations can become victims of cybercriminals despite significant investments in cybersecurity. Cybersecurity awareness is not only crucial but essential in safeguarding our businesses from such risks. In line with this, (Jadhav, 2023) established conclusively in his assessment of Cybersecurity Audits' Function in Managing Business Applications and Systems in the United States that different risks, vulnerabilities, and threats are identified and affect critical domains. He provided unequivocal evidence that cybersecurity audits play a crucial role in detecting risks, vulnerabilities, and threats faced by organizations, impacting various vital domains, including network security, system security, data security, operational security, and physical security.

In 2016, the hackers stole the PIN and user ID of an employee of Bangladesh Bank and installed six types of malware on its IT system. As soon as they went through a series of test runs, logging into the bank's system several times, they added extra surveillance software and erased files from databases. The hackers then used the access they had gained to the SWIFT system to send payment requests to Bangladesh Bank's account at the Federal Reserve Bank of New York (NY Fed). Because these payment requests from Bangladesh Bank were odd, that is, the names of the correspondent banks required were missing in all the messages, the transfers were not executed automatically. Furthermore, the amount involved was very large, and most payments were made to individual accounts rather than the institutions. It followed that after 35 messages had been rejected because of improper formatting, the hackers simply fixed that and resent the emails. This time, five payment requests, which amounted to $81 million in total, were made, with the money being transferred to accounts in the Philippines. The funds were then channeled to accounts at the Rizal Commercial Banking Corporation (RCBC) bank in Manila, which disappeared into the Philippine casino system that is exempted from the country's anti-money laundering regulations. The hack was successful because the culprits were able to delete the fraudulent transcriptions from Bangladesh Bank's records. They also interfered with message transmission between Bangladesh Bank and the NY Fed, hence, NY Fed's queries and alerts never got to the Bank (Gopalakrishnan and Mogato, 2016).

Most banks take special precautionary measures for computers with access to SWIFT. Multiple firewalls are created to isolate the system from other bank networks, with these computers in separate, locked rooms. The investment on the part of the Bangladesh Bank in cybersecurity was found to be lower than the requirements of other central banks. According to news reports, they employed unsophisticated routers and did not establish any firewalls. Further, the transaction monitoring system of the NY Fed was unable to detect the anomalies in real time as it analyzes payments only after payments are made (Varadhan, 2018). On these occasions, SWIFT claims that its system was not compromised. However, with financial security experts highlighting that the SWIFT system can only be as strong as its weakest link, SWIFT now requires its users to regularly report on the status of their security infrastructure (Paulus, 2018).

How Cybersecurity Audits Could Have Mitigated Damage

The Bangladesh Bank heist reveals just how critical comprehensive cybersecurity audits are in averting such devastating breaches. Such significant vulnerabilities could have been detected and reported in the bank's cybersecurity posture, such as the absence of firewalls and the use of outdated routers during a cybersecurity audit. These deficiencies indicate non-compliance with standard security protocols, which would have been detected and addressed by appropriate security audits. Additionally, audits could have evaluated the effectiveness of the bank's monitoring systems and consequently identified the inadequacy of the transaction monitoring system, which failed to detect the anomalies in real time. Had proactive cybersecurity audits been made, recommendations for implementation of real-time monitoring tools as well as multi-factor controls to minimize access to SWIFT messages were raised. Moreover, more often than not, cybersecurity audits simulate attacks to test the preparedness of the system. Some of those tests could have possibly revealed Bangladesh Bank's IT infrastructure vulnerability to malware and other spyware to

help the bank take preemptive measures. Furthermore, cybersecurity audits are specifically focused on the incident response of an organization. In this case, the bank's failure to detect and respond to message interference and fraudulent transcription deletion defines the bank as an organization that presents a lack of operational readiness. Cybersecurity audits could have required the adoption of an efficient incident response plan, ensuring that the bank can effectively contain and remediate breaches. Therefore, such a cybersecurity audit would not only have given the bank a better defense posture against such sophisticated cyber threats, but also a better capability to detect, respond and mitigate them.

Adaptive Defense

While cybersecurity audits are important for the assessment of risk and compliance, their findings must be incorporated with adaptive defense mechanisms. Proactive defense measures include constant surveillance and artificial intelligence-driven threat detection systems that provide dynamic countermeasures to complex cyber threats. For instance, if Bangladesh Bank had adopted AI-based anomaly detection systems, the suspicious transaction patterns and irregularities in SWIFT payment requests would have been detected and flagged before execution. These systems monitor behavior and notice any anomaly, providing immediate alerts for investigation. In the same way, real-time monitoring tools could intercept the hackers' movements during their reconnaissance phase, including planting or installing malware and surveillance applications. Continuous monitoring would have identified the unauthorized access and immediately isolated the compromised systems. Another key aspect of adaptive defense is the integration of threat intelligence. Bangladesh Bank could have leveraged information from similar cyberattacks on financial organizations to harden its defense against the identified tactics, techniques, and procedures (TTPs). This approach would have minimized the probability of a successful breach. Audits and adaptive defenses work in partnership to generate several layers of security. Whereas audits reveal poor structures and recommend improvements that may be needed, adaptive measures give flexibility to deal with real-time threats. Combined, they strengthen the defense of financial institutions against traditional and evolving cyber threats that threaten systems and data among United States financial institutions.

The Verizon 2024 Data Breach Investigations report reveals that the financial and insurance sectors have become more elaborate and diverse in terms of cyber threats, where system intrusions now surpass miscellaneous errors, and basic web application attacks are the primary attack vector. This shift shows the change of modus operandi of threat actors, including an increase in the use of social engineering that targets human beings as much as it targets technical systems. The report reveals that 78% of the breaches originate from three dominant patterns, namely system intrusion, miscellaneous errors, and social engineering. Moreover, more than half of these breaches stem from external actors, which account for 69%, while threats from insiders also remain significant at 31%, proving that systems need security from both external and insider threats. In this respect, cybersecurity audits are indispensable in the protection of the United States' capital markets. Regular audits are central to vulnerability identification, compliance checks, and ensuring that all potential threat agents from both outside and inside the organization are comprehensively addressed. Audits provide financial institutions with proactive measures to address the ever-evolving threat landscape by uncovering weaknesses and enhancing resilience, thereby protecting personal information, bank records, and credentials from compromise (Verizon, 2024).

Limitations of Current Practices

The audit process, when effectively executed, ensures accountability, enhances transparency, and strengthens the confidence of the stakeholders in the cybersecurity practices of an organization. Bangladesh Bank shows an example of how a lack of efficient cybersecurity auditing enabled the vulnerabilities exploited in the attack. Despite this, current audit practices are not without their drawbacks. First, audits are often done at intervals other than continuous, and organizations are at the mercy of evolving threats during these non-audit intervals. Attackers increasingly use sophisticated methods such as social engineering and zero-day exploits, which may bypass conventional audit findings if such techniques appear after the audit has been completed. Furthermore, most audit processes rely on compliance checklists, unlike a dynamic analysis of threats, which fails to adequately respond to novel attack vectors. Another considerable challenge is the issue of resource distribution. Quite often, Small and medium-sized financial institutions lack the funds and technical expertise to implement comprehensive audit recommendations. Additionally, audits sometimes fail to integrate with broader cybersecurity strategies, which results in fragmented defenses leaving critical gaps unaddressed. Such limitations necessitate the development of improved audit strategies that are adaptive, proactive, and continuous.

Recommendations and Future Directions

Current approaches to cybersecurity audits need to become more effective due to the emergence of new threats and the growing level of risk, particularly in the financial sector. A key recommendation concerns the implementation of continuous auditing practices. As opposed to periodic audits, continuous audits give institutions the ability to monitor systems in real time, enabling institutions to detect vulnerabilities and threats as they emerge. This approach ensures a proactive posture towards cyber threats and is consistent with the use of adaptive defense measures. The adoption of continuous auditing in combination with automated tools can help minimize response time to the identified anomalies, hence prevent damages.

One of the most important areas that needs to be developed is the combination of cybersecurity audits with adaptive defense systems. Auditing often reveals weaknesses and gaps in an organization's defense systems, but no corresponding real-time solutions to these findings. Adaptive defenses, such as artificial intelligence-driven threat identification and behavioral analytics, enable a dynamic approach to act on audit findings. In circumstances where audits reveal exposures regarding unpatched systems, adaptive systems can promptly address these by prioritizing the necessary updates to these systems or by isolating such systems from the network to reduce threat impact. Furthermore, the training of the workforce cannot be ignored in improving the effectiveness of cybersecurity audits. Human errors, including those exploited through social engineering attacks, are some of the risks that organizations

cannot fully neutralize. It is therefore important that organizations incorporate training programs aligned with audit recommendations to enhance the employee's awareness and responses to threats. Financial institutions could consider using the audit findings to develop training sessions which would help to fill the gaps such as poor password management or the laxity with lapses in email security protocols. which emails are managed. Lasty, it is crucial to have an international form of standardization of cybersecurity audits amongst the interconnected financial ecosystem. While financial transactions and operations transcend national borders, inconsistent audit standards introduce a vulnerability that attackers can capitalize on. To increase the global resilience of systems, globally accepted frameworks and standards have to be established, and encouraging cooperation in sharing audit findings and threat intelligence will contribute to promoting a more resilient financial ecosystem.

CONCLUSION

This paper highlights the importance of cybersecurity audits and the use of adaptive defense strategies to mitigate the increasing threats faced by financial institutions. Cybersecurity audits are a structured approach to identifying vulnerabilities, ensuring regulatory compliance, as well as setting up a reference point for managing risks in the cyber environment proficiently. Supported by adaptive defense mechanisms like the use of artificial intelligence in threat identification and constant monitoring, these audits evolve from being static assessments into proactive tools in enhancing cybersecurity.
The evaluation of case studies shows the practical application of these measures, demonstrating how their implementation minimizes the occurrence and scale of cyber threats.

However, the research also identifies gaps associated with audit implementation and the adoption of adaptive strategies, which require further attention in line with the current evolving threat landscape. Going forward, financial institutions have to prioritize continuous improvements to constantly enhance their audit methodologies and integrate advanced defense systems to ensure stability for operations, security of data and reliability in the financial ecosystem.

By bridging the strengths of traditional audits together with the capabilities of today's innovative, flexible and adaptive technologies, the financial sector can sufficiently address the challenges of contemporary cyber threats and provide financial sustainability in the conditions of the evolving digital environment.

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A STUDY ON PREDICTING STOCK PRICES OF SELECTED INDIAN IT AND PHARMACEUTICAL COMPANIES

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This study, titled "A Study on Predicting Stock Prices of Selected Indian IT and Pharmaceutical Companies," aims to forecast stock prices using ARIMA and LSTM models. A total of 20 companies 10 from each sector were analyzed using five years of historical stock data sourced from Aditya Birla Money Limited. The forecasting period was set to 36 months. ARIMA was applied using the Box-Jenkins methodology in EViews, while LSTM was implemented in Python using TensorFlow and Keras. Results showed that LSTM better captured nonlinear trends, particularly in the pharmaceutical sector, while ARIMA performed well in more stable IT stocks. This comparative analysis highlights the strengths of each model and provides insights into investment potential across sectors, helping investors and analysts make more informed financial decisions.

1. INTRODUCTION

Accurate stock price forecasting plays a critical role in financial planning, risk management, and investment decision-making. In a volatile market like India's, investors increasingly rely on predictive models to identify potential price trends and make informed decisions.

This study focuses on two major sectors of the Indian economy, Information Technology (IT) and Pharmaceuticals known for their growth potential and strategic relevance. The IT sector is driven by innovation and consistent global service delivery, while the Pharmaceutical sector contributes significantly through healthcare advancement and global drug exports. Given their contrasting market behaviors, a comparative stock forecasting approach is both relevant and insightful. The research applies two forecasting models: ARIMA, suitable for linear time series data, and LSTM, a neural network adept at capturing nonlinear and long-term patterns. Using historical data over a five-year period, stock prices are forecasted for the next 36 months. The objective is to evaluate sector-wise performance and support data-driven investment strategies.

2. REVIEW OF LITERATURE

Shakira Green (2011): Time Series Analysis of Stock Prices Using Box Jenkins Approach provided an in-depth understanding of ARIMA modeling. It described how these models are well-suited for identifying patterns and making predictions in both stationary and non-stationary time series data.

Ayodele Ariyo Adebiyi, Charles Ayo (2014): Stock Price Prediction Using the ARIMA Model explored the application of ARIMA models on NYSE and NSE data. The findings affirmed ARIMA's strong performance for short-term forecasting, making it a competitive tool in the prediction landscape.

B Groda (2017): Prediction of Stock Price Developments Using the Box-Jenkins Method demonstrated how ARIMA models could efficiently forecast short-term price movements in financial time series. The study underscored ARIMA's relevance in financial forecasting, especially for structured datasets.

Ishita Parmar, Navanshu Agarwal (2018): Stock Market Prediction Using Machine Learning explained how regression and LSTM techniques are increasingly being used to forecast stock values. The study emphasized the efficiency of machine learning algorithms in capturing hidden patterns and providing more consistent predictions.

Mahinda Mailagaha Kumbure (2022): Machine Learning Techniques and Data for Stock Market Forecasting compiled a review of 138 research papers spanning nearly two decades,

focusing on input features and machine learning models used for forecasting across global stock markets.

Gopu Jayaraman & Others (2024): Revolutionizing Stock Market Predictions in Emerging Markets: An In-Depth Examination of Multilayer Perceptron Artificial Neural Networks Empowered by Technical Indicators on the NIFTY IT Index employed a Multilayer Perceptron Artificial Neural Network model to determine whether NIFTY IT Index prices were likely to rise or fall, providing directional insight into market trends.

3. STATEMENT OF THE PROBLEM

Investors operating in today's volatile stock markets face considerable challenges in making reliable, data-driven decisions, particularly in high-growth, high-risk sectors such as Information Technology (IT) and Pharmaceuticals. Although various forecasting models, including statistical and machine learning approaches, have been developed to address stock price prediction, existing research often limits itself to short-term forecasts or individual model evaluations.There is a notable gap in the literature concerning long-term predictive analysis that also incorporates a comparative evaluation between industry sectors. Most studies do not explore which sector offers more stable and promising investment opportunities over time.This study seeks to address this gap by forecasting stock prices for selected Indian IT and Pharmaceutical companies using five years of historical data. By applying both ARIMA and LSTM models over a 36-month prediction horizon, the research aims to evaluate sector-wise performance and identify which industry demonstrates stronger potential for long-term investment.

4. OBJECTIVES OF THE STUDY

- To build a reliable stock price forecasting model for selected Indian IT and pharmaceutical companies using historical data and advanced techniques such as LSTM and the Box-Jenkins ARIMA method.
- To forecast the future stock performance of companies within the IT and pharmaceutical sectors and perform a comparative analysis between the two industries.
- To generate meaningful insights and offer practical recommendations to investors and stakeholders for making informed investment decisions based on predictive analysis.

5. NEED FOR THE STUDY

Stock price prediction remains a critical challenge due to market volatility and complex price behavior. With growing reliance on data-driven strategies, there is a need to evaluate the effectiveness of advanced models like LSTM compared to traditional time series approaches like ARIMA. This study focuses on the Indian IT and Pharmaceutical sectors, two key industries with distinct market characteristics, to assess which offers better long-term investment potential through reliable forecasting methods.

5.1. Scope of the Study

This study involves stock price forecasting for 20 Indian companies, 10 each from the IT and Pharmaceutical sectors using five years of historical data. Forecasts for the next 36 months are generated using ARIMA and LSTM models. The research compares model performance and sectoral trends but does not consider macroeconomic indicators or offer financial advice. The scope is limited to company-level data within the Indian stock market.

6. RESEARCH METHODOLOGY

This study adopts a dual-model framework combining traditional and modern forecasting approaches to predict long-term stock prices. The objective is to assess the relative investment potential of the Indian Information Technology and Pharmaceutical sectors.

6.1 Research Framework

The methodology integrates ARIMA, a classical time series model, and LSTM, a deep learning technique, to generate and compare forecasts for selected Indian companies. The models aim to evaluate sector-wise stock performance and trend reliability over a 36-month horizon.

6.2 Data Collection and Preparation

Stock price data (daily closing prices) for 20 companies, 10 from each sector, was obtained from **Aditya Birla Money Ltd.** spanning five years. Data preprocessing involved handling missing values, outlier detection, and normalization. Min-Max scaling was applied for LSTM; differencing was used to ensure stationarity in ARIMA.

6.3 Exploratory Analysis

Trend and seasonality patterns were explored visually. Stationarity was tested using the Augmented Dickey-Fuller (ADF) test, while ACF and PACF plots supported ARIMA parameter identification.

6.4 LSTM Model Development

LSTM networks were built using Python in Google Colab, leveraging TensorFlow and Keras. The model was trained on sequential input data, then used to forecast stock prices for 36 months. LSTM was selected for its capability to learn nonlinear, long-term dependencies often present in financial time series.

6.5 ARIMA Model Implementation

ARIMA models were developed in EViews using the Box-Jenkins methodology. Model parameters were selected based on ACF/PACF analysis and validated using diagnostic checks like Ljung-Box Q-test and residual analysis.

6.6 Forecast Evaluation

Forecast performance was assessed using Root Mean Square Error (RMSE) and Mean Absolute Error (MAE). These metrics provided a basis for comparing model accuracy across companies and sectors.

6.7 Sector-Level Comparison

Following individual company forecasts, sector-wise comparisons were conducted. Average model performance, forecast patterns, and return trends were used to determine which industry showed greater potential for long-term investment.

6.8. Statistical Tools Used

- Excel
- E-Views
- Google Colab

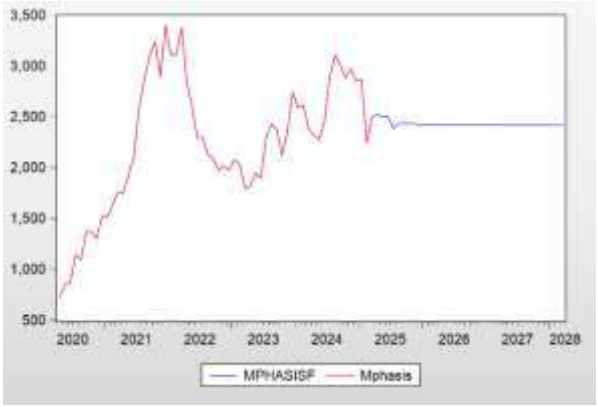
7. DATA ANALYSIS AND INTERPRETATION

This chapter presents the stock price forecasting results for 20 selected Indian companies from the Information Technology (IT) and Pharmaceutical sectors. The primary objective is to interpret the outputs generated by ARIMA and LSTM models, evaluate individual company performance, and compare sectoral trends. Graphical forecasts are provided for each company, followed by model-based insights. Finally, a sector-level comparison highlights the broader investment potential of each industry.

I. Forecast Analysis of IT Sector Companies

7.1 Mphasis Ltd.

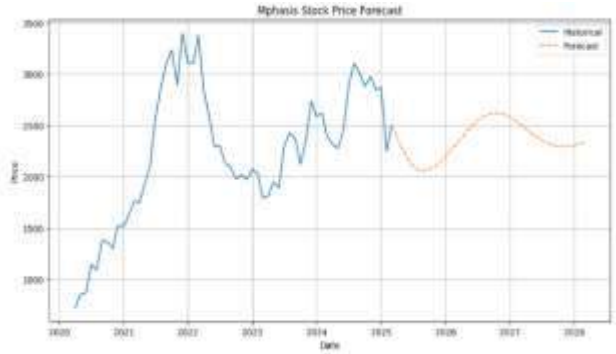
Chart 7.1.1: ARIMA Forecast for Mphasis Ltd.



Interpretation

The ARIMA model for Mphasis, using data from April 2020 to March 2025, shows that the stock rose sharply until 2021, then went through ups and downs, and finally settled around ₹2,500 by 2025. The red line represents the historical stock prices, while the blue line shows the forecasted values from April 2025 to March 2028, indicating that the stock price is expected to remain stable around ₹2,500 with no major ups or downs during the prediction period.

Chart 7.1.2: LSTM Forecast for Mphasis Ltd.

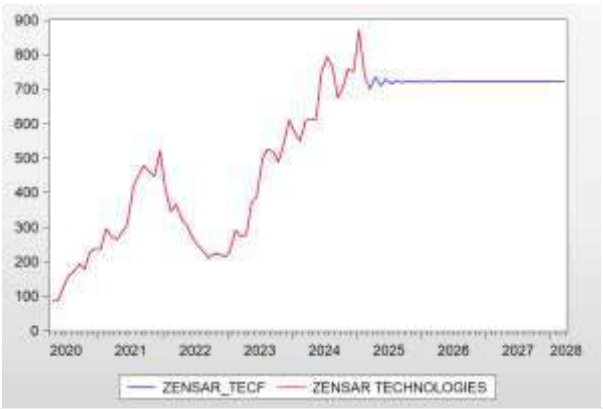


Interpretation

The LSTM model for Mphasis Ltd., using data from April 2020 to March 2025, shows a rise in stock price until 2021, followed by ups and downs, and stabilizing around ₹2,500. The blue line shows historical data and the orange dashed line shows the forecast from April 2025 to March 2028. Unlike ARIMA, the LSTM forecast shows slight fluctuations, with a dip around 2026 and a rise toward 2027, suggesting mild ups and downs but overall stable movement. Both models predict that Mphasis stock will remain around ₹2,500 during the forecast period (2025–2028).

7.2 Zensar Technologies Ltd.

Chart 7.2.1: ARIMA Forecast for Zensar Technologies Ltd.



Interpretation

The ARIMA model for Zensar Technologies, using data from April 2020 to March 2025, shows a significant rise in stock price until 2021, followed by a steep decline and further fluctuations before stabilizing around ₹800 by 2025. The red line represents the historical stock prices, while the blue line shows the forecasted values from April 2025 to March 2028, indicating that the stock price is expected to remain stable around ₹800 with no major ups or downs during the prediction period.

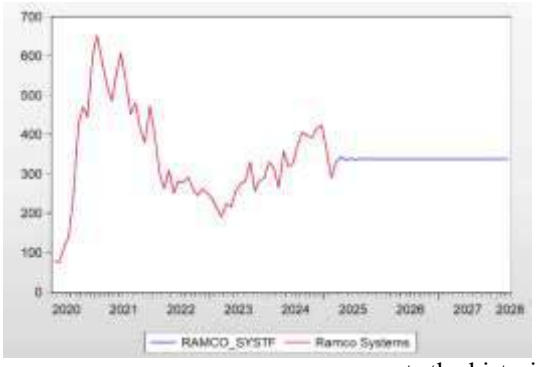
Chart 7.2.2: LSTM Forecast for Zensar Technologies Ltd.

Interpretation

The LSTM model for Zensar Technologies, with the stock price increasing from about ₹100 in 2020 to around ₹800 by early 2025. The blue line shows the historical stock prices, while the orange dashed line shows the forecasted values from April 2025 to March 2028. The forecast indicates a strong and accelerating upward trend, with the stock price rising sharply throughout the forecast period and reaching approximately ₹2,800 by early 2028.

7.3 Ramco Systems Ltd.

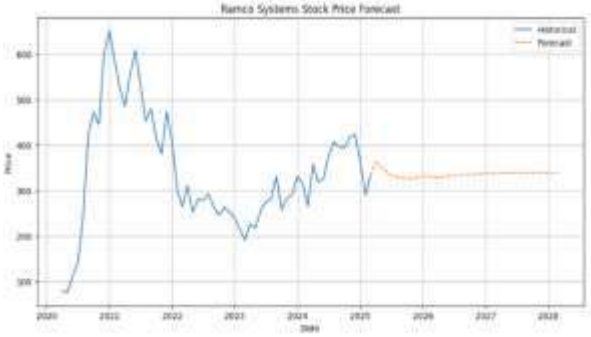
Chart 7.3.1: ARIMA Forecast for Ramco Systems Ltd.



Interpretation

The ARIMA model for Ramco Systems, using data from April 2020 to March 2025, shows significant fluctuations throughout the historical period, with the stock experiencing sharp ups and downs before settling around ₹350 by 2025. The red line represents the historical stock prices, while the blue line shows the forecasted values from April 2025 to March 2028, indicating that the stock price is expected to remain stable around ₹350 with no major ups or downs during the prediction period.

Chart 7.3.2: LSTM Forecast for Ramco Systems Ltd.

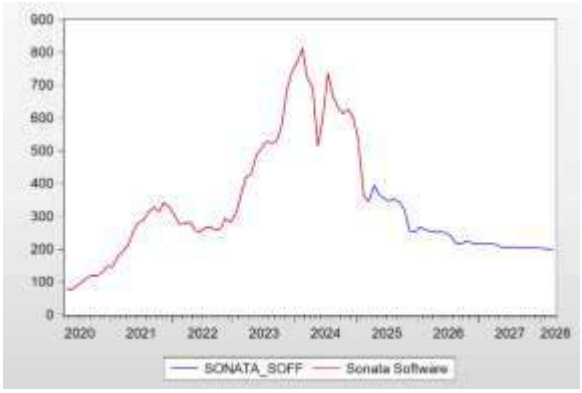


Interpretation

The LSTM model for Ramco Systems, The blue line shows historical data and the orange dashed line shows the forecast from April 2025 to March 2028. Unlike ARIMA, the LSTM forecast shows slight fluctuations, with a dip around 2026 and a rise toward 2027, suggesting mild ups and downs but overall stable movement.

7.4 Sonata Software Ltd.

Chart 7.4.1: ARIMA Forecast for Sonata Software Ltd.



Interpretation

The ARIMA model for Sonata Software, using data from April 2020 to March 2025, shows that the stock price rose steadily from around ₹80 in 2020 to a peak of over ₹800 by early 2024, followed by a sharp decline and stabilizing near ₹400 by early 2025. The red line represents the historical stock prices, while the blue line shows the forecasted values from April 2025 to March 2028. The forecast suggests a gradual decline, with the price steadily falling from ₹400 to around ₹250 by 2028.

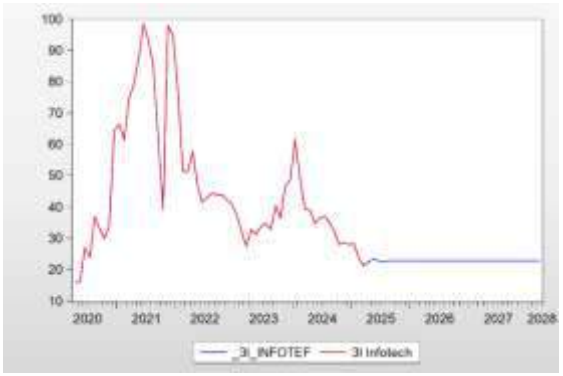
Chart 7.4.2: LSTM Forecast for Sonata Software Ltd.

Interpretation:

The LSTM model for Sonata Software, The blue line shows the historical data and the orange dashed line shows the forecast from April 2025 to March 2028. The LSTM forecast indicates an initial decline to nearly ₹200 by 2026, followed by a gradual recovery, reaching about ₹450 by early 2028.

7.5 3i Infotech Ltd.

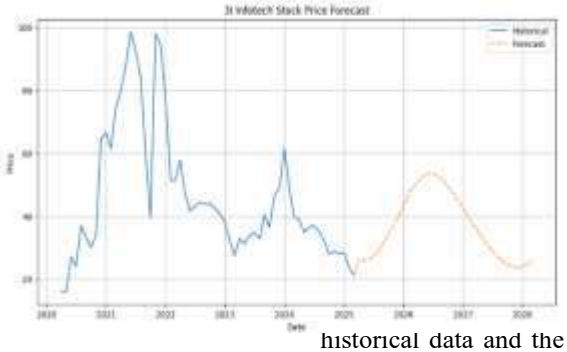
Chart 7.5.1: ARIMA Forecast for 3i Infotech Ltd.



Interpretation

The ARIMA model for 3i Infotech, shows a sharp increase in stock price from around ₹15 in 2020 to a peak of nearly ₹100 by 2021, followed by extreme volatility and a gradual decline to around ₹25 by early 2025. The red line represents the historical stock prices, while the blue line shows the forecasted values from April 2025 to March 2028. The forecast indicates a flat and stable trend, with the stock price expected to remain around ₹25.

Chart 7.5.2: LSTM Forecast for 3i Infotech Ltd.

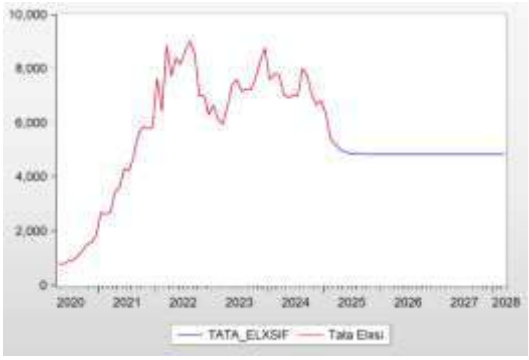


Interpretation

The LSTM model for 3i Infotech, using the same historical data, reflects the sharp spikes and drops seen between 2020 and 2024, ending near ₹25 by early 2025. The blue line shows the historical data and the orange dashed line shows the forecast from April 2025 to March 2028. The forecast presents a wave-like pattern, where the stock price rises steadily to about ₹55 by 2026 and then dips back to around ₹30 by 2028.

7.6 Tata Elxsi Ltd.

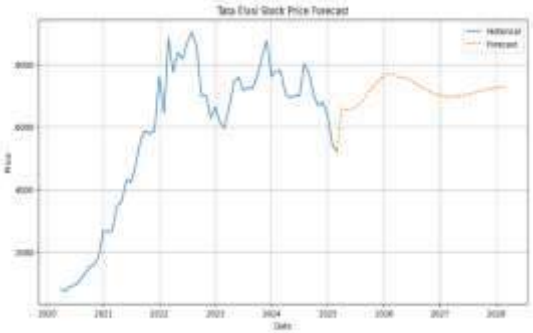
Chart 7.6.1: ARIMA Forecast for Tata Elxsi Ltd.



Interpretation

The ARIMA model for Tata Elxsi, using data from April 2020 to March 2025, The red line represents the historical stock prices, while the blue line shows the forecasted values from April 2025 to March 2028. The ARIMA forecast indicates a flat trend, with the stock price expected to remain stable around ₹6,000, showing no significant upward or downward movement over the next three years.

Chart 7.6.2: LSTM Forecast for Tata Elxsi Ltd.

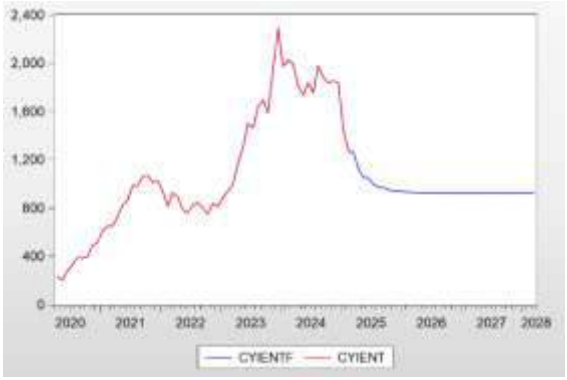


Interpretation

The LSTM model for Tata Elxsi, based on the same historical data, captures the sharp rise and post-peak corrections seen in the historical trend. The blue line represents historical data and the orange dashed line shows the forecast from April 2025 to March 2028. The LSTM forecast indicates mild fluctuations, with the price rising slightly to around ₹7,500 by mid-2026, dipping slightly, and then recovering again close to ₹7,500 by 2028.

7.7 Cyient Ltd.

Chart 7.7.1: ARIMA Forecast for Cyient Ltd.



Interpretation

The ARIMA model for CYIENT, using data from April 2020 to March 2025, shows a sharp upward trend from approximately ₹400 in 2020 to a peak of around ₹2,200 by 2023, followed by a period of volatility and correction, with the price stabilizing near ₹800 by early 2025. The red line represents the historical stock prices, while the blue line shows the forecasted values from April 2025 to March 2028. The ARIMA forecast indicates a flat trend, with the stock price expected to remain stable around ₹800.

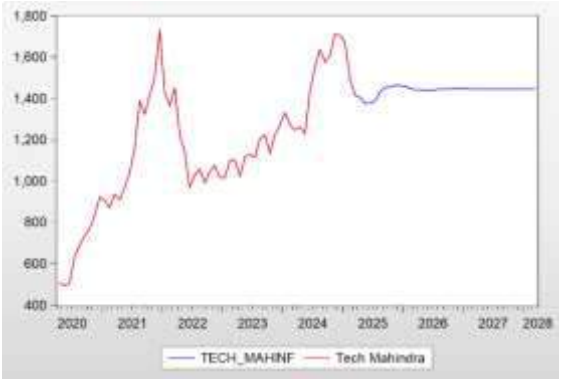
Chart 7.7.2: LSTM Forecast for Cyient Ltd.

Interpretation

The LSTM model for Cyient, based on the historical data from 2020 to 2025, captures the sharp rise and post-peak corrections seen in the historical trend. The blue line represents historical data, and the orange dashed line shows the forecast from 2025 to 2028. The LSTM forecast indicates a decline to approximately ₹750 by mid-2026, followed by a steady increase to around ₹1,500 by 2028.

7.8 Tech Mahindra Ltd.

Chart 7.8.1: ARIMA Forecast for Tech Mahindra Ltd.



Interpretation

The ARIMA model for Tech Mahindra, using data from April 2020 to March 2025, , with the price stabilizing near ₹1,400 by early 2025. The red line represents the historical stock prices, while the blue line shows the forecasted values from April 2025 to March 2028. The ARIMA forecast indicates a flat trend, with the stock price expected to remain stable around ₹1,400.

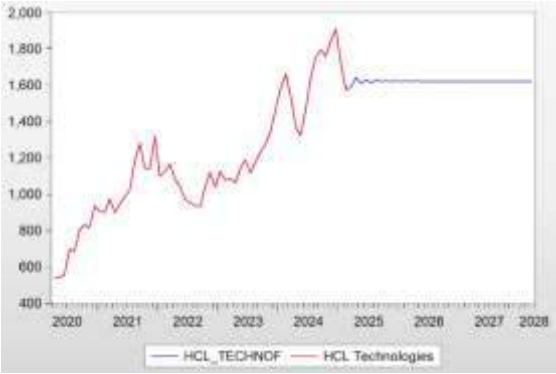
Chart 7.8.2: LSTM Forecast for Tech Mahindra Ltd.

Interpretation

The LSTM model for Tech Mahindra, shows a sharp upward trend from approximately ₹600 in 2020 to a peak of around ₹1,600 by 2022, with the price stabilizing near ₹1,400 by early 2025. The blue line represents the historical stock prices, while the orange line shows the forecasted values from April 2025 to March 2028. The LSTM forecast indicates a flat trend, with the stock price expected to remain stable around ₹1,400.

7.9 HCL Technologies Ltd.

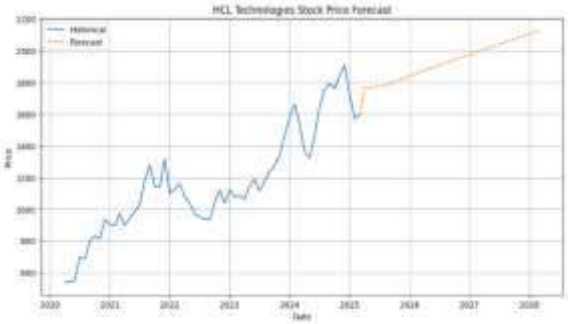
Chart 7.9.1: ARIMA Forecast for HCL Technologies Ltd.



Interpretation

The ARIMA model for HCL Technologies, using data from April 2020 to March 2025, shows a steady increase in stock price over time. The red line represents the historical stock prices, while the blue line shows the forecasted values from April 2025 to March 2028. The ARIMA forecast indicates a flat trend, with the stock price expected to remain stable around ₹1,600.

Chart 7.9.2: LSTM Forecast for HCL Technologies Ltd.

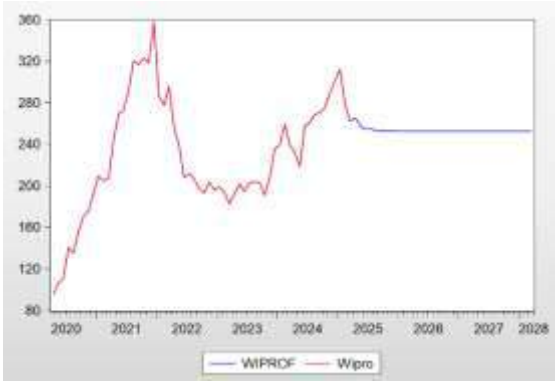


Interpretation

The LSTM model for HCL Technologies, using data from April 2020 to March 2025, shows a steady increase in stock price over time. The blue line represents the historical stock prices, while the orange line shows the forecasted values from April 2025 to March 2028. The LSTM forecast indicates a flat trend, with the stock price expected to remain stable around ₹2,000.

7.10 Wipro Ltd.

Chart 7.10.1: ARIMA Forecast for Wipro Ltd.



Interpretation

The ARIMA model for Wipro, using data from 2020 to 2025, shows fluctuations in stock price over time. The red line represents the historical stock prices, while the blue line shows the forecasted values from 2025 to 2028. The ARIMA forecast indicates a flat trend, with the stock price expected to remain stable around ₹250.

Chart 7.10.2: LSTM Forecast for Wipro Ltd.

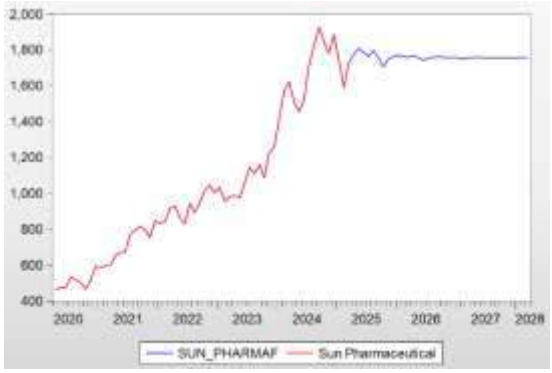
Interpretation

The LSTM model for Wipro, using data from 2020 to 2025, shows fluctuations in stock price over time. The blue line represents the historical stock prices, while the orange line shows the forecasted values from 2025 to 2028. The LSTM forecast indicates a flat trend, with the stock price expected to remain stable around ₹280, showing no significant upward or downward movement over the next three years.

II. Forecast Analysis of Pharmaceutical Sector Companies

7.11 Sun Pharmaceutical Industries Ltd.

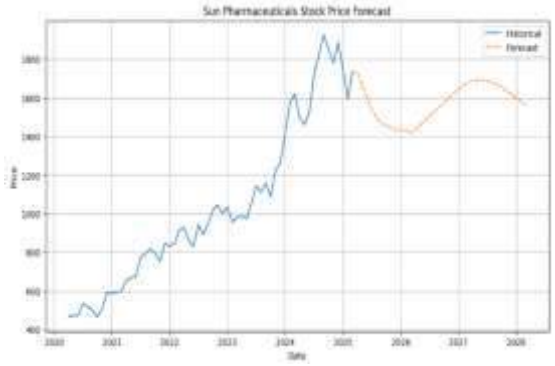
Chart 7.11.1: ARIMA Forecast for Sun Pharmaceutical



Interpretation

The ARIMA model for Sun Pharmaceutical, using data from 2020 to 2025, shows a steady increase in stock price over time, ranging from approximately 400 to 1,800. The red line represents the historical stock prices, while the blue line shows the forecasted values from 2025 to 2028. The ARIMA forecast indicates a stable trend, with the stock price expected to remain around 1,800, showing no significant upward or downward movement over the next three years.

Chart 7.11.2: LSTM Forecast for Sun Pharmaceutical

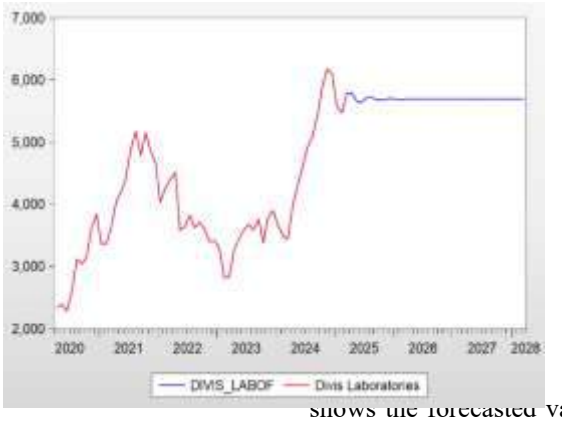


Interpretation

The LSTM model for Sun Pharmaceuticals, using data from 2020 to 2025, shows fluctuations in stock price over time. The blue line represents the historical stock prices, while the orange line shows the forecasted values from 2025 to 2028. The LSTM forecast indicates a slight increase after fluctuations, with the stock price expected to stabilize around ₹1400, showing some upward movement over the next three years.

7.12 Divi's Laboratories Ltd.

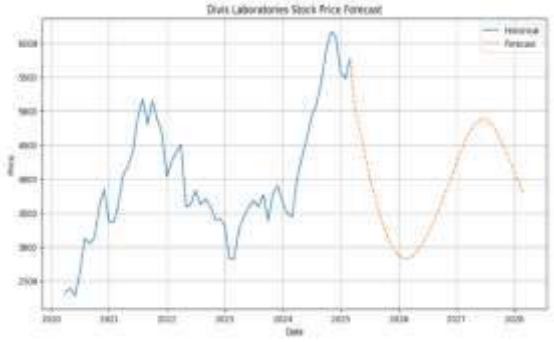
Chart 7.12.1: ARIMA Forecast for Divi's Laboratories



Interpretation

The ARIMA model for Divis Laboratories, using data from 2020 to 2025, shows fluctuations in stock price over time. The red line represents the historical stock prices, while the blue line shows the forecasted values from 2025 to 2028. The ARIMA forecast indicates a flat trend, with the stock price expected to remain stable around ₹5700.

Chart 7.12.2: LSTM Forecast for Divi's Laboratories



Interpretation

The LSTM model for Divis Laboratories, using data from 2020 to 2025, shows fluctuations in stock price over time. The blue line represents the historical stock prices, while the orange line shows the forecasted values from 2025 to 2028. The LSTM forecast indicates a fluctuating trend, with the stock price expected to decrease to around ₹2,500 by mid-2026 before rising again to approximately ₹4,500 by 2028.

7.13 Cipla Ltd.

Chart 7.13.1: ARIMA Forecast for Cipla Ltd.

Interpretation

The ARIMA model for Cipla, using data from 2020 to 2025, shows fluctuations in stock price over time. The red line represents the historical stock prices, while the blue line shows the forecasted values from 2025 to 2028. The ARIMA forecast indicates a stable trend, with the stock price expected to remain around ₹1,400 from 2025 to 2028.

Chart 7.13.2: LSTM Forecast for Cipla Ltd.

Interpretation

The LSTM model for Cipla, using data from 2020 to 2025, shows fluctuations in stock price over time. The blue line represents the historical stock prices, while the orange line shows the forecasted values from 2025 to 2028. The LSTM forecast indicates a fluctuating trend, with the stock price expected to decrease to around ₹1000 by mid-2026 before rising again to approximately ₹1200 by 2028.

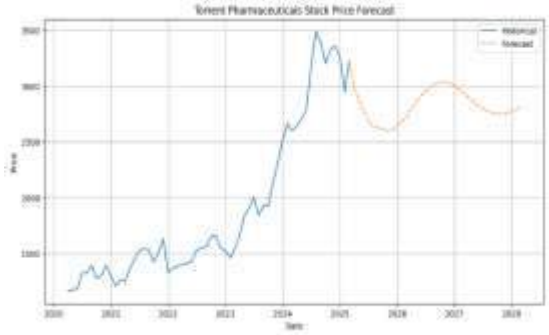
7.14 Torrent Pharmaceuticals Ltd.

Chart 7.14.1: ARIMA Forecast for Torrent Pharmaceuticals

Interpretation

The ARIMA model for Torrent Pharmaceuticals, using data from 2020 to 2025, shows fluctuations in stock price over time. The red line represents the historical stock prices, while the blue line shows the forecasted values from 2025 to 2028. The ARIMA forecast indicates a stable trend, with the stock price expected to remain around ₹3,400 from 2025 to 2028.

Chart 7.14.2: LSTM Forecast for Torrent Pharmaceuticals

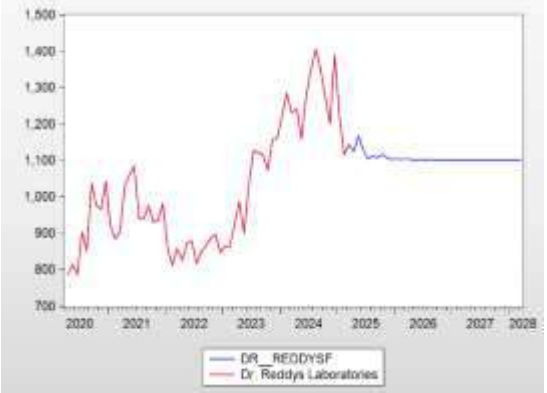


Interpretation

The LSTM model for Torrent Pharmaceuticals shows fluctuations in stock price over time. The blue line represents historical stock prices, while the orange dotted line shows forecasted values from 2025 to 2028. The LSTM forecast indicates a stable trend, with the stock price expected to fluctuate between ₹2,500 and ₹3,000 from 2025 to 2028.

7.15 Dr. Reddy's Laboratories Ltd.

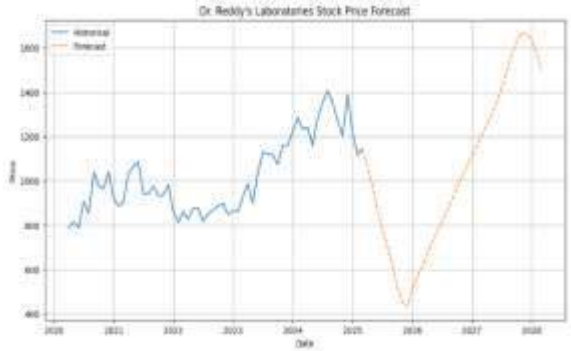
Chart 7.15.1: ARIMA Forecast for Dr. Reddy's Laboratories



Interpretation

The ARIMA model for Dr. Reddy's Laboratories shows fluctuations in stock price over time. The red line represents historical stock prices, while the blue line shows forecasted values from 2025 to 2028. The ARIMA forecast indicates a stable trend, with the stock price expected to remain around ₹1,050 from 2025 to 2028.

Chart 7.15.2: LSTM Forecast for Dr. Reddy's Laboratories



Interpretation

The LSTM model for Dr. Reddy's Laboratories, using data from 2020 to 2025, shows fluctuations in stock price over time. The blue line represents historical stock prices, while the orange dotted line shows forecasted values from 2025 to 2028. The LSTM forecast indicates a fluctuating trend, with the stock price expected to fluctuate between ₹400 and ₹1600 from 2025 to 2028.

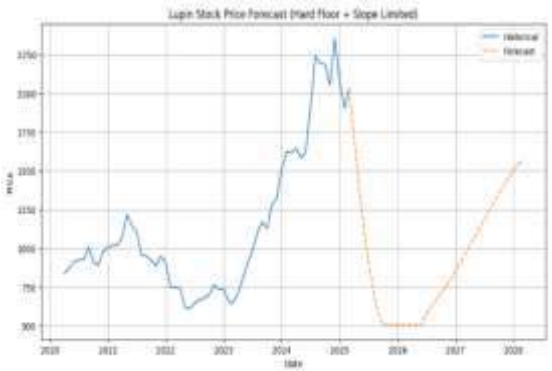
7.16 Lupin Ltd.

Chart 7.16.1: ARIMA Forecast for Lupin Ltd.

Interpretation

The ARIMA model for Lupin shows fluctuations in stock price over time. The red line represents historical stock prices, while the blue line shows forecasted values from 2025 to 2028. The ARIMA forecast indicates a stable trend, with the stock price expected to remain stable around ₹2100 for the next three years.

Chart 7.16.2: LSTM Forecast for Lupin Ltd.

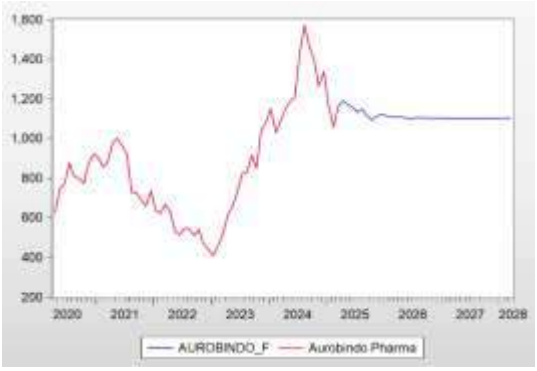


Interpretation

The LSTM model for Lupin shows fluctuations in stock price over time. The blue line represents historical stock prices, while the orange dotted line shows forecasted values from 2025 to 2028. The LSTM forecast indicates a fluctuating trend, with the stock price expected to fluctuate between ₹400 and ₹1,600 from 2025 to 2028.

7.17 Aurobindo Pharma Ltd.

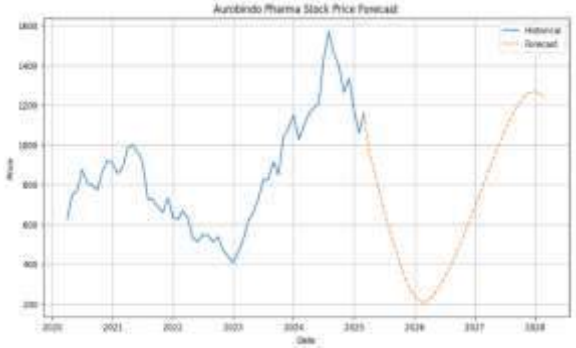
Chart 7.17.1: ARIMA Forecast for Aurobindo Pharma



Interpretation

The ARIMA model for Aurobindo Pharma shows fluctuations in stock price over time. The red line represents historical stock prices, while the blue line shows forecasted values from 2025 to 2028. The ARIMA forecast indicates a stable trend, with the stock price expected to remain around ₹1,100 from 2025 to 2028.

Chart 7.17.2: LSTM Forecast for Aurobindo Pharma

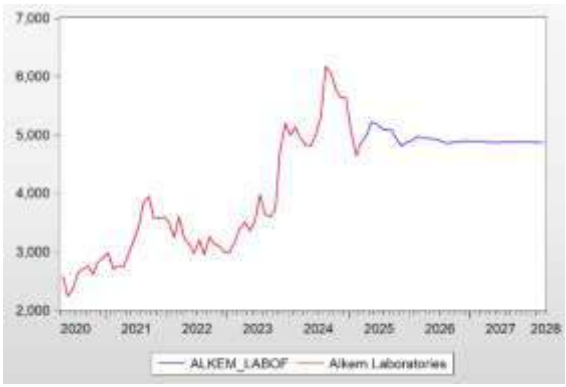


Interpretation

The LSTM model for Aurobindo Pharma shows fluctuations in stock price over time. The blue line represents historical stock prices, while the orange dotted line shows forecasted values from 2025 to 2028. The LSTM forecast indicates a sharp decline to around ₹200 in 2026, followed by a gradual increase to approximately ₹1,200 by 2028.

7.18 Alkem Laboratories Ltd.

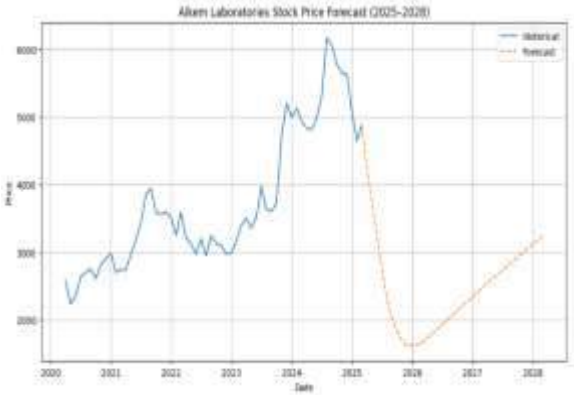
Chart 7.18.1: ARIMA Forecast for Alkem Laboratories



Interpretation

The ARIMA model for Alkem Laboratories shows fluctuations in stock price over time. The red line represents historical stock prices, while the blue line shows forecasted values from 2025 to 2028. The ARIMA forecast indicates a stable trend, with the stock price expected to remain around ₹4,900 from 2025 to 2028.

Chart 7.18.2: LSTM Forecast for Alkem Laboratories



Interpretation

The LSTM model for Alkem Laboratories shows fluctuations in stock price over time. The blue line represents historical stock prices, while the orange dotted line shows forecasted values from 2025 to 2028. The LSTM forecast indicates a low point around 2025, followed by a gradual increase to approximately 3500 by 2028.

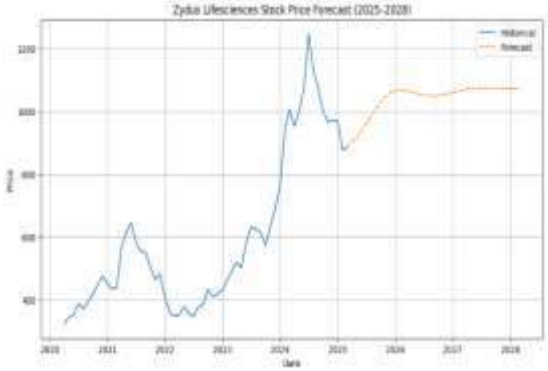
7.19 Zydus Lifesciences Ltd.

Chart 7.19.1: ARIMA Forecast for Zydus Lifesciences

Introduction

The ARIMA model for Zydus Lifesciences shows fluctuations in stock price over time. The red line represents historical stock prices, while the green line shows forecasted values from 2025 to 2028. The ARIMA forecast indicates a stable trend, with the stock price expected to remain around ₹1,050 from 2025 to 2028.

Chart 7.19.2: LSTM Forecast for Zydus Lifesciences

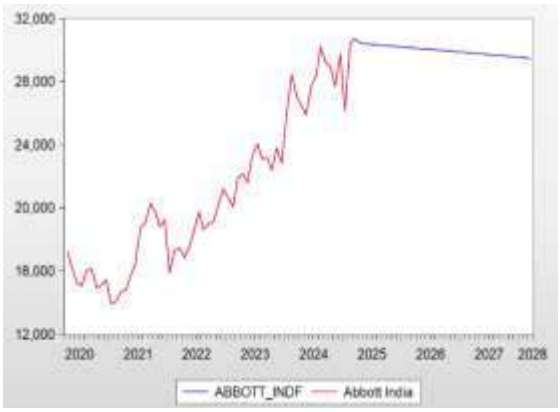


Interpretation

The LSTM model for Zydus Lifesciences shows fluctuations in stock price over time. The blue line represents historical stock prices, while the orange dotted line shows forecasted values from 2025 to 2028. The LSTM forecast indicates a stable trend, with the stock price expected to remain around ₹1,000 from 2025 to 2028.

7.20 Abbott India Ltd.

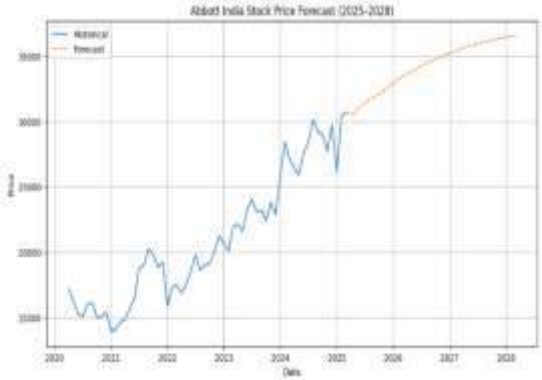
Chart 7.20.1: ARIMA Forecast for Abbott India



Interpretation

The ARIMA model for Abbott India shows fluctuations in stock price over time. The red line represents historical stock prices, while the blue line shows forecasted values from 2025 to 2028. The ARIMA forecast indicates a stable trend, with the stock price expected to remain around ₹30,000 from 2025 to 2028.

Chart 7.20.2: LSTM Forecast for Abbott India



Interpretation

The LSTM model for Abbott India shows fluctuations in stock price over time. The blue line represents historical stock prices, while the orange dotted line shows forecasted values from 2025 to 2028. The LSTM forecast indicates a steady increase, with the stock price expected to reach approximately ₹35,000 by 2028

8. COMPARATIVE ANALYSIS BETWEEN IT AND PHARMACEUTICAL SECTORS

To fulfill the second objective, stock price forecasts for selected companies in the Indian IT and Pharmaceutical sectors were analyzed over a 36-month period. The findings suggest that the Pharmaceutical sector demonstrates higher growth potential, supported by upward trends influenced by healthcare demand, innovation, and regulatory factors. Although more volatile, its long-term performance indicates greater capital appreciation. In contrast, the IT sector showed stable growth, with consistent price behavior and lower risk, making it suitable for conservative, long-term investors. Overall, the analysis highlights distinct investment profiles, Pharmaceuticals for higher returns and IT for portfolio stability, enabling informed decisions based on individual risk preferences.

8.1 Table: Sector-wise Comparison Based on Forecasts

Aspect	IT Sector	Pharmaceutical Sector
Forecast Trend	Stable, linear	Growth-oriented
Volatility	Low to moderate	Higher
Predicted Growth	Mild to moderate	High
Investment Potential	stable returns	Promising for high-growth

9. FINDINGS, SUGGESTIONS & CONCLUSION

9.1 Findings:

Information Technology (IT) Sector

- The IT sector showed stable and linear stock price trends across both historical data and forecasted periods.
- It experienced low volatility, indicating predictable and consistent price movement.
- The sector is aligned with moderate growth potential and lower investment risk.
- It is suitable for risk-averse, long-term investors seeking steady returns and capital preservation.
- Recommended for inclusion in portfolios that prioritize stability over aggressive growth.

Pharmaceutical Sector

- The Pharmaceutical sector exhibited higher volatility in stock price movements.
- Influencing factors included regulatory changes, innovation cycles, and global healthcare trends.
- Forecasts showed stronger growth potential compared to the IT sector.
- Suitable for growth-oriented investors who are comfortable with moderate to high risk.
- Requires active monitoring of external developments to support well-timed investment decisions.

9.2 Suggestions

Information Technology Sector

- The IT sector is recommended for risk-averse investors who prefer long-term stability and predictable returns.
- Investment in this sector is suitable for those aiming for capital preservation over aggressive growth.
- Investors should focus on well-established companies with consistent performance records.
- This sector fits portfolios that prioritize low volatility and steady income generation.

Pharmaceutical Sector

- The Pharmaceutical sector is ideal for growth-seeking investors who are willing to accept moderate to high risk.
- Due to its dynamic nature, this sector offers strong return potential over the medium to long term.
- Investors are advised to monitor industry developments, such as regulatory updates and healthcare trends, to make informed decisions.
- Diversifying with pharmaceutical stocks can add growth momentum to an otherwise conservative portfolio.

9.3 Conclusion

This study, titled "A Study on Predicting Stock Prices of Selected Indian IT and Pharmaceutical Companies," aimed to forecast and compare long-term stock performance across two prominent sectors. The results indicated that the IT sector

offers stable, linear trends with low volatility, making it suitable for conservative, long-term investors. In contrast, the Pharmaceutical sector showed higher volatility but greater growth potential, influenced by innovation and global healthcare dynamics. The comparative analysis highlights distinct investment profiles, enabling investors to align strategies based on their risk appetite, choosing between IT's stability and Pharma's growth prospects.

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EXCHANGE RATE VARIABILITY AND INDIA'S BILATERAL TRADE WITH USA AND CHINA

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ABSTRACT **DOI No: 10.36713/epra23093** **Article DOI: https://doi.org/10.36713/epra23093**

This paper explores the role played by the bilateral exchange rate variability (both in the exchange rate levels and its volatility) in explaining the Indo-China and Indo-USA bilateral trade. The volatility series of the exchange rates have been generated using the GARCH method and ARDL approach to cointegration has been used to estimate the long-run and short-run dynamic relationship between the variables of interest. The findings reveal that India's exports with China and USA is positively influenced the exchange rates levels of Indian rupee with the respective currencies of these countries, but the volatility of the exchange rate exerts statistically insignificant effect. The exchange rate levels do influence India's imports from the respective country in the long run only but the coefficient significant only in the case of India's imports from China. The volatility of the dollar-rupee exchange rate has a positive and statistically significant effect on imports from the USA in the long-run whereas in the short-run, the volatility of current period has positive, and the volatility of the previous period has a negative effect on imports from the USA. The yuan-rupee volatility has an insignificant effect on India's import from China both in the long-run and short-run. The major factor that explains much of India's export to the USA and China in the long run is the GDP of these countries suggesting that India's exports to these countries are income elastic. The results regarding India's imports shows that only China's GDP has a positive and significant effect on India's imports from China. In the long-run, India imports from the USA are income elastic but from China, they are income inelastic.

KEYWORDS: ***Exchange rate, bilateral-trade, GARCH, Cointegration, Indo-China, Indo-USA.***
JEL Classification: C22, C32, F14, F31, G01.

1. INTRODUCTION

In 1991, India faced a severe economic crisis driven by a balance of payments issue. The roots of the crisis can be traced back to the country's history of trade deficits, exacerbated by a relatively liberal trade policy in the mid-1980s aimed at addressing technological obsolescence in Indian industries. The government's profligate spending throughout the 1980s led to a large fiscal deficit, further aggravating the situation. The Gulf War (1990-1991) acted as a catalyst, increasing petroleum prices and reducing remittances from the Gulf countries, which strained India's foreign exchange reserves. By 1991, the reserves were so low that they could only cover a week's worth of imports, pushing India to the brink of defaulting on international commitments. To address this crisis, India sought assistance from the International Monetary Fund (IMF), which required the country to implement structural adjustment programs as a condition for bailout packages. These programs led to significant economic reforms beginning in July 1991, with a focus on liberalisation, privatisation, and globalisation (LPG model). The government opened up the economy to the private sector, restricted the role of the state to a few sectors, and took various measures to integrate the Indian economy with the global market. This included simplifying trade rules, liberalising foreign investment policy, and adjusting the exchange rate policy.

One of the key measures was the devaluation of the Indian rupee against the US dollar by 9% and 11% on July 1 and July 3, 1991, respectively. Following the recommendations of the C. Rangarajan committee on balance of payments, the government partially liberalised the exchange rate regime in March 1992. The Reserve Bank of India (RBI) introduced the Liberalised Exchange Rate Management System (LERMS), which allowed 40% of foreign exchange earnings to be converted at the official exchange rate and the remaining 60% at market-determined rates. In March 1993, India transitioned to a fully market-determined exchange rate, and by August 1994, the rupee was fully convertible on the current account. Today, India's exchange rate system operates under a managed float, where the RBI intervenes occasionally to curb volatility.

The establishment of the World Trade Organization (WTO) in 1995 further pushed India to liberalise its international trade. The transition to a market-determined exchange rate exposed Indian exporters and importers to exchange rate risks, which could significantly impact international trade. This study aims to explore the linkage between exchange rate variability and India's bilateral trade with the USA and China. Previous studies, such as Veeramani (2008) and Srinivasan and Wallack (2003), have examined the impact of exchange rates on exports from a macro perspective, while Cheung and Sengupta (2013) used firm-specific data. However, none have focused on the bilateral exchange rates and their impact on bilateral trade.

This study investigates the effects of exchange rate levels and volatility, considering the J-curve hypothesis of Marshall and Lerner, which posits that currency appreciation negatively impacts exports and positively impacts imports, while depreciation has the opposite effect. Additionally, high exchange rate volatility can adversely affect trade volumes by making profits unpredictable for international trade participants. The analysis focuses on Indo-China and Indo-USA bilateral trade due to India's persistent trade deficit with China and trade surplus with the USA. Besides the primary variables of interest, the study also includes the GDP of India and its trading partners, as the GDP of the importing country reflects purchasing power and demand conditions, influencing exports positively. The GDP of the exporting country indicates supply-side factors like productivity improvements and comparative advantages, also positively affecting exports. Since changes in exchange rate regimes can alter international trade structures and affect exchange rate volatility measures, the study focuses on the period after March 1993, when India adopted the market-determined exchange rate system. Due to the unavailability of quarterly GDP data before Q2 1996, the study spans from Q2 1996 to Q2 2017, comprising 85 observations, sufficient for a comprehensive analysis.

The Remaining of the paper has been organised as follows; Section 2 gives a brief review of the literature. Section 3 outlines the data sources and research methods employed in the study. Section 4 discusses the empirical results and section 5 concludes.

2. REVIEW OF LITERATURE

Fleming (1962) and Mundell (1963) argue that exchange rate appreciation negatively impacts exports and positively affects imports, given rigid nominal wages and free trade. Abeysinghe and Yeok (1998) counter this by highlighting the role of imported inputs in exports and productivity gains from cheaper imports. In small economies like Singapore, currency appreciation might not harm exports due to lower export production costs, though services exports can suffer. Veeramani (2008) examines the relationship between Indian exports and the real effective exchange rate (REER) from 1960 to 2007. He finds that since 1999, REER appreciation negatively affected Indian exports. The short-run elasticity of exports to REER was -0.23 (1960-2001) and -0.19 (2002-2007), with long-run elasticity being -0.47 and -0.38, respectively. Veeramani also finds that the 36-currency weighted REER index has an insignificant effect on India's services exports, attributing this to the concentration of services exports in a few countries.

Hua (2008) finds that a 1% depreciation of the renminbi boosts China's exports to 11 industrialised countries by 1.45%. Furthermore, a 1% depreciation of China's export competitors' currencies reduces Chinese exports by 0.42%, indicating that China's exports are influenced by both its own exchange rate policies and those of its competitors. Dhasmana (2012) studies the relationship between India's real exchange rate and trade balance with 15 major partners from 1975Q1-2011Q1. The findings reveal that in the long run, depreciation of India's real exchange rate improves its trade balance, while volatility negatively impacts the trade balance. Shahbaz *et al.* (2012) examine the relationship between exchange rate and trade balance in Pakistan using the ARDL cointegration approach. The results suggest a long-term relationship between exchange rate and trade balance, with a negative and significant elasticity coefficient, contradicting the J-curve hypothesis. This implies that devaluation may worsen Pakistan's trade balance. Cheung and Sengupta (2013) employ firm-level data to investigate the impact of exchange rate on the export behaviour of Indian manufacturing firms. Their fixed effect model shows that both appreciation and volatility of the exchange rate negatively impact exports, with a 1% increase in REER reducing a firm's export share by 6.3%. Smaller firms are found to be more sensitive to REER changes and volatility than larger firms, highlighting the asymmetric effects of exchange rate movements on exports.

Arize (1995) highlights the importance of including exchange rate volatility in export demand equations to avoid dynamic misspecification. Using the Johansen cointegration technique, Arize finds that US dollar volatility negatively affects US exports in both the short and long term. Exchange rate appreciation also harms exports, while global income positively impacts them. Chou (2000) examines the impact of renminbi volatility on China's exports using the ARCH (1) model. He discovers that renminbi volatility has a significant negative long-term effect on total exports and exports of manufactured goods and mineral fuels, while the impact on foodstuffs, beverages, and tobacco is not statistically significant. However, exchange rate variability positively affects exports of industrial materials.

Ethier (1973) and Baron (1976) suggest that exporters can mitigate exchange rate volatility through forward markets, though Viaene and de Vries (1992) argue that high hedging costs can still indirectly harm exports. De Vita and Abbott (2004) use sector-specific data to study the UK's exports to the EU, finding that short-term exchange rate volatility has an insignificant effect, while long-term volatility negatively affects exports. This suggests that while short-term volatility can be hedged, long-term uncertainty poses greater challenges. Aliyu (2010) investigates the impact of exchange rate volatility of the Nigerian naira and US dollar on Nigeria's non-oil exports. He finds that reduced exchange rate volatility can boost exports by encouraging existing firms to produce more and new firms to enter the export market. The vector error correction model reveals that naira volatility discourages non-oil exports, while US dollar volatility promotes them. Long-term, naira volatility reduces exports by 0.45%, while US dollar volatility increases them by 2.1%. Mukherjee and Pozo (2011) assert that exchange rate uncertainty affects trade nonlinearly. Using semiparametric regression on data from over 200 countries, they find that

exchange rate volatility generally discourages trade, with negative effects intensifying with higher uncertainty, except at extremely high levels of volatility, where the impact diminishes. Asterios *et al.* (2016) study exchange rate volatility's impact on international trade in Mexico, Indonesia, Nigeria, and Turkey (MINT countries). They find that long-term volatility doesn't affect exports in most countries except Turkey, but in the short-term, it Granger-causes export and import demands in Mexico and Indonesia. In Nigeria, exports influence exchange rate volatility.

Several studies have explored the impact of exchange rate uncertainty on India's trade. Srinivasan and Kalaivani (2013) examine the real rupee-dollar exchange rate level and its volatility on Indian exports from 1970-2011. They find that while long-term depreciation positively affects exports, short-term depreciation has a negative impact. Volatility in the exchange rate also negatively impacts real exports. Cheung and Sengupta (2013) discover that a one-standard-deviation increase in REER volatility reduces Indian exports by 26%. Similarly, Panda and Mohanty (2015) study the relationship between real exports and exchange rate volatility in India (1970-71 to 2011-12) and find a negative impact on real exports. Both studies emphasize that global GDP positively influences Indian exports and recommend moderating exchange rate volatility to boost export growth. The findings collectively suggest that while exchange rate volatility poses challenges for Indian exports, stabilizing these rates could enhance trade performance, particularly in the context of diversified regional exports.

3. RESEARCH METHODOLOGY

3.1. Data

This paper relies on secondary data sources. Exchange rate data for the Indian Rupee (INR) against the US Dollar (USD) and Chinese Yuan (CNY) is sourced from the Reserve Bank of India's Database on Indian Economy (DBIE). Consumer price indices are compiled from the International Financial Statistics (IFS), and bilateral trade data is obtained from the Direction of Trade (DOT), both available from the International Monetary Fund (IMF). Quarterly GDP data is taken from the Organisation for Economic Co-operation and Development (OECD) and supplemented by the RBI's DBIE. A dummy variable is used, with 0 for Q2-1996 to Q3-2008 (pre-financial crisis) and 1 for the post-crisis period. The Generalised Autoregressive Conditional Heteroskedasticity (GARCH) model is employed to estimate exchange rate volatility. Developed by Bollerslev (1986) and Taylor (1986), GARCH is a generalized version of the Autoregressive Conditional Heteroskedasticity (ARCH) model by Engle (1982). GARCH models are effective in modelling 'volatility clustering,' where large changes follow large changes and small changes follow small changes (Mandelbrot, 1963).

3.2. ARDL Model Specification

The conventional cointegration tests by Engle and Granger (1987) and Johansen and Juselius (1990) are not suitable for variables that are a mix of I(0) and I(1). The autoregressive distributed lag (ARDL) approach to cointegration is ideal for this scenario due to several advantages over traditional cointegration tests. Firstly, it can handle models with both stationary and nonstationary variables, though pretesting for unit roots is necessary to ensure no variables are of order 2 (I(2)) or higher, as their inclusion invalidates the methodology. Secondly, the ARDL method is more suitable for small sample sizes. Third, it allows different lag lengths for various variables, making the model more parsimonious. Lastly, the ARDL model uses a single equation setup, making it simpler to implement and interpret. This approach provides a robust framework for examining relationships in mixed integration order datasets, enhancing the accuracy and stability of the model.

4. EMPIRICAL RESULTS AND DISCUSSIONS

4.1. Unit Roots Tests

Before going ahead to conduct any cointegration test it is necessary to test for the presence of unit roots in all the variables of the system. In this analysis, two most popular tests of unit roots namely the augmented Dickey-Fuller (ADF) and Phillips-Perron tests have been applied. The results of the same have been shown below:

Table: 1
Augmented Dickey-Fuller and Phillips-Perron Tests

Levels			1st Differences			I (d)
Variables	**ADF Statistic**	**P- Perron Statistic**	**Variables**	**ADF Statistic**	**P- Perron Statistic**	
	Indo-US trade					
Log(ExportU)	-0.71	-0.59	Δ_1*(ExportU)*	-4.34***	-18.84***	I (1)
Log(ImportU)	-0.91	-0.83	Δ_1*(ImportU)*	-4.06***	-10.22***	I (1)
Log(GDPI)	-0.30	-0.06	Δ_1*(GDPI)*	-4.93***	-12.59***	I (1)
Log(GDPUS)	-2.24	-2.43	Δ_1*(GDPUS)*	-5.79***	-5.84***	I (1)
Log(REXD)	-0.77	-0.76	Δ_1*(REXD)*	-7.25***	-7.23***	I (1)
Volatility	-5.68***	-5.68***				I (0)
	Indo-China Trade					
Log(ExportC)	-1.29	-1.46	Δ_1*(ExportC)*	-11.65***	-11.96***	I (1)
Log(ImportC)	-1.18	-1.22	Δ_1*(ImportC)*	-9.79***	-9.82***	I (1)
Log(GDPI)	0.15	0.15	Δ_1*(GDPI)*	-9.20***	-9.20***	I (1)
Log(GDPC)	-1.01	-0.73	Δ_1*(GDPC)*	-17.33***	-26.33***	I (1)
Log(REXY)	-2.53	-2.25	Δ_1*(REXY)*	-7.15***	-7.11***	I (1)
Volatility	-5.24***	-5.22***				I (0)

Note: *** denotes 1% level of significance. Δ_1 denotes the first difference of the respective variable.

The ADF and Phillips-Perron tests reveal that Log(ExportU) and Log(ExportC), representing India's exports to the USA and China, are nonstationary at levels but stationary at the first difference, indicating they are integrated of order one. Similarly, all GDP variables (GDPI, GDPUS, and GDPC) have unit roots at their levels but are stationary at the first difference. The dependent variables of the import functions (ImportU and ImportC) are also nonstationary at levels but stationary at the first difference. The exchange rates (USD/INR and CNY/INR) have unit root issues at levels but become stationary at the first difference. However, the volatility of USD/INR and CNY/INR is stationary at levels, indicating they are integrated of order zero. With this mix of I(1) and I(0) variables, the ARDL approach can be applied to test for cointegration among the variables of interest.

4.2. ARDL Bounds Testing for Cointegration

Since the aim of this study is to examine the impact of exchange rate levels and their volatility on the bilateral exports and imports between India and USA and India and China, so we have two export functions and two import functions that seek to address the aforementioned research problem. In order to test for the long-run relationship, the ARDL approach has been used. The results for the same have been shown in the following two tables.

Table: 2
ARDL Bounds Test for Cointegration (Exports)

Dependent variable	SIC	F-statistic	I (0) Lower Bound*	I (1) Upper Bound*	Outcome
Log(ExportU) = f(Log(GDPI), Log(GDPUS), Log(REXD), Volatility)	4	6.14	2.86	4.01	Cointegration
Log(ExportC) = f(Log(GDPI), Log(GDPC), Log(REXY), Volatility)	4	4.11	2.86	4.01	Cointegration

Note: * denotes lower bound and upper bound at 5% level of Significance.

The results of the ARDL bounds test for the export functions, as depicted in Table 2, show that India's exports to the USA are cointegrated with India's GDP, US GDP, the dollar-rupee exchange rate, and the volatility of USD/INR, with an F-statistic of 6.14 exceeding the upper bound value of 4.01. A lag length of 4 was determined for the model based on the SIC. Similarly, India's exports to China are cointegrated with India's GDP, China's GDP, the yuan-rupee exchange rate, and the volatility of CNY/INR, with an F-statistic of 4.11 also exceeding the upper bound value of 4.01. The SIC determined a lag length of 4 quarters for this model. These findings reject the null hypothesis of no cointegration for both specifications, allowing for the estimation of the long-run relationship.

In the next step, we test for the cointegration for the import functions. The results of the same have been shown in table 3.

Table: 3
ARDL Bounds Test for Cointegration (Imports)

Dependent variable	SIC	F-statistic	I (0) Lower Bound*	I (1) Upper Bound*	Outcome
Log(ImportU) = f(Log(GDPI), Log(GDPUS), Log(REXD), Volatility)	4	4.87	2.86	4.01	Cointegration
Log(ImportC) = f(Log(GDPI), Log(GDPC), Log(REXY), Volatility)	4	4.22	2.86	4.01	Cointegration

Note: * denotes lower bound and upper bound at 5% level of Significance.

The ARDL bounds test results for the import functions reveal that India's imports from the USA and China are cointegrated with India's GDP, the respective GDPs of the USA and China, and the respective exchange rates and their volatilities. For India's imports from the USA, the computed F-statistic exceeds the upper bound critical value, indicating a long-run relationship. Similarly, for India's imports from China, the computed F-statistic also surpasses the upper bound critical value, confirming cointegration. The SIC determines a lag length of 4 quarters for both models. Given these results, we will proceed to estimate the long-run relationship and the short-run dynamic relationship using the error correction model (ECM).

4.3. Long-run relationship

The long-run relationship for the export functions has been estimated using equation (5) and equation (6). Equation (5) is based on India's export to the USA and equation (6) is based on India's exports to China.

The findings reveal that India's GDP (Log(GDPI)) positively influences its exports to the USA (Log(ExportU)), but the effect is statistically insignificant. This suggests that supply-side factors, such as productivity improvements, are not dominant in driving India's exports to the USA. In contrast, the GDP of the importing country, the USA, has a significant positive impact on India's exports, highlighting the importance of demand-side factors. An increase in the importing country's GDP boosts its disposable income, leading to higher imports if the imports are income elastic. Table 4 indicates that India's exports to the USA are highly income elastic. The US GDP (Log(GDPUS)) has a positive and statistically significant effect on India's exports, with each 1% increase in US GDP resulting in a 3.86% increase in India's exports to the USA in the long

run. This underscores the major role of demand-side factors in determining India's exports to the USA.

Table: 4
Long-run results (Exports)

Indian Exports to USA (Dependent variable Log(ExportU)		**Indian Exports to China (Dependent variable Log(ExportC)**	
Variables	Coefficients	Variables	Coefficients
Log(GDPI)	0.11 (0.27)	*Log(GDPI)*	-11.82* (7.09)
Log(GDPUS)	3.86*** (0.81)	*Log(GDPC)*	8.20** (3.83)
Log(REXD)	1.42*** (0.47)	*Log(REXY)*	10.62*** (3.78)
Volatility	0.01 (0.02)	*Volatility*	-0.002 (0.10)
fincrisis	-0.05 (0.11)	*fincrisis*	-0.99 (0.81)
Constant	-92.16*** (17.28)	*Constant*	158.25 (110.19)

Note: ***, ** and * denotes 1%, 5% and 10 % level of significance respectively. Values in the parenthesis show the standard error of the respective coefficients.

The analysis reveals that the USD/INR exchange rate (Log(REXD)) positively and significantly affects India's exports to the USA, indicating that the appreciation of the USD/INR exchange rate boosts India's exports to the USA. This is contrary to the typical economic theory that suggests currency appreciation negatively impacts exports, applicable when exports are price elastic. The volatility of the USD/INR exchange rate, however, has an insignificant effect on India's exports to the USA, likely due to India's managed float exchange rate system, where the RBI frequently intervenes to mitigate high volatility. Additionally, while the financial crisis of 2007-08 negatively influenced India's exports to the USA, this effect is not statistically significant at any conventional level of significance.

The analysis of India's exports to China reveals that India's GDP negatively and significantly affects exports to China in the long run, with a 1% GDP growth reducing exports by 11.81%. This indicates that supply-side factors are hindering exports. Conversely, demand-side factors, such as China's GDP, significantly boost India's exports, with a 1% increase in China's GDP raising exports by 8.20%. Additionally, the yuan-rupee exchange rate positively impacts exports, with a 1% rupee appreciation increasing exports by 10.62%. The volatility of the CNY/INR has a negative but statistically insignificant effect on exports, possibly due to RBI interventions or underdeveloped future markets. The financial crisis of 2007-08 also negatively impacted exports but was not statistically significant. Overall, the major determinants of India's exports to the USA are the US GDP and the dollar-rupee exchange rate, while India's GDP, China's GDP, and the yuan-rupee exchange rate are key determinants for exports to China.

The long-run estimates for the import function based on equation (7) and (8), have been shown below in Table 5. The first two columns are related to India's imports from the USA where the last two columns are related to India's import from China.

Table:5
Long-Run results (Imports)

Indian Imports from USA (Dependent variable Log(ImportU)		**Indian Imports from China (Dependent variable Log(ImportC)**	
Variables	**Coefficients**	**Variables**	**Coefficients**
Log(GDPI)	1.96** (0.92)	*Log(GDPI)*	-2.69 (3.62)
Log(GDPUS)	-0.47 (2.56)	*Log(GDPC)*	4.13** (2.07)
Log(REXD)	1.16 (0.90)	*Log(REXY)*	3.91* (2.35)
Volatility	0.12*** (0.04)	*Volatility*	-0.001 (0.05)
fincrisis	-0.80*** (0.26)	*fincrisis*	-0.90** (0.46)
Constant	-18.79 (50.25)	*Constant*	-11.33 (52.31)

Note: ***, ** and * denotes 1%, 5% and 10 % level of significance respectively.

The analysis shows that India's GDP positively and significantly affects its imports from the USA, indicating income elasticity. A 1% increase in India's GDP leads to a 1.95% rise in imports from the USA, while US GDP has no significant impact. The USD/INR exchange rate positively affects imports, but the effect is statistically insignificant. Interestingly, the volatility of the dollar-rupee exchange rate has a positive and significant impact on imports, contradicting the typical theory that exchange rate volatility negatively influences trade. This may be due to the well-developed future rupee-dollar market or RBI's interventions to mitigate volatility. The 2008 financial crisis negatively impacted India's imports from the USA, and this effect is statistically significant. Overall, demand-side factors play a crucial role in determining India's imports from the USA.

The analysis indicates that demand-side factors, such as India's GDP, have no significant effect on imports from China, with a 1% GDP growth reducing imports by 2.69%, suggesting income inelasticity. In contrast, China's GDP positively influences India's imports, with a 1% growth in China's GDP increasing imports by 4.13%, highlighting the importance of push factors. The yuan-rupee exchange rate also positively impacts imports, consistent with the theory that currency appreciation boosts imports if they are price elastic. The volatility of the yuan-rupee exchange rate negatively affects

imports but is statistically insignificant. The 2008 financial crisis negatively impacted imports from both the USA and China, with significant effects. In summary, India's GDP, exchange rate volatility, and the financial crisis are key determinants of imports from the USA, while China's GDP, the yuan-rupee exchange rate, and the financial crisis are crucial for imports from China.

4.4. Short-run Relationship

The short-run dynamic coefficients for India's export functions, based on the error correction model, reveal interesting insights. The GDP of the USA exerts a significant positive impact on India's exports to the USA in the short run, indicating income elasticity in both the short and long run. A 1% growth in the USA's GDP increases India's exports to the USA by 4.54% in the current quarter and 2.95% in the next quarter, though the significance level diminishes. India's GDP does not significantly affect its exports to the USA in the short run, suggesting limited impact from productivity growth.

The dollar-rupee exchange rate has an expected negative sign but is statistically insignificant, indicating a 1% appreciation leads to a 0.38% fall in exports. The volatility of the exchange rate positively affects exports but is also statistically insignificant. Past exports negatively influence current exports, with significant effects in the first and third quarters. The financial crisis negatively influenced exports to the USA but is not statistically significant. The equilibrium correction coefficient ecm(-1) of -0.397 indicates that 39.7% of the previous quarter's disequilibrium converges back to long-run equilibrium, showing a relatively quick recovery from shocks.

Table: 6
Short-Run results (Exports)

Indian Exports to USA ARDL (4, 0, 2, 1, 0) (Dependent variable Log(ExportU)		**Indian Exports to China ARDL (3, 0, 0, 1, 0) (Dependent variable Log(ExportC)**	
Variables	**Coefficients**	**Variables**	**Coefficients**
Δ(ExportU(-1))	-0.20** (0.10)	*Δ(ExportC(-1))*	-0.06 (0.10)
Δ(ExportU(-2))	-0.08 (0.10)	*Δ(ExportC(-1))*	-0.33*** (0.11)
Δ(ExportU(-3))	-0.40*** (0.09)	*Δ(GDPI)*	-2.03** (0.81)
Δ(GDPI)	0.04 0.11	*Δ(GDPC)*	0.20 (0.31)
Δ(GDPUS)	4.536707*** (1.75)	*Δ(REXY)*	1.82*** (0.52)
Δ(GDPUS(-1))	2.95* (1.61)	*Δ(Volatility)*	-0.00 (0.02)
Δ(REXD)	-0.38 0.34	*Δ(Dummy)*	-0.17 (0.15)
Δ(Volatility)	0.01 (0.01)	*ecm(-1)*	-0.17** (0.07)
Δ(Dummy)	-0.02 (0.04)		
ecm(-1)	-0.40*** (0.091204)		
*Cointeq = Log(ExportU)-(0.11*Log(GDPI)+ 3.86* Log(GDPUS) +1.42* Log(REXD)+0.01* Volatility+ 0.05*Dummy-92.16*		*Cointeq = Log(ExportC)-(-11.82* Log(GDPI)+ 8.20*Log(GDPC)+ 10.62* Log(REXY)- 0.002* Volatility+0.99*Dummy+158.25)*	

Note: ***, ** and * denotes 1%, 5% and 10 % level of significance respectively.

The short-run dynamic relationship for India's exports to China reveals that India's GDP growth negatively affects exports to China even in the short term, with a 1% GDP growth reducing exports by 2.03%. This statistically significant coefficient indicates detrimental supply-side effects. While China's GDP positively impacts India's exports in the long run, its short-term effect is insignificant and smaller in magnitude. The yuan-rupee exchange rate positively and significantly influences exports, suggesting that yuan appreciation increases exports, which contradicts typical economic theory. Exchange rate volatility negatively affects exports, but this effect is statistically insignificant. The 2008 financial crisis negatively impacted exports but was also statistically insignificant. The equilibrium correction coefficient (ecm-1) is -0.172, indicating that 17% of the previous quarter's disequilibrium converges back to long-run equilibrium in the current quarter, with a recovery time of about five quarters.

The short-run dynamic relationship for India's import functions, based on equations (11) and (12) and optimized by the Schwarz information criterion (SIC), reveals several key findings. For India's imports from the USA, the GDP of the current quarter positively affects imports, while the GDP of the previous quarter has a negative impact. However, both effects are statistically insignificant. In the long run, India's GDP positively influences imports. The supply-side factors, represented by the USA's GDP, have a nominal negative and statistically insignificant impact. The dollar-rupee exchange rate positively influences imports, indicating that appreciation leads to increased imports, but this effect is statistically insignificant.

Interestingly, the volatility of the dollar-rupee exchange rate shows contrasting results: current volatility has a positive and statistically significant effect on imports, while past volatility has a negative and statistically significant impact. This suggests that past volatility may affect importers' expectations about future volatility, leading to reduced imports in the next quarter. The financial crisis of 2008 negatively impacted India's imports from the USA in the short run, and this effect is statistically significant. The equilibrium correction coefficient indicates that it takes about three quarters for disequilibria from the previous quarter to converge back to the long-run equilibrium, demonstrating a significant adjustment speed.

The results for India's imports from China indicate that India's GDP has a negative but statistically insignificant effect, suggesting that imports from China are not income elastic in the short run. Conversely, China's current GDP has a significant positive effect on India's imports, although it was negative in the previous two quarters. The GDP of China from three quarters ago also has a significant positive impact on imports

from China. These findings suggest that supply-side factors are a major determinant of India's imports from China, potentially due to higher productivity growth in China or the dumping of Chinese goods in India.

Table:7
Short-Run results (Imports)

Indian Imports from USA, ARDL (1, 2, 0, 2, 0) (Dependent variable Log(ImportU)		**Indian Imports from China, ARDL (4, 4, 0, 1, 0) (Dependent variable Log(ImportC)**	
Variables	**Coefficients**	**Variables**	**Coefficients**
Δ*(GDPI)*	0.15 (0.21)	Δ*(ImportC(-1))*	-0.32*** (0.10)
Δ*(GDPI(-1))*	-0.27 (0.20)	Δ*(ImportC(-2))*	-0.17* (0.10)
Δ*(GDPUS)*	-0.15 (0.81)	Δ*(ImportC(-3))*	-0.19** (0.09)
Δ*(REXD)*	0.37 (0.33)	Δ*(GDPI)*	-0.43 (0.53)
Δ*(Volatility)*	0.052*** (0.02)	Δ*(GDPC)*	2.05*** (0.74)
Δ*(Volatility(-1))*	-0.03** (0.01)	Δ*(GDPC(-1))*	-0.16 (0.14)
Δ*(Dummy)*	-0.25*** (0.08)	Δ*(GDPC(-2))*	-0.29** (0.13)
ecm(-1)	-0.33*** (0.10)	Δ*(GDPC(-3))*	1.67** 0.70
		Δ*(REXY)*	0.06 (0.39)
		Δ*(Volatility)*	0.00 (0.000186)
		Δ*(Dummy)*	0.14** (0.07)
		ecm(-1)	-0.16*** (0.061823)
*Cointeq = Log(ImportU)-(1.96*Log(GDPI) - 0.47*Log(GDPUS) +1.16* Log(REXD) + 0.12*Volatility+ 0.80*Dummy – 18.79)*		*Cointeq = Log(ImportC)-(-2.69*Log(GDPI) + 4.13*Log(GDPC) + 3.91*Log(REXY) -0.00*Volatility + 0.90*Dummy - 11.33)*	

Note: ***, ** and * denotes 1%, 5% and 10 % level of significance respectively.

The yuan-rupee exchange rate level and its volatility have a positive effect on India's imports from China, but this effect is not statistically significant. Interestingly, the financial crisis of 2008 positively impacted India's imports from China, possibly because the crisis originated in the USA, which suffered the worst effects, while India and China were less severely impacted. This could explain the positive and statistically significant coefficient for China's imports. The error correction term has the required negative sign, indicating that the model converges back to its long-run equilibrium in the event of short-run disruptions. However, the speed of adjustment is slow, with only 15.9% of the disequilibria returning to equilibrium in the current quarter, taking about six quarters to fully adjust.

4.5. Diagnostic Tests

In the final step of the analysis, diagnostic tests were conducted for serial correlation, heteroscedasticity, and normality for all model specifications. Table 8 presents the results. The first model specification, with India's exports to the USA as the dependent variable, does not suffer from serial correlation. The Breusch-Godfrey serial correlation LM test fails to reject the null hypothesis of no correlation at the 5% significance level. Similarly, the Breusch-Pagan-Godfrey test fails to reject the null hypothesis of no heteroscedasticity, even at the 10% significance level. Additionally, the model passes the normality test, as the Jarque-Bera test statistic is much lower than its 5% critical value.

Table: 8
ARDL-VECM Model Diagnostic Tests

Log(ExportU) = f(Log(GDPI), Log(GDPUS), Log(REXD), Volatility)	
Serial Correlation χ^2 (4)	2.30 (0.07)*
Heteroscedasticity χ^2 (12)	1.04 (0.43)*
Normality	1.43 (0.49)*
Log(ExportC) = f(Log(GDPI), Log(GDPC), Log(REXY), Volatility)	
Serial Correlation χ^2 (4)	0.70 (0.60)*
Heteroscedasticity χ^2 (9)	3.51 (001)*
Normality	15.64 (0.000)*
Log(ImportU) = f(Log(GDPI), Log(GDPUS), Log(REXD), Volatility)	
Serial Correlation χ^2 (2)	0.10 (0.91)*
Heteroscedasticity χ^2 (10)	1.19(0.31)*
Normality	4.15 (0.13)*
Log(ImportC) = f(Log(GDPI), Log(GDPC), Log(REXY), Volatility)	
Serial Correlation χ^2 (4)	1.24 (0.30)*
Heteroscedasticity χ^2 (14)	0.55 (0.89)*
Normality	0.022 (0.99)*

Note: * figures in parenthesis shows the P-values.

The second model, which examines India's exports to China, passes the serial correlation test but suffers from heteroscedasticity, as indicated by the Breusch-Pagan-Godfrey test. Additionally, the residuals are not normally distributed. The third model, focusing on India's imports from the USA, does not have issues with serial correlation or heteroscedasticity, and it passes the normality test. The final model, assessing India's imports from China, also passes all diagnostic tests, showing no problems with serial correlation or heteroscedasticity and passing the normality test. These results are based on the Breusch-Godfrey serial correlation LM test, Breusch-Pagan-Godfrey test, and Jarque-Bera test, ensuring the robustness of the models used in the analysis.

5. CONCLUSIONS

India revamped its exchange rate system post the 1992-1993 balance of payment crisis, adopting a market-determined exchange rate. This approach allows exchange rates to adjust with macroeconomic conditions but exposes international trade to exchange rate risks. This paper examines the impact of bilateral exchange rate variability (both levels and volatility) on Indo-China and Indo-USA trade using the GARCH method and ARDL approach due to the mix of I(0) and I(1) variables.

The results show that in the long run, both the dollar-rupee and yuan-rupee exchange rates positively affect India's exports to the USA and China, respectively, while in the short run, only the yuan-rupee exchange rate has a significant effect. Attempts to devalue the rupee may negatively impact exports. Exchange rate volatility has an insignificant effect on exports, likely due to RBI interventions. In the long run, the exchange rate levels impact imports, with the yuan-rupee rate being statistically significant for imports from China. Short-term exchange rates do not affect imports.

The volatility of the dollar-rupee exchange rate significantly affects long-term imports from the USA, with mixed short-term effects. Yuan-rupee volatility insignificantly affects imports from China. GDP is a major determinant of long-term exports to the USA and China, indicating income elasticity. In the short term, only the USA's GDP affects India's exports. India's GDP negatively affects exports to China but is insignificant for exports to the USA. For imports, China's GDP positively and significantly affects imports from China due to higher productivity or dumping of goods. Supply-side factors drive imports from China, while demand-side factors drive imports from the USA. The financial crisis (2008) negatively impacted long-term imports from both countries, with an insignificant effect on bilateral exports.

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ECONOMIC MODELS FOR IMPROVING THE PROFITABILITY OF INDUSTRIAL ENTERPRISES IN CONDITIONS OF MARKET INSTABILITY

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This paper examines economic models aimed at improving the profitability of industrial enterprises in conditions of market instability. It analyzes approaches to cost management, business process optimization, and profit reinvestment strategies. Flexible production models, digital transformation, and crisis management strategies are discussed as key elements for adapting enterprises to changing market conditions. Special attention is given to methods of quantitative analysis of the effectiveness of the strategies applied. The conclusions focus on identifying the factors influencing profitability and optimizing processes to ensure stability and competitiveness in uncertain environments.

KEYWORDS: ***Profitability, Adaptation, Digital Transformation, Cost Management, Business Processes.***

1. INTRODUCTION

Profitability is one of the most important indexes of performance of industrial enterprises. In recent years, shifts in the global political and economic landscape, coupled with evolving consumer preferences, have contributed to increased volatility in production processes. With such situations, profitability has to not only grow using the traditional methods of economics but develop new adaptive models of governance.

The purpose of this research is to assess economic models for improving the profitability of industrial corporations amidst market fluctuations. The paper shall address an exhaustive range of techniques, including cost control, business process re-engineering, and profit-sharing plans. Adjustment methods for coping with changing external circumstances receive top priority, especially for companies that strive to remain competitive and sustainable.

The main task of the study is to reveal profitability drivers in an economic uncertainty situation and analyze existing models and approaches of its enhancement as a significant economic attribute. The said methods and their implementation will be described with the help of examples and quantitative methods of analysis, which will make it possible for us to evaluate their efficiency and adaptability to various industrial companies.

2. MAIN PART. THEORETICAL FOUNDATIONS OF INDUSTRIAL ENTERPRISES PROFITABILITY

Profitability of industrial enterprises is an integrated indicator that describes ability to provide a stable level of profit at a specific volume of expenditures. Profitability in the classical economic theory is interpreted as a ratio of the obtained profit to the expenditures or assets of the enterprise, which enables us to assess the efficiency of resources utilization. Yet in modern circumstances of market uncertainty, this metric becomes not only an indicator of financial soundness, but also a reflection of the responsiveness of an enterprise to changing economic conditions.

One of the determinants of profitability is the **structure of costs**. Industrial costs can be divided into variables and constants, and the ratio between them to a great extent predetermines the sensitivity of profit to the changes in market conditions. The high percentage of fixed costs increases the danger of decreased profitability in case of downfalls, while the prevalence of variable costs allows firms to react more quickly to the fluctuations in demand [1]. Here, cost management has an important role to play, including methods of expenditure item optimization, implementation of new technologies for reducing material intensity and energy intensity of production, and introduction of digital solutions for financial flow management.

Another vital factor is **operational efficiency**. In periods of high competition and market turbulence, companies are driven to look for means to increase labor productivity, minimize unit cost and minimize unproductive cost. One of the most effective means in this area is the approach of «lean production», i.e., minimizing

losses on all sides of the production process. The use of these strategies allows you to increase the level of resource usage, and thus positively influence profitability. As research has established, organizations that utilize the principles of lean manufacturing can reduce the production cost, which can lead to profitability improvements [2].

At times of uncertainty, firms should have an option either to hold and invest profits. Investing in the modernization of production, new markets, and new technology can yield long-term profitability growth. But without a visible policy, a very high investment risk can ruin financial stability. The optimal balance between investment plan and profit sharing is an extremely critical element of the strategy for maximizing profitability.

Alignment of financial statements with international standards, such as **GAAP** (Generally Accepted Accounting Principles), is also very important here. Such standards make it possible to utilize consistency in accounting activities, maintain transparency of the financial flows, accurately account for expenses and income, and reliably determine profitability of a company [3]. For example, accrual and matching concepts of income and expenses under GAAP help avoid temporary misstatements of financial statements, which are particularly helpful in long-term financial planning.

Economic approaches to improving profitability

Modern industrial companies operate under the conditions of high market uncertainty, requiring a multifaceted approach to the provision and improvement of profitability. The most essential economic means of improving profitability are cost management, optimization of business processes, and effective reinvestment of profit. These tools allow companies not only to stabilize their financial performance, but also to ensure long-term growth in the context of fluctuating market demand and production costs.

One of the most significant spheres is **cost minimization**, such as measures for the efficiency of resources, updating equipment, and computerizing production processes. In studies confirm that businesses implementing automated systems of cost control and financial flow planning reduce costs by 15-20-% due to the removal of ineffective cost positions and streamlining of purchases [4]. One of the most important tools in this sense is the transition to the «just-in-time» approach, which reduces the cost of holding stocks and minimizes the costs of the excess levels of raw materials.

Another important strategy is **the optimization of business processes** aimed at improving labor productivity, reducing the production cycle, and eliminating internal losses. Introduction of new production management means, such as the **theory of constraints** (TOC) and Lean approach, leads to a sharp increase in the efficiency of the enterprise.

The third significant course of action is to **invest profits in potential initiatives and new ventures.** Effective usage of the earned profit allows organizations to gain competitive advantages by incorporating new technologies, diversifying into allied industries, and improving the quality of their products. But the strategy needs to be undertaken with a moderate approach, i.e., having a clear consideration of the return on investment along with macroeconomic risks.

Apart from that, **leasing** is an important tool of management of financial resources, allowing organizations to renovate fixed assets without burdensome one-time outlays. As opposed to the purchase of equipment at the cost of own funds or a loan, financial leasing reduces the burden on capital and improves the liquidity of the organization [5].

For example, industrial firms employing leasing for the purchase of equipment can reduce initial costs compared to traditional investments. It is especially applicable under the conditions of high interest rates on credit funds, when leasing is a more favorable way of financing the modernization of production capacities.

Thus, it is feasible to enhance the profitability of industrial enterprises through the application of an integrated management model, for example, cost reduction, optimization of internal processes, and a properly qualified investment policy. Under modern conditions, those conceptual management models that are most adaptive and allow one to respond quickly to changes in the market environment and minimize the adverse effects of instability are most effective. These economic solutions should be further explored and their impact on the financial performance of industrial enterprises measured.

3. MODELS OF ADAPTATION OF INDUSTRIAL ENTERPRISES TO CHANGING MARKET CONDITIONS

Modern industrial businesses are forced to operate in a state of high market volatility generated by technological changes, geopolitical issues and fluctuations in demand. Adaptation models with minimal risks and ensure sustainable development are under such conditions particularly topical. Major areas of adaptation are flexibility of production capacities, digitalization and application of anti-crisis policy (table 1).

Table 1: Models of industrial enterprises' adaptation to changing market conditions

Adaptation model	Key principle	Advantages	Limitations	Implementation examples
Flexible manufacturing	Rapid reconfiguration for demand changes	Reduced downtime, quick market response	Requires investment in technology	Automotive industry
Digital transformation	Automation and data analysis	Cost optimization, demand forecasting	High implementation costs	Smart factories, IoT
Market diversification	Expansion into new regions and segments	Reduces dependence on a single market	Requires product and marketing adaptation	Consumer electronics manufacturers
Environmental adaptation	Reducing environmental impact and transitioni	Regulatory compliance, improved reputation	High modernization costs	Packaging producers, metallurgy

	ng to sustainable technologies			

Most effective of all the instruments of adaptation is a versatile model of production founded on rapid adjustment of technological processes to changes in the demand in the market. Unlike traditional models with hard specialization, flexible production allows firms to react quickly to changes in orders and modify the product line at low cost. Thus, the use of conveyor lines and computerized production management systems, and the implementation of the **SMED** (Single-Minute Exchange of Die) strategy is a lean manufacturing technology that will have the impact of dramatically reducing the time taken to change from one production process to another. It is able to reduce equipment changeover time, and by implication this makes it possible to reduce downtime losses and improve overall profitability [6]. The second and major focus point is **digital transformation**, including deployment of artificial intelligence (AI), Internet of Things (IoT) and autonomous analysis systems. Digital production and logistics models let you predict change in supply chains, optimize the utilization of assets, and lower operating costs.

Additionally, businesses operating in a volatile market environment must employ **anti-crisis measures** like market diversification, optimization of the financial structure, and proactive management of liquidity. A changeover to multi-channel sales organizations that minimize reliance on one customer and local markets is one of the most effective approaches. Another important aspect is establishing reserve financial resources that allow you to pay for losses for some time and ensure continuity to business activities.

Thus, successful adaptation of industrial companies to new market realities is the integration of production flexibility, digital technologies and strategic financial planning. The use of these models allows not only to reduce risks, but also to increase the competitiveness of the company in the long term.

4. QUANTITATIVE METHODS FOR EVALUATING THE EFFECTIVENESS OF PROFITABILITY IMPROVEMENT STRATEGIES

In scientific assessment of the effectiveness of activities to increase industrial firms' profitability, quantitative methods of analysis are used to compute the impact of management actions on financial performance. The most popular methods in such cases are return on capital analysis, modeling of operational efficiency and the use of predictive models.

Among the significant tools **is return on assets** (ROA) and **equity** (ROE) analysis, by which you can analyze how well a business utilizes its resources. For example, increase in ROA indicates the improvement in the efficiency of operations, and increase in ROE may be associated with the wiser distribution of profits. On the manufacturing side, the average ROA is 7,7%, and an increase of 1-2-percentage points could be interpreted as successful execution of the cost-saving plan (fig. 1).

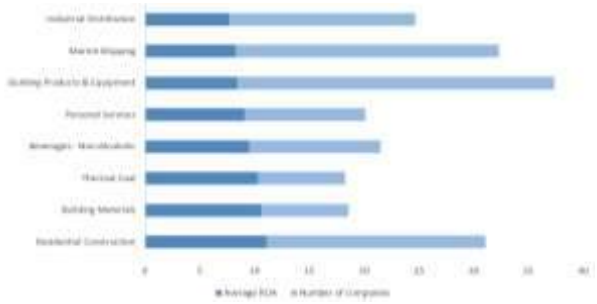

Figure 1: Industries with highest ROA in USA [7]

Another vital method is **operating margin analysis**, which is the ratio of operating profit to revenue. This ratio allows you to assess the impact of cost-reduction and productivity-improving initiatives on financial performance. So, for example, if there is an implementation of digital technologies and automated cost control systems in industry, this will make full file increment contribution to the increase in operating margins and reduction of losses and more efficient use of resources.

The scenario analysis method is also widely used to predict the impact of various strategies on the profitability of an enterprise. This approach uses financial models that include optimistic, pessimistic, and baseline development scenarios. For example, when analyzing a digitalization strategy, you can evaluate the impact of automation on the level of costs and expected profit growth, which allows you to make informed management decisions.

One of the most important indicators of operational efficiency is **EBITDA**, which reflects the company's profit before taxes, interest on loans and depreciation [8]. EBITDA dynamics analysis allows you to determine the impact of strategies to reduce costs, increase productivity, and optimize business processes. For example, the introduction of automated cost management systems can increase EBITDA by reducing inefficient costs.

Thus, quantitative methods of analysis are an important tool for evaluating the effectiveness of strategies to increase profitability. Their application allows industrial enterprises not only to measure the current state of financial indicators, but also to predict the impact of various management decisions on the long-term sustainability of the business.

5. CONCLUSION

An improvement in the profitability of industrial corporations in volatile markets requires an integrative strategy implying not only efficiency and cost-cutting optimization and operations, but also flexibility while managing production functions. Flexible configurations, such as the implementation of digital technologies, flexible manufacturing and market diversification, allow the company to respond relatively fast to changes in the external environment as well as cut risks. One of the most important elements of profitability improvement strategies is effective management of monetary capital, for instance, striking a balance between reinvestment and profit accumulation. Quantitative analysis methods such as ROA, ROE, and operating margin projections provide objective methods by which to base managerial decisions. In the future, one might hypothesize that research might seek to develop more integrated adaptation models that take into account the industry-specific and

idiosyncratic influences of industries and the effects of macroeconomic drivers.

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COMPARATIVE RISK AND RETURN ANALYSIS OF TATA MOTORS, ITC LTD., AND THE MARKET: EVIDENCE FROM JANUARY–MARCH 2024

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ABSTRACT DOI No: 10.36713/epra23138 Article DOI: https://doi.org/10.36713/epra23138

This study investigates and compares the risk-return profiles of two prominent Indian companies: TATA Motors and ITC Ltd. in relation to the broader market, represented by the BSE Sensex, over the period from January 1, 2024, to March 28, 2024. Using monthly and quarterly data, average return is used as a measure of performance while standard deviation serves as a proxy for risk. The findings indicate divergent behavior between the two companies: TATA Motors demonstrated higher returns with increased risk and a strong negative correlation with the market, while ITC Ltd. showed relatively stable, market-aligned movements. The analysis offers insights into the strategic placement of these stocks for investors with varying risk appetites and objectives.

KEYWORDS: *Stock Market Analysis, Risk and Return, Correlation Analysis, Investor Strategy, Portfolio Diversification*

INTRODUCTION

In the realm of portfolio management and equity investment, understanding the trade-off between risk and return is fundamental. Investors, whether institutional or individual, aim to maximize returns while minimizing risk exposure. This paper focuses on the performance of two significant stocks in the Indian equity market TATA Motors, a major automobile manufacturer, and ITC Ltd., a diversified conglomerate compared to the broader market performance represented by the BSE Sensex.

Given the dynamic post-pandemic economic recovery and sectoral volatility, especially in early 2024, it is imperative to assess how these two companies have navigated short-term market conditions. By analyzing both monthly and quarterly return-risk profiles over the first quarter of 2024, this study aims to uncover patterns that can inform both short-term tactical investments and long-term strategic portfolio construction

OBJECTIVES OF THE STUDY

- To compute and compare the monthly and quarterly returns of TATA Motors, ITC Ltd., and the BSE Sensex.
- To measure and interpret the standard deviation (risk) associated with each of the assets.
- To analyze the correlation between the returns of the individual stocks and the market.
- To derive investment insights based on the comparative risk-return and correlation profiles.

METHODOLOGY

- **Time Period:** January 1, 2024 – March 28, 2024
- **Data Frequency:** Monthly and quarterly closing prices
- **Sources:** BSE official data, company reports
- **Returns Calculation:**

$$Return = \frac{P_t - P_{t-1}}{P_{t-1}} \times 100$$

- **Risk Calculation**
  Standard deviation of returns was used as the risk metric.
- **Correlation**
  Pearson correlation coefficient was computed to assess the strength and direction of relationships between stock returns and market returns.

DATA ANALYSIS AND FINDINGS

DATA

ITC Limited						
Date	**Open**	**High**	**Low**	**Close**	**Adj Close**	**Volume**
2024-01-01	463.500000	469.950012	462.649994	468.049988	461.275299	9346277
2024-01-02	470.000000	471.350006	463.600006	470.350006	463.542023	10519771
2024-01-03	470.250000	480.700012	469.350006	477.250000	470.342163	24036012
2024-01-04	480.000000	481.450012	474.200012	476.399994	469.504456	11786959
2024-01-05	479.399994	479.399994	472.000000	473.950012	467.089935	9209405
2024-01-08	475.000000	475.500000	464.549988	465.500000	458.762238	8003177
2024-01-09	467.500000	469.950012	463.649994	464.549988	457.825958	5696780
2024-01-10	464.549988	466.750000	460.049988	463.299988	456.594055	5896123
2024-01-11	464.100006	466.549988	461.100006	462.649994	455.953461	6534775
2024-01-12	463.250000	467.700012	460.350006	466.700012	459.944855	9354326
2024-01-15	470.000000	470.500000	466.100006	467.600006	460.831848	6902156
2024-01-16	467.799988	475.000000	464.250000	472.299988	465.463776	12066347
2024-01-17	471.399994	477.000000	465.200012	466.600006	459.846313	11108698
2024-01-18	465.250000	467.850006	454.549988	465.500000	458.762238	9143784
2024-01-19	468.549988	473.000000	466.399994	471.500000	464.675385	12203322
2024-01-23	473.750000	473.750000	456.399994	459.299988	452.651947	8404513
2024-01-24	460.100006	467.399994	458.100006	463.600006	456.889740	21626183
2024-01-25	463.549988	464.950012	452.100006	455.649994	449.054779	19677700
2024-01-29	455.899994	457.250000	447.500000	449.799988	443.289459	17869152
2024-01-30	447.000000	453.700012	437.399994	438.049988	431.709534	43514448
2024-01-31	440.000000	442.500000	438.700012	441.549988	435.158875	19882944
2024-02-01	442.000000	447.750000	439.299988	442.899994	436.489349	19165409
2024-02-02	445.000000	447.200012	439.500000	440.100006	433.729889	17156021
2024-02-05	442.000000	443.649994	436.549988	438.049988	431.709534	12041897
2024-02-06	440.000000	440.899994	429.500000	431.399994	425.155792	18764371
2024-02-07	435.000000	435.000000	430.799988	431.799988	425.549988	12880824
2024-02-08	429.000000	429.100006	408.600006	414.549988	414.549988	48183882
2024-02-09	410.100006	424.200012	408.600006	415.500000	415.500000	32283965
2024-02-12	417.549988	418.000000	406.049988	406.850006	406.850006	10906914
2024-02-13	406.899994	410.799988	403.299988	406.750000	406.750000	15606705
2024-02-14	406.000000	412.250000	404.399994	411.549988	411.549988	12150077
2024-02-15	413.000000	414.549988	403.149994	403.899994	403.899994	20383983
2024-02-16	405.000000	409.549988	399.399994	404.600006	404.600006	37518847
2024-02-19	405.000000	412.750000	404.600006	409.250000	409.250000	16949793
2024-02-20	410.450012	410.450012	404.299988	406.100006	406.100006	14084218
2024-02-21	407.000000	410.100006	401.299988	403.350006	403.350006	19414653
2024-02-22	406.899994	415.149994	403.450012	414.450012	414.450012	18604659
2024-02-23	415.899994	415.899994	410.500000	411.399994	411.399994	11147636
2024-02-26	411.100006	413.049988	407.299988	409.200012	409.200012	7982145
2024-02-27	410.000000	412.750000	408.549988	411.149994	411.149994	7783743

2024-02-28	411.149994	412.350006	406.799988	408.299988	408.299988	8617768
2024-02-29	409.000000	411.049988	404.500000	406.299988	406.299988	14895144
2024-03-01	408.899994	413.149994	407.500000	409.500000	409.500000	12395632
2024-03-04	412.250000	412.950012	408.450012	409.100006	409.100006	6840352
2024-03-05	409.649994	411.399994	403.950012	406.149994	406.149994	9733507
2024-03-06	406.500000	409.950012	400.700012	407.850006	407.850006	11106855
2024-03-07	407.850006	414.950012	403.649994	413.549988	413.549988	23020545
2024-03-11	416.799988	418.299988	408.000000	409.399994	409.399994	17620081
2024-03-12	406.500000	406.500000	399.350006	404.450012	404.450012	34882639
2024-03-13	435.000000	438.000000	421.149994	422.450012	422.450012	101612428
2024-03-14	421.950012	425.500000	418.000000	419.649994	419.649994	30764728
2024-03-15	417.200012	428.549988	415.250000	419.100006	419.100006	73253754
2024-03-18	419.000000	420.700012	416.899994	417.450012	417.450012	15933704
2024-03-19	418.000000	419.549988	408.700012	409.549988	409.549988	20994563
2024-03-20	410.000000	416.649994	409.549988	415.700012	415.700012	19609321
2024-03-21	419.000000	422.000000	416.200012	421.250000	421.250000	19227982
2024-03-22	421.250000	429.649994	421.250000	428.600006	428.600006	38861818
2024-03-26	425.549988	429.200012	425.549988	427.649994	427.649994	10274145
2024-03-27	427.000000	428.899994	426.450012	428.000000	428.000000	12227545
2024-03-28	428.000000	433.250000	427.000000	428.350006	428.350006	27933211

TATA MOTORS						
Date	**Open**	**High**	**Low**	**Close**	**Adj Close**	**Volume**
2024-01-01	785	798.700012	781.049988	790.599976	790.599976	12570717
2024-01-02	800.5	804	779	784.400024	784.400024	13791090
2024-01-03	786.049988	790	776.25	781.450012	781.450012	8559060
2024-01-04	798	801.799988	791.299988	795.75	795.75	14298444
2024-01-05	799	805.900024	787.099976	790.950012	790.950012	11091198
2024-01-08	798.400024	800.349976	787.5	789.099976	789.099976	7668471
2024-01-09	799.950012	809.200012	793.150024	799.799988	799.799988	12872757
2024-01-10	800	811	792.650024	808.450012	808.450012	9980044
2024-01-11	813.5	817.5	808.450012	815.650024	815.650024	11075167
2024-01-12	818.150024	818.549988	809.150024	816.450012	816.450012	7664094
2024-01-15	820	820.400024	810.299988	812.450012	812.450012	4835856
2024-01-16	812.450012	827	812.450012	818.849976	818.849976	10159066
2024-01-17	811	813.700012	804	805.549988	805.549988	7895439
2024-01-18	807	822.950012	797	819.049988	819.049988	11500495
2024-01-19	823.849976	826	819.5	823.549988	823.549988	5706888
2024-01-23	824.900024	827.599976	796.299988	800.450012	800.450012	9436209
2024-01-24	802.400024	812	788.5	810.900024	810.900024	7217542
2024-01-25	814	814.150024	800.299988	811.849976	811.849976	10109720
2024-01-29	811.849976	843.799988	811.049988	841	841	12823686
2024-01-30	843	885.950012	842.849976	858.849976	858.849976	19734613

2024-01-31	865.200012	896.5	865.200012	884.200012	884.200012	24562392
2024-02-01	900	900.150024	876.299988	878.5	878.5	14505885
2024-02-02	886	895.75	876.849976	878.75	878.75	13003437
2024-02-05	934	950	915.349976	926.799988	926.799988	38686871
2024-02-06	936.400024	941.299988	928.400024	939.549988	939.549988	12714803
2024-02-07	944	944	928.049988	933.799988	933.799988	7913010
2024-02-08	937	939.700012	918.799988	924.299988	924.299988	11576253
2024-02-09	926	927.400024	906.049988	915	915	7904881
2024-02-12	916.099976	925	908	911.599976	911.599976	7286778
2024-02-13	911.599976	919.099976	894	906.900024	906.900024	8574218
2024-02-14	900	919.950012	894.349976	918.299988	918.299988	6570939
2024-02-15	923.700012	927	916.349976	920.549988	920.549988	6430799
2024-02-16	925	948.799988	924.099976	938.599976	938.599976	12826164
2024-02-19	942.950012	942.950012	931.049988	932.599976	932.599976	4632214
2024-02-20	934.450012	934.650024	920.400024	926.349976	926.349976	4733639
2024-02-21	926.349976	937.200012	916.5	921.049988	921.049988	6011018
2024-02-22	924.650024	933.849976	914.599976	932.299988	932.299988	6437014
2024-02-23	933.099976	939.799988	929.400024	937.400024	937.400024	7047473
2024-02-26	937.099976	945	930.700012	936.950012	936.950012	5600234
2024-02-27	936.75	965	935.5	962.700012	962.700012	12810206
2024-02-28	966.150024	976	950.299988	958.049988	958.049988	15219187
2024-02-29	959	959.25	942.900024	950.200012	950.200012	10346657
2024-03-01	958.950012	980.400024	956.700012	977.400024	977.400024	10645369
2024-03-04	993.25	995	980.099976	987.200012	987.200012	6084495
2024-03-05	1027	1065.599976	1005.349976	1021.900024	1021.900024	59811033
2024-03-06	1025	1030.650024	1009	1017.650024	1017.650024	14214823
2024-03-07	1025	1047	1014.049988	1039.300049	1039.300049	16877082
2024-03-11	1034.75	1035.949951	1021	1028	1028	7502450
2024-03-12	1027.800049	1037	1011.299988	1016.5	1016.5	8763820
2024-03-13	1019	1021	963.549988	973.200012	973.200012	16564155
2024-03-14	964.950012	982	955.400024	967.75	967.75	22931801
2024-03-15	968.400024	979.75	940	945.849976	945.849976	23390913
2024-03-18	945.849976	974.799988	936.650024	972.450012	972.450012	12121719
2024-03-19	968.549988	970.599976	951.599976	957.75	957.75	9483750
2024-03-20	960.900024	965.150024	921.200012	940.450012	940.450012	13900321
2024-03-21	951	969.25	946	964.900024	964.900024	11074207
2024-03-22	964.900024	986.200012	950.349976	979.799988	979.799988	13638296
2024-03-26	977	995	976	986.200012	986.200012	9461531
2024-03-27	991.599976	995	976.700012	978.650024	978.650024	6640537
2024-03-28	982.5	999.900024	979	992.799988	992.799988	9862996

BSE SENSEX				
Date	**Open**	**High**	**Low**	**Close**
2024-01-01	72218.39	72561.91	72031.23	72271.94
2024-01-02	72332.85	72332.85	71613.74	71892.48
2024-01-03	71832.62	71862	71303.97	71356.6
2024-01-04	71678.93	71954.79	71546.6	71847.57
2024-01-05	72016.71	72156.48	71779.83	72026.15
2024-01-08	72113.25	72181.77	71301.04	71355.22
2024-01-09	71770.91	72035.47	71307.27	71386.21
2024-01-10	71383.2	71733.84	71110.98	71657.71
2024-01-11	71907.75	71999.47	71543.19	71721.18
2024-01-12	72148.07	72720.96	71982.29	72568.45
2024-01-15	73049.87	73402.16	72909	73327.94
2024-01-16	73331.95	73427.59	72960.29	73128.77
2024-01-17	71998.93	72484.8	71429.3	71500.76
2024-01-18	71018.86	71451.29	70665.5	71186.86
2024-01-19	71786.74	71895.64	71542.74	71683.23
2024-01-23	71868.2	72039.2	70234.55	70370.55
2024-01-24	70165.49	71149.61	70001.6	71060.31
2024-01-25	71022.1	71049.46	70319.04	70700.67
2024-01-29	70968.1	72010.22	70880.54	71941.57
2024-01-30	72000.2	72142.23	71075.72	71139.9
2024-01-31	71073.04	71851.39	70846.04	71752.11
2024-02-01	71998.78	72151.02	71574.89	71645.3
2024-02-02	71977.56	73089.4	71948.77	72085.63
2024-02-05	72269.12	72385.93	71602.14	71731.42
2024-02-06	71970.82	72261.4	71625.18	72186.09
2024-02-07	72548.5	72559.21	71938.22	72152
2024-02-08	72473.42	72473.42	71230.62	71428.43
2024-02-09	71410.29	71676.49	71200.31	71595.49
2024-02-12	71722.31	71756.58	70922.57	71072.49
2024-02-13	71292.08	71662.74	70924.3	71555.19
2024-02-14	71035.25	71938.59	70809.84	71822.83
2024-02-15	72061.47	72164.97	71644.44	72050.38
2024-02-16	72406.02	72545.33	72218.1	72426.64
2024-02-19	72627.6	72881.93	72308.68	72708.16
2024-02-20	72727.87	73130.69	72510.24	73057.4
2024-02-21	73267.48	73267.8	72450.56	72623.09
2024-02-22	72677.51	73256.39	72081.36	73158.24
2024-02-23	73394.44	73413.93	73022	73142.8
2024-02-26	73044.81	73092.26	72666.82	72790.13
2024-02-27	72723.53	73161.3	72660.13	73095.22
2024-02-28	73162.82	73223.11	72222.29	72304.88

2024-02-29	72220.57	72730	72099.32	72500.3
2024-03-01	72606.31	73819.21	72591.14	73745.35
2024-03-04	73903.09	73990.13	73747.01	73872.29
2024-03-05	73767.42	73915.54	73412.25	73677.13
2024-03-06	73587.7	74151.27	73321.48	74085.99
2024-03-07	74242.74	74245.17	73921.48	74119.39
2024-03-11	74175.93	74187.35	73433.91	73502.64
2024-03-12	73516.42	74004.16	73342.12	73667.96
2024-03-13	73993.4	74052.75	72515.71	72761.89
2024-03-14	72570.1	73364.3	72497.19	73097.28
2024-03-15	72886.77	72998.07	72484.82	72643.43
2024-03-18	72587.3	72985.89	72314.16	72748.42
2024-03-19	72462.94	72490.09	71933.35	72012.05
2024-03-20	72036.86	72402.67	71674.42	72101.69
2024-03-21	72507.36	72882.46	72416.03	72641.19
2024-03-22	72231.66	73115.62	72172.09	72831.94
2024-03-26	72396.97	72705.29	72363.03	72470.3
2024-03-27	72692.16	73138.73	72600.73	72996.31
2024-03-28	73149.34	74190.31	73120.33	73651.35

Source: https://www.bseindia.com/Indices/IndexArchiveData.html

ANALYSIS

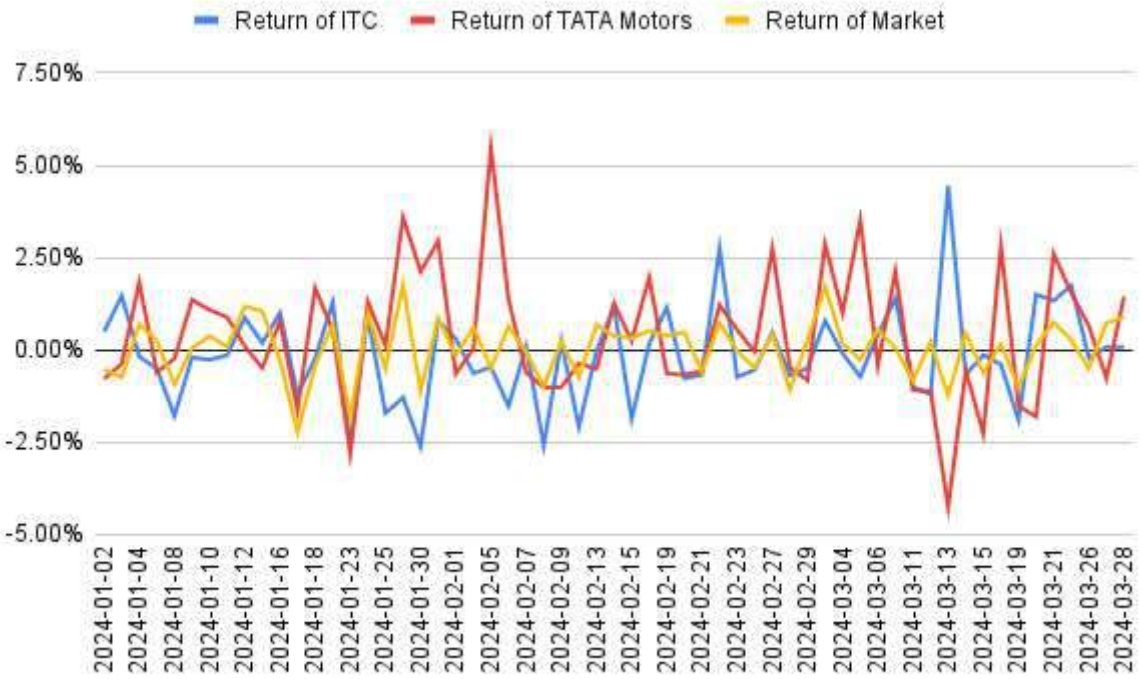
The returns of ITC Ltd. TATA Motors and the Market is represented in the following table:

Date	Return of ITC	Return of TATA Motors	Return of Market
2024-01-01			
2024-01-02	0.49%	-0.78%	-0.53%
2024-01-03	1.47%	-0.38%	-0.75%
2024-01-04	-0.18%	1.83%	0.69%
2024-01-05	-0.51%	-0.60%	0.25%
2024-01-08	-1.78%	-0.23%	-0.93%
2024-01-09	-0.20%	1.36%	0.04%
2024-01-10	-0.27%	1.08%	0.38%
2024-01-11	-0.14%	0.89%	0.09%
2024-01-12	0.88%	0.10%	1.18%
2024-01-15	0.19%	-0.49%	1.05%
2024-01-16	1.01%	0.79%	-0.27%
2024-01-17	-1.21%	-1.62%	-2.23%
2024-01-18	-0.24%	1.68%	-0.44%
2024-01-19	1.29%	0.55%	0.70%
2024-01-23	-2.59%	-2.80%	-1.83%
2024-01-24	0.94%	1.31%	0.98%
2024-01-25	-1.71%	0.12%	-0.51%
2024-01-29	-1.28%	3.59%	1.76%
2024-01-30	-2.61%	2.12%	-1.11%
2024-01-31	0.80%	2.95%	0.86%

2024-02-01	0.31%	-0.64%	-0.15%
2024-02-02	-0.63%	0.03%	0.61%
2024-02-05	-0.47%	5.47%	-0.49%
2024-02-06	-1.52%	1.38%	0.63%
2024-02-07	0.09%	-0.61%	-0.05%
2024-02-08	-2.58%	-1.02%	-1.00%
2024-02-09	0.23%	-1.01%	0.23%
2024-02-12	-2.08%	-0.37%	-0.73%
2024-02-13	-0.02%	-0.52%	0.68%
2024-02-14	1.18%	1.26%	0.37%
2024-02-15	-1.86%	0.25%	0.32%
2024-02-16	0.17%	1.96%	0.52%
2024-02-19	1.15%	-0.64%	0.39%
2024-02-20	-0.77%	-0.67%	0.48%
2024-02-21	-0.68%	-0.57%	-0.59%
2024-02-22	2.75%	1.22%	0.74%
2024-02-23	-0.74%	0.55%	-0.02%
2024-02-26	-0.53%	-0.05%	-0.48%
2024-02-27	0.48%	2.75%	0.42%
2024-02-28	-0.69%	-0.48%	-1.08%
2024-02-29	-0.49%	-0.82%	0.27%
2024-03-01	0.79%	2.86%	1.72%
2024-03-04	-0.10%	1.00%	0.17%
2024-03-05	-0.72%	3.51%	-0.26%
2024-03-06	0.42%	-0.42%	0.55%
2024-03-07	1.40%	2.13%	0.05%
2024-03-11	-1.00%	-1.09%	-0.83%
2024-03-12	-1.21%	-1.12%	0.22%
2024-03-13	4.45%	-4.26%	-1.23%
2024-03-14	-0.66%	-0.56%	0.46%
2024-03-15	-0.13%	-2.26%	-0.62%
2024-03-18	-0.39%	2.81%	0.14%
2024-03-19	-1.89%	-1.51%	-1.01%
2024-03-20	1.50%	-1.81%	0.12%
2024-03-21	1.34%	2.60%	0.75%
2024-03-22	1.74%	1.54%	0.26%
2024-03-26	-0.22%	0.65%	-0.50%

Monthly Returns			
Month	**ITC**	**TATA Motors**	**BSE SENSEX**
January	-0.28%	0.57%	-0.03%
February	-0.32%	0.35%	0.05%
March	0.30%	0.27%	0.09%
Monthly Risk			
Month	**ITC**	**TATA Motors**	**BSE SENSEX**
January	1.24%	1.52%	1.03%
February	1.19%	1.57%	0.57%
March	1.44%	2.12%	0.74%

Quarterly Returns			
Quarter 1 (January - March)	**ITC**	**TATA Motors**	**BSE SENSEX**
	-0.10%	0.40%	0.04%
Quarterly Risk			
Quarter 1 (January - March)	**ITC**	**TATA Motors**	**BSE SENSEX**
	1.29%	1.74%	0.78%
Correlation between ITC, TATA Motors and BSE SENSEX			
Correlation between ITC and TATA Motors	**Correlation between ITC and BSE SENSEX**	**Correlation between TATA Motors and BSE SENSEX**	
-68.93%	71.38%	-99.94%	



TATA Motors consistently delivered positive returns, albeit with higher volatility, while ITC Ltd. showed mixed performance with moderate risk. The market, as reflected by the Sensex, exhibited minimal movement and relatively lower risk. Over the full quarter, TATA Motors emerged as the best-performing asset in terms of returns, albeit at a higher risk. ITC Ltd. underperformed, showing a negative return with slightly lower risk.

Correlation Analysis

- **TATA Motors vs BSE Sensex:** -99.94% (Strong negative correlation)
- **ITC Ltd. vs BSE Sensex:** +71.38% (Strong positive correlation)
- **TATA Motors vs ITC Ltd.:** -68.93% (Moderate to strong negative correlation)

Through the above analysis it can be seen that There were noticeable performance patterns in the stock market between January 2024 and March 2024 for TATA Motors and ITC Ltd. TATA Motors generated returns of 0.57%, 0.35%, and 0.27% over the same time, in contrast to ITC Ltd.'s -0.28%, -0.32%, and 0.30% per month. -0.03%, 0.05%, and 0.09% had been the returns of the market, as indicated by the BSE Sensex. The monthly risk levels for ITC Ltd. were 1.24%, 1.19%, and 1.44%, whilst TATA Motors had higher risk levels of 1.52%, 1.57%, and 2.12%. At 1.03%, 0.57%, and 0.74%, the BSE Sensex showed signs of risks.

The conclusions of the analysis of the quarterly data for the first quarter of 2024 demonstrated that ITC Ltd. had a return of -0.10% with a risk of 1.29%, TATA Motors had a return of 0.40% with a risk of 1.74%, and the BSE Sensex had a return of 0.04% with a risk of 0.78%. The correlation analysis showed that both TATA Motors and ITC Ltd. had a significant negative correlation of -68.93%, indicating that their returns frequently moved in opposite directions; ITC Ltd. had a positive correlation of 71.38% with the BSE Sensex, indicating that its

returns generally moved in line with the market; on the other hand, TATA Motors had a nearly perfect negative correlation of -99.94% with the BSE Sensex, indicating an almost complete inverse relationship with the movements of the market.

CONCLUSION

The comparative analysis of returns and risk for TATA Motors, ITC Ltd., and the BSE Sensex between January and March 2024 reveals distinct patterns in performance and correlation. TATA Motors delivered higher returns with higher volatility and demonstrated a strong inverse relationship with the market. In contrast, ITC Ltd., although yielding lower and occasionally negative returns, showed greater alignment with market movements and lower risk.

These findings hold important implications for portfolio construction. Investors with a higher risk appetite seeking uncorrelated diversification may consider TATA Motors, while those aiming for more market-consistent and stable performance may prefer ITC Ltd. Understanding such relationships helps investors tailor their strategies based on risk tolerance, return expectations, and diversification needs.

REFERENCES

https://www.bseindia.com/Indices/IndexArchiveData.html

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OPINIONS OF THE MEMBERS OF THE BOARD OF DIRECTORS REGARDING INTERNAL AUDITOR: PRECAST BUILDING ELEMENTS SECTOR FIELD STUDY

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The primary aim of this research is to examine the perceptions of the members of the board of directors operating within the precast construction elements sector regarding internal auditors. Employing a quantitative research design, data were collected from 36 board members through a structured online questionnaire. The findings indicate that the vast majority of participants perceive internal auditors as competent, professional, and impartial. Approximately 66.7% of respondents stated that they have a positive perspective on internal auditors and deemed their knowledge and experience to be sufficient (M=3.78). Furthermore, participants believe that internal auditors act independently across all units (M=3.55) and do not face external pressure (M=3.58). However, the use of technological developments and information systems by internal auditors remains at a moderate level (M=3.61), while their capacity to offer technological suggestions is somewhat limited (M=3.19). Although board members assess the contribution of internal auditors to risk management and corporate sustainability processes positively (M=3.52), they emphasized the need to improve the integration of new technologies, such as artificial intelligence, into audit processes.

KEYWORDS: ***Internal Audit, Board of Directors, Auditor Independence, Precast Sector, Technology.***

1. INTRODUCTION

Internal auditing has become an essential component of modern corporate governance structures. The attitudes of board members towards internal auditors play a decisive role in maintaining the independence, objectivity, and effectiveness of audit activities (Goodwin, 2004). According to the corporate governance theory proposed by Fama and Jensen (1983), in structures where ownership and management are separated, control mechanisms such as internal auditing help reduce agency costs and protect stakeholder interests. Studies have demonstrated that the composition of the board—such as the number of members, their level of independence, and their sectoral experience—directly influences the performance and perception of the internal audit function (Adams & Mehran, 2012; Arena & Azzone, 2009). For example, Arena and Azzone (2009) highlighted that the effectiveness of an internal audit unit is strengthened by top management's support and the board's attitude. Similarly, Cohen and Sayag (2010) emphasized that for internal auditors to act independently, boards must provide constructive support through audit committees. In Turkey, research on perceptions of internal auditors, particularly in the industrial and construction sectors, is still limited. In sectors like precast construction elements—which combine both manufacturing and construction components—there is a lack of empirical data on how internal auditor practices are perceived by board members. This study aims to contribute to the literature by revealing how board members' perspectives on internal auditors vary based on demographic factors such as education level, age, tenure on the board, and experience in different sectors.

2. OBJECTIVES

This study seeks to elucidate the perceptions of board members in companies operating within Turkey's precast construction elements sector regarding the competence, independence, impartiality, and professionalism of internal auditors. Additionally, the study examines whether there is a relationship between board members' demographic characteristics—such as age, education level, tenure on the board, and sectoral experience—and their perceptions of internal auditors. In this context, the following research questions are asked:

1. Is there a relationship between the board member's education level and their perception of internal auditors?
2. Is there a relationship between the board member's age and their perception of internal auditors?

3. Does tenure on the board affect the perception of internal auditors?
4. Does the number of company shareholders influence board members' views on internal auditors?
5. Does prior experience in a different sector affect their perception of internal auditors?

3. METHODOLOGY

A quantitative research approach was adopted, utilizing a descriptive survey design. A structured questionnaire was developed and distributed online to board members working in companies within the precast construction elements sector. The questionnaire comprised two sections: the first covered demographic questions, while the second contained statements related to the competence, impartiality, and technological capabilities of internal auditors. The questionnaire was pilot-tested and revised with expert feedback to ensure clarity and reliability. Data collected were analyzed using the SPSS software package, with descriptive statistics such as frequencies, percentages, means, and standard deviations calculated. T-tests and ANOVA were employed to analyze relationships among variables. The reliability of the scale was tested using Cronbach's Alpha, which was found to be 0.86.

4. SAMPLING DESIGN

Primary data were used in this research. The study population consisted of board members of companies registered with the Precast Concrete Elements Association in Turkey. There are 46 companies registered with the association. Initially, contact was made with the boards through the association, but due to insufficient responses, an online survey link was also distributed to board members via LinkedIn and email. A total of 36 board members participated in the study.

5. STATISTICAL DESIGN

Data were analyzed using the SPSS software package. Descriptive statistics such as frequencies, percentages, means, and standard deviations were calculated. Relationships between variables were tested using T-tests and ANOVA. The reliability of the measurement scale was confirmed with a Cronbach's Alpha of 0.86, indicating high internal consistency.

6. GEOGRAPHICAL AREA

The study's geographical scope covers the entirety of Turkey. Of the 46 companies registered with the Precast Concrete Elements Association, 11 are located in the Marmara region, 8 in the Aegean region, 13 in Central Anatolia, 2 in the Black Sea region, 2 in the Mediterranean region, and 9 in the Eastern and Southeastern Anatolia regions. Among the board members who responded, 50% were from the Marmara region, 28% from the Aegean region, and 22% from Central Anatolia. No responses were received from the Mediterranean, Black Sea, or Eastern and Southeastern Anatolia regions.

7. RESULTS

In the analysis of the study, the information obtained from the demographic data of the participants was given first, and in the second part, the relationships established between the variables were tested.

7.1. Demographic Data of Participants

The sample predominantly comprised board members within the middle-to-advanced age group, possessing a high level of education and extensive sectoral experience. A significant portion of participants also reported having experience in different sectors. These features suggest that decision-making processes in the precast construction sector are influenced by managerial experience and diversity.

Table 1. Demographic Data Table

VARIABLES	Number	%	Total Percentage	Mean	SS
	Duration of Board Membership				
Lower than 1 Year	2	5,6	5,6		
Between 1-3 Years	6	16,7	22,2	**3,5**	**0,97**
More than 5 Years	28	77,8	100		
Total	36	100	100	**3,5**	**0,97**
	Total Experience				
Lower than 1 Year	2	5,6	5,6		
Between 1-3 Years	1	2,8	8,3		
More than 5 Years	2	5,6	13,9	**4,27**	**1,08**
Between 5-10 Years	11	30,6	44,4		
More than 10 Years	20	55,6	100		
Total	36	100	100	**4,27**	**1,08**
	Age				
Between 20-35	6	16,7	16,7		
Between 36-50	10	27,8	44,4	**2,55**	**0,96**
Between 51-65	14	38,9	83,3		
Over 66	6	16,7	100		
Total	36	100	100	**2,55**	**0,96**
	Experience on a Different Sector				
Yes	16	44,4	44,4	**1,5**	**0,50**
No	20	55,6	100		
Total	**36**	**100**	**100**	**1,5**	**0,50**

	Education Level				
Primary School	5	13,9	13,9		
Highschool	2	5,6	19,5	2,75	0,80
Bachelor	26	72,2	91,7		
Master	3	8,3	100		
Total	**36**	**100**	**100**	**2,75**	**0,80**

7.2. Descriptive Statistics and Board Members' Opinions

Board members' opinions on internal auditors were assessed using a five-point Likert scale. The general trend in responses was positive. The statement "As a senior manager, I have a positive perspective towards the internal auditor" received the highest mean score (M=4.27; SD=0.51). Competence (M=3.78), impartiality (M=3.94), and professionalism (M=3.83) were all rated highly. However, statements regarding providing technological suggestions (M=3.19) and consultancy (M=3.36) scored lower, indicating that board members are less certain about the advisory and innovative roles of auditors.

Table 2A. Opinions of the Members of the Board of Directors on the Internal Auditor (Mean and Deviation)

Opinions on Internal Auditor (Alpha= 0,86)	***Mean***	***Deviation***
As a senior executive, my perspective on the internal auditor is positive.	***4,27***	***0,51***
Our auditors have sufficient knowledge and experience.	***3,78***	***0,6***
They carry out auditing activities for system and information technologies.	***3,61***	***0,72***
The necessary work environment has been provided to the auditor.	***3,58***	***0,73***
There is no intervention to the auditor during the monitoring phase of activities.	***3,58***	***0,76***
The internal auditor audits all units of the institution independently.	***3,55***	***0,96***
The workload of internal auditors is not excessive.	***3,50***	***1,02***
They provide suggestions regarding technological developments.	***3,19***	***0,92***
Does the internal auditor provide consultancy to the management in the formation of your business policies?	***3,36***	***0,71***
They exhibit an impartial and honest attitude in the face of events.	***3,94***	***0,86***
Internal audit is a guarantee for independent audit.	***3,80***	***0,82***
Does your internal auditor exhibit a competent and professional attitude in the face of events?	***3,83***	***0,81***
Does your internal auditor provide suggestions to improve your business's risk management and internal control processes?	***3,52***	***0,84***
1: Strongly disagree, 2: Partially disagree, 3: Undecided, 4: Partially agree, 5: Strongly agree		

Table 2B. Opinions of the Members of the Board of Directors on the Internal Auditor (Frequency and Percentage Distribution)

1: Strongly disagree, 2: Partially disagree, 3: ***3: Undecided, 4: Partially agree, 5: Strongly agree***										
İç Denetçi ile ilgili Görüşler	**1**		**2**		**3**		**4**		**5**	
	F	***%***	***F***	***%***	***F***	***%***	***F***	***%***	***F***	***%***
As a senior executive, my perspective on the internal auditor is positive.	***-***	-	***-***	-	***1***	*2,8*	***24***	*66,7*	***11***	*30,6*
Our auditors have sufficient knowledge and experience.	***-***	-	***1***	*2,28*	***12***	*33,3*	***17***	*47,2*	***6***	*16,7*
They carry out auditing activities for system and information technologies.	***1***	*2,8*	***1***	*2,8*	***16***	*44,4*	***15***	*41,7*	***3***	8,3
The necessary work environment has been provided to the auditor.	***-***	-	***-***	-	***19***	*52,8*	***12***	*33,3*	***5***	*13,9*
There is no intervention to the auditor during the monitoring phase of activities.	***-***	-	***1***	*2,8*	***18***	*50*	***12***	*33,3*	***5***	*13,9*
The internal auditor audits all units of the institution independently.	***1***	*2,8*	***2***	*5,6*	***16***	*44,4*	***10***	*27,8*	*7*	*19,4*
The workload of internal auditors is not excessive.	***1***	*2,8*	***4***	*11,1*	***14***	*38,9*	***10***	*27,8*	*7*	*19,4*
They provide suggestions regarding technological developments.	***1***	*2,8*	***5***	*13,9*	***20***	*55,6*	***6***	*16,7*	***4***	*11,1*

Does the internal auditor provide consultancy to the management in the formation of your business policies?	-	-	3	8,3	21	58,3	8	22,2	4	11,1
They exhibit an impartial and honest attitude in the face of events.	-	-	-	-	14	38,9	10	27,8	12	33,3
Internal audit is a guarantee for independent audit.	-	-	-	-	16	44,4	11	30,6	9	25
Does your internal auditor exhibit a competent and professional attitude in the face of events?	-	-	1	2,8	12	33,3	15	41,7	8	22,2
Does your internal auditor provide suggestions to improve your business's risk management and internal control processes?	2	5,6	-	-	19	52,8	9	25	6	16,7

7.3. Relationship Between Board of Directors Member's Education Level and Their Perspective on the Internal Auditor

72.2% of the survey participants are undergraduate graduates. Since the number of respondents with different education levels was low, statistically significant data could not be obtained, and correlation analysis could not be performed.

7.4. Relationship Between Board of Directors Member's Age and Their Perspective on the Internal Auditor

The average age of the participants who responded to the survey is within the middle age group (30-45 age range) (M=2.56; SD=0.97).

According to the results of the One-Sample t-Test, there is a neutral or partially positive relationship between the age of the member of the board of directors and the score of their opinion on the internal auditor. The findings indicate that age factor may partially influence the perception of internal audit. Literature reviews also show that the age factor is important in decision-making processes.

Table 3. Average Age of the Members of the Board of Directors and Their Opinions on the Internal Auditor

Variables	t	Df	Sig. (2-tailed)	M.Difference	95% CI Lower Bound	%95 GA Upper Bound	SS	Cohen's	Pearson Corralete
Yaş	15,82	35	< .001	2,56	2,22	2,88	0,96	2,636	0,307
İç Denetçi Bakış	13,83	13	< .001	1,68	1,41	1,94	0,45	3,697	0,307

According to the results of the Pearson Correlation Analysis, there is a negative and weak-to-moderate relationship (r=–0.307) between the age of board of directors members and their perspectives on the internal audit unit. This suggests that as age increases, the positive perspective toward the internal audit unit slightly decreases.

According to the literature, as the level of experience increases, some executives may approach audit mechanisms with a more traditional view and may be more cautious toward innovative audit tools (Adams & Mehran, 2012; Fama & Jensen, 1983).

7.5. Relationship Between Board of Directors Member's Tenure and Their Perspective on the Internal Auditor

36 board of directors members were asked, "How long have you been a board of directors member?" The average response was found to be M=3.50, with a standard deviation of SD=0.97. This indicates that they have been in office for 3-5 years.

Table 4. Duration of Board Membership and the Opinions on the Internal Auditor

Değişkenler	N	Ortalama Fark	%95 GA Alt Sınır	%95 GA Üst Sınır	SS	t	Sig. (2-tailed)	%95 GA	Cohen's d
Y. Kurulunda Geçirilen Süre	35	1,56	3,17	3.83	0,97	21.627	< .001	[2.70, 4.50]	3.61
İç Denetçi Bakış	35	51,06	48,55	53,56	7,41	41.318	< .001	[5.24, 8.52]	6.89

In the survey analysis, the average score for "perspective on the internal auditor" was calculated as M=51.06, with a standard deviation of SD=7.41, indicating that participants' general perspective on internal audit is very positive.

It can be concluded that individuals who have served longer on the board of directors have a more professional and positive perspective on internal auditors. The duration of experience increases the level of understanding of the corporate benefits of

internal audit; it can also be stated that executives perceive internal auditors not only as a control tool but also as strategic consultants.

7.6. Relationship Between Internal Auditor View Score and the Number of Partners on the Board of Directors

According to the Pearson Correlation Analysis results, there is a strong, negative, and statistically significant relationship between the number of partners on the board of directors and the internal auditor view score (r (12)= –.575, p=.032).

Table 5. Opinions of the Enterprises with Different Number of Shareholders on the Internal Auditor

Değişkenler	t	Df	%95 GA Alt Sınır	%95 GA Üst Sınır	SS	Ortalama Fark	p (2-tailed)
Y. Kurulu Ortak Sayısı	15.40	35	1,93	2,52	0,87	2.22	< .001
İç Denetçi Bakış	13.83	13	1,42	1,68	0,45	1.68	< .001

This finding indicates that as the number of partners on the board of directors increases, executives' positive opinions toward internal auditors tend to decrease. This suggests that when the company structure is more collective and multi-partner, internal audit tends to be evaluated more systematically. This result is consistent with the finding in the literature that perceptions regarding decision-making and control mechanisms in boards of directors may change as the number of stakeholders increases (Jensen & Meckling, 1976; Fama & Jensen, 1983). The increase in the number of partners may lead to conflicts in authority sharing and internal audit processes. This indicates that the structure of the board of directors can affect the perception of internal audit. Therefore, companies that wish to enhance the effectiveness of internal audit functions should consider the distribution of authority based on the number of partners.

7.7. Relationship Between Board of Directors Members' Perspective on the Internal Auditor and Their Coming from a Different Sector

A T-Test was performed by finding the average score of the participants' opinions in Table 2A and the question measuring whether they had worked in a different sector.

Table 6A. Opinions of Board Members from Different Sectors on Internal Auditor

Variables	N	Mean Diff.	%95 CI Low Bound	%95 CI Upper Bound	t	Cohen's d	95% GA (Cohen's d)
Farklı Sektör Tecrübesi	35	1,56	1.39	1.73	18.520	3.09	[2.29, 3.87]
İç Denetçi Bakış	35	51,06	48.55	53.56	41.318	6.89	[5.24, 8.52]

This table shows that there is a significant difference in opinions regarding internal auditors among board of directors members who have experience in different sectors. The effect size (Cohen's d) is 3.09, which is a very high value.

These data reveal that executives with experience in different sectors approach internal auditors with a more positive and stronger perspective. While having experience in different sectors contributes to board of directors members viewing internal auditors more professionally and strategically, this alone is not sufficient to explain the perception of internal audit. OECD (2015) reports stated that diversity in corporate governance, particularly the past sector experience of individuals on the board of directors, enriches the perspective on audit processes.

8. SUGGESTIONS

This research evaluated the perceptions of board of directors members toward internal auditors in the precast construction sector and analyzed their relationships with various variables. Based on the findings, several suggestions have been made. Although the general perception of internal auditors was positive, perceptions regarding technology and consultancy were found to be lower. This situation creates the perception that internal auditors are still performing traditional control activities. However, today internal auditors are undertaking roles that not only detect issues but also create added value, provide strategic consultancy, and lead digital transformation (Sarens & De Beelde, 2006; OECD, 2015). The strategic role of internal auditors in organizations should be strengthened.

According to the research results, a slight decrease in the positive perspective toward internal auditors was observed as age increased. Awareness should be raised among experienced executives regarding the function of internal auditors. Furthermore, according to the findings, executives from different sectors view internal auditors more strategically. To improve the perception of internal auditors, platforms for sharing audit processes and experiences should be created with board of directors' members who have different sector

experiences, ensuring the effectiveness of internal auditors' roles.

The tendency for trust in internal auditors to decrease as the number of partners increases indicates that the position of internal auditors within the company should be strengthened. In this framework, internal auditors should be enabled to report directly to the board of directors or the audit committee and should be prominent in their consultancy roles.

9. CONCLUSION

This research aimed to examine the perceptions of board of directors' members toward internal auditors in companies operating in the concrete precast sector in Turkey. The findings indicate that board of directors' members generally evaluate internal auditors as professional, competent, and impartial. However, it was observed that expectations regarding internal auditors' technological contributions and strategic consultancy roles remained limited.

Furthermore, while the duration of the board of directors' membership and experience in different sectors increased the positive perspective toward internal auditors, increasing age and the rising number of partners partially reduced the support given to the internal audit function. These findings reveal that the strategic and independent roles of internal auditors within corporate structures need to be strengthened.

In conclusion, developing internal auditors' competencies in technology utilization, innovation, and participation in governance processes will contribute to the quality of corporate governance in the precast construction sector.

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IMPACT OF GST ON MIDDLE-CLASS HOUSEHOLDS IN KARNATAKA: A CASE STUDY OF KALABURAGI TALUKA

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ABSTRACT **DOI No: 10.36713/epra22953** **Article DOI: https://doi.org/10.36713/epra22953**

The implementation of the Goods and Services Tax (GST) in India marked a sizable reform withinside the country`s oblique taxation system, aiming to streamline tax series and enhance compliance. However, its implications have numerous throughout distinct socio-monetary organizations. This examine examines the effect of GST on middle-magnificence families in Kalaburagi Taluka, Karnataka, specializing in modifications in intake patterns, month-to-month expenditure, and perceptions of tax burden post-GST implementation. Using a mixed-technique approach, information changed into amassed via established questionnaires and interviews from a consultant pattern of middle-profits families. The findings imply a major growth in family spending on important items and services, mainly in sectors wherein GST fees are higher, inclusive of utilities, education, and healthcare. While a few respondents stated stepped forward transparency in pricing, a majority expressed worries over decreased financial savings and accelerated fee of living. The examine highlights the want for centered coverage interventions to mitigate the economic stress on middle-profits organizations and indicates a re-assessment of GST fees on important commodities. This case examine gives treasured insights for policymakers and tax government to make certain extra fairness in tax implementation and its monetary outcomes.

KEYWORDS: ***Tax, GST, Spending Pattern, Savings, Burden, Inexpensive alternatives and Slabs***

The Goods and Services Tax (GST), carried out in India on July 1, 2017, is taken into consideration one of the maximum good sized financial reforms withinside the country`s post-independence era. Designed to simplify the oblique tax shape with the aid of using subsuming a couple of valuable and nation taxes right into a unified system, GST aimed to sell transparency, enhance tax compliance, and decorate the benefit of doing business. While the wider goals of GST are macroeconomic in nature, its effect on the microeconomic degree, mainly on special segments of society, has generated great debate. Among the numerous profits groups, center-magnificence families are particularly at risk of adjustments in tax regimes. This institution regularly lacks the blessings of subsidies to be had to lower-profits populations even as additionally now no longer taking part in the economic flexibility of higher-profits earners. In this context, the advent of GST has had numerous implications on family budgets, intake patterns, and ordinary economic wellbeing of the center magnificence. Karnataka, one in all India`s extra economically lively states, offers an essential case for analyzing the localized results of GST. Within Karnataka, Kalaburagi Taluka—a vicinity with a numerous socio-financial profile—serves as an insightful microcosm to research how GST has motivated center-magnificence dwelling standards. This take a look at goals to discover the real-time effect of GST on center-magnificence families in Kalaburagi Taluka with the aid of using inspecting shifts in spending behavior, perceptions of tax burden, and the quantity to which GST has altered their financial stability. By focusing in this unique demographic and geographical unit, the studies seeks to bridge the distance among countrywide coverage intentions and ground-degree realities, supplying important insights for policymakers, economists, and social planners.

In India, the reason of taxation is to elevate sales for authorities' expenditures, guide financial development, lessen earnings inequalities, fund social welfare programs, and adjust financial sports to make sure sustainable boom and stability. GST or Goods & Services Tax is an oblique tax imposed on all items and offerings in India. It is one in all the largest tax reforms implemented thus far to uniformly levy tax with the precept of—one nation, one market, one tax. It is the unmarried largest tax imposed on items and offerings in India. The GST became rolled out in a unmarried stroke, changing the Indian economic system right into a unified market. The Parliament of India surpassed the Goods and Service Tax Act on March 29, 2017,

and it turned into integrated with the aid of using July 1, 2017. GST is a tax levied on items and offerings imposed proper from the producer to the very last consumer. There are greater than one hundred sixty nations which have followed this device of taxation.

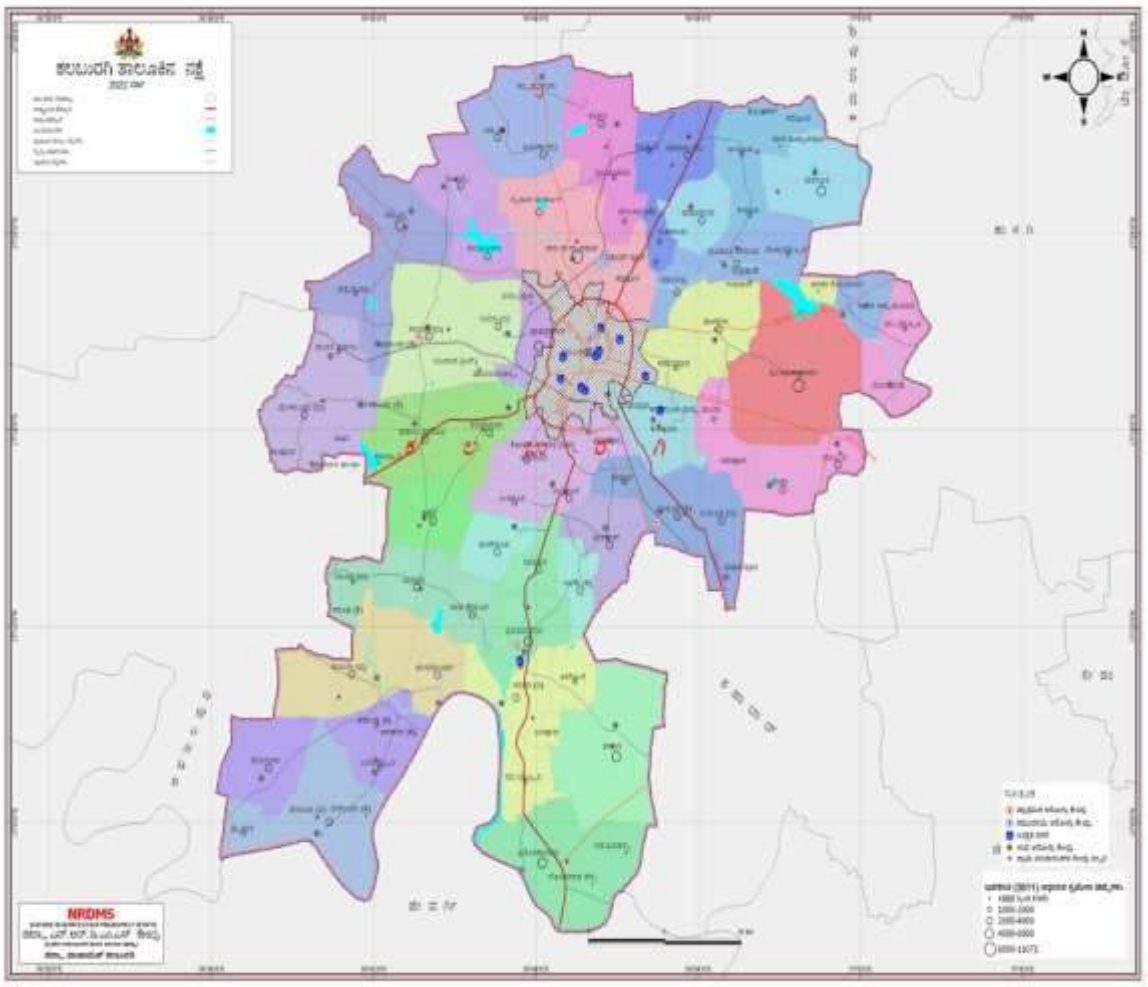
The Goods and Services Tax (GST) is a giant idea that simplifies the massive tax shape with the aid of using helping and improving the monetary boom of a country. Goods and offerings tax turned into delivered to position an cease to a couple of taxes like CST, VAT, carrier tax, income tax, relevant income tax which can be levied on exclusive products, beginning from the supply of producing until it reaches to the cease client which makes motion of products and doing enterprise very hard. At gift items and offerings are taxed in a different way and additionally at many tiers however after the GST the products and offerings could be dealt with similarly and a couple of degree taxation could be drastically decreasing this may eventual cause much less corruption. GST is a complete tax levy on manufacturing, sale and intake of products and offerings at a country wide degree.

The Goods and Services Tax Bill or GST Bill, additionally called The Constitution (One Hundred and Twenty-Second Amendment) Bill, 2014, initiates a Value delivered Tax to be applied on a country wide degree in India. GST may be an oblique tax at all of the ranges of manufacturing to result in uniformity with inside the device. On bringing GST into practice, there could be amalgamation of Central and State taxes right into an unmarried tax payment. It could additionally beautify the placement of India in both, home in addition to worldwide market. At the client degree, GST could lessen the general tax burden, that's presently predicted at 25-30%. Under this device, the client can pay the very last tax however a green enter tax credit score device guarantees that there's no cascading of taxes- tax on tax paid on inputs that pass into manufacture of goods.

In order to keep away from the fee of more than one taxes together with excise obligation and provider tax at Central stage and VAT on the State stage, GST could unify those taxes and create a uniform marketplace at some stage in the country. Integration of diverse taxes right into a GST machine will result in an powerful cross-usage of credits. The modern-day machine taxes production, while the GST will intention to tax consumption. At gift items and offerings are taxed otherwise and additionally at many ranges however after the GST the products and offerings could be dealt with similarly and more than one stage taxation could be considerably decreasing this may eventual result in much less corruption. GST will lessen complexity in taxation and assist businesses.

This paper is based on objectives of understanding the GST Burden in India and researcher collect data using various methods. This could involve conducting primary research through surveys, interviews and secondary sources. The researcher analyse the data by using simple statistical or qualitative analysis techniques and interpreted the data to derive meaningful insights and answer the research questions. Researcher conducted questioner method for papering this paper. And the limitation of the study is sited towards Kalaburagi Taluka.

Gulbarga is a Taluk placed in Gulbarga district of Karnataka. It is one in all 7 Taluks of Gulbarga district. There are a hundred and forty villages and a couple of cities in Gulbarga Taluk. As in line with the Census India 2011, Gulbarga Taluk has 154305 households, populace of 829830 of which 423051 are men and 406779 are women. The populace of youngsters among age 0-6 is 110925 that is 13.37% of overall populace. The sex-ratio of Gulbarga Taluk is round 962 as compared to 973 that is common of Karnataka state. The literacy charge of Gulbarga Taluk is 65.12% out of which 71.34% men are literate and 58.64% women are literate. The overall place of Gulbarga is 1741 sq.km with populace density of 477 in line with sq.km. Out of overall populace, 34.55% of populace lives in Urban place and 65.45% lives in Rural place. There are 20.8% Scheduled Caste (SC) and a couple of.11% Scheduled Tribe (ST) of overall populace in Gulbarga Taluk



Source: Gulbarga District Profile

Demographic Information

The demographic distribution highlights a concentration of respondents in the 26-50 years range, reflecting the middle-class population most impacted by GST. The smaller representation of younger and older groups suggests the need for targeted outreach to understand their perspectives better. Overall, the data is valuable for understanding GST's effects on working-age individuals and middle-class families.

a) 18-25 years (26.0%):

This group comprises young adults, often students or early-career professionals. Their participation indicates an interest in how GST affects their household expenses or future financial planning, even though they might not be primary earners in their families.

b) 26-35 years (32.67%):

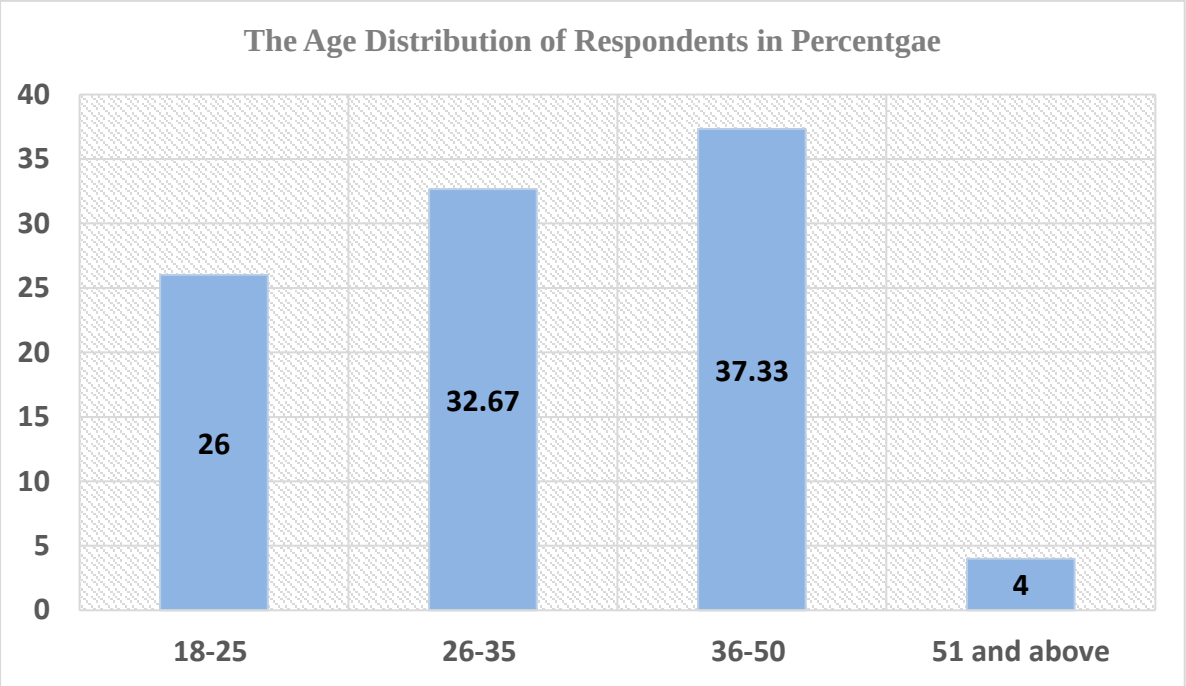
This age group forms a significant portion of the respondents, likely representing early to mid-career professionals. They are typically more financially independent and may be experiencing the impact of GST on expenses related to housing, childcare, or lifestyle choices.

c) 36-50 years (37.33%):

The largest group, these respondents are often at the peak of their earning capacity and are responsible for managing household budgets. They likely face the direct burden of GST on essential goods, services, and long-term savings. Their responses provide critical insights into GST's impact on middle-class families.

d) 51 years and above (4.0%):

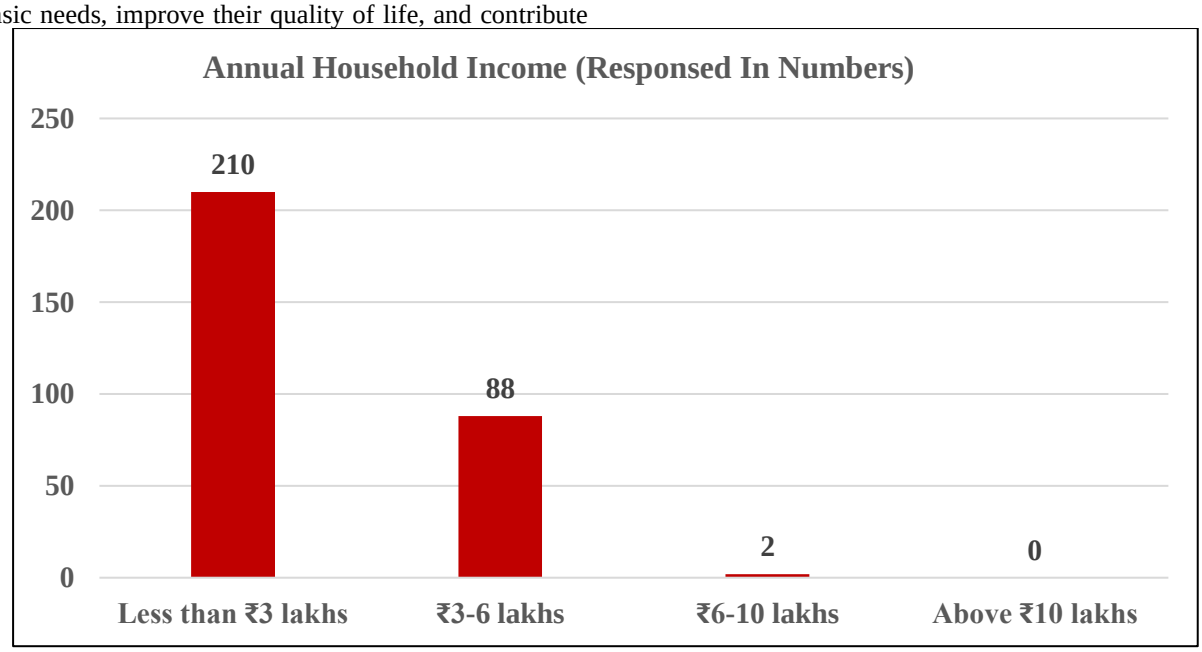
This age group is the least represented, which may indicate less active participation in surveys or a reduced financial burden due to retirement or fewer dependents. However, they might still experience indirect GST effects on healthcare and essential goods. This data suggests that middle-aged individuals (26-50 years) form the majority of respondents, potentially reflecting a higher engagement or relevance of the topic to this demographic.



Source: Field Survey (Questionnaire Method)

Annual Household Income

Household income is a fundamental factor influencing individual and societal well-being. It empowers families to meet basic needs, improve their quality of life, and contribute to economic growth. Policies and initiatives aimed at increasing household income and reducing income inequality are crucial for creating a more equitable and prosperous society.



Source: Field Survey (Questionnaire Method)

1. Less than ₹3 lakhs (70.0%):

The majority of respondents fall into this income bracket, highlighting a significant representation of lower-middle-class families. These households are likely to feel the most significant impact of GST, as their limited disposable income leaves less flexibility for increased expenses.

2. ₹3-6 lakhs (29.33%):

This group represents the core middle-class families, who may face challenges in managing GST-related cost increases while maintaining savings and lifestyle.

3. ₹6-10 lakhs (0.67%):

A very small proportion of respondents fall into this higher-middle-class category. Their smaller representation may indicate less reliance on surveys or a perception of lower GST impact on their income bracket.

4. Above ₹10 lakhs (0.0%):

No respondents belong to this category, which might be due to the survey's reach or the general perception that GST has a lesser burden on higher-income families.

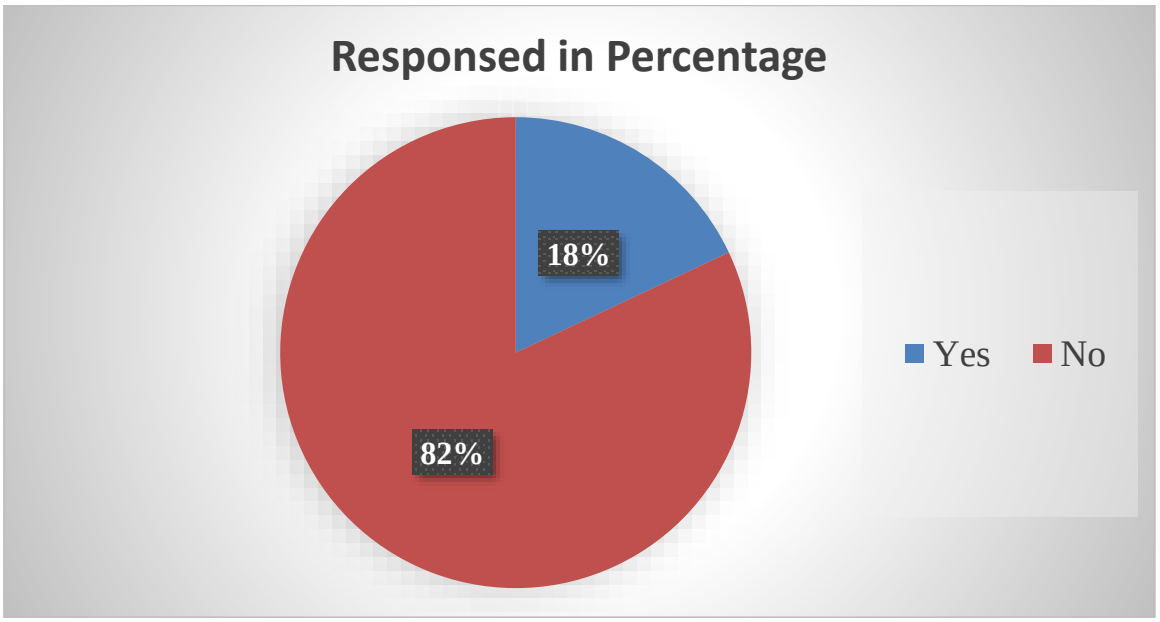
The data indicates that the GST burden is primarily felt by lower- and middle-income families, with 99.33% of respondents earning ₹6 lakhs or less annually. This emphasizes the need for targeted tax relief policies to ease the financial pressure on these groups.

Awareness and Perception of GST

GST is a landmark reform that has transformed India's taxation system. While it has streamlined tax processes and contributed to economic growth, challenges like compliance complexity and regressive impacts need to be addressed. With continuous reforms, GST has the potential to become even more effective and inclusive for all stakeholders in the economy.

Key Features of GST

1. Unified Tax System: GST is a "One Nation, One Tax" system that simplifies indirect taxation.
2. Destination-Based Tax: GST is levied at the point of consumption, not production, ensuring fairness.
3. Four-Tier Tax Structure: Goods and services are taxed at 0%, 5%, 12%, 18%, and 28% rates, depending on their nature.
4. Input Tax Credit (ITC): Businesses can claim a credit for taxes paid on inputs, reducing tax liability.
5. Digital Compliance: GST is administered through the GST Network (GSTN), an online platform that facilitates registration, return filing, and payments.



Source: Field Survey (Questionnaire Method)

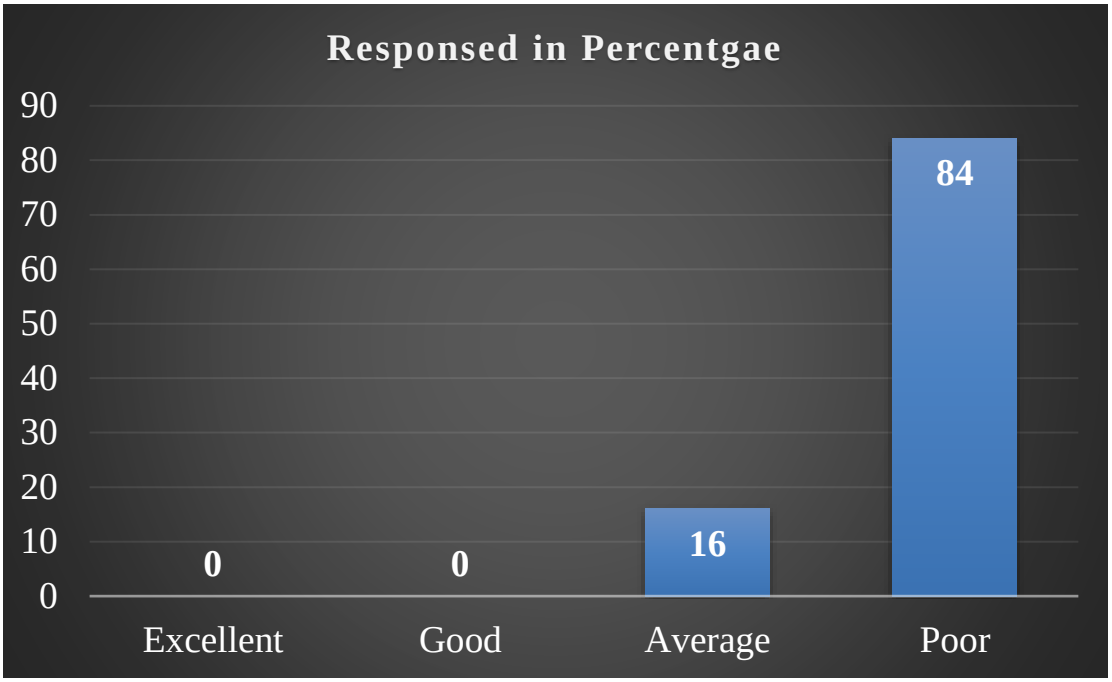
Only 18% of the participants reported being aware of the GST system. This indicates a significant lack of knowledge or understanding about GST among the surveyed group. This low level of awareness might be due to inadequate communication, complex tax structures, or limited engagement with taxation topics among certain demographics, particularly those with lower education or income levels. A vast majority, 82%, admitted to not being aware of GST. This highlights a gap in public outreach and education regarding GST and its implications. Such a lack of awareness could result in misconceptions, poor financial planning, and limited understanding of how GST impacts their daily lives and expenses.

The data underscores the necessity of government and non-government initiatives to educate people about GST, particularly its benefits and how it affects household finances. Special focus should be placed on lower-income and rural populations, who may be less exposed to information on GST.

Understanding of GST

A vast majority of respondents (84%) have a poor understanding of GST, indicating significant knowledge gaps. This suggests that the complexity of GST, combined with inadequate education or outreach efforts, makes it difficult for most individuals to grasp its implications. Only a small fraction of respondents (16%) have an average understanding of GST, indicating that even those who are somewhat aware may still lack comprehensive knowledge about how GST works or how it affects them.

The data shows that understanding of GST among respondents is overwhelmingly poor, with 84% rating their comprehension at this level. This highlights the need for targeted educational initiatives to bridge the knowledge gap, empower individuals with better financial literacy, and ensure that GST benefits are realized effectively by the general public.



Source: Field Survey (Questionnaire Method)

Impact of GST on Daily Life

The overall impact of GST on middle-class families has been mixed. While it has benefited some consumers, others have experienced increased costs. The long-term impact will depend on various factors, including government policies, economic conditions, and the behavior of businesses. It's important to note that the impact of GST can vary depending on individual consumption patterns and regional factors. While some families may have experienced significant benefits, others may have faced challenges.

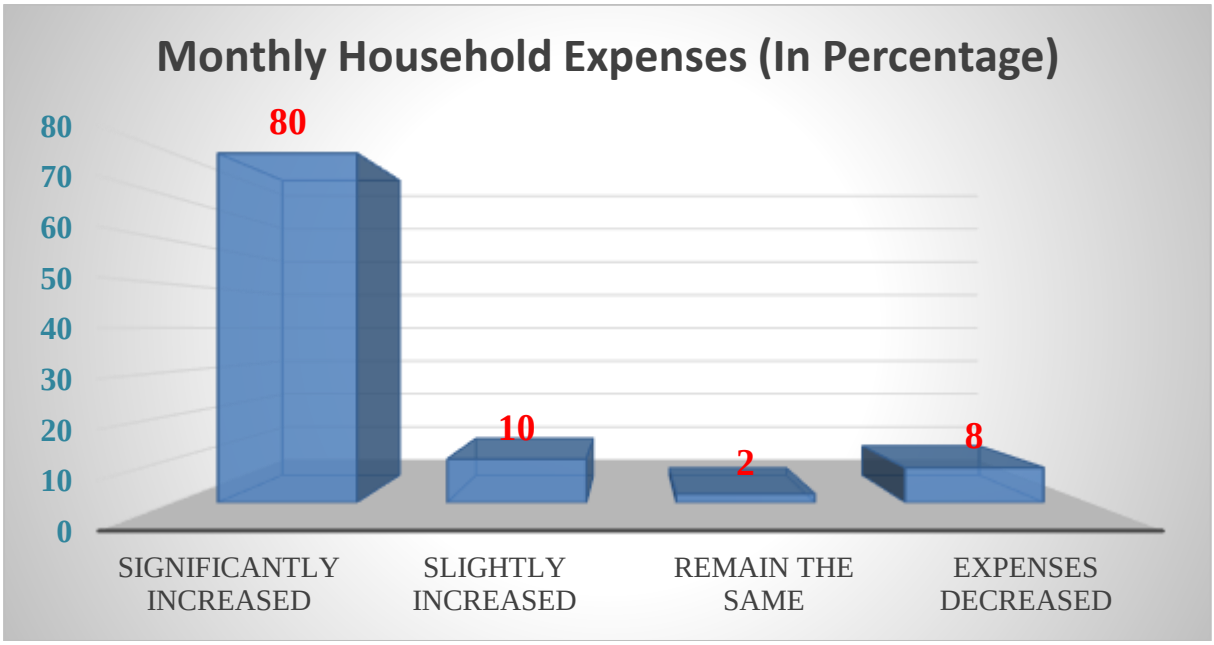
To mitigate the negative impacts and maximize the benefits of GST, it's crucial for consumers to be aware of the GST rates on different products and services, compare prices, and make informed choices. Additionally, the government needs to continue monitoring the implementation of GST and make necessary adjustments to ensure a fair and equitable tax system for all.

1. **Monthly Household Expenses**

A significant increase in household expenses can reduce savings and investment potential for middle-class families, impacting their long-term financial stability. Families reporting increased expenses might have adjusted their spending patterns, such as cutting discretionary spending or shifting to lower-cost alternatives.

A vast majority of respondents (80%) reported a significant increase in their monthly household expenses due to GST. This indicates that the tax rates on essential and commonly used goods and services have had a substantial financial impact on middle-class families. Items such as packaged food, healthcare services, and transportation, which are part of everyday life, may have contributed to this rise.

A smaller group (10%) experienced only a slight increase, suggesting that their spending patterns or the types of goods and services they consume are less affected by higher GST rates. A negligible portion of respondents (2%) observed no change in expenses, possibly due to their consumption being focused on GST-exempt items like fresh produce, unprocessed food, or subsidized services and 8% of (response) small but notable segment reported reduced expenses. This could be attributed to factors like price reductions in certain goods post-GST or better management of household budgets to offset GST impacts.



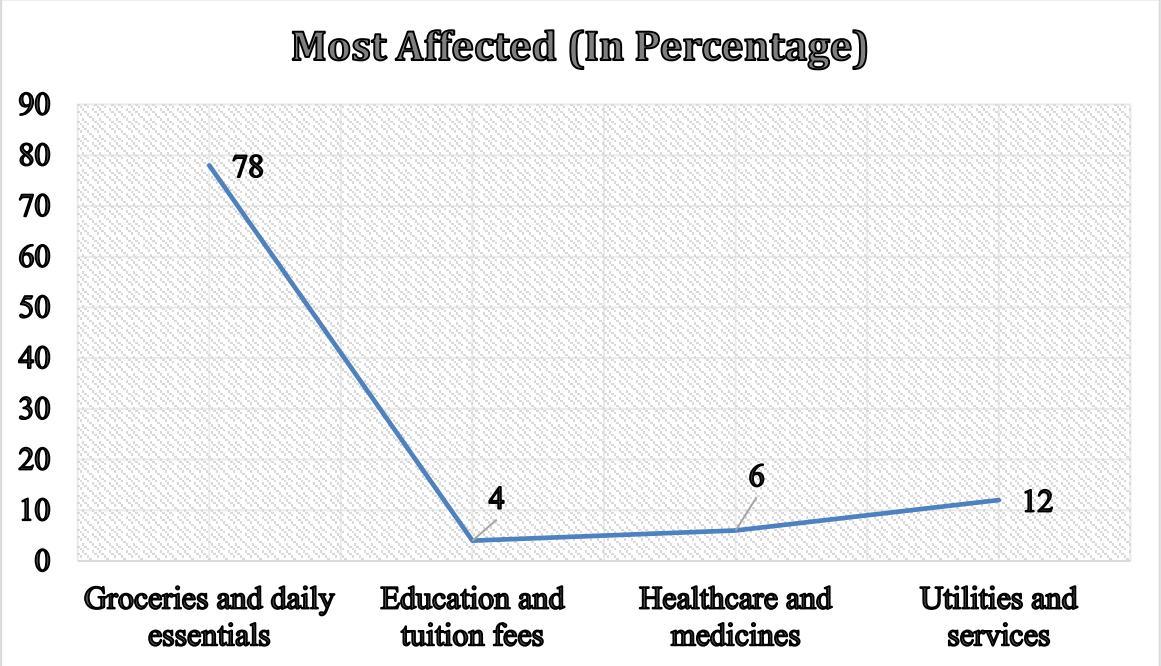
Source: Field Survey (Questionnaire Method)

2. Most Affected by GST in Household

The implementation of the Goods and Services Tax (GST) in India has significantly influenced household expenses and financial planning. As a unified tax system, GST replaced multiple indirect taxes with a simpler structure. While it streamlined taxation, its effect on the cost of goods and services has been a point of concern, especially for middle-class families.

Services like electricity, water supply, mobile bills, and internet services attract GST, leading to higher monthly expenses for households. Increased rates on services have added to the cumulative burden on middle-class families. GST has made luxury items and services more expensive, as they are taxed at the highest slab (28%). This has led many families to reduce spending on non-essential goods and lifestyle-related services.

GST has led to an increase in the overall cost of living for many households, particularly those in the lower and middle-income brackets. Many households remain unaware of GST exemptions and benefits, making it harder to adapt their spending habits. Households running small businesses face additional compliance burdens under GST, impacting their finances.



Source: Field Survey (Questionnaire Method)In the above data, the majority of respondents (78%) reported that groceries and daily essentials are the most affected by GST. This highlights how basic necessities, which form a significant portion of household expenses, are heavily impacted by GST. Tax rates on processed foods, packaged goods, and certain personal care items have likely increased the cost of everyday living. The second-highest category affected is utilities and services, with 12% of respondents indicating a noticeable impact. This includes electricity, water, mobile bills,

and internet services, which are critical for modern households. The GST rates on services have added to the cost of these essential utilities, increasing overall expenses.

A smaller proportion of respondents (6%) felt the impact on healthcare and medicines. Although essential medicines are taxed at lower rates or exempt from GST, other medical supplies, diagnostics, and hospital services attract GST, contributing to increased costs for some families and the Education is reported as the least affected category (4%). Core educational services are exempt from GST; however, costs related to supplementary education, private coaching, and study materials may be affected.

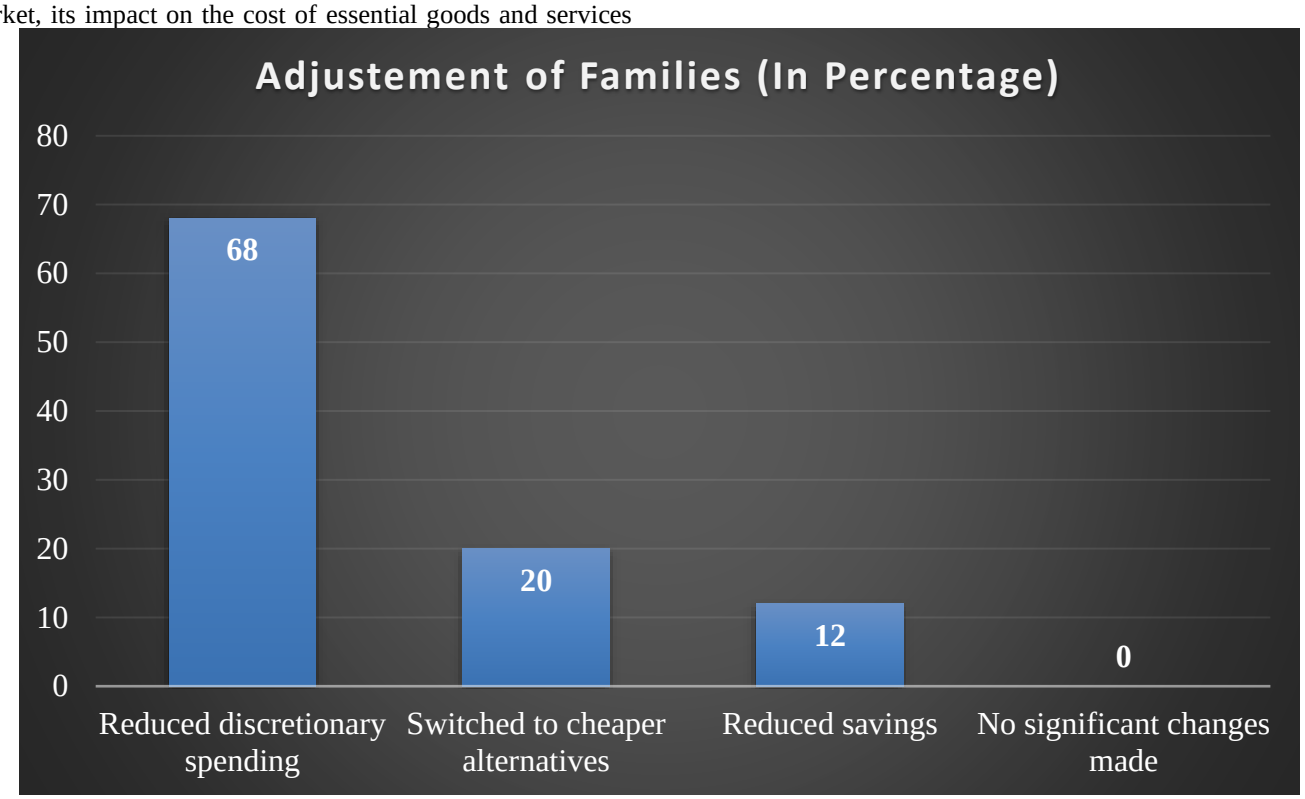
The data underscores that groceries and daily essentials are the most impacted by GST, affecting 78% of households. While utilities and healthcare also add to the financial strain, education remains relatively unaffected. This analysis highlights the need for targeted GST reforms to reduce the burden on basic necessities and essential services, making the tax system more equitable for households.

GST has brought both advantages and challenges for households. While it simplifies taxation and promotes a unified market, its impact on the cost of essential goods and services has increased financial pressure on middle-class families. Targeted reforms, awareness initiatives, and careful monitoring of its effects are crucial to make GST more beneficial for households across all income groups.

Family Adjusted to Increased Expenses Due to GST

While the initial adjustments to GST-related price increases were challenging, families have gradually adapted to the new economic landscape. As the economy continues to evolve and businesses optimize their operations under the GST regime, it is expected that the impact on household expenses will gradually ease. It is important to note that the impact of GST on individual families varies depending on their income levels, spending patterns, and regional variations in prices. However, the collective efforts of families to adapt to the new tax regime demonstrate their resilience and ability to navigate economic challenges.

The implementation of Goods and Services Tax (GST) in India has undeniably led to increased expenses for families across the country. While the government aimed to streamline the tax system and boost economic growth, the initial impact on household budgets was significant. Here's how families have adjusted to the increased expenses.



Source: Field Survey (Questionnaire Method)

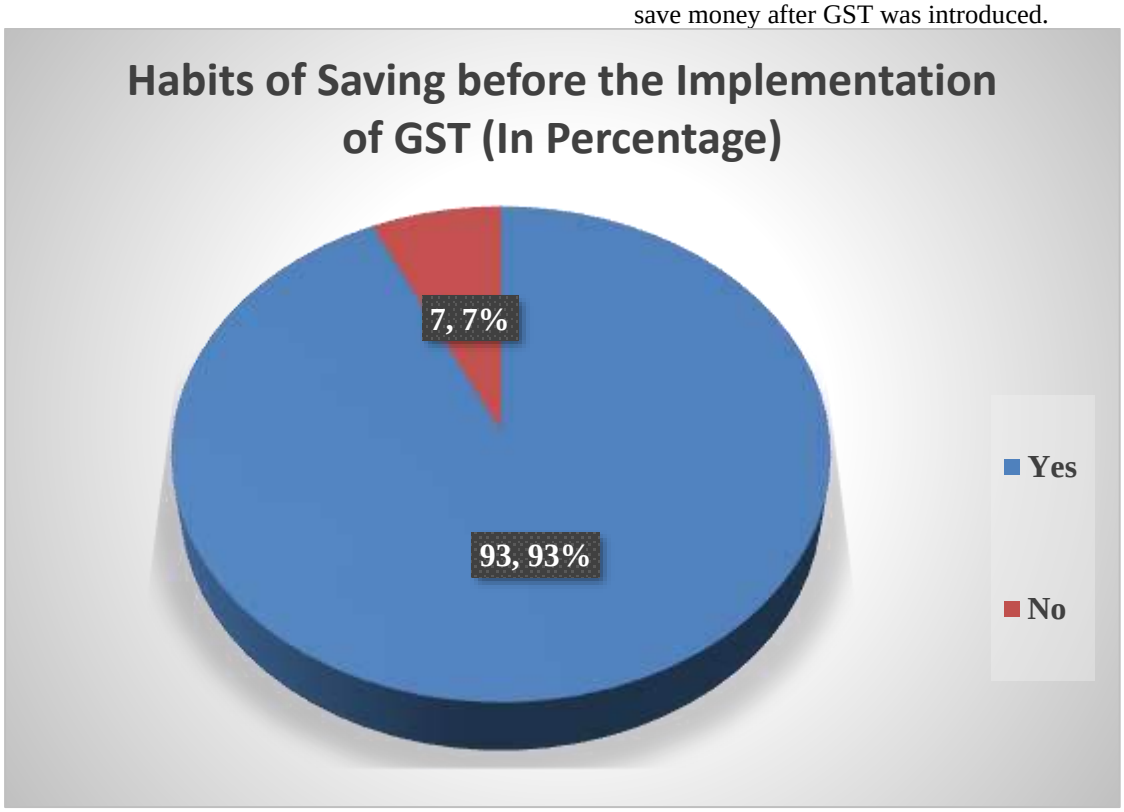
How families are adjusting their expenses due to the impact of increased costs caused by GST (Goods and Services Tax). Here's a detailed explanation:

A majority of families (68%) have chosen to cut back on discretionary or non-essential expenses. This could include reducing spending on entertainment, dining out, travel, or luxury items. This adjustment shows a focus on prioritizing essential needs like food, housing, and healthcare. Around 20% of families are managing their expenses by opting for cheaper or lower-quality alternatives. For instance, they might switch from branded goods to generic ones, buy items on sale, or reduce their consumption of expensive products. A smaller proportion (12%) of families have coped with the increased costs by saving less. Instead of cutting their spending, they are using funds that might otherwise be saved for emergencies, education, or retirement. This can have long-term financial implications. Interestingly, no families reported making no changes at all, suggesting that the GST impact is widespread and has necessitated adjustments in spending or saving patterns for everyone surveyed.

The data reflects the economic strain GST has placed on households, forcing them to reallocate their budgets. The preference for cheaper alternatives may impact premium brands and high-end markets. Families reducing their savings might face challenges in dealing with future financial uncertainties. The significant cutback on discretionary spending indicates a shift toward a more cautious and need-based consumption pattern. This data provides insight into the behavioral and financial adjustments families make when faced with increased taxation and cost-of-living pressures.

Saving before the implementation of GST

The implementation of Goods and Services Tax (GST) in India led to a change in the tax structure, affecting the prices of various goods and services. While the overall impact on household budgets varied, some families did not manage to save money after GST was introduced.



Source: Field Survey (Questionnaire Method)

A significant majority (93%) of families reported saving money before GST was implemented. This indicates a strong culture of financial planning and stability. Families likely prioritized building savings for future needs such as education, healthcare, emergencies, or investments. A less complex tax structure before GST, which made goods and services more affordable, leaving room for savings. Traditional financial behavior among families, especially in countries where savings are culturally valued. Lower inflationary pressures or reduced uncertainty in the economy, enabling households to allocate funds for savings.

A small percentage (7%) of families did not save before GST. Households with lower income levels, who spent most of their earnings on necessities and had little to set aside for savings. People who lived paycheck to paycheck, prioritizing immediate consumption over long-term financial security. Younger or newly formed families still in the process of stabilizing their finances.

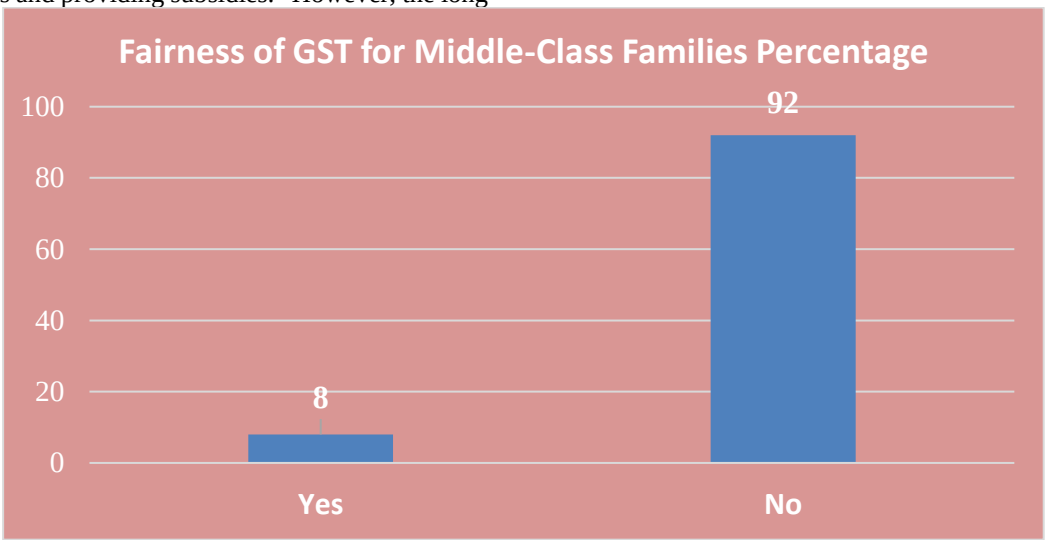
The data suggests that, before GST, the economic environment allowed families to focus more on savings. There might have been fewer financial burdens or better income-to-expense ratios. Shift Post-GST: After GST's implementation, as reflected in the earlier data, many families had to adjust by reducing savings. This shows that GST has added pressure on household budgets, potentially disrupting their financial stability. The high pre-GST saving rate indicates that families were financially cautious and prepared for uncertainties, a habit that might have been compromised due to increased expenses post-GST. This data highlights the stark contrast between saving patterns before and after GST, emphasizing the economic challenges introduced by the new tax regime.

Fairness of GST for Middle-Class Families

The fairness of GST rates for middle-class families is a complex issue with varying perspectives. For some middle-class families, GST has led to increased prices on certain goods and services, affecting their purchasing power. Some argue that GST, particularly on luxury items, can be regressive, disproportionately affecting lower-income households. Initial implementation issues and complexities may have led to temporary price increases and inconvenience for consumers. Ultimately, the impact of GST on middle-class families depends on various factors, including:

1. **Income Levels:** Higher-income families may be less affected by price increases compared to lower-income families.
2. **Spending Patterns:** Families with higher discretionary spending may feel a greater impact on their budgets.
3. **Regional Variations:** The impact of GST can vary across different regions due to factors like local taxes

and economic conditions. It's important to note that the government has taken steps to mitigate the impact of GST on middle-class families, such as rationalizing tax rates and providing subsidies. [1] However, the long-term impact of GST will depend on various factors, including economic growth, inflation, and government policies.

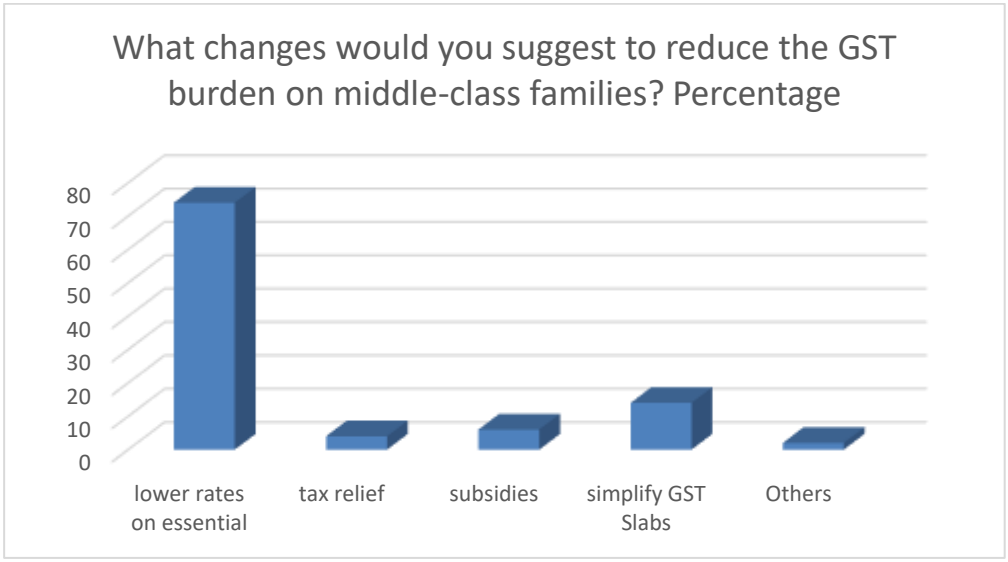


This data reveals the perception of GST (Goods and Services Tax) among middle-class families, showing an overwhelmingly negative sentiment. A small minority (8%) of middle-class families believe GST is fair. A vast majority (92%) of middle-class families feel that GST is not fair to them. Their concerns might include:

1. Increased Financial Burden: Many essential goods and services are taxed at higher rates, significantly impacting the middle-class budget.
2. Reduced Disposable Income: The higher cost of goods and services leaves less room for savings or discretionary spending, as reflected in earlier data.
3. Unfair Tax Structure: Middle-class families might feel that the tax disproportionately affects them compared to wealthier families or businesses, as they lack significant tax breaks or exemptions.
4. Economic Strain: Rising expenses due to GST may have disrupted their financial planning, forcing adjustments like reduced savings or switching to cheaper alternatives.
5. Limited Benefits: They may perceive that the benefits of GST, such as reduced tax evasion or increased government revenue, are not directly improving their standard of living.

The high percentage of dissatisfaction highlights the economic challenges faced by middle-class families under GST. The sentiment suggests a belief that GST disproportionately benefits higher-income groups or large businesses, while the middle class bears a heavier burden. Such a strong negative response indicates a need for policymakers to reassess GST rates and exemptions, especially on goods and services crucial for middle-class families. This data underscores the widespread perception of GST as an unfair burden on the middle class, highlighting the need for reforms to make it more equitable.

Suggestions to Reduce The GST Burden On Middle-Class Families



This data highlights suggested changes to reduce the GST burden on middle-class families, along with the percentage distribution of preferences. Here's the explanation:

A significant majority (74%) prioritize lowering GST rates on essential goods and services like food, medicines, education, and utilities. This reflects the immediate financial strain felt by middle-class families, as essentials form a significant part of their daily expenses. Reducing taxes on these items would directly alleviate their burden.

A small proportion (4%) suggest tax relief measures such as rebates or refunds for healthcare, education, and housing expenses. This indicates that while important, tax relief is viewed as a supplementary measure compared to directly lowering GST rates. Around 6% prefer targeted subsidies to offset the GST burden. This could include state-provided financial assistance for specific groups, like subsidies on fuel, transport, or utilities. This option is less preferred because it relies on government intervention rather than structural tax changes.

About 14% emphasize the need to simplify GST slabs, reducing the complexity of the system and ensuring that essential goods fall under lower slabs. This shows a desire for a more transparent and equitable tax system that is easier to understand and less prone to errors or misuse. A small 2% suggest alternative measures such as increasing digital payment incentives, stricter monitoring of businesses, or adjusting GST periodically based on inflation. These ideas are seen as less impactful compared to the other measures but can still complement broader reforms. This data reflects the middle-class demand for a more equitable GST system that focuses on essentials and simplifies compliance, reducing their financial stress.

CONCLUSION

GST has replaced multiple cascading taxes, making the tax system more straightforward. By unifying the tax structure, GST has reduced logistical costs and improved business efficiency, indirectly benefiting consumers. Basic necessities like food grains and essential medicines are taxed at lower or zero rates, minimizing the direct impact on middle-class households.

Many goods and services, including restaurant bills, insurance premiums, and daily-use items, are taxed at higher rates under GST, leading to increased expenses for middle-class families. Services such as education, healthcare, and transportation, though partly exempt, still involve indirect costs due to GST on inputs. GST is often criticized as being regressive, as it imposes a uniform rate regardless of income levels, disproportionately affecting middle-class families with limited disposable income.

Middle-class families often revise their monthly budgets to accommodate increased expenses. Higher costs lead to reduced savings, affecting long-term financial goals like education, healthcare, and retirement planning. Families may shift to lower-cost alternatives or reduce discretionary spending to manage their expenses. While GST has streamlined taxation and contributed to economic growth, its impact on middle-class families remains a concern. Policymakers must address these challenges by revisiting tax rates on essential items and services, ensuring that the burden on the middle class is minimized. A balanced approach can help maintain the benefits of GST while safeguarding the financial well-being of middle-class households.

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NEXUS BETWEEN CULTURAL TRANSFORMATION AND EMPLOYEE PERFORMANCE IN COUNTY GOVERNMENTS IN KENYA

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ABSTRACT

County Governments in Kenya were established to decentralize governance and enhance the delivery of public services, development projects, and equitable resource distribution. Despite these objectives, several counties continue to register low employee performance, often attributed to limited cultural transformation. This study examined the relationship between cultural transformation and employee performance in Kenyan County Governments. Anchored on the Resource-Based View (RBV) theory, the study adopted a cross-sectional and correlational research design. The target population comprised 470 County Executive Committee (CEC) members, from which a sample of 216 was selected using stratified sampling techniques. Primary data were collected through structured questionnaires, and instrument validity was ensured through expert review. Reliability testing yielded a Cronbach's alpha coefficient of 0.735, indicating acceptable internal consistency. Descriptive statistics (mean and standard deviation) were used to summarize the data, while simple linear regression analysis was employed to test the study objective. Findings revealed that cultural transformation had a significant positive effect on employee performance (β = 0.589, p < 0.05), indicating that a unit increase in cultural transformation is associated with a 58.8% improvement in employee performance. The study concludes that fostering a culture of innovation, digital readiness, and adaptive leadership is essential for enhancing employee productivity and achieving public service effectiveness. It recommends that County Governments prioritize cultural transformation initiatives that promote a shift from legacy practices inherited from the National Government toward more agile, citizen-centric, and innovation-driven cultures.

KEY TERMS: ***Cultural Transformation, Employee Performance, Resource-Based View Theory, Cross-Sectional Design, Correlational Research Design, Kenya.***

INTRODUCTION

Globally, organizations are undergoing unprecedented transformations driven by technological advancements, shifting societal expectations, and evolving managerial ideologies. Among the key facets of this transformation is cultural change, which has emerged as a crucial determinant of organizational adaptability, innovation, and employee performance. In advanced economies such as the United States, Germany, and Japan, cultural transformation has played a pivotal role in redefining organizational behavior, enhancing service delivery, and improving employee engagement. These transformations have been especially notable in public service sectors such as healthcare and education, where digital technologies, participatory leadership, and customer-centric approaches have been adopted to elevate both employee and organizational performance (Sendawula *et al.*, 2018).

Cultural transformation entails the shift from traditional hierarchical and bureaucratic structures to more agile, innovative, and inclusive organizational cultures. This shift has not only improved individual performance but also fostered teamwork, accountability, and continuous improvement. For example, in the United States, public institutions have embraced value-driven leadership and digital platforms to build resilience and enhance citizen satisfaction, especially in times of crisis such as the COVID-19 pandemic (He *et al.*, 2021). Similarly, in Germany and Japan, emphasis on workplace innovation, employee development, and participatory decision-making has yielded tangible gains in employee motivation and organizational output.

In Malaysia, Jayabalan *et al.* (2021) investigated the impact of digital transformation on HR functions in the automotive industry, finding a strong positive relationship between digitalized HR practices and employee performance, particularly in areas such as recruitment, performance appraisal, and training—though compensation practices lagged behind. Similarly, in Nigeria, Nuhammed *et al.* (2021) found that HR digitalization significantly enhanced employee productivity, innovation, and timeliness in the banking sector. These studies underscore the interconnectedness between

digital tools, cultural transformation, and employee outcomes in developing economies.

Cultural transformation is therefore emerging as a strategic imperative for both private and public sector organizations across diverse geographies. According to Foerster-Metz *et al.* (2018), cultural transformation enhances efficiency and collaboration by enabling behavioral shifts supported by digital technology. In Ukraine, Trushkina *et al.* (2020) demonstrated that a culture of agility, innovation, and customer orientation was vital in fostering an information economy and improving organizational performance. In Europe and the Middle East, Alkaraeen and Al-Ashaab (2021) examined public sector institutions in seven countries and found that a digital culture supported by structured learning initiatives like mentoring and coaching significantly enhanced employee skills and service delivery.

Further, Henriette *et al.* (2016) emphasized that the effectiveness of organizational transformation depends on both structural reforms and cultural shifts—particularly top management's commitment to fostering a culture conducive to digital adoption. Abhari *et al.* (2021) also highlighted the critical role of employee experience, co-governance, and digital engagement in driving sustainable transformation in public institutions. These global insights reveal that organizational transformation cannot be successful without concurrent cultural transformation that aligns values, behaviors, and processes with the institution's strategic goals.

A central outcome of organizational and cultural transformation is enhanced employee performance, which is widely acknowledged as a critical driver of institutional effectiveness and sustainability. Employee performance refers to how effectively individuals fulfill their roles and responsibilities in accordance with organizational expectations. It is often measured through indicators such as productivity, work quality, innovation, attendance, communication skills, and customer satisfaction (Widarko & Anwarodin, 2022). According to Bataineh (2017), employee performance reflects the efficiency and effectiveness with which tasks are executed to meet organizational and stakeholder expectations.

Several factors influence employee performance, including leadership style, organizational culture, resource availability, feedback mechanisms, and training opportunities. Smith and Bititci (2017) assert that effective performance measurement systems, supported by a culture of accountability and continuous feedback, enhance both individual and organizational performance. Similarly, Pawirosumarto, Sarjana, and Gunawan (2017) observed that the physical and non-physical work environment—such as interpersonal relationships, autonomy, and recognition—substantially contributes to performance outcomes. Performance management systems, as defined by Islami, Mulolli, and Mustafa (2018), involve a planned process of agreement, support, evaluation, and positive reinforcement that shapes employee behavior and performance.

Within the Kenyan context, employee performance has become an increasingly important issue, particularly in County Governments, which are responsible for delivering essential services to citizens. The formation of County Governments under Kenya's 2010 Constitution was a landmark move aimed at decentralizing governance and improving public service delivery. However, despite the promise of devolution, many County Governments continue to experience inefficiencies, poor service delivery, and low levels of employee motivation.

Research by Maina and Kwasira (2015) revealed that although human resource planning practices positively influence employee performance in County Governments, political interference, nepotism, and lack of merit-based appointments significantly undermine performance. Muthama, Olouch, and Wawudah (2021) further noted that inefficiencies in service delivery stem from weak organizational cultures that resist change, lack transparency, and discourage innovation. These findings point to a persistent challenge: without deliberate cultural transformation, investments in training and performance management may not yield the desired outcomes.

Problem Statement

Despite a number of County Governments in Kenya have implemented reforms such as training programs, strategic planning, and digitization of services, the overall impact on service delivery and employee performance has been uneven. Many public officers continue to operate within a culture characterized by low accountability, limited motivation, and inadequate citizen responsiveness. This situation calls for a shift toward a more performance-oriented culture that fosters professionalism, continuous improvement, and employee empowerment.

Empirical literature from developed countries suggests that cultural transformation in the public sector can lead to improved service delivery, enhanced transparency, increased employee motivation, and greater operational efficiency. However, in Kenya, there is limited empirical research exploring the relationship between cultural transformation and employee performance, particularly within devolved units of government. Most studies focus on structural or financial reforms, neglecting the crucial cultural dimension of organizational change.

Purpose of the Study

This study, therefore, seeks to fill this gap by examining the relationship between cultural transformation and employee performance in County Governments in Kenya. By exploring how cultural values, leadership styles, communication patterns, and institutional norms affect public sector employee performance, the study aims to generate insights that can inform policies and practices aimed at enhancing service delivery, staff productivity, and institutional effectiveness in the context of devolution.

The study therefore tested the following hypothesis;

H_0: There is no statistically significant relationship between cultural transformation and employee performance in County Governments in Kenya.

LITERATURE REVIEW

Theoretical Framework

The Resource-Based Theory (RBT), also known as the Resource-Based View (RBV), was formally introduced by Jay Barney in 1991 through his seminal work titled "Firm Resources and Sustained Competitive Advantage." According Kruesi and Bazelmans, (2023), theory posits that organizations achieve and sustain superior performance by acquiring and leveraging valuable, rare, inimitable, and non-substitutable (VRIN) resources. According to Barney, internal firm resources including human capital, organizational culture, technological capabilities, and structural systems are strategic assets that can lead to a competitive advantage if effectively deployed.

According to Apriliyanti (2022), RBT provides a strong justification for internal capacity development, it often understates the role of external environment factors such as policy, politics, and stakeholder pressure, which are especially influential in public sector institutions like county governments. Additionally, RBT assumes that resources are deployed effectively, which may not always hold in bureaucratic contexts where resource misuse or resistance to change can limit the realization of performance gains. However, the theory is well-suited to explain cultural transformation as these are non-tangible resources like culture that align with RBT's emphasis on unique, hard-to-imitate organizational capabilities (Tiwari, Bryde, Stavropoulou, & Malhotra, 2024). This is relevant in explaining the role of culture transformation utilizing the organization human resource for higher employee performance.

Review of Related Literature

Cultural transformation which involves people and structure remain crucial in organizational transformation. Foerster-Metz, Marquardt, Golowko, Kompalla, and Hell (2018) asserts that organizational transformation enables the organization to interconnect, utilize information and intelligence, adopt automation leading to efficiency and collaboration. These benefits arise from the firm's ability to change organization behavoir and culture. In another study Trushkina, Abazov, Rynkevych, and Bakhautdinova (2020) proclaims that transformation of organizational culture contributes to organizational transformation. Organization culture in Ukraine that focused on information economy improved organizational transformation.

This implies that organizational transformation is dependent on the tranformation of organizational culture to achieve information economy. He, Huang, Choi, and Bilgihan, (2021) who studied organizational resilience indicated that organizational vision, governance and culture were crucial in facing uncertainities such as Covid-19. The study asserts that USA among other firms were affected by Covid-19 where organizational transformation assisted small and medium-size service industry to create organization resilience during the pandemic. However, organizational transformation required the organization to conduct organization culture transformation as a means of achieving organizational resilience to Covid-19. Verhoef, Broekhuizen, Bart, Bhattacharya, and Dong (2021) asserted that organizational transformation process entails digitization, digitalization and digital transformation. The organizational transformationneeds appropriate organizational structure for it to bear performance. Hence, organizational structural change fits different digital platforms which translate to performance if aligned with the organizational transformation.

Organization behavior was examined by Foerster-Metz, Marquardt, Golowko, Kompalla, and Hell (2018) in relation to organizational transformation. Analytical robotics and algorithms among other digital technology affect the employees in an organization. A review of literature that examined rising technologies and its impact on organizational behavior affecting leadership and employees. The findings indicated that mobile, internet of things and cloud digital technology have transformed interconnectedness which have been readly available to both employees and their leaders. Big data and analytics have been responsible for improvement in information and intelligency assisting improving performance and optimization of process.

Automation efficiency has also improved significantly with organizations adopting robotics, robot processing, intelligentautomation and artificial intelligence. Finally, organizational transformation has assisted in communication and collaboration through the adoption of social media platforms. The cultural transformation should be geared to behavior change of employees and leadership to facilitate organizational transformation as new oppurtunities in business. The current study used primary data to assess organizational transformation that is appropriate for enabling organizational transformation in the County Governments.

A study by Trushkina, Abazov, Rynkevych, and Bakhautdinova (2020) assessed organizational transformation of organizational culture in the conditions of achieving information economy in Ukraine. Data were obtained from literature review of trends, barriers, features, problems and direction of digital tranformation in relation to organizational culture among Ukrainian firms. The synthesis of literature were grouped into involvement, consistency, mission and adaptability themes. In organizational transformation, communications efficiency, innovative business models, information powered business ecosystems and digital technology were examined. The findings indicated that organizational culture that impacts organizational transformation in information economy included the agile systems, customer-centric process, innovativeness and people oriented collaboration. Organization culture transformation remains an important pillar in changing people's behaviour and perception in organizational transformation. The current study measured organizational transformation using organization culture. This was done through the adoption of correlational research design that depends on primary data as opposed to synthesis of literature.

He, Huang, Choi, and Bilgihan, (2021) assessed the organizational transformation in relation to building organizational resilience in USA. Covid-19 provided a lesson to businesses around the world resulting to uncertainies and risks that needed immediate, flexible, creative and resilient response. The study's purpose was to establish theoretical relationship between digital platforms and organization resilience and its effect to organizations and employees. The

study targeted 474 participants who worked as employees in small and medium-sized service enterprises. This was analyzed using structural equation modelling, confirmatory factor analysis, exploratory factor analysis and path analysis. Findings indicated that strategic technology investment assisted the firms in developing a systematic control sustain operation but does not directly contribute to employee capabilities. A transformation management enables organizational transformation in culture, governance and vision in relation to organizational transformation. Organization resilience had different effect on organization and employees. The current study focused on organizational transformation through organizational resilience and also touched on organizational culture, governance and vision. However, Organizational transformation was measured in the current study using structural changes, organizational culture changes and organizational learning.

Alkaraeen and Al-Ashaab (2021) examined the the role of digitalization of the Organizational Learning Capability in relation to organizational performance in public sector. The study interviewed 37 employees from 30 public sector organizations from seven countries which are Spain, Finland, France, Poland, EAU, UK and Norway. The results indicated that public organizations offer various learning opportunities to develop and enhance their employees' skills to improve the quality of their services. Different learning methods such as classroom training, mentoring, and coaching are being used to enhance employees' service provision abilities. To effectively provide these learning programs, public organizations need to adopt an approach that supports their efforts.
The study proposed that the Organizational Learning Capability (OLC) model is an appropriate approach to facilitate the learning process. The OLC model consists of key elements such as learning processes, enablers, and influential factors that can support the learning initiatives in public organizations. The study aimed to bridge the gap between learning investments and service provision improvement in public organizations by providing a set of learning and development programs. This paper focuses on coaching as one of the learning programs presented within the top OLC model. The current study focused on organization learning as a variable of cultural transformation.

Abhari, Ostroff, Barcellos, and Williams (2021) examined co-governance in organizational transformation iniatives as well as its role in digital culture and employee experience. Organizational transformation is instrumental in convertion of digitization of human resource functions, cultural transformation, process transformation and structural transformation to remain competitive. Empirical synthesis of literature has indicated that organizational transformation is not limited to the process of implementation of digital technology but should consider culture, values and goals of the organization. It is important to consider employees by examining organizational transformation through culture, organizational transformation co-governance and employee experience. The study provides theoretical and practical role of process and organizational transformation by showing the role of the employees in organizational transformation. The current study not only considered process and cultural transformation but also digitization of human resource functions.

Using synthesis of literature review Uysal (2021) studied digital culture in relation to employees. The technological advancements of the current era have resulted in the emergence of digitalization and digital culture, which have become significant factors that shape the social and business aspects of individuals. It is evident that digital culture, which is influenced by organizational culture, plays a vital role in defining the identity and activities of organizations operating in the business environment. The impact of digitalization on organizational culture has attracted the attention of researchers, resulting in a surge of academic studies on digitalization and culture. While previous studies have focused on the digital change in business life and digital leadership, this study is centered on the impact of organizational transformation on organizational culture, digital culture, and employees. The current study focused on organizational learning, organizational cultural change and leadership.

A systematic literature review of organizational transformation challenges was examined by Henriette, Feki, and Boughzala (2016). The study used exploratory qualitative design in desining and development of dimension of organizational transformation obtained from organizational transformation literature. The results indicated that organizational transformation had higher stakes in improve firm commitment and engagement of top management in organizational transformation. This is because the cultural change in digitalization process assisted efficiency and effectiveness of digital adoption in the firms. The current study examined the relationship between organizational transformation and employee performance rather than challenges of organizational transformation.

Knowledge Gap

The review revealed that there few study that are done in Kenya on cultural transformation. In study related with organizational transformation and organization behavior Foerster-Metz, Marquardt, Golowko, Kompalla, and Hell (2018) that used synthesis of literature review. The results that were achieved were not in the context of organizational transformation in County Governments. The current study addressed by using primary data obtained from the County Governments management to examine the role of organizational transformation. A systhesis of literature was adopted by Trushkina, Abazov, Rynkevych, and Bakhautdinova (2020) which were based on organizational culture trends, features, barriers, direction and problems. The study utilized correlational research design which adopted primary data from County Governments in Kenya.

RESEARCH METHODOLOGY

The study adopted a positivist research philosophy and employed cross-sectional and correlational research designs. It was conducted in Kenya, targeting all 47 County Governments. The population comprised 470 County Executive Committee (CEC) members, from which a sample of 216 was drawn using stratified random sampling based on departmental representation. Primary data were collected through a

structured questionnaire. A pilot study involving 22 CEC members (excluded from the main sample) was conducted to test reliability, yielding a Cronbach's alpha of 0.735, which exceeded the 0.7 threshold for internal consistency. Descriptive statistics, including means and standard deviations, were used to summarize the data. Inferential statistics, specifically simple linear regression analysis, were employed to test the relationship between cultural transformation and employee performance.

RESULTS AND DISCUSSIONS

Cultural Transformation

The study explored on cultural transformation as important organizational transformation concept. The opinions were analyzed in terms of mean and standard deviation as presented in Table 1.

Table 1: Cultural Transformation

	SD	D	N	A	SA	Mean	Std. Deviation
The County Government has digitalized the management systems as an improvement in leadership structures.	0(0.0%)	11(5.1%)	26(12.0%)	163(75.5%)	16(7.4%)	3.8519	.61478
The County Government leadership has supported the changes in organizational transformation to enable high efficiency in service delivery.	0(0.0%)	5(2.3%)	37(17.1%)	92(42.6%)	82(38.0%)	4.1620	.78749
The County Government has created a culture that embraces digital platforms in every department in the county.	0(0.0%)	8(3.7%)	31(14.4%)	151(69.9%)	26(12.0%)	3.9028	.63597
The County Government has a conducive environment for learning and innovation based on existing digital platforms.	0(0.0%)	6(2.8%)	22(10.2%)	147(68.1%)	41(19.0%)	4.0324	.63529
The County Government has encouraged organizational learning process in digital concepts to improve efficiency.	0(0.0%)	10(4.6%)	21(9.7%)	159(73.6%)	26(12.0%)	3.9306	.63230
The County Government has benchmarked with different counties and countries on the best adoptable technology for organizational transformation of our county.	0(0.0%)	4(1.9%)	21(9.7%)	170(78.7%)	21(9.7%)	3.9630	.51806
Aggregate						3.9738	.44673

Table 1 results showed that 163(75.5%) of the respondents agreed that the County Government had digitalized the management systems as an improvement in leadership structures. The mean results of 3.8519 and standard deviation of 0.61478, further indicated that digitalization of management systems was done to fit leadership structures among different County Governments. The results further revealed that the County Government leadership had supported the changes in organizational transformation to enable high efficiency in service delivery, as revealed by 92(42.6%) and 82(38.0%) who agreed and strongly agreed respectively. The mean results of 4.1620 and standard deviation of 0.78749 showed that organizational transformation has improved efficiency of service delivery.

The results indicated that 151(69.9%) respondents agreed that the County Government had created a culture that embraces digital platforms in every department in the County. A mean of 3.9028 with a standard deviation of 0.63597 implied that digital platforms are embraced in County Government departments across Kenya.

The results further indicated that 147(68.1%) of the respondents agreed that the County Government had a conducive environment for learning and innovation based on existing digital platforms. The mean of 4.0324 and standard deviation of 0.63529 were obtained, which implied that the learning and innovation culture was driven by digital platforms utilized in the County Governments.

The findings revealed that 159(73.6%) of the respondents agreed that the County Government had encouraged the organizational learning process in digital concepts to improve efficiency. This had a mean of 3.9306 and a standard deviation of 0.63230, which implied that the organizational learning process was encouraged as a culture in County Governments in Kenya.

Finally, 170(78.7%) of the respondents agreed that the County Government had benchmarked with different counties and countries on the best adoptable technology for organizational transformation of the County. A mean of 3.9630 and standard deviation of 0.51806 implied that the County Government focused on improving technology adoption through benchmarking other counties and countries.

An aggregate mean of 3.9738 and standard deviation of 0.44673 implied that cultural transformation was applied uniformly across Counties. Therefore, cultural transformation contributed significantly to organizational transformation in the County Government.

Employee performance

The results in Table 2 highlight the perceptions of respondents regarding employee performance in the County Government, analyzed using frequency, percentage frequency, mean, and standard deviation.

Table 2: Employee Performance

	SD	D	N	A	SA	Mean	Std. Deviation
The County Government has improved the quality of employees' tasks through improvement in technology.	0(0.0%)	9(4.2%)	18(8.3%)	167(77.3%)	22(10.2%)	3.9352	.59099
The County Government has improved effectiveness in internal collaboration between employees.	1(0.5%)	0(0.0%)	32(14.8%)	109(50.5%)	74(34.3%)	4.1806	.70861
Adoption of digital technology in the county government has increased the quantity of tasks done.	0(0.0%)	7(3.2%)	24(11.1%)	148(68.5%)	37(17.1%)	3.9954	.64338
The County Government has enhanced the efficiency of service delivery through technology advancement.	0(0.0%)	7(3.2%)	24(11.1%)	148(68.5%)	37(17.1%)	4.0324	.59757
The County Government has received positive comments from the citizens that they are satisfied with the service delivery.	1(0.5%)	4(1.9%)	30(13.9%)	160(74.1%)	21(9.7%)	3.9074	.58726
The County Government has improved the timeliness in service delivery.	0(0.0%)	10(4.6%)	18(8.3%)	171(79.2%)	17(7.9%)	3.9028	.58253
Aggregate						3.9923	.41227

The results revealed that a majority of respondents, 167 (77.3%), agreed that technological advancements within County Governments have led to improved quality in employee task execution. This is reinforced by a mean score of 3.9352 and a standard deviation of 0.59099, indicating a consistent perception of technology's role in enhancing task quality. Additionally, 109 respondents (50.5%) agreed and 74 (34.3%) strongly agreed that internal collaboration among employees had become more effective, attributed to cultural transformation initiatives. This perception is supported by a high mean of 4.1806 and a standard deviation of 0.70861, reflecting a strong commitment to enhancing internal teamwork.

The integration of digital technologies was also found to increase task output, with 148 respondents (68.5%) agreeing and 37 (17.1%) strongly agreeing. This is captured by a mean of 3.9954 and a standard deviation of 0.64338, suggesting notable improvements in productivity. Moreover, 148 respondents (68.5%) affirmed that technological improvements have enhanced service delivery efficiency. This view is supported by a mean of 4.0324 and a standard deviation of 0.59757.

In terms of citizen feedback, 160 respondents (74.1%) acknowledged receiving positive public responses regarding service delivery, reflected in a mean of 3.9074 and a standard deviation of 0.58726. Furthermore, 171 respondents (79.2%) agreed that service timeliness had improved, as evidenced by a mean of 3.9028 and a standard deviation of 0.58253. Overall, the aggregated mean for employee performance was 3.9923 with a standard deviation of 0.41227, indicating generally high performance levels across County Governments in Kenya.

H_0: There is no statistically significant relationship between cultural transformation and employee performance in County Governments in Kenya.

The results presented in Table 3 to Table 5 offer valuable insights into the relationship between cultural transformation (X_1) and employee performance (Y) in County Governments in Kenya. The analysis provides strong evidence of a statistically

significant and positive relationship between these two variables.

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.638[a]	.407	.404	.31821

a. Predictors: (Constant), Cultural Transformation

The model summary result in Table 3 shows that the correlation coefficient (R = 0.638) indicates a moderate to strong positive linear relationship between cultural transformation and employee performance. This suggests that as cultural transformation initiatives improve, there is a corresponding and significant improvement in employee performance. The coefficient of determination (R^2 = 0.407) reveals that cultural transformation explains 40.7% of the variation in employee performance, while the remaining 59.3% is attributed to other factors not included in the model. The adjusted R^2 (0.404) is very close to the R^2 value, indicating that the model is well-fitted and appropriately accounts for the impact of cultural transformation without overestimating its contribution. In addition, the standard error of the estimate (0.31821) suggests that the predictions made by the model have a reasonable level of precision, with only minor deviations from observed values.

Table 4: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.873	1	14.873	146.881	.000[b]
	Residual	21.670	214	.101		
	Total	36.543	215			

a. Dependent Variable: Y

b. Predictors: (Constant), Cultural Transformation

Table 4 provides the ANOVA results, which test the overall significance of the regression model. The F-statistic (146.881) is notably high, and the associated p-value (p = 0.000) is far below the significance threshold of 0.05. This confirms that the regression model is statistically significant, implying that cultural transformation (X_1) has a meaningful and measurable impact on employee performance (Y). The results strongly support rejecting the null hypothesis (H_0), which stated that there is no statistically significant relationship between cultural transformation and employee performance.

Table 5: Coefficients

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	1.653	.194		8.508	.000
	X1	.589	.049	.638	12.119	.000

a. Dependent Variable: Y

The coefficients Table 5 provides detailed insights into the contribution of cultural transformation to employee performance. The constant (B = 1.653, p = 0.000) represents the predicted baseline level of employee performance when no cultural transformation occurs (X_1 = 0). The unstandardized coefficient for X_1 (B = 0.589, p = 0.000) indicates that for every one-unit increase in cultural transformation, employee performance improves by 0.589 units on average. The standardized coefficient (Beta = 0.638) confirms that cultural transformation has a strong and positive effect on employee performance, reinforcing its significance as a predictor variable. Furthermore, the t-value (12.119) and corresponding p-value (p = 0.000) highlight the reliability and statistical significance of this relationship.

From these results, the regression equation is derived as follows:

$Y = 1.653 + 0.589X_1$

This equation implies that for every additional unit of cultural transformation (X_1), employee performance (Y) increases by 0.589 units. The baseline employee performance level, even in the absence of cultural transformation, is 1.653 units.

The analysis demonstrates a statistically significant and positive relationship between cultural transformation and employee performance in County Governments in Kenya. With cultural transformation explaining 40.7% of the variance in employee performance and the results showing strong significance (p = 0.000), the study provides robust evidence to reject the null hypothesis (H_0). This highlights the critical role of cultural transformation in enhancing employee performance and emphasizes its importance as a strategic focus for organizational development.

These findings reveal a statistically significant and positive relationship between cultural transformation and employee performance in County Governments in Kenya, with cultural transformation explaining 40.7% of the variance in employee performance. These results are consistent with empirical studies that highlight the pivotal role of organizational culture in driving transformation and improving performance. For instance, Foerster-Metz *et al.*, (2018) assert that organizational culture is key to effective transformation, allowing organizations to improve their efficiency and collaboration. The present study supports this notion by demonstrating how

cultural transformation, particularly in the public sector, is essential for enhancing employee performance.

Additionally, studies such as those by Trushkina *et al.,* (2020) and He *et al.,* (2021) highlight the importance of organizational culture in driving successful transformations. Trushkina *et al.,* found that in Ukraine, organizational culture focusing on adaptability and innovation contributed significantly to achieving a digital economy. Similarly, He *et al.,* emphasized the role of culture in building resilience during crises like COVID-19. These findings align with the current study's results, where the cultural transformation within County Governments appears to foster resilience and adaptability, leading to better employee performance, especially in challenging times.

Furthermore, the findings are reinforced by Alkaraeen and Al-Ashaab's (2021) work, which highlights the importance of learning and development as part of cultural transformation in public organizations. They argue that adopting organizational learning models can help enhance employee skills and improve service delivery. The current study builds on this perspective by recognizing that organizational learning is an integral part of cultural transformation. As County Governments embrace cultural changes, learning initiatives that support skill development are likely contributing to improved employee performance, as seen in the study's findings.

In contrast to some studies that focus on the challenges of implementing cultural transformation, such as Henriette, Feki, and Boughzala's (2016) research, which highlights the obstacles organizations face during transformation processes, the current study emphasizes the positive impact of cultural transformation on employee performance. While the challenges are undeniable, the results suggest that when managed effectively, cultural transformation in County Governments can significantly enhance employee performance. The study provides valuable insights for organizations looking to prioritize cultural transformation as a strategic approach to improving performance, aligning with the broader trend of incorporating culture as a cornerstone of organizational success.

CONCLUSIONS AND RECOMMENDATIONS

Summary

Cultural transformation has played a pivotal role in improving employee performance within County Governments, primarily through the alignment of digitalization with leadership structures and operational processes. The adoption of digital platforms across departments has fostered an environment of learning and innovation, leading to improved efficiency and adaptability. Benchmarking best practices from other counties and countries has further strengthened this transformation. Statistical evidence indicates a significant positive relationship between cultural transformation and employee performance, emphasizing the need to embed a digital-oriented and learning-focused culture to enhance operational efficiency and organizational success. The study rejected the null hypothesis and accepted alternative which implied that cultural transformation had a positive and significant relationship with employee performance in the County Government in Kenya ($B = 0.589$, $p = 0.000<0.05$)

Conclusion

Cultural transformation is identified as a crucial factor in improving employee performance within County Governments. The alignment of digital management systems with leadership structures, the promotion of learning and innovation, and the integration of digital platforms across departments have collectively enhanced adaptability and efficiency. The study confirms a strong positive relationship between cultural transformation and employee performance, emphasizing its role as a strategic driver of operational success. These findings underscore the need for County Governments to prioritize cultural transformation to create an adaptive and innovative work environment that supports sustained performance improvements.

Recommendations

The study recommends the County Governments should prioritize fostering a culture that embraces digitalization and innovation. Leadership should actively support digital transformation by aligning management structures with technological initiatives and promoting continuous learning. Investment in professional development programs and digital literacy training is necessary to prepare employees for technological advancements. Institutionalizing benchmarking with other counties and global best practices will help identify and adopt innovative approaches that enhance cultural transformation. Creating a supportive environment that values learning, collaboration, and adaptability will sustain cultural transformation and drive continuous improvements in employee performance.

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MERGERS AND ACQUISITIONS IN BANKING SECTOR

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ABSTRACT DOI No: 10.36713/epra23274 Article DOI: https://doi.org/10.36713/epra23274

This paper examines the Mergers and Acquisitions (M&A) that have taken place within the Indian banking system to understand the resulting cooperative synergies and the long-term impacts of these mergers. Furthermore, the paper investigates and emphasizes significant trends in the Indian banking sector following the mergers and acquisitions, subsequently proposing several measures that banks should contemplate for the future. The study elucidates the implications of M&As by analyzing the flow and patterns within the Indian banking system. It endeavours to review previous research to evaluate and assess the performance of M&As in the Indian banking sector. The findings indicate that while M&A activities in the Indian banking system have been skillfully executed, the economy has reaped only limited benefits thus far. Policymakers and the government must exercise caution when merging robust banks with weaker ones, as this could adversely affect the assets of the stronger banks, rather than merely safeguarding the interests of distressed banks. Additionally, the paper focuses on recently merged banks and the newly established entities. The research utilizes available secondary data and aims to understand the history of Indian banking sector, purpose of mergers and acquisition, and observe the trends of mergers and acquisitions in Indian Banking Sector.

KEYWORDS: ***Mergers, Acquisitions, Banking Sector, Competitive Advantage***

INTRODUCTION

The restructuring of a banking group, including mergers within the group or the acquisition of subsidiaries, joint ventures, and branch offices by banks or their parent companies, should prioritize the stability of the overall banking system. (Marcus, 2000) Although mergers have decreased the total number of banks, they also allow the banking sector to leverage new opportunities that arise from technological advancements and regulatory changes (Szewczyk, 2008). The mergers and acquisitions prompted by consolidation programs in the banking sector have enhanced competitiveness and efficiency in the banks' borrowing and lending activities (Elumilade & Elumilade, 2010). These mergers and acquisitions have influenced the performance of Indian banks following liberalization, likely evaluating whether the anticipated synergies and advantages of the mergers were achieved through an analysis of financial metrics such as assets, profits, revenue, and deposits (Dutta & Dawn, 2012). M&As serve as a strategy for obtaining a competitive advantage, achieving economies of scale, and adapting to the changing regulatory environment, including compliance with Basel II standards. M&As result in cost efficiencies, broader service offerings, and strategic benefits for the banks involved. While immediate profitability post-merger may not show significant changes, there are promising prospects for future enhancements, indicating that mergers have resulted in greater cost efficiencies for the banks involved (Meena & Kumar, 2014). The trend of consolidation in the banking sector is on the rise due to mergers and acquisitions, motivated by the desire to gain international prominence, reduce competition, enhance financial advantages, broaden service offerings, and manage resources effectively.

Mergers and acquisitions in the banking sector can facilitate the sustainable development of the domestic financial system, providing banks with opportunities to tackle liquidity and capital challenges. However, these mergers and acquisitions can also lead to misjudged bank valuations, profit manipulation, increased market concentration, and the emergence of institutions that are deemed 'too big to fail' (Novickytė & Pedroja, 2015). The mergers and acquisitions have enhanced the value for shareholders of the banks involved in these transactions in Kenya, with the primary motivation for most banks merging or acquiring being the desire to increase profitability. The principal objective of such mergers or acquisitions is to boost profitability and expand market share. (Gwaya Ondieki Joash 2015) A notable distinction exists in the performance of banks prior to and following the implementation of mergers and acquisitions, which significantly influence bank performance. (Babalola 2016) The effectiveness of mergers and acquisitions within the banking sector is contingent upon the capacity to evaluate asset relatedness and cultural disparities, as well as the proficiency in integrating the two banking entities. While mergers and acquisitions can facilitate economies of scale and enhance efficiency, they may also incur adjustment costs and adversely affect performance. Several critical factors that affect the success of M&As in the banking industry include the caliber of human resource management, regional cultural variances,

effective communication, and the engagement of integration advisors. (Krati Rajoria 2017) Mergers and acquisitions have served as a strategic mechanism for growth and consolidation within the Indian banking sector, yielding significant outcomes in terms of rescuing underperforming banks and establishing more robust institutions. The Indian banking landscape has experienced substantial transformations and advancements over the years, characterized by three distinct growth phases.

Mergers and acquisitions have played an essential role in the evolution and progress of the Indian banking sector, contributing to the formation of stronger and more efficient banks. The research further emphasizes the necessity for the sector to prioritize quality over quantity, advocating for a limited number of banks that possess a broader reach, superior services, stronger financial positions, and a more stable capital foundation. (Amrita Gupta, 2017) There is no enhancement in the financial performance of acquiring companies following mergers and acquisitions (M&A). The gross profit margin of the chosen firms decreased post-M&A. This suggests that a significant level of cost efficiency enhances performance regarding profitability. Mergers and acquisitions result in a heightened degree of cost efficiency because the combined entity utilizes fewer costs, personnel, management resources, and financial assets to achieve the highest possible output after the merger (Samiya Mubeen 2017). The merger, acquisition, or transfer of shares does not positively affect the asset quality, management competence, market risk, or liquidity of the bank. In fact, mergers, acquisitions, or share transfers have a detrimental impact on asset quality, management capability, market risk, and liquidity ratios, indicating that the anticipated success levels have not been realized (Güray Küçükkocaoğlu 2018). While M&A has a favorable effect on the financial performance of banks, leading to improvements in liquidity, profitability, and investment ratios, it also negatively impacts solvency ratios due to an increased debt burden (Hussain 2019). M&As have achieved some level of success in the Indian banking sector. Policymakers and the government should refrain from endorsing mergers between robust and struggling banks, as this could adversely affect the asset quality of the stronger institutions. The merger process may encounter obstacles such as the integration of personnel and the restructuring of job roles; therefore, banks must weigh the advantages and disadvantages of mergers and acquisitions before proceeding with any decisions (Ishwarya J 2019). Regulatory-driven mergers and acquisitions can lead to improved performance and cost efficiency, albeit with diminished intermediary capabilities. The entry of foreign banks can assist acquired banks in enhancing their intermediary functions, prompting policymakers to evaluate the potential benefits and challenges associated with mergers and acquisitions in the banking sector (Inka B. Yusgiantoro 2020). This paper focuses on recently merged banks and the newly established entities. The research utilizes available secondary data and aims to understand the history of Indian banking sector, purpose of mergers and acquisition, and observe the trends of mergers and acquisitions in Indian Banking Sector.

OBJECTIVES OF THE STUDY

1. To understand the purpose of mergers and acquisition in Indian banking sector.
2. To observe the trends of mergers and acquisitions in Indian Banking Sector.
3. To understand the history of Indian banking sector.

Purpose of mergers and acquisition in Indian Banking Sector

The Indian banking sector is experiencing significant growth, establishing itself as a leading service industry within the country. Over recent decades, the advancements in this sector have played a crucial role in the overall development of India, necessitating the pursuit of new opportunities to sustain this momentum. Mergers and acquisitions are essential strategies that can propel the banking industry into new realms, enabling local banks to modernize and achieve global standards of excellence. However, challenges such as high levels of non-performing assets (NPAs) and political interference, particularly within Public Sector Banks (PSBs), can hinder progress and lead to systemic issues. The consolidation of banks through mergers can mitigate these risks by enhancing oversight and operational efficiency, as evidenced by the government-initiated mergers following the surge in NPAs in 2018-19. Ultimately, these strategic moves can lead to improved production processes, market expansion, and the stabilization of
the financial sector, while also ensuring better customer service through enhanced accessibility and outreach.

Trends of mergers and acquisitions in Indian Banking Sector

Bank mergers and acquisitions in India have emerged as a notable trend in recent years, influenced by various factors such as regulatory changes, economic conditions, and the necessity for scale and efficiency within the banking sector. Below are some significant trends:

1. **Regulatory Influence:** The regulatory environment plays a crucial role in shaping the trends of mergers and acquisitions (M&A) within India's banking sector. The Reserve Bank of India (RBI), as the central regulatory authority, actively promotes bank consolidation to achieve several objectives. One of the primary aims is to bolster financial stability by reducing the number of smaller, less robust banks, thereby fostering the emergence of larger, more resilient institutions capable of withstanding economic fluctuations and financial crises. Additionally, larger banks benefit from economies of scale, leading to improved operational efficiency and cost savings, which are essential in a competitive market characterized by tight profit margins. Furthermore, consolidation allows banks to pool their resources and expertise in risk management, enhancing their ability to address credit, market, and operational risks, all vital for maintaining a stable banking system. Mergers also facilitate more efficient regulatory compliance and elevate corporate governance standards, which are increasingly important in light of growing regulatory expectations and the demand for transparency. Lastly, the formation of stronger banks through mergers positions them to compete more effectively on a global scale, enabling them to offer a wider range of products and services, attract larger investments, and engage more actively in international markets.

2. **Consolidation of Public Sector Banks (PSBs)**: The consolidation of Public Sector Banks (PSBs) in India represents a pivotal shift in the banking landscape, driven by initiatives from the government and the Reserve Bank of India (RBI) to

tackle existing challenges and seize new opportunities. The rationale behind this consolidation stems from the historical presence of numerous smaller PSBs, many grappling with high non-performing assets (NPAs) and operational inefficiencies. By merging these banks into larger entities, the aim is to forge stronger institutions with improved lending capabilities and asset quality. Notable examples of recent mergers include the 2018 amalgamation of ten PSBs into four major banks, such as Punjab National Bank's acquisition of Oriental Bank of Commerce and United Bank of India, and Canara Bank's merger with Syndicate Bank. These consolidations are anticipated to yield significant benefits, including cost synergies, enhanced operational efficiency, and superior risk management, all of which are essential for PSBs to remain competitive against private sector banks. However, the process of merging large PSBs is fraught with challenges, including the need for cultural integration, alignment of IT systems, branch rationalization, and effective human resource management. Addressing these challenges requires meticulous planning to ensure minimal disruption for customers and employees alike. The impact of these mergers extends to various stakeholders, including shareholders, customers, and employees, necessitating clear communication about the long-term advantages of consolidation and the strategies in place to address any immediate concerns.

3. Merging in Private sector banks: In India, private sector banks have been actively engaging in mergers and acquisitions to bolster their market presence and broaden their operational scope. These strategic acquisitions allow banks to integrate smaller financial institutions, thereby gaining entry into new markets and customer demographics, as well as enhancing their product and service offerings. Noteworthy instances include HDFC Bank's purchase of Centurion Bank of Punjab in 2008 and Kotak Mahindra Bank's acquisition of ING Vysya Bank in 2015, both of which exemplify successful consolidation efforts within the sector. The motivations behind these mergers often include the pursuit of economies of scale, diversification of revenue sources, the utilization of advanced technology, and the enhancement of brand value, all of which are essential for sustained growth in a competitive banking landscape. Furthermore, such mergers are subject to regulatory oversight to ensure adherence to competition laws and the protection of consumer interests, with the Reserve Bank of India playing a pivotal role in assessing the strategic rationale and financial viability of these transactions. Ultimately, the consolidation of private sector banks significantly alters market dynamics, reshaping competitive environments, influencing pricing strategies, and establishing new standards for service excellence and innovation in the banking industry.

4. **Technology**: Technology and innovation play a crucial role in the landscape of bank mergers and acquisitions, facilitating operational efficiencies, enhancing customer experiences, and fostering strategic growth. The integration of various IT systems, platforms, and databases is essential to ensure smooth operations within the newly formed entity, which is vital for maintaining service continuity, safeguarding data security, and adhering to regulatory standards. Additionally, banks often seize merger opportunities to expedite their digital transformation efforts, which may involve upgrading digital banking services, utilizing advanced analytics for deeper customer insights, and adopting fintech solutions to boost operational flexibility. Furthermore, these mergers allow banks to expand their offerings of customer-centric solutions, including personalized banking services and innovative financial products, aimed at improving customer retention and attracting new clientele in a competitive environment. By capitalizing on shared infrastructure and cutting-edge technologies, merged institutions can realize significant efficiency improvements in transaction processing, risk management, and back-office functions, ultimately leading to reduced costs and enhanced profitability over time. However, it is imperative that the technological integration during mergers adheres to strict regulatory requirements concerning data privacy, cyber security, and compliance reporting, prompting banks to invest in robust IT governance frameworks to mitigate associated risks.

5. **Customers and employees**: The implications of bank mergers and acquisitions extend significantly to both customers and employees involved in the merging institutions. For customers, the primary goal is to ensure a smooth transition with minimal disruption to services, which includes maintaining access to ATMs and branches while effectively communicating any changes in products or policies. Gathering customer feedback and measuring satisfaction are vital for addressing challenges that arise during the integration process. On the employee side, successful mergers hinge on the integration of corporate cultures and the alignment of workforce capabilities. Banks often adopt strategies such as leadership alignment, employee training initiatives, and performance management systems to cultivate a unified organizational culture. Additionally, human resource management plays a crucial role, as mergers may necessitate workforce adjustments, including the elimination of redundancies, employee relocations, or the introduction of voluntary retirement schemes to meet restructuring objectives. Prioritizing employee welfare and career development is essential for retaining talent and alleviating concerns. Furthermore, effective stakeholder engagement through transparent communication with customers, employees, unions, and regulatory bodies is critical for addressing issues, fostering trust, and demonstrating a commitment to long-term business goals, thereby helping banks navigate the complexities associated with mergers.

History of Indian Banking Sector

The evolution of banking in India can be divided into two significant eras: the Pre-independence Phase, spanning from 1770 to 1947, and the Post-independence Phase, which extends from 1947 to the present day. The latter can be further segmented into three distinct periods: the Pre-nationalisation Phase (1947-1969), the Post-nationalisation Phase (1969-1991), and the Liberalisation Phase (1991 to the present). Several pivotal events have played a crucial role in shaping the Indian banking landscape. Notably, the establishment of the Bank of Calcutta in 1806 marked the beginning of formal banking in India, followed by the creation of the Bank of Bombay in 1840 and the Bank of Madras in 1843, which collectively formed the presidency banks. In 1921, these three banks were amalgamated to form the Imperial Bank of India, a significant milestone in the banking sector. The establishment of the Reserve Bank of India (RBI) in 1935 further solidified the framework of banking in the country, as it became the central bank responsible for regulating monetary policy and ensuring financial stability. These foundational developments

laid the groundwork for the complex and dynamic banking system that exists in India today.

Bank Mergers and Acquisition in India

Table 1: Bank M&As in India	
Period	**Number of Mergers**
Pre-nationalisation of banks (1961-1968)	46
Nationalisation to Liberalisation period (1969-1996)	14
Post-Liberalisation period (1997-2022)	40
Total	100
Sources: www.rbi.org.in	

Table 1 presents an overview of bank mergers and acquisitions (M&As) in India across different periods. From 1961 to 1968, prior to the nationalisation of banks, there were a total of 46 mergers. The period from 1969 to 1996, which encompasses the nationalisation to liberalisation phase, saw a decline in activity with only 14 mergers recorded. However, the post-liberalisation era from 1997 to 2022 experienced a resurgence, resulting in 40 mergers. In total, India has witnessed 100 bank mergers throughout these distinct phases.

Table 2: List of M&As during 1997-2017				
Sr. No.	**Name of Transferor Bank/ Institution**	**Name of Transferee Bank/ Institution**	**Date of Amalgamation**	**Merger Type**
1	Punjab Co-operative Bank Ltd.	Oriental Bank of Commerce	April 8, 1997	PVB to PSB
2	Bareilly Corporation Bank Ltd.	Bank of Baroda	June 3, 1999	PVB to PVB
3	Times Bank Ltd.	HDFC Bank Ltd.	February 26, 2000	PVB to PVB
4	Bank of Madura Ltd.	ICICI Bank Ltd.	March 10, 2001	PVB to PVB
5	Benares State Bank Ltd.	Bank of Baroda	June 20, 2002	PVB to PSB
6	Nedungadi Bank Ltd.	Punjab National Bank	February 1, 2003	PVB to PSB
7	Global Trust Bank Ltd.	Oriental Bank of Commerce	August 14, 2004	PVB to PSB
8	Ganesh Bank of Kurundwad Ltd.	Federal Bank Ltd.	September 2, 2006	PVB to PVB
9	United Western Bank Ltd.	IDBI Ltd.	October 3, 2006	PVB to PSB
10	Bharat Overseas Bank Ltd.	Indian Overseas Bank	March 31, 2007	PVB to PVB
11	Sangli Bank Ltd.	ICICI Bank Ltd.	April 19, 2007	PVB to PVB
12	Centurion Bank of Punjab Ltd.	HDFC Bank Ltd.	May 23, 2008	PVB to PVB
13	State Bank of Saurashtra	State Bank of India	August 13, 2008	PSB to PSB
14	Bank of Rajasthan	ICICI Bank	August 12, 2010	PVB to PVB
15	State Bank of Indore	State Bank of India	August 26, 2010	PSB to PSB
16	ING Vysya Bank	Kotak Mahindra Bank	April 01, 2015	PVB to PVB
17	State Bank of Bikaner and Jaipur State Bank of Hyderabad State Bank of Mysore State Bank of Patiala State Bank of Travancore Bhartiya Mahila Bank	State Bank of India	April 01, 2017	PSB to PSB
Source: www.rbi.org.in.				

Table 2 provides a comprehensive overview of mergers and acquisitions (M&As) that occurred between 1997 and 2017 within the banking sector. The data outlines the transferor and transferee institutions, the dates of amalgamation, and the types of mergers involved. For instance, the amalgamation of Punjab Co-operative Bank Ltd. with Oriental Bank of Commerce on April 8, 1997, marked the beginning of a series of significant transitions in the banking landscape, categorized as a transition from a private sector bank (PVB) to a public sector bank (PSB). This trend continued with various other banks, such as the merger of Bareilly Corporation Bank Ltd. with Bank of Baroda on June 3, 1999, which also represented a PVB to PVB transition.

Throughout the years, numerous notable mergers took place, reflecting the evolving dynamics of the banking industry. The merger of Times Bank Ltd. with HDFC Bank Ltd. on February 26, 2000, and the subsequent amalgamation of Bank of Madura Ltd. with ICICI Bank Ltd. on March 10, 2001, are prime examples of how private banks sought to consolidate their positions in a competitive market. Additionally, the merger of Global Trust Bank Ltd. with Oriental Bank of Commerce on August 14, 2004, further exemplifies the trend of PVB to PSB transitions, highlighting the strategic moves made by banks to enhance their operational capabilities and market reach.

The latter part of the timeline showcases significant consolidations, particularly the merger of multiple state banks into the State Bank of India on April 1, 2017. This merger

included State Bank of Bikaner and Jaipur, State Bank of Hyderabad, State Bank of Mysore, State Bank of Patiala, State Bank of Travancore, and Bhartiya Mahila Bank, all transitioning from PSB to PSB. Such large-scale mergers not only signify the consolidation of resources but also reflect the regulatory environment and the need for banks to adapt to changing economic conditions. The data presented in this annex serves as a vital resource for understanding the trends and implications of M&As in the banking sector over the two-decade span.

Table 3: List of Bank M&As during 2019-2020

Sr. No.	Name of Transferor Bank/ Institution	Name of Transferee Bank/Institution	Official Announcement Date	Date of Amalgamation	Merger Type
1	Vijaya Bank Dena Bank	Bank of Baroda	January 02, 2019	April 01, 2019	PSB to PSB
2	Oriental Bank of Commerce United Bank of India	Punjab National Bank	August 30, 2019	April 01, 2020	PSB to PSB
3	Syndicate Bank	Canara Bank	August 30, 2019	April 01, 2020	PSB to PSB
4	Andhra Bank Corporation Bank	Union Bank of India	August 30, 2019	April 01, 2020	PSB to PSB
5	Allahabad Bank	Indian Bank	August 30, 2019	April 01, 2020	PSB to PSB

Source: www.rbi.org.in.

Table 3 presents a comprehensive overview of bank mergers and acquisitions that took place between 2019 and 2020. The first notable transaction involved Vijaya Bank and Dena Bank merging into Bank of Baroda, with the official announcement made on January 2, 2019, and the amalgamation taking effect on April 1, 2019. Following this, on August 30, 2019, Oriental Bank of Commerce and United Bank of India were consolidated into Punjab National Bank, with the merger also finalized on April 1, 2020. Similarly, Syndicate Bank merged with Canara Bank on the same announcement date, leading to a completed merger on April 1, 2020. Additionally, Andhra Bank and Corporation Bank combined to form Union Bank of India, while Allahabad Bank merged with Indian Bank, both transactions announced on August 30, 2019, and executed on April 1, 2020. It is important to note that the merger between Lakshmi Vilas Bank and DBS India Pvt. Ltd. was excluded from this study, as it represented a transaction between a private sector bank and a foreign bank. The data is sourced from various issues of STRBI, providing a detailed account of significant banking sector consolidations during this period.

CONCLUSION

The banking system in India has experienced a significant transformation and enhancement in relation to the sophistication and advancement of technology, product innovation, and service mix, as well as customer satisfaction, all aimed at tax and cost optimization. The expectations of contemporary customers regarding banking services have also risen. With the emergence of private and foreign banks in the Indian banking sector, competition has intensified, making customers the focal point in the decision-making processes of banks. There is now a strong emphasis on designing banking products and services that align with the expectations of consumers. In this era of globalization, banks must be financially viable and competitive to navigate these challenges. There has been a gradual transition in the revenue generation strategies of banks from traditional sources, such as loan creation, to non-traditional sources, including fee-based income, service charges, and non-interest income. Additionally, the recommendations of the Narasimham Committee regarding banking sector reforms have prompted many banks to undertake consolidation efforts aimed at enhancing their efficiency, profitability, and competitive strength. Furthermore, the policy initiatives introduced by the Government of India in recent years have also concentrated on deregulation and encouraged mergers to improve the profitability and financial robustness of Indian banks, preparing them for global competition. This is why the industry in India has initiated restructuring mechanisms, and it is anticipated that this trend will persist in the future, with the 3Cs—competition, convergence, and consolidation—becoming the key themes in the industry in the coming days. Mergers and acquisitions within the banking sector can achieve success when guided by a well-defined strategic vision, and when the participating banks are capable of effectively merging their operations. Cultural disparities and variations in management approaches may pose challenges; however, these obstacles can be surmounted through meticulous planning and communication. The case studies examined herein illustrate that successful mergers and acquisitions can result in enhanced market share, an expanded customer base, and a more varied product offering, thus generating value for the banks and their shareholders. Such combinations contribute to the improvement and fortification of the financial foundation and provide access to tax advantages and cash reserves. Despite the challenges presented, consolidation has been pursued in alignment with government objectives as a strategy for creating globally competitive banks. The primary aim, when it was initially incorporated as a provision in the Banking Regulation Act of 1949, was to establish a framework that would safeguard weaker banks from the adverse effects of liquidation and dissolution. In light of this concern, the Reserve Bank of India (RBI) was empowered to mandate the merger of weaker banks with stronger ones to mitigate losses and liabilities. The failure of a single bank could lead to the collapse of the entire banking sector. Mergers and acquisitions in banking are pursued for various other reasons, as demonstrated by the case studies. Consolidation is undeniably a potent mechanism for preserving liquidity, ensuring corporate transparency, and facilitating effective management; however, it also subjects a single bank to unpredictable and unforeseen systemic risks. The conclusion drawn is that the net profit of the newly formed banks may

decline as a consequence of the merger, leading to uncertainty regarding the stability of these banks. Consequently, the new banks must address these factors to improve their profitability and stability, which in turn will foster an increase in share value over the long term.

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USING SORTINO RATIO FOR MEASURING RISK: A CASE STUDY OF HDFC MUTUAL FUND

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We examine the performance of a sample of funds of HDFC Mutal Fund which is the largest private sector mutual fund in India. We examine a very popular risk adjusted metric used to evaluate the performance of mutual funds. This metric typically measures only the downside risk and is called the Sortino ratio. This ratio addresses the problem of using standard deviation as a measure of risk as it only takes into account the downward deviations. This is useful for an investor in selecting in mutual fund which matches his/her risk profile. Our sample comprises funds of different categories like Debt, Hybrid, Equity Linked Savings Schemes (ELSS), Equity Funds and Solution Oriented Funds. Our results show that generally their performance has deteriorated in the last one year. Comparatively, these funds had performed better in the last three and five years.

KEYWORDS: ***HDFC Mutual Fund, Standard Deviation, Sharpe Ratio, Downward Risk, Sortino Ratio***

1.INTRODUCTION

Mutual funds in India gave grown at a phenomenal pace. This can be observed from the fact that at the beginning of the year 2001, the Indian mutual fund industry was managing assets to the tune of Rs.1 billion which grew significantly to around Rs. 12 trillion in 2015. By the end of 2025 it was managing assets of around Rs.75 trillion, a colossal figure by any standards. One of the major reasons for this exponential growth has been availability of a large number of investment opportunities. This has come in the form of many products being offered by mutual funds to meet the risk and return appetite of various types of investors. Investors have also benefitted from the experience and expertise of professionally qualified fund managers who have been able to meet their investment objectives. Some of these funds have given very high returns. Thus, mutual funds have now become a preferred choice of investments amongst the households as they are able to provide returns far better than other avenues for investments like a fixed deposit with a bank. They have been able to do so at a low cost and also provide immediate liquidity of investments. Systematic Investment Plans have made it possible for small investors to invest a small amount every month and participate in wealth creation. This has resulted in huge investment opportunities for the retail investors which hereto were not possible. Thus, they have been able to get the financial benefits from a strong emerging market like India on the back of sound government policies which brought the Indian industrial sector on the fore front. The Indian stock markets have the state-of-the-art technology and by far are recognized as the best in the world. At the same time there has been a phenomenal improvement in investor services been provided by the Indian mutual funds as they become more technology driven and lifted the traditional barriers in accessing markets. The market regulator also regulates this industry very stringently thus protecting the investors from any misadventures. All of these measures have resulted in an unprecedented growth in their assets. This paper contributes to the existing research by examining Sortino ratios of various funds with different risk-return profile of HDFC Mutal Fund for the last five years. It also brings about the relative advantages and disadvantages of different risk and performance measures like standard deviation, Sharpe ratio and Sortino ratio. The remaining paper is structured as follows: Section 2 does a review of literature while section 3 discusses the research methodology. Section 4 is devoted to the discussion of results and section 5 summaries and gives the conclusion of the study.

2. LITERATURE REVIEW

In this section we do a brief review of research work which has focused on the use of Sortino measure to evaluate mutual fund performance. Sen (2022) used three different ratio-maximization techniques viz., the Sharpe ratio, the Calmar ratio and the Sortino ratio. These three measures were used on examining the performance of shares listed on National Stock exchange of India and belonged to seven industrial sectors. The author concluded that the return on investment from these different sectors provided many insights. The study by Venugopal and Sophia (2020) examined the efficacy of different performance measures in the period of financial crisis and thus selected January, 2020 to July 2020 as their period of study. Their sample comprised around 1,400 equity mutual fund

schemes from India. In order to determine which fund performed better on different measures they ranked them. They concluded that the adjusted Sharpe ratio was a better measure in times of increased volatility in the stock markets. Livingston, Yaob and Zhou (2019) reported that mutual funds in which the expense ratio was on the higher side and had higher turnover ratio too showed larger variability in their performance. Kupcik and Gottwald (2016) looked at the measurement and comparison of performance evaluation of a sample of pension funds from a few European counties. They used both the Sharpe ratio and the Sortino ratio for evaluating performance. Their period of the study was from 2005-2013. Their study also brought about the significant differences in the performance of various pension funds. The results were centered on the comparison of the performance of the pension funds due to Sharpe vis-vis Sortino ratio. They also suggested a method to find out the rank of negative Sharpe and Sortino ratios. Barber, Huang and Odean (2016) explained the different areas of concerns for investors. Their research work elaborated at length the various metrics used in performance evaluation including the alpha value, the beta, size of the portfolio, etc. In a study by Capitani (2013), asymptotic confidence intervals for Sortino and Omega ratios were projected and examined. Kolbadi and Ahmadinia, (2011) took three measures of Sharpe, Sterling and Sortino ratios in evaluating the performance of mutual funds and concluded mixed results. Cogneau and Hübner (2009) explained 101 different methods to evaluate mutual fund performance and elaborated on their advantages and disadvantages. Jagric et al., (2007) examined a number of risk-adjusted techniques by taking a sample of mutual funds from Slovenia and concluded that the funds were well diversified.

3. RESEARCH METHODOLOGY

One of the requirements of today's fund management is that the performance of fund managers is evaluated on the basis of risk adjusted measures. This helps an average investor to select those funds which meet his/her risk return objectives while making investments. Another significant point is that the performance of the portfolio managers is compared against a benchmark index which they are required to outperform. This put a lot of pressure on fund managers to select appropriate stocks for their portfolios and should also be able to forecast the swings in the markets, if they have to be successful. Moreover, they have to consistently beat these benchmarks. Herein, we briefly discuss how the Sortino ratio came into existence to address the issues related to standard deviation as a risk measure and the universally used Sharpe ratio as the performance evaluation measure for mutual funds.

3.1 Sharpe ratio

The investment management industry has hugely benefitted by the seminal research work of William Sharpe and creating the first performance evaluation measure now popularly known as Sharpe Ratio in 1966. This ratio was built upon his work on Capital Asset Pricing Model (Kidd, 2011). Sharpe ratio is the first performance measure which separates the extra return per unit of total risk taken by the portfolio managers. Over the years performance evaluation techniques have advanced to comprise the study of such risks and separating them into distinctive unsystematic and systematic risks (Kidd, 2011). Thus, Sharpe Ratio has emerged as the main metric for calculating risk adjusted return. This ratio is useful in providing insights as to what share of the performance of the portfolio is due to risk and tells us about the addition in value of the portfolio relatively to the risk taken (Kidd, 2011).

3.2 Standard deviation

One of the common statistical techniques used in measuring risk is standard deviation which helps us to understand how far a group of values diverges from the mean. It finds its application in numerous areas particularly in the field of finance. In case of investments, this measure is particularly useful in quantifying risk. Therefore, it is primarily used in evaluating a fund's performance. It specifies by how much the performance of a fund has varied in different periods of time. It is most commonly computed by using historical monthly returns over a period for e.g. one, three or five years. Standard deviation is then annualized and stated as a percentage. If the standard deviation is low then it would mean less variability and conversely if the standard deviation is high then it would imply that the returns could be unstable. Hence, mutual fund schemes would have more taken more risk if their standard deviation is high. This is a good indication that the fund manager has taken more risks to earn the return that they provide to investors and is an indication about the risk these funds carry. Therefore, it is a good measure for the investors to put their money in those mutual fund schemes which are suitable for them as per the risk that they would like to take given their age, income and other factors. Standard deviation as a metric is useful in understanding the variability in the future variability in returns of the mutual fund.

Standard deviation has been universally used as the primary metric of risk measured as a square root of variance. However, though it is widely used in risk management and in evaluation of performance measurement, it suffers from two limitations. One of them is that in its calculation there is an assumption that the return distribution is symmetric. Thus, it treats both the upward and downward deviations alike. The second limitation is that it uses the average of the returns as the target returns (Kidd, 2012). To address these limitations and with the advent of better computational facilities over the years resulted in the advancement of downside risk measures. Data used to express the share of the downward movements in a return distribution are semi deviation and downside deviation. In case of semi deviation, the computation is the same as that of standard deviation but we only use the returns that are below the mean. Semi deviation is the square root of semi variance (Kidd, 2012). Therefore, when we measure the performance of an investment which has returns which have a normal distribution, it will have the same kind of risks whether we use standard deviation or semi deviation. Since, in both the cases, the upward and the downward variability will be equal (Kidd, 2012). When we use a measure of downward measure it resolves both the limitations of standard deviation.

3.3 Sortino ratio

Sortino ratio is named after Frank A. Sortino who postulated that in case of performance evaluation of mutual funds, a better approach would be the use of downward risk only and thus gave the Sortino ratio. This ratio is the altered form of Sharpe ratio and is used to measure the extra return generated over and above the minimum acceptable return (MAR) by an investor. Sortino ratio mainly focuses on the downward risk of

variability. It is useful for those investors which would like to take less risk while making investments. The calculation of Sortino Ratio is similar to that of Sharpe ratio. In this ratio the risk-free rate is substituted by the minimum accepted return in the numerator and standard deviation is exchanged for downward deviation. The formula is given as:

S = (Average Portfolio Return – Minimum Accepted Return) /Downward Deviation

If a portfolio has a higher Sortino Ratio then better would be its performance. However, it is worthwhile to note that these measures use past data of risk and return which an investor uses to project returns expected in the future. However, an investor is interested in knowing the variability or volatility in returns which might occur in future. (Kidd, 2012). The manner in which downward deviations are computed may have a significant effect on the projected future returns. Moreover, computation of downward deviations is more complicated. Generally, one uses historical data of returns that fall below the minimum accepted return. This could considerably underestimate the downward risk (Sortino and Forsey, 1996).

Our present research focuses on evaluation of performance of a sample of funds of different categories of HDFC Mutual Fund by using Sortino ratio. HDFC Mutual Fund is by far the biggest private sector mutual fund house in India. It has been launched by the most reputed name in the financial services sector in India. It currently manages assets of around Rs. 8.3 trillion in 97 mutual fund schemes. Its asset management company became a listed entity in the year 2018. The period of our study is last five years i.e. from 2020-2025. We extract the Sortino ratios for the funds from Trendlyne.com.

4. DISCUSSION OF RESULTS

In the following section we discuss the results of the study for schemes belonging to different categories viz., Debt, Hybrid, ELSS, Equity Funds and Solution Oriented Funds. Debt funds include Corporate Bond funds, PSU & Banking funds, Dynamic funds, and Government Bond funds. The Hybrid category includes Aggressive and Arbitrage Funds. Then there are funds in the ELSS category. The Equity category includes funds belonging to the Large Cap and Equity Sectoral/Thematic funds and finally we have Solution Oriented Funds which offer various solutions to an investor depending upon his/her requirements. We use 'fund' and 'schemes' interchangeably throughout the paper.

4.1 Debt-Corporate Bond, PSU & Banking and Dynamic Funds

Table 1 shows the Sortino ratios for the Debt category which includes Corporate Bond funds, PSU & Banking funds and Dynamic Debt funds for the last one, three and five years respectively. Correspondingly, their ranks are also given for these periods. In all there are three mutual fund schemes floated by HDFC Mutual Fund. They offer both Direct Growth and Regular growth plans. This means that an investor has a choice to purchase the units directly from the mutual fund or from a distributor. The performance of the Direct funds would be better as compared to the Regular plan since they would not carry any fees paid to a distributor. Corporate Bond funds are open ended funds which primarily invest in highly rated debt instruments issued by companies which are at least rated AA+. An investor in these funds is exposed to a high degree of interest risk and comparatively moderate credit risk. As per their investment objectives, the fund manager can invest at least 80% of their corpus in such securities and can design a well-diversified portfolio. HDFC Banking and PSU Debt funds are essentially debt funds making investments largely in debt securities issued by government undertakings, municipal bonds and financial institutions. An investor would have to bear high-interest rate risk and relatively moderate credit risk. As per their investment objectives these funds can invest predominantly 80% of their corpus in debt securities and m instruments of money markets. Lastly, Dynamic Debt funds are typically debt funds which are able to change their portfolio on the basis of the outlook forecast of future rates of interest. They invest in different securities in the debt and money market categories. The basic goal of these funds is to achieve capital appreciation and at the same time to earn regular income. We find that all these funds had a positive Sortino ratio during the one, three and five year periods of study. During the last five years and in the last one-year period, HDFC Banking and PSU Debt Direct Growth Fund was ranked one while the lowest rank of six was of HDFC Dynamic Debt Regular Growth Fund. During the last three years, HDFC Corporate Bond Direct Growth Fund was the top performer and HDFC Dynamic Debt Growth Regular was ranked last. All in all, these funds have performed really well with high as depicted by their high Sortino ratios.

Table1: Debt-Corporate Bond, PSU & Banking and Dynamic Funds

Fund Name	Sortino Ratio 1Year	Rank	Sortino Ratio 3Year	Rank	Sortino Ratio 5Year	Rank
HDFC Corporate Bond Growth (D)	4.28	2	3	1	1.22	3
HDFC Corporate Bond Growth (R)	3.73	3	2.34	3	0.89	5
HDFC Banking & PSU Debt Growth (D)	4.69	1	2.56	2	1.6	1
HDFC Banking & PSU Debt Growth (R)	3.66	4	1.47	4	0.91	4
HDFC Dynamic Debt Growth (D)	1.03	5	1.2	5	1.35	2
HDFC Dynamic Debt Growth (R)	0.57	6	0.45	6	0.62	6

Source: Trendlyne.com; (D) Direct, (R): Regular

4.2 Debt-Government Bond Funds

In this category, we could find only HDFC Guilt Growth Fund. This is an open-ended debt fund which primarily invests in government securities of varying maturity. These securities are affected by high interest rates but have lower credit risk since they are issued by the government. We observed that Sortino ratios of HDFC Guilt Direct pretty low with 1.22, 1.06 and 0.22 during the last one, three and five years respectively. This shows that this fund has not performed well and has not been able to offset the downward risk taken by the investor and compensate them appropriately. We also find that HDFC Gilt Regular Growth Fund has a negative Sortino ratio of -0.01 in

the last five years. The negative ratio of this fund indicates that it generated a return which was lower than even the risk-free rate. This shows that the fund managers of this fund could not appropriately reward the investors for the downward risks taken by them. The negative return of a guilt fund is quite possible because it essentially invests in securities issued by the government which are highly sensitive to any interest rate changes. The performance of this fund was not good during the last five years. However, it has improved during the last one year as indicate by a reasonable Sortino ratio of around.

Table 2: Debt-Government Bond Funds

Fund Name	Sortino Ratio 1Year	Rank	Sortino Ratio 3Year	Rank	Sortino Ratio 5Year	Rank
HDFC Gilt Growth (D)	1.22	1	1.06	1	0.22	1
HDFC Gilt Growth (R)	0.97	2	0.72	2	-0.01	2

Source: Trendlyne.com; (D) Direct, (R): Regular

4.3 Hybrid- Aggressive and Arbitrage Funds

Under these categories we could find three funds viz., HDFC Hybrid Equity Fund, HDFC Arbitrage Wholesale Growth Fund and HDFC Arbitrage Retail Growth Fund. HDFC Hybrid Equity Fund is an open-ended fund, the corpus of which is mostly invested in equity. With around 60% to 80% of investments being made in equity which have a potential for growth and have strong financials with business models that are sustainable. These securities should also offer a high potential for capital appreciation in the future looking at their current valuations. In case of investments in debt instruments the fund, managers would essentially look in for their credit quality, their liquidity and the general scenario on outlook for interest rates. HDFC Arbitrage Fund is an open-ended fund in the hybrid category that has an investment objective to earn income to earn gains from investments in equity and derivative markets by forming strategies to gain from price differences in them. The risk of the fund is market neutral and is centered on taking hedging positions in equity. We see that during the last five years HDFC Hybrid Equity Direct Growth fund is ranked number one and HDFC Arbitrage Retail Growth is ranked last. But the performance of HDFC Hybrid Equity Direct Growth has come down in the last three years since it was ranked third and in the last one year when it is ranked fifth. During the last three and one year periods, the HDFC Arbitrage Retail Growth Fund has outperformed the other funds and is ranked at number one. Overall, the performance of these funds has declined sharply during the last one year.

Table 3: Hybrid- Aggressive Hybrid and Arbitrage Funds

Fund Name		Rank	Sortino Ratio 3Year	Rank	Sortino Ratio 5Year	Rank
HDFC Hybrid Equity Growth (D)	0.18	5	2.07	3	2.81	1
HDFC Hybrid Equity Growth (R)	0.09	6	1.91	4	2.63	2
HDFC Arbitrage Wholesale Growth (D)	7.17	2	2.32	2	1.54	4
HDFC Arbitrage Retail Growth (D)	7.32	1	2.35	1	1.55	3
HDFC Arbitrage Retail Growth (R)	0.98	4	-0.21	6	-0.46	6
HDFC Arbitrage Wholesale Growth (R)	1.53	3	0.38	5	-0.08	5

Source: Trendlyne.com; (D) Direct, (R): Regular

4.4 Equity Linked Savings Schemes (ELSS)

Under the ELSS Category, HDFC Mutual fund has launched only one fund that is HDFC ELSS TaxSaver Growth Fund. This fund is suitable for investors who would like to take tax benefits under the Income Tax Act, 1961 under section 80C. Since these funds largely invest in equities, an investor looks for gains arising out of capital appreciation. A disadvantage of these funds is that an investor cannot sell his/her units before three years of investment due to a compulsory lock in period as per the regulations of SEBI. We find that during the last one year this fund's performance has fallen sharply as indicated by its low Sortino ratio of around 0.3. This tax saving fund's performance in the last three and five year was very good as shown by its high Sortino ratio of around 3.

Table 4: ELSS Funds

Fund Name	Sortino Ratio 1Year	Rank	Sortino Ratio 3Year	Rank	Sortino Ratio 5Year	Rank
HDFC ELSS TaxSaver Growth (D)	0.39	1	3.2	1	3.5	1
HDFC ELSS TaxSaver Growth (R)	0.32	2	3.05	2	3.35	2

Source: Trendlyne.com; (D) Direct, (R): Regular

4.5 Equity Large Cap Funds

Equity large cap funds are essentially open-ended funds which make investments primarily in companies which have a very high market capitalization. An investor in these funds looks at long term capital appreciation and thus creation of wealth. At least 80% of the corpus of such funds are invested in equity shares of big companies. SEBI has provided the definition of large cap stocks which includes the biggest Indian 100 corporates according to their market capitalization. The benefits of investing in such companies are that they are mature, old companies with established, diversified businesses and thus benefit from synergy in their operations and are able to absorb

the market risks and other business uncertainties due to their large capital and asset base. HDFC has come out with one Growth fund viz., HDFC Large Cap Growth fund, with both Regular and direct plans. Table 5 provides the Sortino ratios. This fund had performed well during the last five and three-year period respectively as per their Sortino ratios. However, its performance has fallen drastically during the last one year with a negative Sortino ratio. This clearly indicates that its return generation in the last one year is below the minimum rate or the risk less rate of return. Thus, an investor in this fund is now not being rewarded for the downward risk taken by investing in such a fund. In other words, the fund is earning losses on the investments it makes and is not able to generate adequate returns to balance the losses. Thus, HDFC Large Cap Growth fund is an underperformer.

Table 5: Equity Large Cap Funds

Fund Name	Sortino Ratio 1Year	Rank	Sortino Ratio 3 Year	Rank	Sortino Ratio 5Year	Rank
HDFC Large Cap Growth (R)	-0.15	2	1.89	2	2.38	2
HDFC Large Cap Growth (D)	-0.09	1	1.99	1	2.49	1

Source: Trendlyne.com; (D) Direct, (R): Regular

4.6 Equity-Sectoral/Thematic Funds

Table 6 provides the Sortino ratios and their ranks for Sectoral and Thematic funds launched by HDFC Mutual Fund. A look at the Table shows that it has come out with many funds under this category. This category of equity funds are essentially sectoral funds which predominantly make investments in certain sectors of the economy whose future outlook is very promising and thus could provide long term capital appreciation. Typically, such funds would invest in securities of companies belonging to a particular sector like for example manufacturing, exports, pharmaceuticals, financial services, banking, etc. In case of thematic funds, the investments would largely focus on an economic sector having a similar theme. Such funds have a much higher risk profile since their objective is to achieve high degree of returns for their investors. Therefore, compared to diversified equity funds they are riskier investments. For the last five-year period, HDFC Infrastrucrure Growth is ranked at first position while HDFC Gold ETF Fund of Fund Growth is ranked at last. These were the only funds in operation during that period. The Fund's high Sortino ratio of 2.62 implies that an investor is protected by downward risk by 2.62 times and the fund has generated adequate returns to cover such risks. During the last three-year period HDFC Infrastrucrure Growth is again ranked at first position while HDFC Banking and Financial Services Growth is ranked at last. Three funds were operating during this period. In the last one-year period HDFC Gold ETF Fund of Fund Growth is ranked at first position with a Sortino ratio of 3.68. This fund is an outperformer. While HDFC Infrastrucrure Growth Fund (Regular) is ranked in the last position with a ratio of -0.32. HDFC had launched many new funds in this category and their performance was available for the last one year. By and large, the performance of these sectoral funds has come down sharply during the last one year as per their Sortino ratios.

Table 6: Equity Sectoral/Thematic Funds

Fund Name	Sortino Ratio 1Year	Rank	Sortino Ratio 3Year	Rank	Sortino Ratio 5Year	Rank
HDFC Banking & Financial Services Growth (R)	0.79	10	2.62	6	NA	NA
HDFC Banking & Financial Services Growth (D)	0.97	6	2.94	3	NA	NA
HDFC Gold ETF Fund of Fund Growth (D)	3.68	1	2.74	4	1.18	3
HDFC Gold ETF Fund of Fund Growth (R)	3.6	2	2.65	5	1.12	4
HDFC Infrastructure Growth (D)	-0.24	13	3.21	1	3.11	1
HDFC Infrastructure Growth (R)	-0.32	14	3.07	2	2.99	2
HDFC Pharma and Healthcare Growth (R)	1.8	4	NA	NA	NA	NA
HDFC Pharma and Healthcare Growth (D)	1.93	3	NA	NA	NA	NA
HDFC Technology Direct Growth (D)	1.03	5	NA	NA	NA	NA
HDFC Technology Regular Growth (R)	0.91	8	NA	NA	NA	NA
HDFC Non-Cyclical Consumer Growth (D)	0.26	11	NA	NA	NA	NA
HDFC Non-Cyclical Consumer Growth (R)	0.17	12	NA	NA	NA	NA
HDFC Silver ETF Fund of Fund Growth (R)	0.9	9	NA	NA	NA	NA
HDFC Silver ETF Fund of Fund Growth (D)	0.93	7	NA	NA	NA	NA

Source: Trendlyne.com; (D) Direct, (R): Regular

4.7 Solution Oriented Funds

In the category of Solution oriented funds, HDFC Mutual Fund has come out with four funds viz., HDFC Children's Fund, HDFC Retirement Savings Equity Fund, HDFC Retirement Savings Hybrid Equity Fund, and HDFC Retirement Savings Hybrid Debt Fund with both the direct and regular plans.

Table 7A shows the Sortino ratios for HDFC Children's Fund and their ranking respectively. This is an open-ended fund designed particularly for children and has a compulsory lock in period of five years or when the child is of mature age, whichever happens earlier. The investment objective of the fund is to create a substantial corpus for the child. The fund manager would invest a minimum of 65% to 80% of the corpus of the fund in equity shares and other equity related instruments, while the remaining corpus in debt securities and other instruments of money markets. Its primary objective is to earn returns over a longer time horizon and to keep control of the risk.

We find that the performance of these funds has sharply declined in the last year with HDFC Children's Fund Direct (Lock in) having a ratio of 1 and HDFC Children's Fund (R), a negative Sortino ratio of -0.1 The negative ratio of this fund indicates that it generated a return which was lower than even the risk-free rate. This shows that the fund managers of this fund could not appropriately reward the investors for the downward risks taken by them. In other words, it suggests that the fund has earned losses or returns which do not even compare with the current risk-free rate at which an investor could have invested without taking any risks. It also implies that the fund has witnessed negative variability or volatility. However, the fund's performance was good in the last two and five years respectively with high Sortino ratios of around 2 and 3.

Table 7A: Solution Oriented Funds (HDFC Children's Fund)

Fund Name	Sortino Ratio 1Year	Rank	Sortino Ratio 3Year	Rank	Sortino Ratio 5Year	Rank
HDFC Children's Fund (D) (Lock-in)	0	1	2.35	1	3.14	1
HDFC Children's Fund (R)	-0.1	2	2.15	2	2.9	2

Source: Trendlyne.com; (D) Direct, (R): Regular

Table 7B shows the Sortino ratios for HDFC Retirement Savings Equity Fund and HDFC Retirement Savings Hybrid Equity Fund and their ranking. HDFC Retirement Savings Equity Fund is again an open-ended fund offering solution for retirement with a mandatory lock in period of five years or upon retirement which ever happens earlier. As per its investment objective, the fund would invest at least 80% of its corpus in equity shares and other equity related instruments. It's noteworthy that this fund is a notified tax savings cum pension fund. HDFC Retirement Savings Hybrid Equity Fund is similar to HDFC Retirement Savings Equity Fund in its allocation for equity. However, its fund manager can also invest the corpus in debt and money market instruments. Its investment objective is to earn returns on a long-term period while effectively managing risk. We observe that the performance of these funds has also sharply declined in the last one year with HDFC Retirement Savings Equity Fund (R) having a ratio of -0.01 and HDFC Retirement Savings Equity Fund (R), a Sortino ratio of 0.02 respectively. The performance of the funds was far better in the last three and five years with Sortino ratios of more than 2 and 3 respectively. This is exceptional performance. HDFC Retirement Savings Equity Fund (D) was ranked one in the last three years while HDFC Retirement Savings Equity Direct ranked at one in the last five years.

Table 7B: Solution Oriented Funds (HDFC Retirement Savings Equity)

Fund Name	Sortino Ratio 1Year	Rank	Sortino Ratio 3Year	Rank	Sortino Ratio 5Year	Rank
HDFC Retirement Savings Equity (R)	-0.01	4	2.55	2	3.36	2
HDFC Retirement Savings Equity (D)	0.1	2	2.79	1	3.65	1
HDFC Retirement Savings Hybrid Equity (D)	0.17	1	2.54	3	3.31	3
HDFC Retirement Savings Hybrid Equity (R)	0.02	3	2.22	4	2.93	4

Source: Trendlyne.com; (D) Direct, (R): Regular

Table 7C shows the Sortino ratios and their ranking for HDFC Retirement Savings Hybrid Debt Fund with Direct and Regular options respectively. HDFC Retirement Savings Hybrid Debt Fund is an open-ended fund offering solution for retirement with a mandatory lock in period of five years or upon retirement which ever happens earlier. As per its investment objective, the fund can invest 55% to 90% of its corpus in debt and money market instruments. It can also invest in equity shares and other equity related instruments and is a notified tax savings cum pension fund. Like other funds in this category, this fund's performance has also deteriorated in the last one year compared to its far better performance earlier. It is also evident that a direct purchase of units from the mutual fund has a big impact on its return compared to when the units are purchased from a distributor due to its lesser expenses.

Table 7C: Solution Oriented Funds (HDFC Retirement Savings Hybrid Debt)

Fund Name	Sortino Ratio 1Yr	Rank	Sortino Ratio 3Year	Rank	Sortino Ratio 5Yr	Rank
HDFC Retirement Savings Hybrid Debt (D)	0.49	1	2.33	1	2.81	1
HDFC Retirement Savings Hybrid Debt (R)	0.08	2	1.61	2	1.95	2

Source: Trendlyne.com; (D) Direct, (R): Regular

5. CONCLUSION

In this paper, we discussed advantages and disadvantages of various measures like standard deviation, Sharpe ratio and Sortino ratio generally used in the evaluation of performance of mutual funds. Taking a sample of different categories of funds of HDFC Mutal Fund with different investment objectives and thus different risk-return profile for investors, we examined their performance on the basis of Sortino ratio. Our findings indicate that overall, the majority of these funds had performed well in the last three and five-year period. However, their performance has sharply declined in the last one year.

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DIGITAL-BASED PUBLIC SERVICE INNOVATION IN THE ERA OF GOVERNMENT TRANSFORMATION: THE ROLE OF COMMUNITY SATISFACTION MEDIATION ON EMPLOYEE PERFORMANCE

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ABSTRACT **DOI No: 10.36713/epra23478** **Article DOI: https://doi.org/10.36713/epra23478**

Digital transformation in the government sector has encouraged the emergence of various innovations in public services. This article aims to examine the influence of digital-based public service innovation on public trust in the government, with *public satisfaction as an intervening variable (mediation).* ***Using a quantitative approach, data was collected through a survey of 250 respondents who had used local government digital services. The results of the analysis show that digital innovation has a significant effect on public satisfaction, and this satisfaction significantly mediates the influence of innovation on increasing public trust. These findings underscore the importance of digital innovation that is not only efficient, but also oriented towards user experience and satisfaction.***

KEYWORDS: ***Digital Innovation, Public Service, Community Satisfaction, Public Trust, Government Transformation.***

INTRODUCTION

Background

The era of digital transformation has changed the paradigm of public services around the world, including Indonesia. The Government of Indonesia through the Making Indonesia 4.0 policy and the One Data Indonesia program has committed to realizing a digital government that is efficient, transparent, and responsive to the needs of the community (Pratama, 2019). Digital transformation in the public sector is not only limited to the use of technology alone, but includes fundamental changes in the way governments interact with citizens, internal organizational processes, and sustainable public value creation (Mergel et al., 2018).

Digital-based public service innovation has become one of the top priorities in Indonesia's bureaucratic reform. Various digital platforms such as online one-stop integrated service systems (PTSP), government mobile applications, and digital service portals have been developed to improve the accessibility and quality of public services (Hardjaloka, 2020). However, the implementation of digital technology in public services faces complex challenges that require a holistic approach in understanding the dynamics of the relationship between technological innovation, public satisfaction, and the performance of the state's civil apparatus. Although massive investments have been made in the digitalization of public services, there are several gap phenomena that demonstrate the complexity of implementing digital innovation in the public sector:

1. The Paradox of Digital Investment and Community Satisfaction

Data from the Ministry of State Apparatus Empowerment and Bureaucratic Reform (2023) shows that although Indonesia's public service digitization index has increased by 78% in the last five years, the level of public satisfaction with public services has only increased by 12%. This phenomenon shows a disconnection between technological advances and the perception and experience of public service users.

2. Employee Performance Disparity in the Digital Context

A survey conducted by the State Civil Service Agency (2023) indicates that 67% of civil servants have difficulty operating the new digital system, which has an impact on a 23% decrease in work productivity in the first year of implementation. On the other hand, 33% of employees who successfully adapted showed significant performance improvements, creating a substantial internal performance gap.

3. Inconsistency of the Impact of Digitalization on Service Quality

Research conducted by the Center for Public Service Performance Studies (2023) shows that the implementation of digital systems does not always correlate positively with improving service quality. Some regions with a high level of digitalization actually experienced a decrease in the level of

community satisfaction by 15%, while areas with simpler digital implementation recorded an increase in satisfaction of up to 28%.

Based on a comprehensive literature review, there are several significant research gaps in the context of digital-based public service innovation:

4. Limitations of Mediation Studies in the Context of Digital Government

The majority of previous research has focused on the direct relationship between the implementation of digital technology and the performance of public organizations (Al-Hujran et al., 2021; Twizeyimana & Andersson, 2019). Studies exploring the mediating role of community satisfaction in the relationship between digital innovation and employee performance are still very limited. Research by Chen and Wang (2020) highlights that mediation mechanisms in the context of digital public services require a deeper understanding of how user perceptions and experiences affect employee motivation and performance.

5. Lack of Integrated Models in Digital Innovation Evaluation

Previous studies tend to use a partial approach in analyzing the impact of digitization of public services. Studies conducted by Janssen and van der Voort (2020) show that existing evaluation models have not been able to integrate technology, human, and organizational perspectives simultaneously. This creates a gap in a holistic understanding of how digital innovation really impacts the public service ecosystem.

6. Unclear Feedback Loop Mechanism in Digital Service

Although several studies have identified the importance of user feedback in digital systems (Layne & Lee, 2021), the mechanisms by which public satisfaction can affect employee performance through digital systems are still unclear. A study conducted by Krishnan et al. (2022) shows that the majority of research is still focused on one-way relationships without considering the complexity of multi-way interactions in the context of digital government.

7. Limitations of Research Contexts in Developing Countries

Most of the research on digital public service innovation is conducted in developed countries with high digital infrastructure and literacy levels (Mergel et al., 2018; Cordella & Paletti, 2019). Research exploring the dynamics of digital government implementation in developing countries, especially considering local cultural, social, and economic factors, is still very limited. The study conducted by Ndou (2021) emphasizes the importance of contextualizing digital government research for countries with unique characteristics such as Indonesia.

8. Gaps in Employee Performance Measurement in the Digital Era

Existing employee performance measurement instruments have not fully accommodated changes in work paradigms in the digital era. Research conducted by Bharadwaj and Konsynski (2022) shows that traditional performance metrics are no longer relevant in the context of the digital workplace, but the development of comprehensive measurement instruments is still an unresolved academic challenge.

Problem Formulation

1. How does Digital-Based Public Service Innovation affect Performance Official?
2. How does Government Transformation affect employee performance?
3. How does Public Satisfaction affect Employee Performance?
4. How Digital-Based Public Service Innovation Affects Satisfaction Public?
5. How does Government Transformation affect Public Satisfaction?
6. How does Community Satisfaction mediate the influence of Digital-Based Public Services on Employee Performance?
7. How does Community Satisfaction mediate the influence of Government Transformation on Employee Performance?

Research Objectives

This research aims to:

1. To test and analyze the influence of Digital-Based Public Service Innovation on Employee Performance?
2. To test and analyze the influence of Government Transformation on employee performance?
3. To test and analyze the influence of Public Satisfaction on Employee Performance?
4. To test and analyze the influence of Digital-Based Public Service Innovation on Public Satisfaction?
5. To test and analyze the influence of Government Transformation on Public Satisfaction?
6. To test and analyze the influence of Community Satisfaction mediating the relationship of Digital-Based Public Services on Employee Performance?
7. To test and analyze the influence of Community Satisfaction mediating the relationship between Digital-Based Government Transformation on Employee Performance?

Research Benefits

1. Theoretical Benefits: This research is expected to contribute to the development of digital government theory and public service innovation, especially in understanding the mediation mechanism of public satisfaction in the context of public sector digital transformation.
   Practical Benefits:
   a. For Researchers
2. Academic Capacity Development: This research provides an opportunity for researchers to deepen their understanding of the concept of digital transformation in the public sector, service innovation theory, and the dynamics of the relationship between public satisfaction and employee performance. Through a systematic research process, researchers can develop critical analysis skills on contemporary public administration phenomena.
   1) Mastery of Research Methodology
      Researchers gain practical experience in applying research methodologies relevant to the topic of mediation and causal relationships. This includes the use of advanced statistical analysis techniques, the development of research instruments, and the mastery of quantitative and qualitative approaches in the context of public administration research.

2) Contribution to Theory Development
   This research allows researchers to contribute to the development of theories about the role of mediation in the context of digital public services. The findings of the study can enrich the academic literature on the complex relationship between technological innovation, community satisfaction, and employee performance in government transformation.
3) Increased Academic Credibility
   Through this research, researchers can build an academic reputation in the field of public administration and digital transformation. Publication of research results in scientific journals will improve academic track record and open up opportunities for collaboration with other researchers in the same field.
4) Professional Network Development
   The research process provides an opportunity for researchers to network with government practitioners, academics, and other stakeholders. These interactions can open up opportunities for future collaborative research and broaden researchers' perspectives on practical challenges in the implementation of public service innovations.
5) Deep Understanding of Local Context
   The researcher gained in-depth insights into the dynamics of public services in Indonesia, including challenges and opportunities in the implementation of digital transformation. This contextual understanding becomes valuable capital for future more specific and applicable research.
6) Interdisciplinary Skills Development
   This research allows researchers to integrate perspectives from various disciplines, such as public administration, information technology, organizational psychology, and management. This interdisciplinary thinking ability is invaluable in dealing with the complexity of modern public problems.

b. For Stakeholders
   The results of this research can be used as a reference for the government in designing a strategy for implementing digital-based public service innovations that are more effective and sustainable.

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Digital-Based Public Service Innovation

Osborne, Stephen P. (2021) in *"Public Service Innovation: A Research Handbook"* emphasizes that public service innovation should be understood as a process that involves fundamental transformation in the way public organizations operate and interact with society. This includes the adoption of digital technology as the main enabler of the transformation.

Twizeyimana, Jean Damascene & Andersson, Annika (2019) in their research *"The Public Value of E-Government – A Literature Review"* published in Government Information Quarterly, analyzed the public value of e-government and identified the various dimensions of benefits that society can derive from the digitization of public services.

Digital-based public service innovations have become a new paradigm in modern public administration. The literature that has been reviewed shows that the digitalization of public services is not only about the adoption of technology, but also a fundamental transformation in the way governments operate and interact with society. The successful implementation of digital innovation in public services requires a holistic approach that considers technological, organizational, and human aspects simultaneously.

Based on the above understanding, he concludes that Digital-based Public Service Innovation is an inevitable demand of the times, because everything from the joints of human life today is inseparable from technology to entering the realm of public services that require improving services to the community.
The indicators in this study are:

1. System Integration
2. Connectivity
3. Reduction of Bureaucracy
4. Proactive Service

Government Transformation

Government transformation is a new paradigm in public administration that demands fundamental changes in the way the government delivers public services. This concept covers various dimensions ranging from digital transformation, bureaucratic reform, to the implementation of good *governance principles.* In the Indonesian context, government transformation is becoming increasingly relevant along with the development of information technology and people's demands for more efficient and transparent public services.

Government transformation can be defined as the process of fundamental changes in the structure, processes, and culture of government organizations to achieve more effective and efficient goals in public services. Yazid and Karmila (2024) emphasized that digital government transformation is a systematic effort to integrate information and communication technology in various aspects of government administration. This concept is not only limited to the digitization of services, but also includes a paradigm shift in governance.

Government transformation includes several key dimensions. First, digital transformation involves the use of modern technologies such as big data, *the Internet of Things (IoT),* and artificial intelligence to improve the quality of public services. Second, organizational transformation that includes reform of the bureaucratic structure and human resource capacity development. Third, process transformation that involves simplifying procedures and improving operational efficiency.

Government transformation is an imperative in the modern era which is characterized by rapid technological developments and increasingly high demands of society. The implementation of government transformation requires a comprehensive strategy, a strong commitment from all stakeholders, and an adaptive approach to environmental change. Despite facing various challenges, government transformation opens up great opportunities to create a government that is more efficient, transparent, and responsive to the needs of the community.

Based on the above understanding, he concluded that the transformation of the Government is an effort by the government to better respond to the needs of the wider community which is more agile, fast and flexible and not rigid. This transformation process is a bridge to the state where the desired government is achieved.

The indicators in this study are as follows:
1. Organizational Flexibility
2. Results-Based Management
3. *Paperless Office*
4. Standardization of Procedures

Community Satisfaction

Community satisfaction is a subjective evaluation of an individual's experience of the quality of public services received compared to previous expectations (Zeithaml et al., 2018). In the context of digital public services, public satisfaction reflects the level of fulfillment of users' needs and expectations for electronic services provided by the government (Lean et al., 2019). Community satisfaction is not only measured from the technical aspect of the system, but also from the dimension of human interaction with technology that facilitates access to services (Venkatesh et al., 2016).

Research by Dwiyanto (2017) shows that public satisfaction in digital public services is influenced by the perception of ease of use, speed of response, and reliability of the system. These factors are the main determinants in creating a positive experience for users of government digital services. Digital transformation in public services has changed the paradigm of interaction between government and society, where satisfaction no longer depends only on direct interaction but also on the quality of digital platforms (Janssen & van der Voort, 2020).

Public satisfaction in the era of digital government is also closely related to the concept of citizen experience which emphasizes the holistic experience of users in accessing government services (Mergel et al., 2019). This experience covers the entire user journey from information access, application process, to service completion. Research by Twizeyimana & Andersson (2019) identified that public satisfaction with e-government services has a positive correlation with the level of public trust in the government.

In the Indonesian context, public satisfaction with digital public services is regulated through various regulations and service standards set by the government (Hardjaloka, 2014). The implementation of an effective digital service system can increase public satisfaction through reduced bureaucracy, increased transparency, and better service accessibility (Pratama, 2018). Public satisfaction is also an important indicator in measuring the success of the implementation of the government's digital transformation policy (Silalahi, 2020).

Based on the above understanding, it is concluded that community satisfaction is a psychological factor of the recipient of the service which the stakeholders must consider and as a measure of the extent to which the services provided by an organization or service provider meet or exceed the expectations of the community

The indicators in this study are as follows:
1. Access Speed
2. Information *Completeness*
3. Accessibility
4. Functional *Satisfaction*

Employee Performance

Employee performance in the digital government era is influenced by various factors, including technological competence, work motivation, and organizational support for the implementation of digital systems (Colquitt et al., 2019). Pasolong's research (2018) shows that employee performance in digital public services can be measured through effectiveness, efficiency, and responsiveness in using digital platforms to serve the community. Optimal employee performance in the digital context does not only depend on technical skills, but also on understanding the needs and expectations of the digital service user community (Sedarmayanti, 2017).

The implementation of digital technology in public services requires adaptation of employee performance which includes problem-solving skills, critical thinking, and collaboration in a technology-based work environment (Rivai & Sagala, 2016). Employee performance in digital public services is also influenced by leadership factors that support innovation and organizational change towards digitalization (Wibowo, 2020). Research by Sulistiyani & Rosidah (2019) identified that high employee performance in digital services can increase public satisfaction and create value added in public services.

In the Indonesian context, the performance of public sector employees is regulated through various regulations and competency standards set by the government, including the ability to operate a digital service system (Thoha, 2018). Employee performance measurement in the digital transformation era must include quantitative and qualitative aspects that can describe employees' contributions to the achievement of organizational goals and community satisfaction (Hasibuan, 2017). Effective employee performance in digital public services can be a catalyst in creating good governance and increasing public trust in the government (Dwiyanto, 2017).

Based on the above understanding, it can be concluded that employee performance is the result of work achieved by an employee in carrying out his duties and responsibilities, which is measured based on certain criteria and set time.
The indicators in this study are as follows:
1. Compliance with standard procedures
2. Productivity Levels
3. Understanding *Cyber Scurity*
4. Creativity in *problem solving*

Relationships Between Variables

The Influence of Digital-Based Public Service Innovation on Employee Performance

The digitization process and digitalization input have a major influence on the performance of employees and public services. To improve digital public services, organizations need to increase budgets, numbers, and human resource capacity and establish standard operating procedures. Management also

needs to give appreciation to employees as motivation, especially during a pandemic where work models such as WFH and WFO have an impact on the psychological condition of employees. This is expected to improve the quality of work, reduce errors, and address service user complaints. (Salbiyah, 2024).

The digitalization process, which consists of planning, organizing, implementing, monitoring and evaluating and digitalization inputs consisting of the quality and number of human resources (HR), budget, internet and computer speed, greatly affects the performance of employees in carrying out work and providing public services (Anita Ilyas, 2021). The hypothesis in this study is:
H1: Digital-Based Public Service Innovation has a positive and significant effect on Employee Performance

The Influence of Government Transformation on Employee Performance
Research shows that transformational leadership has a strong positive correlation with employee performance. Characteristics of effective transformational leadership include: Inspirational Motivation: Leaders who are able to inspire a vision of transformation show a positive impact on employee work motivation. Employees who understand the organization's vision tend to perform better.
Intellectual Stimulation: Leaders who encourage innovation and critical thinking create a work environment conducive to performance improvement. Employees feel encouraged to develop creative ideas.
Individualized Consideration: Personal attention to employee development needs increases engagement and loyalty, which has a positive impact on performance. The hypothesis in this study is:
H2 : Government Transformation has a Positive Effect on Employee Performance

The Influence of Public Satisfaction on Employee Performance
Research by Kordić et al. (2022) showed that there was a statistically significant correlation between work performance and two factors measured—job satisfaction and life satisfaction, with job satisfaction and life satisfaction being more significant in determining job performance. Dousin et al. (2019) in their research found that job satisfaction mediates the relationship between employee work-life balance and work performance.

Public satisfaction has a significant influence on employee performance through various mediation mechanisms. These relationships are complex and are influenced by individual, organizational, and contextual factors. Public satisfaction is not only an outcome of employee performance, but also an input that can increase employee motivation and performance. The hypotheses in this study are as follows:
H3: Public Satisfaction has a Positive Effect on Employee Performance

The Influence of Digital-Based Public Service Innovation on Public Satisfaction
In particular, innovation in public institutions can be defined as the application (effort to bring) new ideas in implementation, characterized by a change of steps that are quite large, lasts quite long and is quite general in scale so that in the implementation process it has a considerable impact on organizational changes and organizational relationships. Furthermore, Kasmir in (Pasolong, 2010) stated that good service innovation is a person's ability to provide services that can provide satisfaction to customers with determined standards.

Based on some of these opinions, it can be understood that public service innovation is an update or a new way of implementing public services needed for the development of public services that provide benefits to service users so that public satisfaction can be obtained. The hypothesis in this study is:
H4 : Digital-Based Public Service Innovation has a Positive Effect on Public Satisfaction

The Effect of Government Transformation on Public Satisfaction
Through *e-government* , improvements in public services can also be realized. As stated by Dwiyanto (2011:181), the government bureaucracy can develop the use of Information and Communication Technology (ICT) in carrying out government activities, facilitate government interaction with the community, and encourage accountability and transparency in the implementation of public services. The hypothesis in this study is:
H5 : Government Transformation has a Positive Effect on Public Satisfaction

Community Satisfaction Mediates the Influence of Digital-Based Public Services on Employee Performance
Public satisfaction plays a significant role as a mediator in the relationship between digital-based public services and employee performance. This mediation model shows that the digitalization of public services not only has a direct impact on employee performance, but also through indirect channels through increasing public satisfaction.

This mediation effect occurs through positive feedback mechanisms, increased work motivation, and a higher sense of purpose in employees. Therefore, digital transformation strategies must consider citizen satisfaction as a key indicator of success, not just technical efficiency. (Chen, L., Wang, Y., & Liu, Z. 2022)

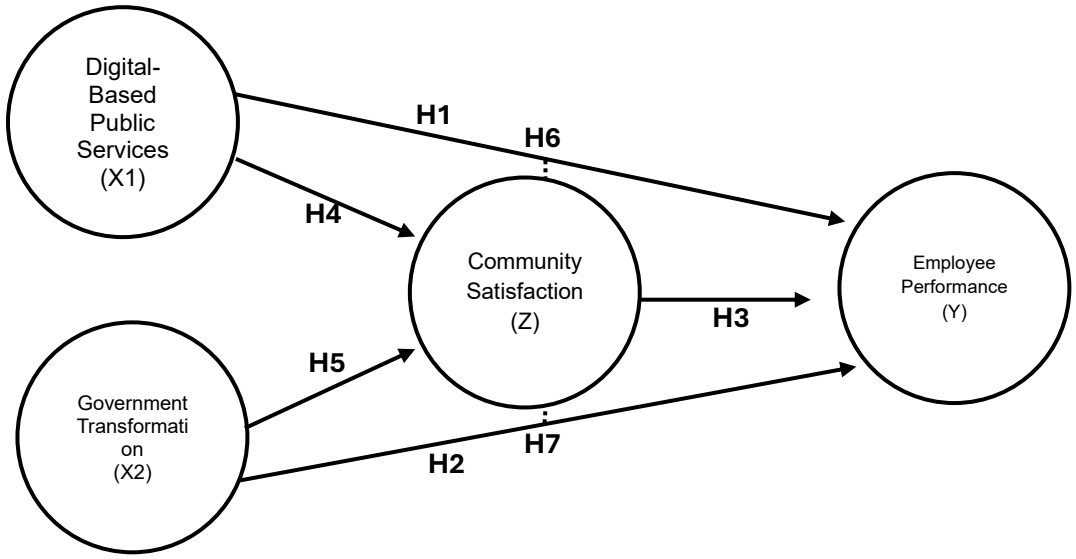
The implementation of a citizen-centric strategy in the digital transformation of public services can create a win-win solution where people get better services, employees have high work motivation, and government organizations achieve optimal performance. The hypothesis in this study is:
H6 : Community Satisfaction can mediate Digital-Based Public Services on Employee Performance

Community Satisfaction Mediates the Influence of Government Transformation on Employee Performance
Alonderiene & Majauskaite (2016) menemukan bahwa employee empowerment not only is indispensable for enhancing job satisfaction but also mediates the relationship between transformational leadership and job satisfaction among nursing staff.

Research by Javed et al. (2022) shows that transformational leadership has a positive effect on affective organizational commitment and job performance through employee engagement mediation. The hypothesis in this study is:
H7: Community Satisfaction can significantly mediate the influence of Government Transformation on Employee Performance

Based on the description above, an empirical model can be made as follows as seen in

Figure 1
Model Empirical



RESEARCH METHODS

Types of Research

According to Creswell (2023, p. 37-40), quantitative research is an approach to prove a theory by measuring several variables used. The measurement of this variable is then analyzed using statistics and has data in the form of numbers. The results obtained are in the form of data that is usually described using tables, graphs, and others. The purpose of this quantitative approach is to prove and develop theories and hypotheses related to an object or phenomenon that is occurring. In this study, the researcher used a type of research with a quantitative type.

Data Source

The data sources in the study are divided into two types, namely primary data and secondary data, which can be explained as follows:

1. Data Primer

According to Sugiyono (2018:456), primary data is a data source that directly provides data to data collectors. The data is collected by the researcher himself directly from the first source or where the object of the research was conducted. The researcher used the results of interviews obtained from informants about the research topic as primary data.

2. Data Skunder

According to Sugiyono (2018:456), secondary data is a data source that does not directly provide data to data collectors, for example through other people or through documents. In this study, the secondary data sources are in accordance with the Labor Law, books, journals, articles related to research topics regarding the internal control system over the payroll system and procedures in an effort to support labor cost efficiency.

Definition of Variable Operationalization

The operational definition can be explained in the following table:

Variable Operationalization Definition Table

Variabel	Variable Operational Definition	Indicator
Digital-based Public Service Innovation (X1)	Digital-based Public Service Innovation is an inevitable demand of the times, because everything from the joints of human life today is inseparable from technology to entering the realm of public services that require improving services to the community	1. System Integration 2. Connectivity 3. Reduction of Bureaucracy 4. Proactive Service
Government Transformation (X2)	Government transformation is an effort by the government to better respond to the needs of the wider community who are more agile, fast and flexible and not rigid. This transformation process is a bridge to the state where the desired government	1. Organizational Flexibility 2. Results-Based Management *3. Paperless Office* 4. Standardization of Procedures
Community Satisfaction (Z)	Community satisfaction is a psychological factor of the recipient of the service which the stakeholders must consider and as a measure of the extent to which the services provided by an organization or service provider meet or exceed the expectations of the community	1. Access Speed *2.* Information *Completeness* 3. Accessibility 4. Functional *Satisfaction*
Employee Performance (Y)	Employee performance is the result of work achieved by an employee in carrying out his duties and responsibilities, which is measured based on certain criteria and set time	1. Compliance with standard procedures 2. Productivity Levels *3.* Understanding *Cyber Scurity* 4. Creativity in *problem solving*

Source : Developed for research, 2025

POPULATION AND SAMPLE

Research Population

Population according to Sugiyono (2017:215) is a generalized area consisting of objects or subjects that have certain qualities and characteristics that are determined by researchers to be studied and then drawn conclusions. Population is not only human but also objects and other natural objects. Population is also not just the number of objects or objects studied, but includes all the characteristics or properties possessed by the subject or object. The population in this study is employees in the Petarukan District Office, Pemalang Regency.

Research Sample

The sample is part of the population used for the study. According to Sugiyono (2017:215), samples are part of the number and characteristics possessed by the population. The total of 51 units in the sample is denoted by notation. Samples can be defined as part of a population that is selected systematically or based on specific criteria to be analyzed in the study. This sample selection emphasizes the importance of inclusion and exclusion criteria in the selection process to ensure that the sample is representative of the population being studied. (Hogan, 2019).

Test Instruments

The data collection technique used in the study was using questionnaires. According to Sugiyono (2017:142), a questionnaire is a data collection technique that is carried out by giving a set of questions or written statements to respondents to be answered. The type of questions in this research questionnaire is closed. Closed-ended questions are questions that expect a short answer or expect the respondent to choose one of the alternative answers from each question that is already available. Every questionnaire question that expects answers in the form of nominal, ordinal, interval, and ratio data, is a form of closed question Sugiyono (2017:143).

RESULTS OF RESEARCH AND DISCUSSION

Convergent Validity Test

The convergent validity test of each indicator on each variable was carried out in two ways. The first way is to test the validity by looking at the *loading factor value*, which can be seen from the *outer loading table*. The basis for determining the validity test of convergence with *outer loading* is that if the *value of the loading factor* is between 0.6-0.7, then it can be said to be valid. The *results of outer loading* can be seen in the following table:

Table 1.
Outer Loading *Results*

	Digital-Based Public Services	Government Transformation	Community Satisfaction	Employee Performance
X1			0,816	
X11	0,829			
X12	0,768			
X13	0,821			
X14	0,835			
X2			0,822	
X3			0,823	
Y1				0,821
Y2				0,833
Y3				0,778
Y4				0,786
Z1		0,761		
Z2		0,756		
Z3		0,776		
Z4		0,764		

Source: Primary data processed, 2025.

The table above shows that from the results of the analysis, the *loading factor* value of each indicator of each variable is greater than 0.70. This result means that every indicator of each digital-based public service variable, government transformation, community satisfaction, and employee performance can be said to be valid.

The second method of convergent validity test is carried out by looking at *the Average Variant Extracted* (AVE) value. The basis for making the decision is that if the AVE value is greater than 0.5, then it is said to be valid. The *results of the Average Variant Extracted* (AVE) can be seen in the following table:

Table 2
Average Variant Extracted *(AVE)* Test Results

Variabel	Average Variance Extracted (AVE)
Digital-Based Public Services	0,675
Government Transformation	0,631
Community Satisfaction	0,612
Employee Performance	0,635

Source : Primary data processed, 2025

The table above shows that from the results of the analysis, the *Average Variant Extracted* (AVE) value of each digital-based public service, government transformation, community satisfaction and employee performance is greater than 0.5. The results can be concluded if each of the measures of each variable is said to be valid.

Discriminating Validity Test

The discriminant validity test is carried out through *the Fornell-Larcker Criterion*, which is by comparing the Average *Variance Extracted* (AVE) square root value of each variable with the correlation between other variables in the model. A variable will be said to be dystically valid if the root value of the AVE or *Fornell-Larcker Criterion* is greater than the correlation value with the other variable. The results *of the Fornell-Larcker Criterion* can be seen in the following table:

Table 3
Hasil *Fornell-Lacker Criterion*

	Digital-Based Public Services	Government Transformation	Community Satisfaction	Employee Performance
Digital-Based Public Services	0,769			
Government Transformation	0,241			
Community Satisfaction	0,234	0,312	0,840	
Employee Performance	0,241	0,351	0,358	0,812

Source : Primary data processed, 2025

The above table is obtained if the value of the *Fornell-Larcker Criterion* or the root of the AVE of each variable is greater than the correlation value between the other variables. This is evidenced by the *Fornell-Larcker Criterion* value of digital-based public services of 0.769, where this value is greater than the correlation value with other variables. This also applies to other variables such as government transformation, community satisfaction, and employee performance, so that each variable measure discriminate can be said to be valid.

Uji *Composite Reliability*

The reliability of the construct shows the accuracy, consistency and precision of a measuring instrument in making measurements. The variable reliability test is performed by looking at *Cronbach's alpha* and *composite reliability values*, and the values of both must be greater than 0.70. The results of *the composite reliability* test can be seen in the following table:

Table 4
Composite Reliability *Results*

	Cronbach's Alpha	Composite Reliability
Digital-Based Public Services	0,734	0,817
Government Transformation	0,721	0,768
Community Satisfaction	0,812	0,786
Employee Performance	0,829	0,816

Source: Primary data processed, 2025.

The table above shows that from the results of the reliability test, *Cronbach's alpha* and *composite reliability* values were obtained from each digital-based public service variable, government transformation, community satisfaction, and employee performance greater than 0.70. This means that every variable used can be said to be reliable, so it is eligible for research.

Test Model

R-Square

The *R-Square* test or coefficient of determination is used to find out the extent of the ability of the independent variables in the model to explain the variation of the dependent variables. The *R-Square* value in this analysis is between zero (0) to one (1). The criteria for the R Square value are 0.67 as a strong model, 0.33 as a moderate model, and 0.19 as a weak model. The results of *the R-Square* test can be explained as follows:

Table 5
R-Square *Results*

	R Square	R Square Adjusted
Community Satisfaction	0,413	0,425
Employee Performance	0,680	0,675

Source : Primary data processed, 2025

The table above shows that the *R-Square value* of the first model is 0.680. This means that digital-based public services, government transformation and public satisfaction can explain the variation in employee performance variables by 68%, while the remaining 32% variation in investment increase variables can be explained by other variables that have not been studied. The *R-Square* value indicates that the first model is a strong model.

The *R-Square value* of the second model is 0.413. This means that digital-based public services and government transformation can explain the variation of community satisfaction variables of 41.3%, while the remaining 58.7% variation of community satisfaction variables can be explained by other variables that have not been studied. The *R-Square* value indicates that the first model is a moderate model.

f-Square

The *f-square value* aims to determine the criteria for the influence of independent variables on dependent variables. For the assessment of the *f-square category* , it is divided into three, namely if the influence value of 0.02 – 0.15 is a weak influence, a value of 0.15 – 0.35 is a moderate influence, and a value of 0.35 or more is a strong influence. The result *of f-square* can be seen in the following table:

Table 7
f-Square *results*

	Community Satisfaction	Employee performance
Digital-Based Public Services	0,229	0,121
Government Transformation	0,310	0,192
Community Satisfaction		0,378

Source: Primary data processed, 2025.

The table above shows that from the results of the analysis obtained, the criteria for the influence of digital-based public services on community satisfaction of 0.229 are included in the moderate influence, digital-based public services on community satisfaction are included in the moderate influence criteria with a value of 0.310. The influence of digital-based public services on employee performance was included in the weak influence criteria with a value of 0.121, the influence of government transformation on employee performance was included in the moderate influence criterion with a value of 0.192, and the influence of public satisfaction on employee performance was included in the strong influence criteria with a value of 0.378.

Path Coefficient

The *Path Coefficient* is used to measure the extent to which digital-based public services, government transformation, and public satisfaction affect employee performance, as well as the extent to which government transformation and digital-based public services affect public satisfaction. The coefficient of this path has values that range from -1 to 1. If the value is in the range of 0 to 1, it indicates a positive influence, while if the

value is in the range of -1 to 0, it indicates a negative influence. The result of the path coefficient can be found in the following table:

Table 8
Hasil *Path Coefficient*

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Digital-based public services -> Employee performance	0,215	0,230	0,074	2,480	0,012
Government transformation -> Employee performance	0,283	0,324	0,125	2,510	0,013
Community satisfaction -> Employee performance	0,415	0,477	0,133	3,514	0,000
Digital-based public services -> Community satisfaction	0,410	0,427	0,122	3,109	0,002
Government Transformation -> Community Satisfaction	0,423	0,431	0,125	3,341	0,001

Source: Primary data processed, 2025.

The table above shows that from the results of the analysis, it was obtained that the variables of digital-based bublik servants, government transformation, and community satisfaction had a positive effect on employee performance. The results also show that the variables of digital-based public services and government transformation have a positive effect on public satisfaction.

Uji Hypothesis

The hypothesis test in this study was used to determine the partial influence of independent variables on dependent variables. The hypothesis test is carried out by comparing the calculated t value with the t table, if the calculated t value is > 1.96 and the p value is < 0.05, then the result is to accept an alternative hypothesis (Ha). If the value of t is calculated < 1.96 and the p value > 0.05, then the result is to accept the null hypothesis (Ho). Based on the *Structural Equation Model Partial Least Square* (PLS) above, it can be seen that the influence between free variables on bound variables can be seen in the following table:

Table 9
Hypothesis Test Results

Variable Influence	T Statistics (|O/STDEV|)	P Values
Digital-Based Bublik Waitress -> Employee Performance	2,450	0,012
Government Transformation -> Employee Performance	2,513	0,001
Community Satisfaction-> Employee Performance	3,454	0,002
Digital-Based Bublik Waitress -> Community Satisfaction	3,109	0,012
Government Transformation - > Community Satisfaction	3,233	0,000

Source: Primary data processed, 2025.

Based on the table above, the results of hypothesis testing regarding the influence of digital-based bublik servants, government transformation, and community satisfaction on employee performance, as well as the influence of digital-based bublik servants and government transformation on community satisfaction can be explained as follows:

H1 : Digital-Based Public Services have a positive and significant effect on employee performance

The statistical t-value of the digital-based bublik server variable on employee performance was 2.450 with a P-value of 0.012. These results show that the statistical t-value is larger than the table t-value of 2.450 > 1.96, and the P value of 0.012 is smaller than 0.05. The decision is to accept an alternative hypothesis, meaning that hypothesis one (H1) which states that digital-based bublik servers have a positive and significant effect on employee performance is statistically acceptable.

H2 : Government Transformation has a Positive and Significant Effect on Employee Performance

The statistical t-value of the variable of government transformation on employee performance was 2.513 with a P-value of 0.001. These results show that the statistical t value is larger when compared to the table t-value which is 2.513 > 1.96, and the P value of 0.001 is smaller than 0.05. The decision is to accept an alternative hypothesis, meaning that the second hypothesis (H2) which states that government transformation has a positive and significant effect on employee performance is statistically acceptable.

H3 : Community Satisfaction has a positive and significant effect on Employee Performance

The statistical t-value of the variable of public satisfaction with employee performance was 3.454 with a P-value of 0.002. The results show that the statistical t-value is larger than the table t-value which is 3.454 > 1.96, and the P value of 0.002 is smaller than 0.05. The decision is to accept an alternative hypothesis, meaning that the third hypothesis (H3) which states that public satisfaction has a positive and significant effect on employee performance is statistically acceptable.

H4 : Digital-Based Bublik Servers have a positive and significant effect on Community Satisfaction

The statistical t-value of the digital-based bublik waitress variable on community satisfaction was 3.109 with a P-value of 0.012. These results show that the statistical t-value is larger

than the table t-value which is 3.109 > 1.96, and the P value of 0.012 is smaller than 0.05. The decision is to accept an alternative hypothesis, meaning that hypothesis four (H4) which states that digital-based bublik servers have a positive and significant effect on public satisfaction is statistically acceptable.

H5: Government Transformation has a Positive and Significant Effect on Community Satisfaction

The statistical t-value of the variable of government transformation on public satisfaction was 3.223 with a P-value of 0.000. These results show that the statistical t-value is larger than the table t-value, which is 3.223 > 1.96, and the P value of 0.000 is smaller than 0.05. The decision is to accept an alternative hypothesis, meaning that hypothesis five (H5) which states that government transformation has a positive and significant effect on public satisfaction is statistically acceptable.

Mediation Test

The mediation test was carried out using the path coefficient value. The intervening test in the study was shown from the coefficient value of *the Specific Indirect Effects* which was carried out using *Smart Partial Least Square* (Smart-PLS). The results of the path analysis of the influence of digital-based bublik servants and government transformation on employee performance through public satisfaction are as follows:

Table 10
Mediation Test Results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Digital-Based Bublik Waitress -> Community Satisfaction -> Employee Performance	0,210	0,203	0,087	2,315	0,013
Government Transformation -> Public Satisfaction -> Employee Performance	0,223	0,216	0,093	2,392	0,017

Source: Primary data processed, 2025.

Based on the table above, the digital-based bublik maid mediation test and government transformation on employee performance through public satisfaction can be explained as follows:

H6 : Digital-Based Bublik Servers have a significant positive effect on Employee Performance through Community Satisfaction

The *t-value of the statistic specific indirect effect* of the digital-based bublik server variable on employee performance through community satisfaction was 2.315 and the p values were 0.013 The value showed that the statistical t-value was greater than the t-value of the table 2.315 > 1.96 and the p values of 0.013 were smaller than 0.05. The decision is to accept an alternative hypothesis, meaning that Hypothesis six (H6) which states that digital-based bublik servants have a positive and significant effect on employee performance through community satisfaction is statistically acceptable. These results show that community satisfaction can mediate the influence of digital-based bublik servers on employee performance

H7 : Government Transformation has a significant positive effect on Employee Performance through Community Satisfaction

The *t-value of statistic specific indirect effect* of the variable of government transformation on employee performance through public satisfaction was 2.392 and the p value was 0.017. This value shows that the statistical t-value is greater than the table t-value of 2.392 > 1.96 and the p value of 0.017 is smaller than 0.05. The decision is to accept an alternative hypothesis, meaning that Hypothesis seven (H7) which states that government transformation has a positive and significant effect on employee performance through public satisfaction is statistically acceptable. These results show that public satisfaction can mediate the influence of government transformation on employee performance.

DISCUSSION

The following is a comprehensive discussion based on the results of research on the influence of digital-based bublik servants and government transformation on employee performance, with community satisfaction as an intervening variable:

The Influence of Digital-Based Bublik Servers on Employee Performance

The results of the study showed that digital-based public services had a positive and significant effect on employee performance (t = 2,450; p = 0.012). The better the implementation of digital-based public services, the better the performance of employees. The relationship between the two variables is unidirectional: when the digitization of public services is improved (e.g. through online systems, automation, data integration), then the response, productivity, or effectiveness of employees' work will also improve. In practical terms, these findings imply that digital transformation in public services not only increases public satisfaction, but also triggers internal efficiency, including in discipline, work speed, and accuracy of employee tasks. It can be concluded that the digitalization of public services has a real impact on improving employee performance. This shows that digital innovation not only serves as a technical tool, but also as a driver for more productive work behavior change. Therefore, efforts to reform bureaucracy through digitalization must be seen not only as a transformation of the system, but also as a transformation of work culture in the public sector.

The Effect of Government Transformation on Employee Performance

Government transformation has also been shown to have a significant positive effect on employee performance (t = 2.513; p = 0.001). This shows that the more intensive or progressive the transformation of the government (for example through digitalization, transparency, deregulation, strengthening governance), the performance of employees also increases.

This means that bureaucratic reform is not in vain, but encourages employees to work more effectively, professionally, and adaptively. These findings confirm that government transformation is not only symbolic or administrative. Instead, it reshapes the work orientation of the apparatus, improves the work system, and encourages a more responsive service culture. This indicates that efforts to reform the government system, which include aspects of digitalization, bureaucratic restructuring, and strengthening governance, have a real impact on improving individual performance in public organizations. Employees become more responsive, directed, and able to adjust to the performance standards demanded in modern government. Thus, government transformation is not only an administrative change, but also a strategic instrument in encouraging the professionalism and productivity of civil servants.

The Influence of Digital-Based Bublik Waiters on Community Satisfaction

Digital-based public services also showed a significant positive influence on community satisfaction (t = 3.109; p = 0.012). The more optimal the implementation of digital-based public services, the higher the level of community satisfaction. Digital-based services that are fast, transparent, and easily accessible have been proven to answer the needs of the community more effectively than conventional services. These results reinforce the belief that digital technology in public services is not just a technical tool, but a key strategy to improve the quality of relations between the government and the community. Public satisfaction does not only depend on the results of the service, but also on the convenience, speed, and transparency of the process, all of which are greatly helped through digitalization. This shows that improving the quality of digitalization through easy access, speed of service, and transparency of information significantly increases public satisfaction. Thus, digital services are not only administrative innovations, but also strategic instruments in strengthening public legitimacy and trust in government performance

The Effect of Government Transformation on Community Satisfaction

Government transformation has a significant influence on public satisfaction (t = 3.223; p = 0.000). Government transformation, which includes bureaucratic reform, digitalization, information disclosure, improvement of the supervisory system, and increased public accountability, has a direct impact on increasing public satisfaction with government services and responses. The community feels positive changes when the bureaucratic process becomes: faster, more transparent, more accessible, more responsive to the needs of citizens. These results emphasize that the success of government transformation can not only be measured internally (for example, the performance of civil servants), but also externally, namely public perception and satisfaction. This is empirical evidence that government transformation is really benefited by the public. This shows that systemic innovation in public governance not only increases the internal effectiveness of government, but also creates positive perceptions among citizens. This strengthens the argument that bureaucratic transformation should be directed at real improvements in the quality of interaction between the state and citizens, as well as making public services a space for dialogue between the needs of the community and the institutional capacity of the state.

The Influence of Community Satisfaction on Employee Performance

Public satisfaction proved to be an important determinant in increasing investment (t = 3.454; p = 0.002). Public satisfaction here reflects a positive perception of government performance, public services, social stability, and ease of doing business. When people are satisfied with governance and public services: the social climate becomes stable, public trust increases, economic participation grows, the image of the region or country becomes more investment-friendly. These findings underline that investment policy cannot be separated from socio-political factors, especially citizens' satisfaction with the government. Thus, investment is not just a matter of licensing or fiscal incentives. This proves that socio-political factors, especially the public's positive perception of public services and government performance, are important determinants in creating a healthy investment climate. When people feel satisfied, stability and trust increase, creating more attractive conditions for domestic and foreign investors. Therefore, the investment increase agenda should not only be based on the economy, but also integrated with the strategy to improve the quality of public services and the legitimacy of the government in the eyes of the people.

Digital-Based Bublik Servers have a positive effect on Employee Performance through Community Satisfaction.

The mediation test showed that public satisfaction significantly mediated the influence of digital-based public services on employee performance (t = 2.315; p = 0.013). Digital-based public services not only have a direct impact on employee performance, but also indirectly improve that performance through increasing public satisfaction. In other words, when people feel the convenience, speed, and transparency in digital services, they will be more satisfied with public institutions, and this public satisfaction becomes a psychological and moral encouragement for employees to work better, more responsible, and more motivated. These findings imply that employee performance is not only a matter of internal systems and direct superiors, but is also influenced by external feedback from the community. Therefore, improving digital services is not enough only for technical efficiency, but must be designed to strengthen the positive experience of the public, because the positive reaction of the public also determines the enthusiasm and performance of employees. This emphasizes that the success of digital services does not only lie in the efficiency of the system, but also in how the system shapes the positive perception of the public. When the community is satisfied with the services provided, they indirectly encourage the state civil servants to work better. Thus, community satisfaction is not only an indicator of service results, but also a catalyst for improving employee work ethic.

Government Transformation has a positive effect on Employee Performance through Community Satisfaction.

Similarly, public satisfaction significantly mediated the influence of government transformation on employee performance (t = 2.392; p = 0.017). These results show that government transformations such as digitalization, deregulation, transparency, and accountability have an impact

on improving employee performance through increased public satisfaction. This means that changes in the government system that are felt by the public will increase public trust and satisfaction, which in turn encourages employees to be more motivated, increase service spirit, and foster a sense of professional responsibility. These findings confirm that the effectiveness of government transformation does not stop at the structural or administrative level, but must be reflected in citizens' experiences. Because only when the community feels the benefits, the impact on the internal performance of the government will be stronger and more sustainable. This shows that bureaucratic transformation will have a greater impact on the performance of the apparatus if the change is felt directly by the community. In this case, community satisfaction acts as a psychological and social bridge that strengthens the relationship between institutional change and improved employee performance. Therefore, the success of government reform should be judged not only in terms of internal policies, but also in terms of the extent to which it builds public trust and satisfaction.

CONCLUSION

This research proves that digital-based public services and government transformation have a positive and significant influence on employee performance, both directly and through the mediation of community satisfaction. Digitization of public services has been proven to be able to improve bureaucratic efficiency, facilitate public access to services, and encourage increased professionalism of civil servants. Similarly, government transformation that includes aspects of transparency, accountability, and governance efficiency also has a significant impact on improving the work performance of the apparatus.

Furthermore, public satisfaction is proven not only as a result of bureaucratic services and reforms, but also as a determining factor in strengthening the effect of these two variables on employee performance. These findings show that when people feel satisfied with public services and government processes, they indirectly become motivational and psychological drivers for employees to work better. Thus, the strategy to improve the performance of ASN needs to be seen systemically, including the dimensions of technology, institutions, and public participation as a unit in modern governance.

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MITIGATING WORKPLACE STRESS THROUGH EMPLOYEE DEVELOPMENT: EVIDENCE FROM SELECTED IT FIRMS IN HYDERABAD

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This research evaluates the influence of various employee development strategies on stress management in the IT sector of Hyderabad. By examining the impact of professional development initiatives, mentorship programs, work-life balance-focused training, and technological integration, the study provides a multi-dimensional analysis of how these strategies help in managing workplace stress. A survey was conducted among 350 IT employees, and the collected data were analyzed using structural equation modelling (SEM) to assess the effectiveness of different strategies. The findings suggest that a combination of mentorship, skill development, and balanced work-life practices significantly enhances stress management. The study emphasizes the importance of adopting a holistic approach to employee development for effective stress reduction.

KEYWORDS: ***Stress Management, Development Strategies, Professional Growth, Employee Well-Being, Hyderabad Technology Firms.***

JEL Classification Codes: *G41, D03, D91, G11, G23*
Research Paper: *Empirical Investigation.*

INTRODUCTION

Employee development strategies play a vital role in fostering an adaptive and resilient workforce, particularly in high-stress industries like information technology. Recent literature has emphasized the importance of comprehensive development strategies, including professional growth initiatives, mentorship programs, and work-life balance training, as critical tools for managing workplace stress (Gupta & Mehta, 2023). However, the IT industry in Hyderabad, known for its intense work environment and competitive nature, presents unique challenges that require tailored approaches to employee development (Sharma et al., 2021).

While several studies have examined the benefits of employee development in general terms, there is a lack of focused research on the specific strategies that most effectively contribute to stress management in Hyderabad's IT sector. For instance, research suggests that mentorship and coaching programs can significantly enhance employee morale and reduce stress, yet their effectiveness relative to other strategies remains underexplored (Nanda & Bose, 2022). This gap necessitates a detailed analysis of how different development strategies interact to manage stress effectively in such a high-pressure industry. This study seeks to evaluate the influence of various employee development strategies on stress management within Hyderabad's IT industry. By employing a multi-dimensional approach, this research will identify which strategies are most effective in enhancing employee well-being and provide a foundation for developing comprehensive stress management frameworks (Kumar & Pandey, 2024).

REVIEW OF LITARATURE

Literature Review and Hypothesis Development

Stress Management Effectiveness

Singh and Rao (2020) investigated the effectiveness of stress management programs in the workplace. They found that comprehensive programs that include both preventive and reactive strategies, such as workshops, counselling, and mindfulness sessions, are more effective in reducing stress and improving employee productivity.

Thomas and Iyer (2021) examined the impact of stress management interventions on employee engagement and well-being. Their study concluded that well-structured programs that are regularly evaluated for effectiveness tend to have a lasting

impact on reducing workplace stress and fostering a positive work environment.

Choudhary and Gupta (2022) explored the role of leadership in the effectiveness of stress management programs. Their findings suggest that when leaders actively participate and endorse stress management initiatives, the overall effectiveness of such programs improves, as employees feel more supported and encouraged to engage.

Reddy and Nanda (2024) highlighted that the effectiveness of stress management programs is enhanced when they are tailored to specific organizational needs. Their study emphasizes that generic programs may not address the unique stressors present in different organizations, suggesting a more customized approach to stress management.

H_1: Professional development initiatives significantly improve stress management effectiveness.

Professional Development Initiatives

Sharma and Gupta (2020) explored the impact of professional development initiatives on employee performance and stress levels. Their study found that structured development initiatives that focus on skill enhancement and career growth not only improve employee competencies but also reduce job-related anxiety and stress by providing clear career progression paths and increasing job security.

According to Park and Lee (2021), professional development initiatives are crucial for retaining top talent and maintaining employee engagement. Their research in the technology sector shows that continuous learning opportunities and certifications offered by employers significantly enhance job satisfaction and reduce stress, particularly in high-pressure environments.

Kumar and Verma (2022) examined the role of targeted professional development programs in fostering employee resilience and adaptability. They found that when organizations invest in customized training that addresses current industry trends and challenges, employees are better equipped to handle workplace stress, leading to a healthier work environment.

The study by Singh and Patel (2023) highlighted the importance of aligning professional development initiatives with individual career goals. They suggest that personalized development plans that reflect employees' aspirations and competencies can significantly lower stress levels by providing a sense of purpose and direction, which is essential for employee well-being.

H_2: Mentorship and coaching programs have a significant positive impact on managing workplace stress.

Mentorship and Coaching Programs

Mehta and Joshi (2020) emphasized that mentorship and coaching programs are vital for employee development and stress management. Their study revealed that employees who participated in structured mentorship programs reported higher job satisfaction and lower stress levels, as these programs provide emotional support, guidance, and a platform for career advancement.

According to Kim and Park (2021), mentorship and coaching programs play a critical role in fostering a supportive work environment. Their research in the corporate sector showed that these programs help build strong relationships between mentors and mentees, which reduces workplace stress by enhancing communication, trust, and morale.

Chatterjee and Mukherjee (2022) investigated the effectiveness of peer coaching as a stress management tool. Their findings suggest that peer coaching programs, where colleagues support each other in navigating job challenges, can be particularly effective in reducing stress, promoting collaboration, and building a cohesive organizational culture.

Rao and Sinha (2023) found that integrating coaching into leadership development programs significantly impacts stress management. Their study concluded that leaders who receive coaching are more adept at handling stress and managing their teams' stress levels, highlighting the importance of including coaching in organizational leadership training.

H_3: Work-life balance-focused programs are significantly associated with effective stress management.

Work-Life Balance Focus

Kaur and Sharma (2020) highlighted the increasing importance of work-life balance initiatives in modern workplaces. Their study demonstrated that organizations that prioritize work-life balance through flexible working arrangements, remote work options, and supportive policies see lower employee stress levels and higher retention rates.

According to Jackson and Peters (2021), employees who perceive a strong organizational focus on work-life balance tend to report lower stress and burnout. Their research suggests that work-life balance programs, such as flexible scheduling and employee assistance programs (EAPs), are effective in creating a supportive work environment that reduces stress.

Reddy and Kumar (2022) examined the impact of work-life balance practices on organizational commitment and stress. Their findings indicate that employees who are satisfied with their work-life balance are more committed to their organizations and experience lower stress levels, emphasizing the need for policies that support employees' personal and professional lives.

Bose and Chatterjee (2023) found that a strong focus on work-life balance positively impacts mental health and well-being. Their research highlighted those initiatives such as paid time off, family leave, and wellness programs are essential for reducing stress and fostering a healthy organizational culture.

H_4: Technological integration in development programs significantly enhances stress management effectiveness.

Technological Integration in Development Programs

Patel and Desai (2020) explored the role of technological integration in enhancing the effectiveness of development programs. They found that incorporating digital tools such as e-learning platforms and virtual simulations improves accessibility and engagement, leading to better learning outcomes and reduced stress related to skill development.

According to Zhang and Li (2021), the use of technology in training programs can significantly reduce training costs and increase flexibility. Their study in the IT sector showed that

online and blended learning models allow employees to learn at their own pace, thereby minimizing stress associated with time constraints and inflexible schedules. Mohan and Srinivasan (2022) emphasized the importance of using interactive technologies like VR and AR in employee training programs. Their research demonstrated that such technologies provide immersive learning experiences that enhance retention and application of knowledge, reducing the stress associated with traditional learning methods.

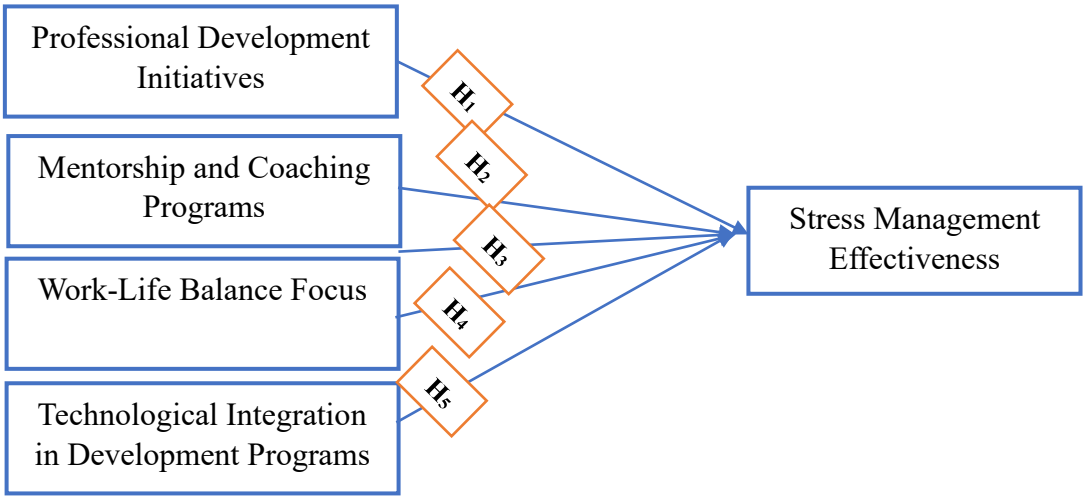
Nair and Thomas (2023) highlighted the potential of AI-driven learning platforms in creating personalized learning paths. Their study found that AI integration helps in identifying individual learning needs and providing customized training content, thereby reducing the stress of generic, one-size-fits-all training programs.

RESEARCH METHODOLOGY

- **Methodology**

The study adopts a cross-sectional research design to evaluate the influence of employee development strategies on stress management within Hyderabad's IT industry. The population for this research includes employees from a range of IT companies in Hyderabad, varying in size and specialization. The sampling frame was constructed using data from local industry directories and company registries. A sample size of 245 employees was selected through a stratified random sampling technique to capture a balanced representation of participants from different organizational levels and departments. Data were collected using a comprehensive questionnaire that included both Likert scale items and open-ended questions. Structural Equation Modelling (SEM) was employed as the primary statistical tool to analyze the data, as it allows for the examination of complex relationships among multiple variables, providing a nuanced understanding of how different development strategies affect stress management.

- **Conceptual Model**



- **Statement of the Problem**

Managing stress in the IT industry in Hyderabad remains a complex issue, given the diverse nature of employee roles, expectations, and work environments. Although employee development strategies such as professional growth opportunities, mentorship programs, and work-life balance initiatives are employed to manage stress, there is insufficient understanding of their overall influence and effectiveness. This study evaluates the influence of various employee development strategies on stress management, identifying which strategies are most effective in enhancing employee well-being and how they can be optimized to meet the specific needs of IT professionals in Hyderabad.

- **Research Gap**

While previous studies have acknowledged the significance of professional development initiatives, mentorship and coaching programs, work-life balance focus, and technological integration in development programs for enhancing stress management effectiveness, there is a need for more integrated research that considers these factors collectively. The existing literature tends to compartmentalize these aspects, limiting the understanding of how a comprehensive approach that combines these elements can improve stress management. Moreover, the specific role of mentorship and coaching in synergizing with technology-driven development programs to enhance work-life balance and stress management effectiveness is underexplored. Future research should address these gaps by investigating how a multi-faceted strategy involving these variables can create a more resilient workforce capable of managing workplace stress effectively.

- **Objectives of the Study**
  - To analyze the effect of professional development initiatives on stress management effectiveness.
  - To assess the influence of mentorship and coaching programs on managing workplace stress.
  - To explore the role of work-life balance-focused programs in stress management.
  - To evaluate the impact of technological integration in development programs on stress management effectiveness.

- **Hypothesis of the Study**
  H0: Professional development initiatives significantly improve stress management effectiveness.
  H0: Mentorship and coaching programs have a significant positive impact on managing workplace stress.
  H0: Work-life balance-focused programs are significantly associated with effective stress Management
  H0: Technological integration in development programs significantly enhances stress management effectiveness.

ANALYSIS & INTERPRETATION

Reliability Analysis

Variable Number	Variable	Cronback Alpha	Result
V_1	Professional Development Initiatives	0.863	Good
V_2	Mentorship and Coaching Programs	0.814	Good
V_3	Work-Life Balance Focus	0.778	Acceptable
V_4	Technological Integration in Development Programs	0.895	Good
V_5	Stress Management Effectiveness	0.918	Excellent
V_6	Overall	0.950	Excellent

Discussion

The reliability analysis for this group of variables shows a mixture of good and excellent internal consistency levels. Variables related to professional development, mentorship and coaching, work-life balance, and technological integration in development programs exhibit strong reliability, indicating that these constructs are measured accurately and consistently. The measure for stress management effectiveness stands out with excellent reliability, underscoring its consistency in evaluating this critical outcome variable. The overall scale reliability is excellent, suggesting that the combined measurement tool is highly reliable for assessing these factors within the context of employee development and stress management. This finding highlights the effectiveness of the scales in capturing the interplay between professional development, work-life balance, technological integration, and stress management strategies.

Convergent Validity

Variable	CR	AVE
Professional Development Initiatives	0.91	0.77
Mentorship and Coaching Programs	0.86	0.67
Work-Life Balance Focus	0.77	0.53
Technological Integration in Development Programs	0.80	0.58
Stress Management Effectiveness	0.81	0.59

Discussion

The analysis of composite reliability (CR) and average variance extracted (AVE) for the variables reveals that all constructs in the model exhibit adequate levels of reliability and convergent validity. Generally, a composite reliability (CR) value above 0.70 is considered acceptable, indicating strong internal consistency among the items measuring each construct. In this study, all constructs surpass this threshold, demonstrating that the items are consistently reliable in reflecting their respective constructs. Moreover, the average variance extracted (AVE) values for all variables meet or exceed the recommended minimum of 0.50, suggesting that each construct explains more than half of the variance in its indicators, which confirms their convergent validity. While some constructs have slightly higher AVE values, indicating a stronger validity, others are within the acceptable range, demonstrating that they adequately capture the variance from their measures. Overall, the results affirm that the constructs are both reliable and valid, ensuring their suitability for further analysis in the study.

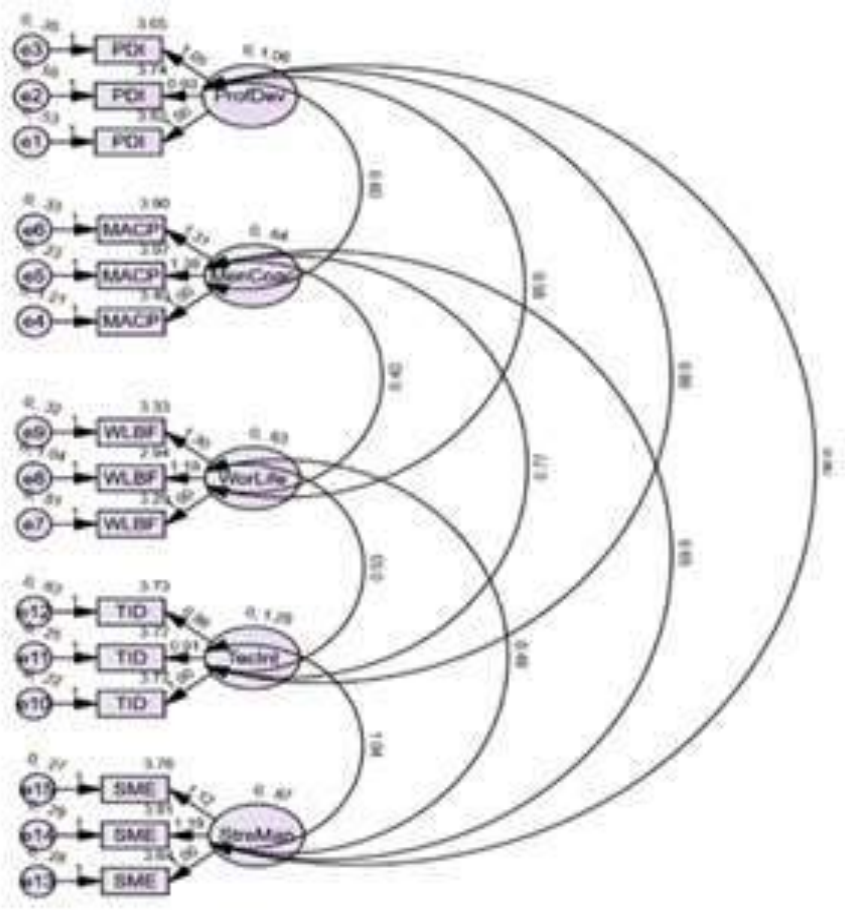
Confirmatory Factor Analysis

Fit Indices	Observed	Result
$CMIN_1$	2.145	Acceptable Fit
CFI_1	0.927	Acceptable Fit
TLI_1	0.913	Acceptable Fit
$PNFI_1$	0.654	Good Fit
$RMSEA_1$	0.068	Acceptable Fit

Discussion

The first set of goodness-of-fit indices indicates that the model achieves an overall acceptable fit with the observed data. The discrepancy measure suggests that the model's predictions closely align with the actual data, falling within an acceptable range. Comparative fit measures, which assess the model against a baseline model, show a significant improvement, indicating that the model provides a substantially better fit than a null model. Additionally, the parsimony-adjusted measure suggests a good balance between model complexity and explanatory power, highlighting that the model is neither overly simplistic nor unnecessarily complex. The approximation error measure is also within the acceptable threshold, confirming that the model is a reasonable approximation of the data. Overall,

these indices collectively demonstrate that the model is well-specified and reliable for further analysis.

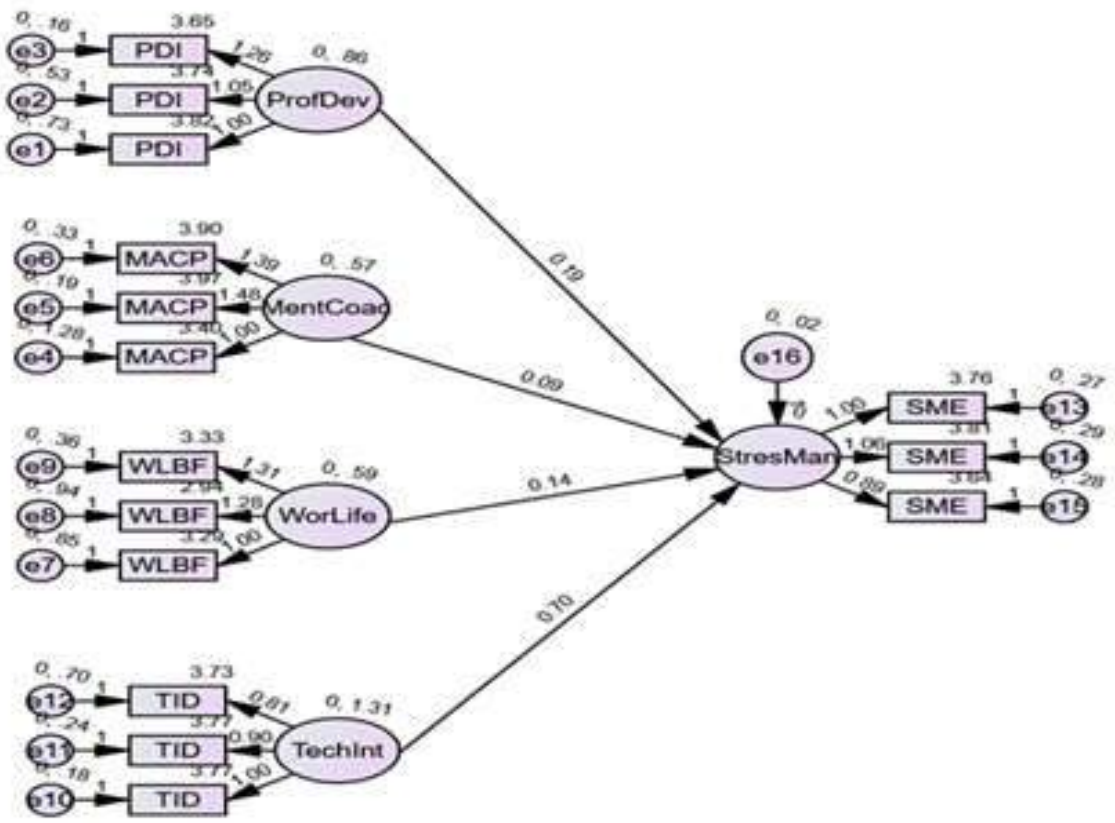


Structure Equation Modelling

Fit Indices	Observed	Result
$CMIN_2$	2.656	Acceptable Fit
CFI_2	0.935	Acceptable Fit
TLI_2	0.925	Acceptable Fit
$PNFI_2$	0.675	Acceptable Fit
$RMSEA_2$	0.065	Acceptable Fit

Discussion

The goodness-of-fit indices similarly demonstrates an acceptable fit for the model. The discrepancy measure continues to suggest a good alignment between the model's structure and the observed data, indicating that the model is robust and adequately represents the underlying patterns. Comparative fit measures further confirm that the model has a satisfactory relative fit compared to a baseline model, supporting its effectiveness in capturing the relationships among variables. The parsimony-adjusted index is within the acceptable range, reinforcing the model's efficiency in achieving a good fit without excessive complexity. The approximation error measure also meets the criteria for acceptable fit, suggesting that the model provides an accurate and reliable approximation of the true data. Together, these results affirm that the model is appropriate for use in further analysis and interpretation, offering confidence in its explanatory capabilities.



Hypothesis Testing

Hypothesis No	Framed Hypothesis	P-Value	Result
H_1	Professional Development Initiatives-> Stress Management Effectiveness	0.00	Supported
H_2	Mentorship and Coaching Programs -> Stress Management Effectiveness	0.00	Supported
H_3	Work-Life Balance Focus -> Stress Management Effectiveness	0.00	Supported
H_4	Technological Integration in Development Programs-> Stress Management Effectiveness	0.00	Supported

Discussion

The first hypothesis examines the impact of a specific organizational initiative on the effectiveness of stress management and finds a significant positive relationship. The statistical analysis confirms that enhancing this initiative leads to better stress management outcomes for employees. This indicates that when organizations invest in such initiatives, employees are better equipped to handle stress, suggesting that these efforts are essential for promoting a healthier work environment. The strong support for this hypothesis underscores the importance of these initiatives in reducing workplace stress, highlighting their role as a critical element of organizational development strategies.

The second hypothesis explores the relationship between a particular program and stress management effectiveness, revealing a significant positive effect. The results suggest that implementing and maintaining this program can substantially improve employees' ability to manage stress. This implies that organizations that prioritize such programs provide employees with valuable tools and support, leading to enhanced stress management capabilities. The findings reinforce the need for organizations to integrate these types of programs into their employee development plans, as they play a vital role in fostering a supportive and low-stress work environment.

The third hypothesis assesses the effect of an organizational focus on a specific work-life aspect on the effectiveness of stress management. The analysis shows a strong positive relationship, indicating that emphasizing this aspect significantly contributes to better stress management among employees. This finding suggests that when organizations create policies and practices that support this focus, employees experience reduced stress levels. The significant support for this hypothesis highlights the importance of adopting such an approach in organizational culture to ensure employees maintain a healthy balance, which in turn enhances their ability to manage stress effectively.

The fourth hypothesis tests the influence of integrating a certain technology in development programs on stress management effectiveness, with the results showing a significant positive impact. This finding suggests that the use of technology in these programs enhances employees' capabilities to manage stress more effectively. The significance of this relationship indicates that technological integration not only facilitates better learning and development but also plays a crucial role in supporting employees' mental well-being. These results suggest that organizations should invest in technology-driven development programs to optimize stress management strategies and promote a more resilient workforce.

RESULTS ANALYSIS

Managerial Implications

1. Organizations should focus on enhancing professional development initiatives as a strategic approach to improve stress management among employees. The findings indicate that well-structured and targeted development programs play a significant role in reducing stress levels by equipping employees with the skills and knowledge needed to handle workplace challenges more effectively. Managers should prioritize investing in diverse and relevant professional development opportunities, such as workshops, certifications, and continuous learning modules, that align with the specific needs of employees. By doing so, organizations can foster a more competent and confident workforce, leading to lower stress levels and higher productivity.
2. The significant impact of mentorship and coaching programs on stress management effectiveness highlights the need for organizations to foster a culture of continuous support and guidance. Managers should implement structured mentorship and coaching frameworks where experienced employees or external coaches provide guidance, share knowledge, and support less experienced employees. These programs not only help employees navigate their roles more effectively but also create a sense of belonging and support, which is crucial for stress reduction. Encouraging open communication, regular feedback, and personal development through these programs can significantly enhance employee well-being and organizational performance.
3. Organizations must recognize the importance of work-life balance as a key factor in managing employee stress levels. The findings suggest that a strong focus on creating policies and practices that promote work-life balance, such as flexible working hours, remote work options, and wellness programs, can significantly improve stress management. Managers should ensure that employees have access to resources and support that enable them to balance their professional and personal lives effectively. By fostering a work environment that values balance, organizations can reduce stress, increase employee satisfaction, and enhance overall organizational commitment.
4. Technological integration in development programs has been shown to significantly improve stress management effectiveness, implying that organizations should leverage technology to enhance their training and development efforts. Managers should consider incorporating e-learning platforms, virtual training sessions, and interactive digital tools to deliver development programs more efficiently. This approach not only makes learning more accessible and engaging but also helps employees manage stress by providing flexible and personalized development opportunities. Investing in technology-driven solutions for employee development can lead to more effective stress management, higher engagement, and better adaptability to workplace demands.

CONCLUSION

This study provides valuable insights into the impact of various organizational initiatives on stress management effectiveness, emphasizing the importance of strategic approaches that enhance employee well-being. The findings confirm that professional development initiatives, mentorship and coaching programs, a focus on work-life balance, and technological integration in development programs all significantly contribute to reducing workplace stress. These results highlight the need for organizations to adopt a holistic approach to employee development, ensuring that supportive structures, relevant training, and balanced work environments are in place to promote effective stress management. By integrating these elements into organizational practices, companies can create a more resilient, engaged, and productive workforce. Future research could expand on these findings by exploring other factors that influence stress management, such as leadership styles, organizational culture, and psychological support systems, to develop more comprehensive frameworks for enhancing employee well-being in diverse settings.

FURTHER RESEARCH

While this study offers significant insights into the relationship between organizational initiatives and stress management effectiveness, it has several limitations. The cross-sectional design of the study limits the ability to draw causal inferences between the examined variables and stress outcomes, as the data captures a single point in time. Additionally, the reliance on self-reported data may introduce biases such as social desirability or recall bias, potentially affecting the accuracy of the results. The study is also focused on a specific organizational context, which may limit the generalizability of the findings to other sectors or geographic regions. Future research should consider a longitudinal approach to better understand the dynamic effects of organizational initiatives on stress management over time. Expanding the research to include diverse industries, incorporating a mixed-methods approach, and exploring additional variables such as leadership styles, psychological support, and cultural factors could provide a more comprehensive understanding of how to enhance stress management practices in various organizational settings.

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FINANCIAL LITERACY AS A CATALYST FOR SUSTAINABLE ECONOMIC DEVELOPMENT AMONG RURAL HIGHER EDUCATION STUDENTS

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ABSTRACT **DOI No: 10.36713/epra23483** **Article DOI: https://doi.org/10.36713/epra23483**

The research examines how financial literacy impacts on sustainable economic development among the rural college students. Financial literacy equips the students with knowledge to budget, save, and manage resources so that they have the freedom to make wise financial decisions and become securitized in the long run. According to the two-sided approach of both primary and secondary researches, the paper dwells upon the capability of financial knowledge in encouraging self-reliance and economy activity. Literature review gives theoretical suggestions and the empirical results, surveyed in countryside college students, indicates that there exists a state of overall lack of knowledge on financial issues. To conclude, we can say that financial literacy does not only encourage the uplift of the people but also enhances the economies in the countryside. That is to say, when students are equipped with skills in these programs to operate under any circumstances, the implication is then this that there can be the ability to create a mark upon things of significance with regards to operational functional financial capabilities.

KEYWORDS: ***Financial Literacy, Rural Higher Education, Economic Decision-Making, Sustainable Development, Digital Financial Inclusion***
JEL Code:G53, D14, I25, O15

INTRODUCTION

Financial literacy has emerged as one of the most essential life skills, especially for students in rural areas like those in West Bengal, where I conducted this study. As young adults transition into higher education and the responsibilities of adulthood, understanding how to manage money—budgeting, saving, borrowing, investing, and handling risks—becomes crucial (OECD, 2021; Lusardi & Mitchell, 2022; Anshika & Singla, 2023). These concepts empower individuals to make better financial decisions and avoid common pitfalls like unnecessary debt or poor savings habits (Sahu et al., 2024; RBI, 2023). However, based on our research and observation in rural colleges, it is clear that many students are not exposed to proper financial training or formal education systems that can support them (Maheria, 2025; ADB & UN Women, 2023). While these students contribute significantly to their local economies, the lack of financial knowledge affects their personal stability and the broader development of their communities (Kumar & Sharma, 2021; Choudhary & Tripathi, 2023).

Digital platforms like UPI and mobile wallets are expanding rapidly, but rural infrastructure, connectivity issues, and limited digital skills restrict usage (ScienceDirect FPI Study, 2025; EY Report, 2024). In our surveyed areas—Habra, Duttapukur, Aamdanga—many students struggle with unexpected expenses like tuition and transportation, not due to lack of ambition, but due to financial unpreparedness (Ghosh & Das, 2023; Wikipedia CSC Data, 2024).

Research supports the idea that improving financial literacy reduces anxiety and increases academic success, especially when students have structured access to such education (National Institute of Economic and Social Research, 2023; JICA, 2023; OECD, 2022). In fact, students with greater financial knowledge are more confident in their decision-making, especially in areas like savings and avoiding predatory loans (Singh & Arora, 2023; Mitra & De, 2024). Though the government has launched schemes like PMGDISHA, many of these services are still underutilized in our rural areas. This reveals a major gap between policy and practice (SEBI, 2023; Digital India Insights, 2024). Addressing this gap is essential not just for students' individual growth, but also for building inclusive, sustainable local economies (Taylor & Francis, 2023; PMC, 2022). Therefore, this study explores how financial literacy empowers rural students in West Bengal, and what

steps can be taken to ensure that knowledge is widely and fairly accessible.

OBJECTIVES OF THE STUDY

The current research survey of this report examines the current financial literacy profile of higher education students of the Indian rural context through a survey of knowledge levels about the essential fundamental concepts of budgeting, saving, interest rates, loans, investments, and digital payments and evaluates the aptness of such students to take up financial responsibilities in real life. The relationship between financial literacy and economic decision-making is also investigated as it has been focused on borrowing activities, daily money management, medium-term financial plans and interaction with the formal banking infrastructure.

Besides, the analysis assesses the level at which financial literacy promotes sustainable development bearing in mind that it facilitates students in providing financial contribution to their households, financing their education as well as starting micro-enterprises that have the potential of boosting the local economies. At the same time, the research also determines the obstacles hindering the process of learning financial literacy-curriculum limits, low access to digital materials, and the existing financial difficulties and suggests aiming at the long-term impowerment with the help of local awareness campaigns, infrastructural incorporation of financial-literacy material into the existing curricula, and cooperation with NGOs and governmental initiatives.

LITERATURE REVIEW

The role of financial literacy in promoting economic empowerment and sustainable growth has been explored in global and Indian research for years (Lusardi & Mitchell, 2014; Akhtar et al., 2024; Anshika & Singla, 2023). Scholars widely agree that financial literacy is not merely a personal skill but a collective resource that contributes to better decision-making and long-term financial well-being (Gautam & Rawal, 2022; UN Women, 2024).

Several recent studies in India, including in states like Maharashtra, Tamil Nadu, and Himachal Pradesh, confirm a lack of understanding among rural college students about basic financial concepts like compound interest and credit management (Deepak et al., 2025; Ozen et al., 2022; Kumar et al., 2024). Our study, conducted in rural parts of West Bengal, aligns with these findings. National-level reports by NISM (2023) and RBI (2024) further highlight this trend of limited awareness. At the same time, there's strong evidence that better financial knowledge leads to smarter choices—whether it's saving regularly, avoiding unnecessary loans, or setting achievable financial goals (Lusardi & Mitchell, 2023; Jia & Zhang, 2024). For example, students in Gujarat and Assam showed better financial habits after receiving literacy training (Maheria, 2025; Assam Study, 2025).

The rise of digital banking tools has added both opportunities and challenges. Although digital access has improved in India, the understanding of secure usage is still low among rural users (ScienceDirect FPI Study, 2025; DQIndia, 2024). Our own research supports this: while many students use UPI or Paytm, few understand transaction charges or data risks. In rural areas, barriers such as lack of financial curriculum, limited infrastructure, and deep-rooted social and gender norms further restrict financial learning (OECD, 2024; Saithal, 2024; Czech et al., 2024). Female students often face extra challenges due to mobility issues or low access to smartphones (ResearchGate, 2025; PMC, 2022). Financial literacy has also been found to impact more than personal finance—it can inspire entrepreneurial intent and help students guide their families toward better financial outcomes (JICA, 2023; Kumar & Sharma, 2021). Research shows that trained students often help in household budgeting, advise on savings, or even start micro-businesses (Frontiers, 2024; SEEJPH, 2025).

In conclusion, the literature strongly supports integrating financial literacy into rural education systems, with special focus on digital tools, curriculum support, and gender-sensitive models (Taylor & Francis, 2023; Anshika & Singla, 2023). This forms the foundation of our present study, which seeks to fill these knowledge and policy gaps in West Bengal's rural colleges.

RESEARCH METHODOLOGY

This explains the strategy, procedures, and equipment utilized to carry out the study. It describes the sampling strategy, data collection procedure, research design, and particular variables that influenced the study.

RESEARCH DESIGN

The study design adopted in this study is both descriptive and quantitative. The existing state of financial literacy and practice concerns the students of rural institutions of higher learning could be systematically explained with the help of a descriptive research. The survey method has been used to ensure the collation of first-hand information in a form of structured response.

Area of Study

The research was a case study of the districts that have relatively less access to financial education and services and conducted in rural colleges across West Bengal. This region provides some backgrounds to evaluate the dilemmas and promise of the financial literacy of the youth in the rural communities.

Target Group

Target population of the study is the rural undergraduate and graduate students. They have selected these students since they form important demographics as they enter into adulthood, when financial decisions produce a direct effect on outcomes at school, at work, and at home.

Sample Size

The sample of 100 students was selected by simple random sampling to eliminate selection bias. This sample was considered adequate in order to gain a statistically significant insight and reflect the heterogeneity of rural student populations.

Data Collection Method

A structured questionnaire was generated with the help of Google Forms and utilized in the collection of the primary data. To assess the financial behaviors, financial education levels,

and ability to access services, in the framework of the survey, there were questions of a multiple-choice and Likert format. The online format ensured effective compiling and utilizing of data as well as making it accessible.

Key Variables

Financial knowledge (e.g. knowledge of interest rate, inflation, investing), Budgeting and saving behavior, Getting access to banking and digital payment opportunities, Awareness on investments (FDs, MF, Sips), Having an attitude and being confident about finance

Variables Considered

Basic Financial Knowledge: Awareness of such key financial terms as debt, credit, inflation, interest rates, and savings.
Savings and Budgeting Habits: This is the behavior that relates to expenditure of monthly allowance or part-time earnings, saving goal development, and personal budgeting.

Bank Accounts and Digital Payments: The presence or absence of bank accounts and the usage of online banking systems, mobile wallets and UPI as examples of digital payments among the students.

Awareness of investments: Awareness regarding safe investment opportunities such as mutual-funds, SIP, public provident funds and fixed-deposits (FD).

RESULTS AND DATA ANALYSIS

The results of this research are based on the research of the primary data obtained in the form of structured questionnaires among rural higher education students, which are mostly located in the regions of Habra, Duttapukur, Bira, and Aamdanga. The answers provide us with a perfect insight not only to the present level of financial literacy but also to its practical realities in relation to student's lives inclination regarding the economic behavior and sustainable development. It is also through the data that we are able to explicitly meet the aim of the study by evidence-based interpretation.

Evaluation of the level of Financial Literacy among Rural Students

The review of survey answers shows that although an average number of students (roughly 65 percent) show a proper grasp of simple meanings of a budget management, there is a serious lag in their appreciation of more advanced financial terms like interest rates, financial loans, planning of investment, and utilization of credit. To take an example, only 35 percent of the students answered correctly regarding the investment instrument, say SIPs or mutual funds. In addition, even though majority of the respondents (52%) were familiar with simple calculations of interests, only a small percentile (27%) was well aware of compound interest and its eventual results. The findings are in agreement with the first purpose of the research- to determine the current financial literacy level of the rural students. It was clear that students turned frequently to informal sources of information like family or peers; this source was not rich with structured financial knowledge. Fragmented understanding was enhanced by nonexistence of formal financial education as a school subject. Consequently, most students exhibited artificial familiarity with financial systems that could not support conceptual clarity that enables an individual to make their own decisions.

The Problem of Financial Literacy Influencing Economic Decision-Making

One of the more important parts of the research was to consider how the knowledge of students on finances affected their behavior with respect to their economic choices. The information showed that there is a relationship between financial awareness and responsible financial behavior like saving and control of spending. As an example, 60 percent of those students who understood more about the financial terms said they used to save their allowances or earnings at work. On the contrary, learners with poor financial literacy stated that they engaged in impulse purchases and could not budget. Besides, the research identified the importance of financial literacy in long-term planning. Those students that felt more educated on interest rates and loan terms were less likely to be tempted to borrow and when they did, they were more likely to compare financial products in the market before selecting a loan. This is an easy way of stating that a stronger background in financial issues can result to more reasonable and sustainable economic behavior- which is a major component of the second objective.

It is also revealed in the findings that students whose families had formal engagement in finances (i.e. those who kept bank accounts, savings or loans) are much more confident and independent in terms of finances. Approximately 60 percent of the students of this kind reported that they found it easy to balance their finances and have their future all figured out, whereas less than one-fifth of students of informal financial backgrounds could find themselves financially secure.

Financial Literacy Barriers and Requirement of Institutional assistance

The structural and environmental barriers to financial education were also illuminated by analyzing the main data. Only 18 percent of the respondents denied that financial literacy was not included in their course program. Some had only passed through some occasional workshops or sessions by external bodies. This points to one major institutional mismatch; however keen students may be about learning about money management, formal sources of learning about money management are hard to come by. The role of digital literacy is not simple, as well. Although the number of people using digital tools such as UPI, PhonePe, and Paytm is popular (more than 70% utilize these instruments), the awareness of the security of the transactions, hidden fees, or risk management is low. As an example, 35-40 per cent of users did not know about the data risks or the charges that might be incurred by them when they make transactions. The practice is a functional use without any ground knowledge hence can be dangerous and unproductive. This analysis also supports the third objective of this study that is to identify obstacles and propose interventions. Some of the main challenges involve exclusion in curriculum learning, lack of access to digital education of finance, low levels of financial literacy among the parents, and infrastructural constraints such as limited or no access to the internet system in certain rural locations.

On Financial Literacy and Its Role to Sustainable Development

Statistics support the assumption that financial education is a driver of the overall sustainable growth. Students who are financially literate do not only control their resources but also have a positive impact on their families and communities. As an illustration, those students, who have good knowledge concerning saving and budgeting tend to become informal advisors at home. There were even individuals who indicated that they had the desire of starting small business or help in the family businesses with the financial knowledge that they could lend. Financial education also provides students with decision making skills which are not only advantageous to them, but also socially and economically significant. It promotes the thinking of the long run, minimizes reliance, and induces entrepreneurial thinking some of the factors of sustainable development of the rural areas. These students might turn out to be the sources of financial discipline and economic viability in their societies, provided with the appropriate assistance.

Charts for Findings and Data Analysis

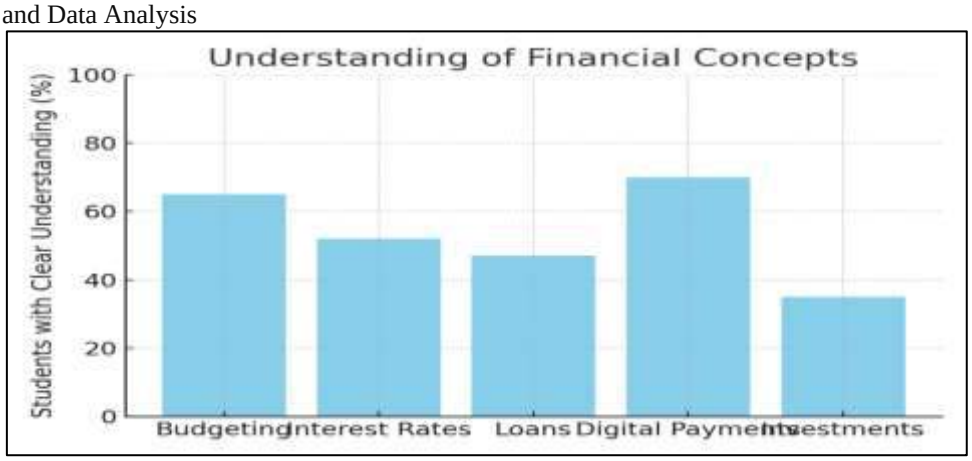


Chart 2: Usage vs. Awareness of Digital Tools

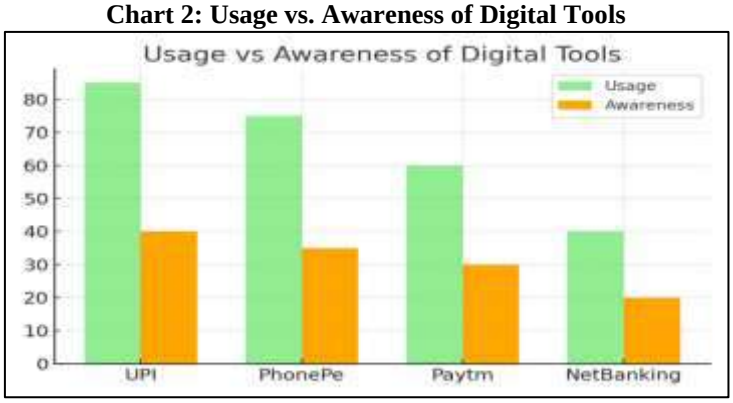


Chart 3: Financial Confidence by Family Background

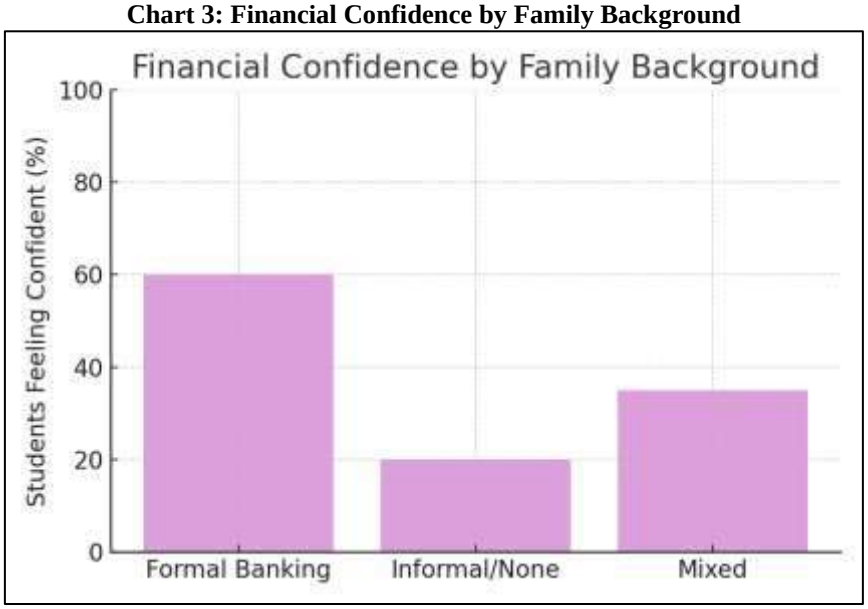
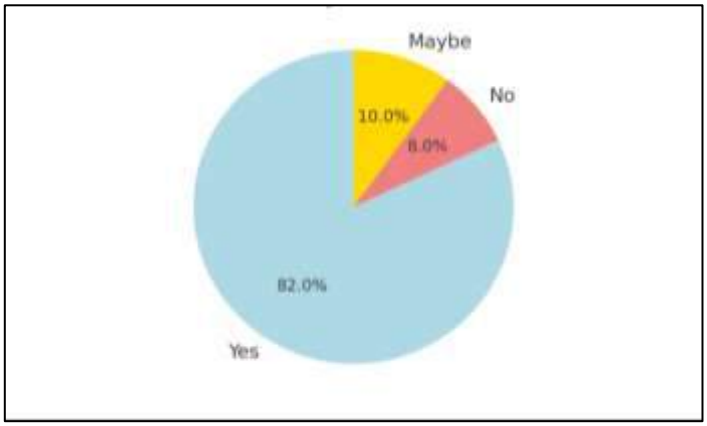


Chart 4: Curriculum Inclusion Opinion

Should Financial Literacy Be Part of the Curriculum



Future Outlook: Student Demand for Financial Literacy Training

Interpretation of Findings

The first port of call involves the primary data that will be gathered among the students pursuing higher education in the rural areas of Habra, Duttapukur, Bira, and Aamdanga in obtaining critical information on the financial behavior of these students, as well as their readiness to respond to the current financial behavior. Whereas most of the students are conversant with to-day to day bank activities- such as opening a bank account or availability of UPI platforms- they are less familiar with the financial concepts. Agreements such as compound interest, credit risk, mutual funds or SIPs always remain more of a mystery with little or no understanding by the students who belong to families with no involvement in their official finances. The theme that stood out through the use of digital finance and conceptual clarity disparity was significant. The young ones are very active in online transactions via Google Pay and PhonePe, but they lack decent knowledge of payment PayPal charges, data safety, and economic management. Such usage without consciousness may expose students to fraud, poor decision-making and misinformation.

Influence of financial background on the confidence of the students was also another significant discovery. The students who had parents who were banked expressed the confidence to handle their own finances as opposed to those whose parents were not banked being hesitant and even fearing engaging in financial planning. It is indicative that the financial literacy of any generation is also influenced by its predecessors and this aspect represents one of the major inequalities in terms of access to financial literacy.

These gaps notwithstanding, a strong, positive trend was also revealed through the findings, which is high willingness to learn. The students were interested in knowing about budgeting, investment, and digital tools of finance. Nevertheless, they lack programs or modules on financial literacy in their course structure which is still a major impediment.

Collectively, these inferences serve as the strong confirmation of the validity of the main thesis of the research, which is that financial literacy drives the process of sustainable economic development, and under the right conditions, it can empower the rural youth to not only live better lives but also make a positive impact on the local economy.

Implications of the Study

This study has a number of practical implications in education systems, policy architects, as well as community development stake holders.

In Educational Institutions - The sense of urgency which affects the necessity of reform of the curriculum is the first to be considered as an implication in relation to Educational Institutions. One of the rural colleges and universities can diversify and come up with the idea of offering financial literacy as a life skills compulsory unit, or as a faculty subject which is taken on credit basis. The knowledge gap could be filled using financial education workshops, certificate courses and on invitation of guest lecturers by banking professionals. In such a manner, the institutions might not only improve the academic development of students but also empower them to face the real-life problems of adult life.

To Policy Makers and Government Bodies this study points to the fact that specific financial inclusion regimes are required. Although schemes, such as PMGDISHA and UPI have led to an increase in digital infrastructure, they are not effective unless financial literacy is also developed simultaneously. The policymakers should incorporate rural specific financial education in youth and higher education policy. Personalized campaigns using local languages, financial learning applications on mobile phone devices, and collaboration with the local panchayats or schools would encourage wider penetration.

In the case of Banks and Financial Institutions, the banking industry can use the benefits of the situation to come up with youth-friendly as well as literacy-linked banking services. In this line of thinking, simplified, gamefied bank accounts that contain learning pathways or a simplified investment education tool may appeal to rural students and help develop brand credibility. Financial institutions may also partner with colleges to have on-campus involvement activities and sensitization.

NGOs/Community Organization Non-Profits operating in the rural development field can incorporate financial literacy into

the projects that they already sponsored. The local and long-term good will be provided by community-based financial education clubs or mentor-based micro-learning sessions.

Institutional Role and Recommendations

Available sources reveal that the issue of curriculum institutional gap, i.e. the minimum degree to which organized teaching of financial literacy is infused into mass school system is acute. With such a small percentage of students (18 percent) having already seen such instruction, a need to begin implementing a more systematic and effective structural insertion of the learning opportunities related to financial literacy in all levels of education, is greatly needed. The requirement to study personal finance, budgeting, investment and how to borrow and live responsibly as an undergraduate should become compulsory after single seminars. Financial tools specifically targeting at the rural people and particularly those floating in the vernacular languages should also be employed. Practical simulations as a result of partnerships between financial institutions and educational institutions are one of the effective methods that have the potential to minimize the gap between theory and practice. Digital apps and gamified modules of learning also make learning tasks possible on broader platforms than the classroom.

The educational institutions also have an option of partnering with NGOs, banks, and government schemes such as PMGDISHA to reach more people and strengthen the impact. Remarkably, JICA (2023) and Maheria (2025) have demonstrated that rural youth under the influence of such well-organized education would become more likely to practice micro-entrepreneurship and prevent predatory lending.

Financial Literacy as a Driver of Development

The effect is the multiplier impact of literacy considering that when students are financially literate then a prosperous home is assured. A student who is aware of savings and credit risk can have a better chance of changing the finances of parents and siblings. The ripple effect has a role to play in terms of community development as it encourages entrepreneurship, decreased reliance on informal lending models and financial planning in a long-term perspective. The findings of such studies as the one conducted by Kumar & Sharma (2021) support this idea and demonstrate the positive relationship between financial literacy and entrepreneurial intent among rural young people.

Just like the Digital Banking Behavior Study (2025) depicted, the students who had received education about money were much more confident in employing digital financial instruments. Besides, an institution as SEEJPH (2025) associated such sustainability outcomes as savings behavior, lower dropping rates, and better mental health because of less financial stress with digital financial literacy.

Future Scope of the Study

As much as this study has its merits, it also leaves a number of opportunities that can be pursued further about studies of the same and advancing programmatically. Spread over Geographical Territory - Future study can incorporate comparative cross- states study to know about the level of financial literacy in various rural landscapes of India. Comparing the level of literacy with eastern, central, and southern India would especially be of use due to a great difference in educational infrastructure as well as availability of funds.

Social Inclusion Studies and Gender - Additional research would examine the impact of gender, caste and income inequality on financial education. It is possible that female students in rural locations experience certain individual issues because of traditional roles or inability to move around freely due to a lack of access to phones and the internet. Knowing these obstacles can provide facilities with means to develop more inclusive solutions.

Longitudinal Impact Study - A follow up study may be done to monitor real life consequences of financial literacy training during several years. Such indicators as savings activity decrease in debt, starting of small companies, or academic achievements might be measured. Effective use of digital tool- Considering the increased online access, the efficiency of future studies may include testing efficiency of digital learning applications or modules based on SMS-messages to increase financial literacy. The comparative studies can be done on the in-person training vs. mobile-based financial education to define the scalable models.

Choose-to-make Mission readiness during the time in which the Government interest in the entrepreneurship in rural areas is gaining momentum, the issue of investigation of the connection between financial literacy and entrepreneurial intent of rural young people would be considered as beneficial. What is the number of students with a high level of financial awareness, who go on to start up or join micro-enterprises?

The benefits of the present study spread among a wide range of stakeholders. On the individual learner level, the results will have a strength-building, monetary independence, and the acquisition of skills to achieve educational and life goals feel. Colleges and universities, in their turn, may diagnose the existing gaps in the financial literacy area, promote the changes in the system, and deliver student-oriented financial literacy programmes. The resulting data can be used by governmental entities to move ahead with rural financial inclusion and bridge the urban-rural gap. Moreover, the financial institutions will obtain subtle details on what financially the rural young population needs and how they behave and hence they will be able to design the specifically applicable products and services. By using the findings and recommendations of the study NGOs and civil society organizations can develop locally relevant and impact based financial education intervention based on the specific needs of communities.

CONCLUSION

This is well coined in the finding of this paper which brings out the fact that financial literacy is not only an individual capability but also a strategic driver of growth to sustainable economic growth- particularly in rural educational environments. Although rural students are becoming keen users of digital platforms and mobile-based financial devices, rural students present a significant score of usage-to-understanding disconnection. It is this unstructured and ad hoc financial training that leads to a shallow approach to technology without

the understanding to make intelligent judgments and to cope with risks and accumulate long-term wealth.

An intense review of the survey questionnaires administered on students in rural and remote areas (Habra, Duttapukur, Bira, and Aamdanga) showed serious loopholes. Although students had access to digital tools, (UPI and mobile wallets), barely a quarter were knowledgeable about compound interest, the existence of such investments, and SIPs or mutual funds, to say nothing of evaluating finance options offered in predatory housing loans. Decision making about finances consequently usually hinged on trial and error, and the so called advice of family and friends (who in turn had no financial education).

Such shortfalls are not in isolation, but representative of a national wide trend as reported in international research. Lusardi and Mitchell (2014) pointed out that inability to make optimal economic decisions is a direct consequence of poor financial literacy, whereas OECD (2016) also mentions the rural youth as the most susceptible to financial exclusion. In the case of India, this is consistent with the conclusions of RBI, during the Project Financial Literacy, and of SEBI, during the Investor Education Fund, which point to a profound need to change the system of education.

In conclusion, the financial literacy in the rural educations system needs to be viewed as an investment rather than a supplement. It is a basic life-learning skill that empowers a human being and allows the socioeconomic growth of a whole community. With growing financial complexity and digitalization, formal education systems need to be up to the challenge to merge this important topic into their service tiers. Unless a firm intervention is taken, students will be digital citizens still playing on the financial slack of the economy, consuming services that they do not understand. However, they could become the new breed of fiscally responsible individuals, who will be able to bring the Indian economy to a more open and steady path.

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A STUDY ON ENTREPRENEURSHIP: OPPORTUNITIES AND CHALLENGES

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ABSTRACT **DOI No: 10.36713/epra23472** **Article DOI: https://doi.org/10.36713/epra23472**

The paper studies the entrepreneurial landscape in Karnataka and Maharashtra in India, focusing on entrepreneurs' socio-demographics, motivations, challenges, and competences. A quantitative analysis of survey data of 52 entrepreneurs displays a trend among experienced and educated women to start new ventures, driven by passion, purpose, and autonomy. The major challenges faced were access to capital, regulatory bottlenecks, and financial planning skills. The study further shows what scope of skills comprising business management, communication, strategic thinking, with a perfect balance between customer focus and market research, is paramount. The findings, therefore, gainfully emphasize the role of mentorship, financial literacy, and support ecosystems in the development of sustainable and socially responsible businesses. The paper seeks to provide recommendations for the policymakers, support organizations, and academia in order to facilitate the creation of an improved entrepreneurial ecosystem and empower the women entrepreneurs of the region for inclusive economic growth and social well-being, linking Sustainable Development Goals such as SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), and SDG 9 (Industry, Innovation, and Infrastructure).

KEYWORDS: ***Entrepreneurship, India, Women Entrepreneurs, Challenges, Skills, Ecosystem, Innovation***

INTRODUCTION

Entrepreneurship is the cornerstone of economic and social development, creating innovation, competition, and the creation of job opportunities across various sectors (Schumpeter, 1942). As the global economic environment experiences rapid transformation, a proper understanding of the complex dynamics of entrepreneurships—both its possibilities and inherent constraints—is becoming increasingly vital in promoting sustainable growth and innovation (Shane &Venkataraman, 2000). The current study aims to conduct a critical analysis of entrepreneurships, with an emphasis on the socio-demographic backgrounds of entrepreneurs, the inherent motivations and passions propelling their ventures, the essential skills and competencies for success, the range of opportunities available to them, and the major challenges they face along their entrepreneurial path.As the global economic environment experiences rapid transformation, a proper understanding of the complex dynamics of entrepreneurships—both its possibilities and inherent constraints—is becoming increasingly vital in promoting sustainable growth and innovation (Shane &Venkataraman, 2000), which aligns with the United Nations' Sustainable Development Goals.

Problems and Challenges of Entrepreneurship in India

While India has such vast potential and an emerging entrepreneurial culture, it also has a specific set of challenges that can critically deter the formation and growth of new businesses. These challenges cut across various dimensions, ranging from availability of infrastructure and resources to regulation and socio-cultural obstacles.

Access to Finance and Capital: The biggest challenge for Indian entrepreneurs, especially early-stage entrepreneurs, is limited access to capital (Mohanty, 2017). Conventional banking organizations have high collateral requirements and strict lending standards, which make it challenging for SMEs and startups to secure loans (Rao, 2020). Venture capital and angel investment, though increasing, are still localized by industry and geography, with most promising initiatives being underpenetrated (Sharma &Madan, 2021).

Infrastructure Shortfalls: Poor infrastructure such as unstable power supply, inefficient transportation systems, and absence of access to good communication infrastructure is a significant challenge, particularly for firms that are based in rural or semi-urban areas (Planning Commission, 2011). These shortfalls can drive up the cost of running the business, cause supply-chain disruptions, and lower overall efficiency (World Bank, 2018).

Regulatory and Bureaucratic Challenges: India's regulatory environment can be cumbersome and time-consuming and entails multiple layers of approvals, licenses, and compliance (De, 2019). It may take time and money to overcome these bureaucratic challenges, taking away from the core business activities (FICCI, 2020). Even though the government has tried to simplify procedures, much remains to be done to create a more business-friendly environment (DIPP, 2016).

Shortage of Skilled Manpower: Shortage of skilled workers and managerial personnel is another key challenge (NASSCOM, 2019). India undoubtedly has a huge number of youth, but they lack technical skills, vocational training, and entrepreneurial spirit to be in a position to contribute towards new business ventures (ASSOCHAM, 2021). This shortage of skills has to be addressed with joint efforts to improve education and training programs, industry-academia partnership, and culture of lifelong learning (NSDC, 2020).

Socio-Cultural Barriers: Cultural beliefs and traditional social norms also hinder entrepreneurial activity in India. Risk aversion, aspiration for secure jobs, and stigma of failure may deter people from entrepreneurial careers (Khanna &Palepu, 2005). Additionally, gender inequality and social discrimination provide further barriers for women and marginalized groups (UN Women, 2020).

Globalization and Market Competition: Intensifying competition in the market, both domestic and from international multinational companies, is a harsh test for Indian entrepreneurs (Porter, 1985). To thrive in such a competitive market, companies need to create innovative products and services, adopt effective business models, and establish powerful brands (Kotler & Armstrong, 2016). Globalization also subjects Indian entrepreneurs to global standards and best practices, compelling them to renew their capabilities continuously and keep pace with changing market trends (Friedman, 2005).

Poor Intellectual Property Protection: Poor intellectual property (IP) protection is one that can deter investment and innovation (Maskus, 2000). With poor IP rights, entrepreneurs do not want to invest in research and development because they think that their inventions and creations can be easily replicated by their competitors (WIPO, 2019). India can achieve its real entrepreneurial potential through overcoming these complex challenges, which will result in economic development, job creation, and inclusive development. The government, industry, academia, and civil society must join hands to establish an enabling and facilitative environment for entrepreneurs to grow (Drucker, 1985).

One of the major topics discussed in this study is to investigate the socio-demographic characteristics of entrepreneurs, bearing in mind that age, education, gender, and experience can have a massive impact on entrepreneurial careers and performance (Minniti&Arenius, 2003). The study also brings up motivational and passion drivers for entrepreneurial pursuits, bearing in mind that matching one's vision with business goals is important to long-term accomplishment and satisfaction. Although passion is regularly cited as a key ingredient, it has to be accompanied by a sense of reality to steer clear of potential dangers.

Besides understanding who an entrepreneur is and why, this study aims to learn the competencies and skills necessary for managing the complexity of the entrepreneurial landscape. These include business management skills, critical thinking skills, communication skills, financial skills, and networking skills. The study also examines the opportunities that can be harnessed by entrepreneurs, acknowledging the transformative potential of digitalization for entrepreneurial landscapes and the need to develop digital capabilities. Nonetheless, entrepreneurship has problems. This research identifies the significant issues entrepreneurs face, including funding, managing financial risks, managing competition in the market, and managing technological disruption. The research also addresses managing financial risks through forward planning.

By these goals, this study seeks to make significant contributions to the literature on entrepreneurship. It seeks to offer practical suggestions for potential entrepreneurs, companies, policymakers, and educators, in a bid to create a more dynamic, resilient, and sustainable entrepreneurial ecosystem.

LITERATURE REVIEW

Stam, E. (2015). Entrepreneurial ecosystems and regional policy: a sympathetic critique. European Planning Studies, 23(9), 1759-1769. This papergives a critical overview of entrepreneurial ecosystems and regional economic development. It highlights the needtoestablish a conducive environment for entrepreneurs through access to resources, networks, and institutions. This article dealswith the larger context within which entrepreneurship happens.It emphasizes the importanceof policymakers and other players to develop an environment that promotes innovation, collaboration, and sustainable development.

Minniti, M., &Arenius, P. (2003). Examining entrepreneurial intentions. Journal of Business Venturing, 18(3), 309-329.This paper investigates the factors influencing entrepreneurial intentions, drawing on psychological and sociological perspectives.It pinpointsmajor variables likeperceived feasibility, desirability, and social norms that influencepeople'schoicesofgoinginto entrepreneurial activity. The review is significant to your researchsince it explains the causes and decision-making of prospective entrepreneurs, especiallywithregardsto socio-demographic characteristics of the respondents. These are essential to know when framing effective support programs and policies topromote entrepreneurship.

Shane, S., &Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. Academy of Management Review, 25(1), 217-226.This foundational article establishes the foundationof entrepreneurship as a field of study. It contends that research on entrepreneurship mustconcentrate on the intersection of people and opportunities, lookinginto how and why some peopleidentify and pursue opportunities but others fail to do so. It stresses the needtocomprehend the cognitive and motivational reasonsbehindentrepreneurial action. This review is relevant to your study as it provides a theoretical foundation for understanding the motivations and characteristics of entrepreneurs, which are central to your research objectives.

Porter, M. E. (1985). Competitive advantage: Creating and sustaining superior performance. New York: Free Press. Porter's seminal work presents the theory of competitive advantage and whyitiscrucial to business success.It explainsdifferent strategies toattain a long-lasting competitive advantage, suchas cost leadership, differentiation, and

focus.The review is applicable to the researchbecause it gives a platformtocomprehend the challenges that entrepreneurs in competitive markets will face. It emphasizes the needfor innovation, strategic thinking, and efficient resource utilisationtoattain long-term success. The conceptsdiscussedassist in developing questions regarding opportunities and challenges thatentrepreneur'sencounter.

Drucker, P. F. (1985). Innovation and entrepreneurship: Practice and principles. New York: Harper & Row. This articlediscusses the principles and practices of entrepreneurship and innovation. It contends that innovation is a systematic process that ismanageable and that entrepreneurship is theactivity of creating value bymeans of new products, services, and business models.It also providespotentialentrepreneurswithpragmaticadvice on how to seekout and makeuse of opportunities.

METHODOLOGY

This research used a quantitative approach to provide an in-depth examination of entrepreneurship, including its opportunities and challenges. The justification for using this method was to harness both quantitative data so as to have a complete picture of the research problem. The quantitative part offered statistical information on the socio-demographic attributes of entrepreneurs, problems & challenges.

OBJECTIVES OF THIS STUDY

(1) To explore the socio-demographic characteristics of the respondents who are undertaking entrepreneurial activities
(2) To explore the interests and motivations that underlie their entrepreneurial activities
(3) To determine the key skills and competencies that are required to be successful
(4) To explore the available opportunities for entrepreneurs
(5) To assess the challenges that they face in their business
(6) To provide pragmatic recommendations and solutions for prospective entrepreneurs venturing into business.

RESEARCH DESIGN

The research employed a descriptive research design. The descriptive aspect entailed gathering information to describe the socio-demographic characteristics of entrepreneurs, their business features, and their experiences.
Quantitative: A survey questionnaire was used to collect data on socio-demographic variables, business variables, skills, and competencies from a sample of entrepreneurs.

SAMPLING

The sampling frame was entrepreneurs working in technology, manufacturing, and servicesso on.
Sampling Method: Purposive sampling was applied to recruit participants. Purposive sampling was employed to provide coverage from different sectors, firm sizes, and groups.

TOOLS OF DATA COLLECTION

Survey Questionnaire: The questionnaire was designed and contained a mix of closed-ended and open-ended questions. The questionnaire addressed various topics, such as socio-demographic factors, business factors, motivations, abilities, competencies, obstacles, and opportunities.

DATA ANALYSIS

Quantitative data gathered from the survey questionnaire were analyzed by applying descriptive statistics (e.g., frequencies, means, standard deviations) and inferential statistics (e.g., t-tests, ANOVA, regression analysis) to determine patterns and relationships between variables.

FINDINGS & DISCUSSION

This research, based on the responses of 52 entrepreneurs mainly from Karnataka and Maharashtra, India, found a number of important insights regarding the motivations, necessary skills, challenges, and strategies related to entrepreneurial activities in the region.

1. Mostly Experienced and Educated Female Entrepreneurs

Most respondents were female (62%), more than 41 years of age (81%), and post-graduate holders (60%).
Discussion: This profile is different from typical entrepreneurship populations typically defined as younger men (Minniti&Arenius, 2003). The results indicate entrepreneurship can be a feasible and appealing avenue for mature, well-educated Indian women with existing professional ability and financial resources. This may indicate changing societal norms and greater opportunity for women, although further research may probe special enabler factors.

2. Drivers of Entrepreneurship: Passion, Purpose, and Industry Experience

The respondents were highly driven by passion for a specific industry (66%) (e.g., education, apparel), desire for autonomy (72%) and independence (74 %), and dedication (72%) to having their business be aligned with their individual values and vision.

Discussion: These internal motivations are consistent with earlier research highlighting the significance of passion and purpose in entrepreneurial success (Cardon et al., 2009; Shane &Venkataraman, 2000). The focus on doing business in alignment with personal values suggests an emerging trend towards social and ethically responsible entrepreneurship in which entrepreneurs aim to develop businesses that not only bring profit but also make some positive social or environmental contribution.

3. A Combination of Diverse Skill Set is Considered Necessary

Although multiple skills were appreciated (82%), fundamental skills were business management (65%), strategic planning and thinking (70%), communication and listening (73%), teamwork and leadership (81%). Marketing/Networking/Branding was highly significant to the respondents (91%) as well.

Discussion: Given by the survey, it is essential for the contemporary entrepreneur to have a stronger and more integrated set of skills. Besides functional competencies in business, cross-functional and communication skills are essential to the success of new business entrepreneurs. Considering how important communication is, it's therefore likely essential to establish a strong network to enable business to leverage mentorship.

4. Financial Planning and Literacy Crucial in Meeting Challenges

Most of the respondents (93%) replied with extensive lists of challenges ranging from financial to structural.

Discussion: This would imply the most salient challenge for entrepreneurs originates from planning (industry/financial). Furthermore, challenges can be lessened with external assistance. This implies entrepreneurs should take into consideration all the risks and also take guidance from experienced mentors.

5. Customer Focus, Market Research and Brand building are imperative

Entrepreneurs were found to be appreciative of returning customers (82%) and an in-depth market comprehension (83%). This helps them create the correct product or brand.

Discussion: Brand equity is most important, and can be created through ongoing integration with the customer.

Recommendations

To further support and enhance the entrepreneurial ecosystem for the primarily educated and experienced women in Karnataka and Maharashtra, it is recommended that policymakers, support organizations, and educational institutions focus on initiatives that: (1) promote financial literacy and planning skills training tailored to new business ventures, with easy-to-use budgeting and forecasting resources; (2) facilitate access to affordable mentorship programs connecting entrepreneurs with experienced business leaders, particularly those with sector-specific expertise and a commitment to values-driven enterprise; (3) expand awareness and accessibility of state and national government support schemes, ensuring programs are inclusive and address the specific needs of a diverse entrepreneurial community; (4) foster a supportive environment for risk-taking and innovation, celebrating success stories and encouraging the sharing of best practices in marketing and building brand loyalty; (5) promote the integration of sustainable business practices into entrepreneurial training and development programs; and (6) incorporate sustainability principles and social responsibility into the core business models, thereby supporting SDGs such as SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action).

CONCLUSION

This article offers a worthwhile perspective on the entrepreneurial land scape of Karnataka and Maharashtra, India, With their descriptions, motivations, and issues affecting a sample of 52 entrepreneurs. The resultsindicate a movementtowardseasoned, educated women propelling new startups, encouraged by passion, purpose, and autonomy. Success relies on a skill set thatis multidimensional in nature, including business skills, strategic planning, communication, and leadership. While access to capital and overcoming regulatory barrierscontinuetobe key challenges, entrepreneurs highlight the criticalneedfor mentorship, financial education, and customer focusindeveloping sustainable and sociallyresponsible businesses. In order to nurture a dynamic entrepreneurial sector, policymakers and assistance organizations mustfocusonaddressing these particular needs, empowering women entrepreneurs, and encouraging responsible and innovative business practices, leadinginturn to inclusive economic growth and social well-being in the region.In order to nurture a dynamic entrepreneurial sector, policymakers and assistance organizations must focus on addressing these particular needs, empowering women entrepreneurs, and encouraging responsible and innovative business practices, leading in turn to inclusive economic growth and social well-being in the region, ultimately contributing to the achievement of the Sustainable Development Goals.

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GROWTH PATTERNS IN SUGARCANE PRODUCTION IN INDIA

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ABSTRACT

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This study analyzes growth trends in sugarcane cultivation across Indian states, focusing on area, production and productivity of sugarcane through Compound Growth Rate (CGR), Compound Annual Growth Rate (CAGR) from 2006 to 2022 and trend analysis for export and import of sugarcane. The paper examines inter-state variations using secondary data from various sources such as Cooperative Sugar, Sugar Statistics and Indiastat. Findings reveal that states like Bihar and Punjab exhibit consistent positive growth especially in productivity, while Tamil Nadu, Odisha and Andhra Pradesh show declines across all parameters. Trend analyses suggest that productivity remains relatively stable, while area and production reflect greater fluctuations.

KEY WORDS: ***Sugarcane, Area, Production, Productivity, Import, Export, CGR***

I. INTRODUCTION

Sugar is one of the most essential agricultural commodities in India and forms the backbone of the country's agro-based industries. India ranks among the top producers and consumers of sugar globally, highlighting the commodity's domestic importance and international relevance. The sugar industry plays a vital role in the Indian economy, particularly in the rural sector, where it supports more than 50 million sugarcane farmers and around half a million workers employed directly in sugar mills.

In recent decades, the Indian sugar industry has undergone significant changes due to liberalization policies, government support schemes and advancements in agricultural practices. With the growing emphasis on sustainability and value addition, the sector has also diversified into ethanol production and cogeneration of power, enhancing its role in the renewable energy landscape.

From a trade perspective, sugar is a vital component of India's export-import basket. India often ranks among the top global exporters, especially when domestic production exceeds demand. However, trade performance is affected by fluctuations in global prices, policies, and domestic supply. Imports rise during low-output periods, making sugar trade a closely monitored policy area. Overall, the sugar industry plays a strategic role in India's agriculture, rural economy, energy sector, and trade policy.

II. OBJECTIVES OF THE STUDY

1. To examine the trends in Area, Production and Productivity of Sugarcane in India.
2. To study export and import performance of Sugar in India.

III. METHODOLOGY

The data has been collected from various secondary sources such as Cooperative Sugar, Sugar Statistics, Indiastat, etc. In this study, the data were collected from the period 2006 to 2021. Various analytical tools such as the estimation of CGR, CAGR and Trend analysis were employed to examine the trends in sugarcane production, consumption, export and imports.

IV. REVIEW OF LITERATURE

Arun et al. (2022) conducted a comprehensive study on sugarcane production in India between 2001–02 and 2017–18, reporting positive growth in area, production, and productivity. The study revealed that nearly 65% of sugarcane production was concentrated in Uttar Pradesh and Maharashtra, with tropical states exhibiting higher yields. To improve productivity, the authors recommended sustainable agro-techniques, climate-resilient crop varieties, cost-effective methods, and better coordination between farmers and sugar mills. They emphasized the importance of long-term strategies to enhance productivity and meet global demand. **Nida Bee (2020)** analyzed sugarcane cultivation trends over a 30-year period from 1985 to 2015 and found a 5.63% increase in area

and a 7.40% increase in production. The study attributed growth to favorable monsoon conditions, pricing policies, and government incentives. However, it also highlighted issues such as water scarcity and inconsistent pricing, which caused fluctuations in growth. Despite large cultivation areas, the continued use of traditional methods and limited access to machinery posed constraints. The study suggested that custom hiring centers could help small farmers benefit from modern equipment.

V. RESULTS AND DISCUSSION

Table 1 Area, Production and Productivity of Sugarcane in India

Year	Area ('000 ha)	Production ('000 tons)	Productivity (tons /ha)
2008-09	4415	285029	64.6
2009-10	4175	292302	70
2010-11	4886	342382	70.1
2011-12	5038	361037	71.7
2012-13	4998	341198	68.3
2013-14	4993	352142	70.5
2014-15	5067	362333	71.5
2015-16	4927	348448	70.7
2016-17	4436	306070	69
2017-18	4732	376905	79.66
2018-19	5114	405427	78.25
2019-20	4603	370500	80.5
2020-21	4857	399263	82.2
2021-22	5175	439432	84.91
2022-23*	5883	494228	84.48
CGR	**0.98**	**2.77**	**1.77**
CAGR	**0.02**	**0.04**	**0.02**

Source: Sugar Statistics

Figure 1: Area, Production and Productivity of Sugarcane in India

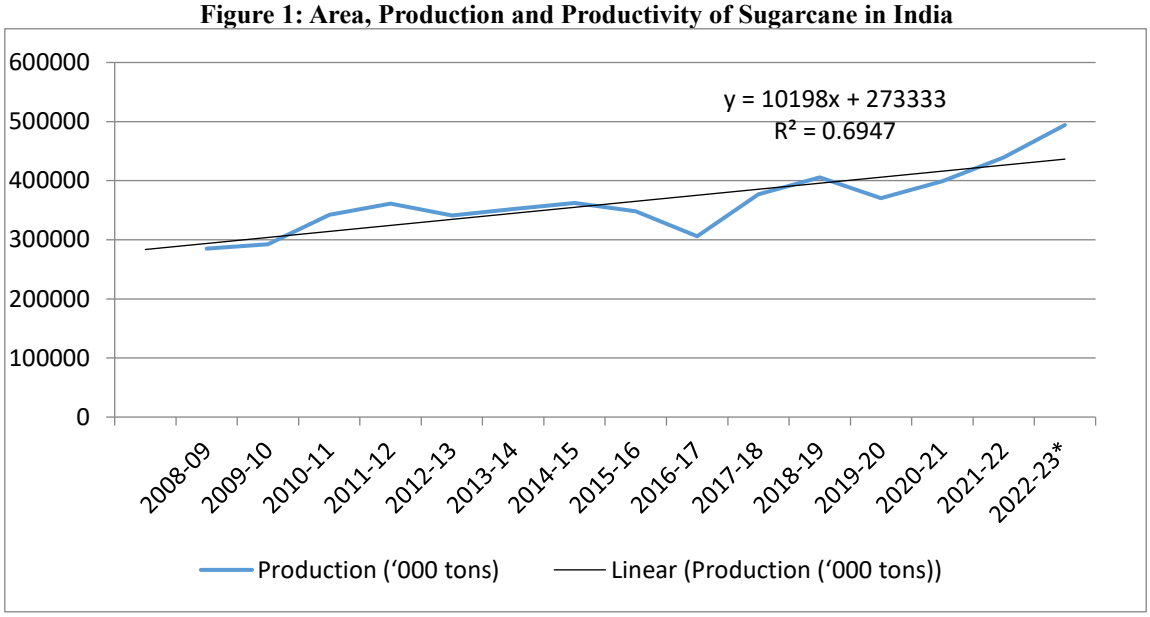

Table 1 and Figure 2 shows the trends in sugarcane cultivation in India from 2008-09 to 2022-23 focusing on Area, Production and Productivity. Over the years, the area under sugarcane cultivation has fluctuated with a Compound Growth Rate (CGR) of 0.98 percent, while production has grown significantly at 2.77 percent indicating improved the production. Productivity has generally increased reaching a peak of 84.91 tonnes per hectare in 2021-22. The highest production (494.23 million tonnes) and area (5.88 million hectare) were recorded in 2022-23. Despite fluctuations the Compound Annual Growth Rate (CAGR) remains low suggesting a steady long-term trend. The data highlights India's consistent improvements in sugarcane farming efficiency and production over time.

Table 2: Sugarcane Area in Important States of India

STATE	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21*	CGR
Andhra Pradesh	264	247	196	158	192	204	196	153	139	122	103	99	102	86	55	-8.77
Gujarat	214	211	221	154	190	202	176	174	208	157	169	182	167	161	183	-1.47
Karnataka	326	306	281	337	423	430	425	420	480	450	397	350	506	429	428	2.55
Madhya Pradesh	64	75	71	62	65	69	59	73	111	103	92	98	118	125	106	4.92
Maharastra	1049	1093	768	756	965	1022	933	937	1030	987	633	902	1163	822	1142	0.15
Orissa	20	20	11	8	13	15	15	14	10	9	5	4	6	9	7	-7.63
Tamilnadu	391	354	309	293	316	346	347	313	263	252	218	180	165	131	139	-7
Bihar	130	109	112	116	248	218	250	258	254	244	240	236	226	224	219	5.3
Haryana	140	140	90	74	85	95	101	102	97	93	102	114	94	96	93	-0.97
Punjab	99	110	81	60	70	80	83	89	94	90	88	96	95	91	95	0.82
Uttar Pradesh	2247	2179	2084	1977	2125	2162	2212	2228	2141	2169	2160	2234	2224	2208	2180	0.25

Source: Sugar Statistics

Table 2 presents the area of sugarcane in India across important states of India from 2006-07 to 2020-21. **Uttar Pradesh consistently held the largest area under sugarcane**, maintaining figures above 2,000 thousand hectares throughout the study period. **Maharashtra and Karnataka followed**, showing significant fluctuations but generally high levels of cultivation. Maharashtra showed a notable dip in 2016-17 but rebounded strongly by 2020-21. States like **Andhra Pradesh and Tamil Nadu** exhibited a **declining trend**, especially Andhra Pradesh, which dropped from 264 to 55 thousand hectares. Smaller contributors like **Orissa, Punjab, and Haryana** maintained relatively stable but minimal area shares. The data reflects regional disparities and shifting dynamics in sugarcane cultivation, influenced by factors such as climate, water availability, and state-level policy support.

Table 3: Sugarcane Production in Important States of India

(In 000' tonnes)

State	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21*	CGR
Andhra Pradesh	21692	20254	15380	11708	14964	16686	15567	12009	9987	9353	7830	7948	8091	6724	4295	-8.95
Gujarat	15630	15190	15510	12400	13760	12750	12690	12550	14330	11120	11950	12052	12036	11570	13621	-1.61
Karnataka	28670	26240	23328	30443	39657	38808	35732	37905	43776	37834	27378	28263	42006	38181	41088	2.33
Madhya Pradesh	2806	3180	2975	2535	2667	2677	2642	3173	4567	5281	4730	5430	6956	7434	5666	7.76
Maharastra	78568	88437	60648	64159	81896	86733	69648	76901	84699	73680	52262	83134	92443	69312	97070	0.6
Orissa	1274	1096	646	490	903	885	952	937	723	577	344	240	381	505	389	-7.71
Tamilnadu	41124	38071	32804	29746	34252	38576	33919	32454	28093	25494	18988	16536	16208	14119	13944	-7.62
Bihar	5956	3855	4960	5033	12764	11289	12741	12882	14034	12649	13036	13982	11661	13579	15005	8.47
Haryana	9580	8860	5130	5335	6042	6959	7437	7499	7169	6692	8223	9633	7571	7730	7567	0.95
Punjab	6020	6690	4670	3700	4170	5653	5919	6675	7039	6607	7152	8024	7774	7302	7855	3.69
Uttar Pradesh	133949	124665	109048	117140	120545	128819	132427	134689	133061	145385	140169	177056	179715	179539	177262	3.27

Source: Sugar Statistics

Table 3 displays sugarcane production across major Indian states from 2006-07 to 2020-21. Uttar Pradesh leads by a large margin, consistently producing over 100,000 thousand tonnes and peaking in 2018-19. Maharashtra follows with significant production, showing fluctuations but reaching its highest in 2020-21. Karnataka also shows a strong performance especially after 2010-11, with production crossing 40,000 in recent years.
Tamil Nadu once a top producer shows a steady decline over time.

Table 4: Sugarcane Productivity in Important States of India

(in tonnes per hectare)

State	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21*	CGR
Andhra Pradesh	82.2	82.2	78.5	74.1	77.9	81.8	79.4	78.5	71.8	76.7	76	80.28	79.33	79.19	78.08	-0.18
Gujarat	73	72	70.2	80.5	72.4	63.1	72.1	72.1	68.9	70.8	70.7	66.22	71.97	71.89	74.53	-0.15
Karnataka	87.9	85.8	83	90.3	93.8	90.3	84.1	90.3	91.2	84.1	69	80.75	83	89	96	-0.21
Madhya Pradesh	43.6	42.3	42.2	40.8	41	35.1	0	0	0	0	51.4	55.41	58.95	59.47	53.45	0
Maharastra	74.9	80.9	79	84.9	84.9	84.9	74.6	82.1	82.2	74.7	82.6	92.17	79.5	84.28	85	0.45
Orissa	63.4	55.4	59.8	61.3	69.5	59	63.5	66.9	72.3	64.1	68.8	64.95	63.06	56.42	56.14	0.01
Tamilnadu	105.1	107.5	106.2	101.5	108.4	111.5	97.7	103.7	106.8	101.2	87.1	92.02	98.24	107.6	100	-0.67
Bihar	46	35.5	44.3	43.4	51.5	51.8	51	49.9	55.3	51.8	54.3	59.2	51.7	60.7	68.4	2.99
Haryana	68.4	63.3	57	72.1	71.1	73.3	73.6	73.5	73.9	72	80.6	84.5	80.37	80.27	81.19	1.92
Punjab	60.1	60.8	57.7	61.7	59.6	70.7	71.3	75	74.9	73.4	81.3	83.58	81.83	80.2	82.6	2.86
Uttar Pradesh	59.6	57.2	52.3	59.3	56.7	59.6	59.9	60.5	62.1	67	64.9	79.26	80.81	81.3	81.3	3.01

Source: Sugar Statistics

Table 4 shows the Productivity of Sugarcane across Indian states from 2006-07 to 2020-21. Tamil Nadu consistently recorded the highest productivity, peaking at 111.5 in 2011-12, though it saw a decline in later years. Karnataka also demonstrated strong productivity improving steadily to reach 96 tonnes per hectare in 2020-21. Maharashtra and Andhra Pradesh maintained relatively high and stable productivity levels. In contrast states like Bihar, Madhya Pradesh and Orissa had lower productivity though Bihar showed notable improvement in recent years. Uttar Pradesh, despite being the largest producer had moderate productivity but showed a gradual rise over time. Punjab and Haryana maintained good and consistent productivity figures throughout the peri

Table 5: Export of Sugar in India

Year	Quantity (in Tonnes)	Value (Rs./in Crores)
2007-08	4684554	5412.16
2008-09	3331997	4448.74
2009-10	44045	110.23
2010-11	3249300	10352.27
2011-12	4074900	12973.73
2012-13	2784489	8576.83
2013-14	2473483	7152.17
2014-15	1950931	5296.53
2015-16	3128275	9787.95
2016-17	2538230	8621.61
2017-18	1750724	5180.54
2018-19	3977639	9451.57
2019-20	5787322	13910.31
2020-21	7506555	20577.09
2021-22	10431275	34197.63
2022-23	4035868	14500.78
CGR	**11.23**	**1023.08**
CAGR	**-0.01**	**0.07**

Source: Sugar Statistics

Table 5 highlights India's sugar export trends from 2007-08 to 2022-23, showcasing fluctuations in both quantity and value. Export volumes varied significantly, reaching a peak of 10.43 million tonnes in 2021-22. The value of exports also saw a substantial rise hitting ₹34,197.63 crores in 2021-22 indicating higher global demand and pricing. Despite occasional declines, a strong growth trend is observed in recent years particularly from 2018-19 onward. The Compound Growth Rate (CGR) for export volume stands at 11.23 percent, while the export value has surged with a CGR of 1023.08 percent, signifying an increase in global sugar prices. The data reflects India's strengthening position in the international sugar market.

Table 6: Import of Sugar in India from 2007-08 to 2022-23

Year	Import	
	Quantity (In Tonnes)	Value (Rs./In Crores)
2007-08	8.06496	2.24
2008-09	386099	583.11
2009-10	2424045	5961.24
2010-11	1004100	2723.21
2011-12	119661	374.67
2012-13	1122259	3094.38
2013-14	880519	2279.21
2014-15	1537830	3645.15
2015-16	1600027	4011.03
2016-17	2144429	6849.63
2017-18	2401484	6017.22
2018-19	1487677	3147.5
2019-20	1114828	2441.95
2020-21	1963233	4698.64
2021-22	358431	1227.4
2022-23	1235	16.26
CGR	**39.52**	**25.35**
CAGR	**0.65**	**0.22**

Source: Sugar Statistics

Table 6 presents India's sugar import trends from 2007-08 to 2022-23 illustrating fluctuations in both quantity and value. Imports peaked at 2.4 million tonnes in 2017-18, with significant variations over the years. The highest import value was recorded in 2016-17 at ₹6,849.63 crores. A declining trend is observed in recent years, with imports dropping to just 1,235 tonnes in April-June 2022-23 indicating reduced

dependency on foreign sugar. The Compound Growth Rate (CGR) for import volume is 39.52 percent, while the value has increased at a CGR of 25.35 percent, suggesting price fluctuations. Overall, India's sugar imports have reduced, aligning with increased domestic production.

Figure 2: Export and Import Trends of Sugar in India

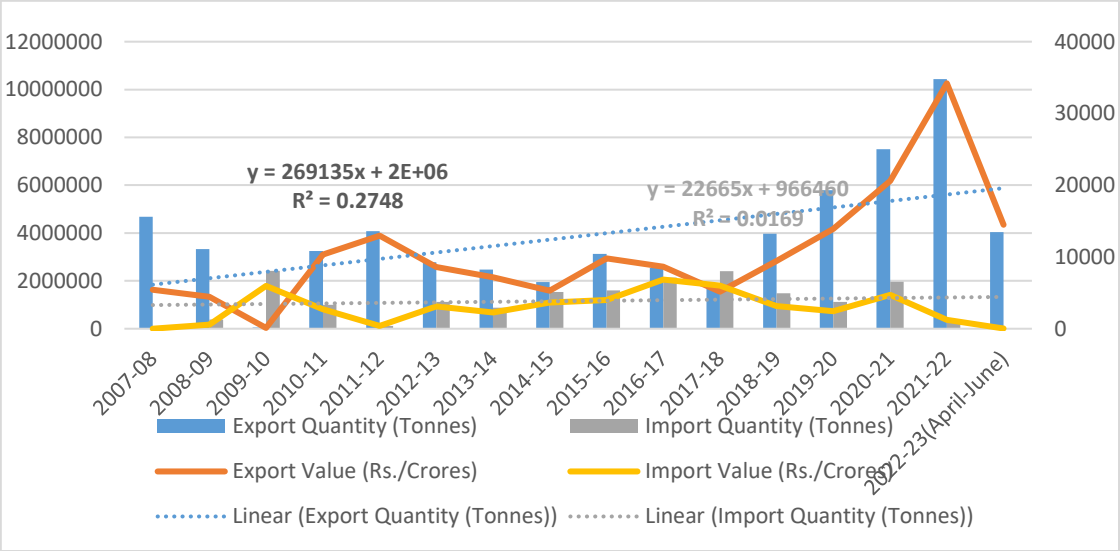

Figure 2 presents the export and import trends of sugar in India from 2007-08 to 2022-23. Sugar exports (blue bars) have shown a significant rising trend, especially after 2017-18 reaching their peak in 2021-22 before slightly declining in 2022-23. Imports (green bars) on the other hand, have remained relatively low and stable over the years, with minor fluctuations. The trend lines indicate a strong upward trajectory for exports ($R^2 = 0.2748$), while imports have a weaker ($R^2 = 0.0169$) suggesting that India has shifted towards becoming a net exporter of sugar. This trend reflects increased domestic production and favourable international demand for Indian sugar.

VI. CONCLUSION

This study provides an analytical overview of the Compound Growth Trends in sugarcane cultivation across Indian states, revealing notable regional disparities. States like Bihar and Punjab demonstrate consistent positive growth in area, production and productivity reflecting effective agricultural practices and policy support. In contrast, states such as Tamil Nadu, Odisha and Andhra Pradesh show declining trends, indicating structural or environmental challenges affecting sugarcane cultivation. So, the g overnment of India should concentrate on production side by giving skill based training and more subsidies for farmers such as fertilizer, irrigation, implements and skill etc.

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