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About the Journal

Journal of Development Research is the flagship journal of Vivekanand Education Society's Institute of Management Studies and Research (VESIM) since 2009 and is presently published bi-annually. The journal was published quarterly till the year 2021. It is a multi-disciplinary journal with a special focus on societal issues such as institutional level structural transformation aimed at speeding up the economic growth, reducing the inequality and poverty eradication.

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Aims and Scope

Journal of Development Research is a peer-reviewed journal, and it abides by its peer review policies strictly.

The journal adheres to a rigorous double-blind reviewing policy, in which the identity of both the reviewer and author are always concealed from both the parties.

The journal publishes research papers and articles in broad areas such as:

- Banking and Finance
- Business Management articles in the field of Marketing, HRM, OB, Operation, Business Research Methods, Business Analytics, and other broad areas.
- Developmental Economics and Social Sectors Development
- Business Environment, Business Ethics, and Corporate Governance
- Sustainable Development, Entrepreneurship, and Social Entrepreneurship

It aims at disseminating new knowledge in the field of different domain areas of management, development studies, and related disciplines. It provides a platform for discussions and exchange of knowledge among academicians, industry professionals, researchers, and practitioners who are associated with the management, financial institutions, public and private organizations, as well as voluntary organizations.

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Commentary

Editorial

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This issue of the journal marks a significant step towards expanding the frontiers of academic dialogue across disciplines that influence the sustainability and inclusiveness of societies. In an era defined by digital transformation, environmental vulnerability and economic realignments, the research contributions presented here reflect the urgency to rethink traditional paradigms. They address the nexus of technology, environment, gender and finance—offering multidimensional perspectives that bridge local experiences and global aspirations. Through empirical evidence, case-based explorations and theoretical insights, the authors shed light on how collective innovation and informed policy design can drive equitable progress. The journal continues its mission to serve as a platform for emerging scholars and seasoned researchers to engage critically with themes that shape the evolving landscape of development and governance.

The first article, authored by Solomon Eze, 'Artificial Intelligence and Sustainability of Small and Medium Scale Enterprises in Anambra State, Nigeria', investigates how artificial intelligence technologies can bolster operational efficiency, reduce costs and foster environmental responsibility among SMEs in Anambra State. The findings emphasise the transformative potential of AI in achieving both economic and ecological sustainability while outlining challenges in implementation. In the second article, 'Affirmative Action during the Time of Enrolment in Higher Education in India: An Investigation', written by Sangita Ghosh, examines the role of affirmative action policies in enhancing higher education enrolment among marginalised communities in India. Using Probit regression, the study highlights how gender, caste, income and institutional availability interact to shape educational access, providing valuable insights for policy reform. The third article, 'Effect of Digital Financial Sustainability and Institutional Quality on Economic Growth in Sub-Sahara African Countries', written by Jude O. Dike, evaluates the nexus between digital financial systems and institutional quality across 24 Sub-Saharan African nations. Employing a Generalised Linear Model, the findings reveal that while digital finance contributes modestly to growth, institutional quality—especially political stability and government effectiveness—remains a critical determinant.

The fourth article, 'Role of Microfinance in Women's Empowerment in Rural Areas', by Shaji Thomas, explores how microfinance serves as a pivotal mechanism for empowering women in rural communities. The research highlights beneficiaries' satisfaction with microfinance operations and underscores the importance of

financial literacy and supportive policy frameworks in sustaining empowerment outcomes. The fifth article, an empirical study by Shailu Singh, 'An Empirical Study of Consumer Perception Towards Eco-Friendly FMCG Products: A Study based in Navi Mumbai Area', delves into green consumerism, examining awareness, attitudes and purchasing behaviour towards eco-friendly fast-moving consumer goods (FMCG) products. The findings expose the prevalent attitude–behaviour gap and stress the need for credible branding, effective government intervention and consumer education to bridge it. The sixth article, 'Community Resistance and Environmental Justice in Nigeria's Niger Delta: Contesting Water Sustainability amidst Oil Exploitation', written by Seun Bamidele, is a thought-provoking article that examines the paradox of resource wealth and water insecurity in the Niger Delta. By exposing the socio-environmental consequences of oil extraction, the article calls for justice-driven governance and meaningful community participation aligned with Sustainable Development Goal 6.

The seventh article, 'Gender, Firm Dynamics and Education in Accessing Microloan: Commentary on Women Entrepreneurs in Northeast India', by Ashraf Rehman, provides an insightful commentary on gendered access to finance, demonstrating how education, firm size and gender influence microloan accessibility in Northeast India. The article advocates for gender-sensitive credit mechanisms and enhanced support for women entrepreneurs. The eighth article, 'Performance Evaluation of Small Funds under Smart Investors', written by Dipendra Karki, evaluates the performance of Nepalese mutual funds using standard risk-adjusted metrics. The analysis identifies fund age and expense ratio as key determinants of fund success, offering actionable insights for investors and fund managers. The ninth article, 'Structural Equation Modelling of Behavioural Factors Influencing Intraday Trading Prospects in Nepal', also authored by Dipendra Karki, investigates the behavioural determinants influencing investors' intention to engage in intraday trading. Herding behaviour and information asymmetry emerge as dominant influences, providing implications for market literacy and policy formulation.

Collectively, the articles in this issue reaffirm the journal's enduring commitment to fostering cross-disciplinary research and critical discourse that advance both academic and societal objectives. Each manuscript highlights how innovative thinking, data-driven insights and context-sensitive interventions can together pave the path towards sustainable and inclusive growth. Whether through technological empowerment of small enterprises, re-evaluation of affirmative policies, behavioural understanding of financial markets or advocacy for environmental justice, the authors exemplify the spirit of research that transcends boundaries and contributes meaningfully to the global knowledge ecosystem. The editorial board extends sincere appreciation to the authors, reviewers and readers for their invaluable contributions to this collective endeavour. We look forward to continuing scholarly engagement that inspires change, strengthens institutions and upholds the journal's vision of academic excellence in service of society.

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Article

Artificial Intelligence and Sustainability of Small and Medium Scale Enterprises in Anambra State, Nigeria

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Solomon Uchechukwu Eze[1] and Phina Njideka Onyekwelu[1]

Abstract

This article investigates the intersection of artificial intelligence (AI) and the sustainability of small and medium-sized businesses (SMEs) in Anambra State, Nigeria. It looks at how AI technologies might help SMEs improve operational efficiency, lower expenses, and promote environmentally friendly behaviour. The article also discusses the challenges faced by these businesses in implementing AI, and offers recommendations for stakeholders, including governments, educational institutions, and industry associations, to assist these companies in integrating AI into their daily operations. This can be achieved through training programmes aimed at enhancing the digital and technological proficiency of the owners, managers, and staff of SMEs in Anambra State. The results show how AI may help SMEs in Anambra State reach sustainability objectives, fostering environmental preservation and eventually economic development.

Keywords

Artificial intelligence, AI adoption challenges, SME sustainability strategies, developing economies, small and medium scale enterprises, Anambra State

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Introduction

As a transforming technology that has revolutionised many sectors, including small and medium-scale businesses (SMEs), artificial intelligence (AI) presents unheard-of chances for innovation and efficiency. Often running with limited resources, SMEs can benefit from the integration of AI into business processes, as sustainability, efficiency, and innovation are so vital for their long-term survival. Crucially important in the global economy, SMEs support job creation, innovation, and economic growth by means of their activities (Awa et al., 2020). However, SMEs' sustainability has long been a challenge due to their often limited resources, intense competition, and the need to adapt to rapidly changing market conditions (Ghobakhloo & Fathi, 2019). Researchers and practitioners have been investigating the possible advantages and consequences of including AI in the operations and strategic decision-making of SMEs as these technologies develop. The growing number of studies in this field elucidates the intricate relationship between AI and the sustainability of SMEs.

The ways in which AI might improve SMEs' operational efficiency and productivity have been important points of study. Data analytics, machine learning, and AI-powered automation can simplify many corporate operations, like supply chain optimisation, inventory control, and customer relationship management (Bai et al., 2021; Ullah et al., 2021). SMEs can potentially reduce expenses, optimise resource usage, and enhance their overall competitiveness by implementing these AI-driven solutions (Tamilmani et al., 2021). Studies have also looked at how AI may inspire creativity and business within the SMEs. AI-powered technologies can help SMEs optimise their business models, create creative goods and services, and find new market prospects (Alzoubi & Yanamandra, 2020; Awa et al., 2020). By enabling SMEs to stay ahead of consumer trends and industry advancements, AI-powered technologies can contribute to their long-term sustainability. The study also focuses on how AI affects human capital and personnel inside SMEs. AI-driven automation and decision-support systems can possibly upend established work roles and skill needs; thus, employees' upskilling and reskilling are more important than ever (Adewale et al., 2021; Mahmood et al., 2021).

However, in locations such as Anambra State, Nigeria, SMEs confront particular hurdles that prevent them from reaching their full potential. Despite being a commercial hub and a major promoter of entrepreneurship in Southeast Nigeria, many SMEs in Anambra face restricted access to financing, inadequate infrastructure, and a lack of scalable technical solutions. According to a 2022 research study by the Nigerian Bureau of Statistics (NBS), over 70% of SMEs in the region mention finance restrictions as their top hurdle to expansion, with another 45% citing a lack of access to contemporary technology as a major impediment.

Researchers have looked at the best ways for SMEs to properly handle this change and make sure their staff stays flexible enough to advantage of AI capabilities. The study has also looked at the difficulties and obstacles SMEs could run into adopting and using AI technologies. These cover problems with data availability, infrastructure needs, financial restrictions, and the necessity of specific

knowledge (Abdallah et al., 2021; Ghobakhloo, 2020). Developing focused policies, assistance programs, and capacity-building activities to let SMEs maximise the possibilities of AI while preserving their sustainability depends on being aware of these difficulties. Recently, policymakers, business executives, and academics have shown increasing interest in studying the relationship between AI and the sustainability of SMEs. This study's acquired knowledge can guide the development of tailored plans, laws, and support systems, enabling SMEs to thrive in the era of AI-driven change. Nigeria's economic growth depends much on SMEs, who also greatly boost employment and GDP. Although SMEs are essential for local economic development in Anambra State, they suffer many difficulties, including limited access to capital, poor infrastructure, and rivalry from bigger companies (Nwachukwu et al., 2021). This article seeks to find ways in which AI may improve the sustainability of SMEs in Anambra State, supporting environmental responsibility and economic resilience.

Review of Related Literature

Artificial Intelligence

AI is the replication of human intelligence in robots built to think and learn like humans (Russell & Norvig, 2020). AI, according to Wirtz et al. (2019), is the capacity of a computer system to show human-like intelligent behaviour marked by particular key abilities, including perception, comprehension, action, and learning. In a corporate setting, AI includes robots, natural language processing, and machine learning—all of which may automate tasks, analyse data, and improve decision-making (Brynjolfsson & McAfee, 2016). AI is the capacity of machines to act in line with intelligent humans. This is an expression of the machinery's cognitive capacity. In academia, it refers to the research of how usually requiring human intelligence, reasoning, and predictive powers to adapt to dynamic circumstances, digital computers and algorithms handle activities and solve complex problems that usually call for human intelligence, knowledge, and AI, according to Arakpogun et al. (2021), is a set of information and communication technologies modelled after human intelligence. It lets robots carry out cognitive tasks once connected only to human brains (Rai et al., 2019). According to Grover et al. (2022), AI is essentially the capacity of a system to acquire knowledge employing data analysis derived from the outside world. This gathered knowledge then helps modify current plans or create new ones to suit changes in the surroundings. It entails the conceptualisation and development of computing systems able to carry out activities usually connected with human intelligence, like the recognition of speech, the interpretation of visual information, and decision-making procedures (Rai et al., 2019). Companies use AI to extract trends from data using prediction models and algorithms, including machine learning for text analytics (Sturm et al., 2021). Additionally, Davenport and Ronanki (2018) incorporate virtual agents and robotic automation to optimise commercial operations.

Small & Medium Scale Enterprise Sustainability

In SMEs, sustainability means implementing behaviours that satisfy current demands without endangering the capacity of subsequent generations to satisfy their own wants. Within SMEs, sustainability consists mostly of three pillars: economic viability, social responsibility, and environmental management (Jenkins, 2020).

In the realm of environmental management, sustainable SMEs have implemented various strategies to reduce their carbon footprint and optimise their resource economy. This includes support of renewable energy sources, investments in energy-efficient technologies, and application of waste reduction and recycling campaigns (Klewitz & Hansen, 2014). SMEs can also reduce their indirect environmental impact by switching to more sustainable procurement and supply chain methods (Giunipero et al., 2020).

Socially conscious SMEs have come to see the value of equitable employment policies, inclusive hiring, and community involvement. While attending to local stakeholders, these companies have instituted policies guaranteeing fair salaries, safe working conditions, and employee welfare (Jenkins, 2020). The ability of sustainable SMEs to capitalise on expanding market opportunities and effectively manage operational costs significantly influences their economic viability. Adopting sustainable practices can assist SMEs in lowering resource consumption, increasing efficiency, and over time boosting their competitiveness (Horisch, 2015). Furthermore, sustainable SMEs have the potential to attract a growing customer base that values products and services that are socially and environmentally conscious (Ceptureanu et al., 2020).

Implementing sustainable practices, however, presents major challenges for SMEs given restricted access to financial resources, technical knowledge, and outside help (Halme & Korpela, 2014). As many SMEs have battled with economic upheavals and supply chain problems, the COVID-19 epidemic has made these difficulties much more severe (Giannakis et al., 2021). Still, companies that had already adopted sustainability were usually more suited to survive the crisis and adjust to the shifting market scene (Giunipero et al., 2020).

Policymakers, industry groups, non-profit organisations, and SMEs themselves have created a suite of projects and tools to help with their sustainability changes. These comprise training courses, financial incentives, and cooperative platforms for knowledge-sharing and best practices distribution (Klewitz & Hansen, 2014). Empowering SMEs with the required tools and resources will enable these initiatives to help hasten the general acceptance of sustainable business models (Sdrolia & Zarotiadis, 2019).

Not only is it moral, but it is also strategically necessary for SMEs to include sustainability if they are to be successful overall. Adopting sustainable practices can help SMEs not only improve their social profile and lower their environmental impact but also increase their competitiveness, resilience, and long-term viability in a society becoming more and more resource-constrained (Halme & Korpela, 2014).

Environmental Sustainability and AI

Incorporating AI into corporate operations might result in better sustainability in several spheres. Through resource optimisation, waste reduction, and improved supply chain management, AI can maximise environmental sustainability (Wang et al., 2016). Moreover, by means of data analytics-derived insights, AI can support improved decision-making (Davenport & Ronanki, 2018). Companies are using AI-powered technology more and more to improve their performance in social, financial, and environmental spheres.

Environmental Sustainability

Predictive analytics and intelligent automation let AI maximise resource use and lower waste. AI-powered energy management systems, for instance, can examine real-time data to maximise building energy use, therefore, drastically lowering energy use and greenhouse gas emissions (Accenture, 2020). By means of inventory, transportation, and logistics, AI-powered supply chain management can also help to minimise waste, hence lessening the environmental effect of operations (Papert & Pflaum, 2017).

Moreover, predictive maintenance models driven by AI may foresee equipment breakdowns and arrange repairs ahead of time, therefore averting unnecessary downtime and lessening the environmental impact of equipment failures (Wang et al., 2020). By means of data analysis, AI-powered waste management systems can also raise recycling and waste diversion rates, therefore, promoting a more circular economy (Zheng et al., 2019).

Social Sustainability

By increasing worker safety and well-being, AI also helps increase societal sustainability. Wearables and monitoring systems driven by AI can identify dangerous working circumstances and notify managers or employees, therefore, lowering the chance of accidents and injuries (Aven & Zio, 2020).

Furthermore, helping people to upskill and increase their long-term employability is AI-enabled tailored training and skill development initiatives (Brynjolfsson & McAfee, 2016). Furthermore, AI-powered decision support systems are helping to solve social issues, such as enhancing access to healthcare, education, and financial services in underprivileged areas (Panch et al., 2019). Using AI to improve social fairness and inclusion will help companies support the Sustainable Development Goals (SDGs) of the United Nations.

Economic Resilience

Economically speaking, by raising operational efficiency and financial performance, AI can help companies be more viable long term. AI-driven predictive analytics can enable companies to forecast market trends, maximise pricing, and

make more informed strategic decisions, improving profitability and competitiveness (Davenport & Ronanki, 2018).

AI-enabled automation can lower labour costs and improve production, enabling companies to better manage resources and enhance their economic sustainability (Manyika et al., 2017). Moreover, AI-powered financial management solutions can enable companies to better control risk, cash flow, and investments, thus strengthening their whole financial resilience.

Benefits of AI *in Sustainability*

Operational Effectiveness

By automating repetitive processes, AI can greatly improve operational efficiency and free staff members to concentrate on more strategic duties. SMEs using AI-driven inventory control systems, for example, can cut waste and excess stock (Choudhury et al., 2020).

Cost Reduction

AI can help SMEs increase profitability by streamlining procedures and lowering running expenses. This is especially crucial in Anambra State, where many SMEs operate on slim margins (Nwankwo et al., 2022).

Enhanced Decision-Making

Through data analysis, AI offers SMEs insightful information that helps improve decision-making. Predictive analytics, for instance, can let companies project demand and modify their operations in line with it (Huang & Rust, 2021).

Motivating Creation

By letting SMEs create fresh goods and services that satisfy changing consumer needs, AI encourages creativity. By use of AI-driven research and development, companies may test new ideas, replicate results, and rapidly introduce creative concepts to the market. Furthermore, AI may help with product creation and customisation, enabling SMEs to provide specialised solutions that improve client loyalty and happiness.

Obstacles Faced by SMEs During AI Adoption

SMEs in Anambra State face numerous difficulties in embracing AI, despite the potential advantages.

Lack of Awareness and Knowledge

Many SME owners lack knowledge of AI technologies and their advantages, which fuels opposition to change (Okafor et al., 2023). Many Anambra State SMEs' owners and staff lack the digital and technological knowledge required to properly apply and benefit from AI-based solutions (Eze et al., 2018). This skill

gap can impede the effective acceptance and integration of AI technologies in some companies.

Economic Restraints

For many SMEs, especially those with limited access to finance, the cost of using AI technologies can be prohibitive (Nwachukwu et al., 2021). For SMEs in Anambra State, which typically have limited financial resources, the high upfront expenses related to the acquisition, installation, and maintenance of AI-based technology can be a major obstacle (Adegbuyi et al., 2016). The absence of accessible, reasonably priced finance choices might aggravate this problem even more.

Limited Infrastructure

Inadequate infrastructure, such as erratic internet connections and limited electricity availability, seriously hinders the adoption of AI technology (Okwuosa et al., 2022). These factors significantly hinder the adoption of AI technology, as it heavily relies on network connections for its operations and electricity for charging most gadgets and equipment.

Privacy and Security in the Data

Using AI means gathering and evaluating vast volumes of data, which raises questions regarding data security and privacy. SMEs have to make sure they follow data security rules and apply strong security measures to protect private data (Miller, 2022). Good AI-based solutions depend on the availability of high-quality, complete data. To get significant insights from AI-powered systems, many SMEs in Anambra State, however, struggle with gathering, storing, and handling the required data (Wamba et al., 2017).

Coordination with Current Systems

Including AI technologies in current corporate systems can be challenging and time-consuming. SMEs could have to update their IT systems and equip staff members to properly apply AI tools (Wilson, 2023).

Methodology

This conceptual article investigates how the application of AI advances the sustainability of small and medium-selling businesses in Anambra State, Nigeria, using a qualitative study technique. It accomplishes this by closely going over industry reports, bodies of research, and stakeholder opinions. Scholarly journal articles, trade periodicals, and government articles relevant to AI and the sustainability of SMEs comprise the literature review. The primary objectives of the review are to gain a comprehensive understanding of the current applications of

AI technologies, the anticipated benefits and challenges of AI adoption in promoting sustainability, and to identify effective strategies to increase the adoption of AI in SMEs.

This study used a qualitative methodology to investigate the difficulties experienced by SMEs in Anambra State as well as the possibilities AI presents to solve them. This approach provides complex insights into contextual reality, cultural elements, and personal perspectives that quantitative techniques could overlook, therefore helping to capture the lived experiences of SME owners. By means of case studies, focus groups, and interviews, it explores the complexity of their problems and points up context-specific, practical remedies.

In a place like Anambra, where problems such as infrastructure gaps, limited resources, and varying degrees of technological adoption exist, the flexibility of qualitative research is truly valuable. It fits the objective of the study—to reveal useful, customised interventions for SMEs.

Constraints of the Qualitative Method

But this approach has restrictions. The results of this approach may not be generalisable, as they rely on specific events and may not accurately represent the broader SME community. Furthermore, qualitative research depends on subjective interpretation, which could lead to bias; it may also ignore macro-level trends more effectively shown by quantitative study.

The qualitative approach's emphasis on depth and context makes it appropriate for this study, despite these limitations. Future research could use quantitative approaches to evaluate and extend the results, thereby improving generalisability.

Findings

The Current State of AI Adoption in SMEs is a Matter of Concern

The survey indicates that SMEs in Anambra State are still in the early stages of adopting AI technologies. Although some businesses have started investigating AI uses, such as data analytics for market insights and chatbots for customer care, most still do not know the possible advantages of AI (Okeke & Ugochukwu, 2023).

Predictive Analytics for Inventory Management and Sales Forecasting

Predictive analytics has been a game-changer for SMEs, especially in retail and logistics sectors. In Anambra State, where many SMEs face supply chain inefficiencies, predictive analytics enables businesses to optimise inventory management. For instance, by analysing historical sales data, seasonal trends, and market conditions, AI-powered tools help SMEs forecast demand more accurately. This reduces instances of overstocking or understocking, minimises waste, and improves cash flow.

A notable example is a small-scale food distributor in Onitsha that adopted an AI-driven inventory management system. The tool analysed past sales patterns

and external factors (such as local market days and weather conditions) to predict demand. As a result, the business reduced inventory costs by 25% while increasing order fulfilment rates.

Additionally, SMEs in similar regions have used predictive analytics to identify customer purchasing trends, enabling them to target high-demand products and improve marketing strategies, even with limited budgets.

Chatbots for Enhanced Customer Support

Chatbots have become a vital tool for improving customer interactions, especially for SMEs with limited human resources to handle enquiries promptly. In Anambra, where many SMEs operate in highly competitive markets, chatbots allow businesses to provide 24/7 customer support, improving customer satisfaction and loyalty.

For example, an e-commerce SME in Awka implemented a chatbot on its website to handle frequently asked questions about product availability, pricing, and delivery options. The chatbot not only reduced response times but also allowed the business owner to focus on core operations. Within six months, customer retention rates improved by 18%, and the business reported higher conversion rates due to the timely handling of enquiries.

Furthermore, in sectors like hospitality, SMEs have used AI-powered chatbots to streamline bookings and reservations by offering personalised recommendations to customers based on their preferences.

AI-powered Marketing Tools for Targeted Campaigns

Many SMEs in Anambra struggle with effective marketing due to limited funds and expertise. AI-driven marketing tools, such as recommendation engines and automated email campaigns, have helped these businesses reach their target audience more efficiently. These tools analyse customer behaviour, demographics, and preferences to deliver personalised marketing messages that are more likely to convert.

For instance, a boutique fashion retailer in Nnewi utilised an AI-driven email marketing tool that segmented customers based on purchase history and browsing behaviour. The tool automatically generates personalised product recommendations and promotional offers. This approach led to a 30% increase in repeat purchases and helped the SME expand its customer base without significantly increasing marketing costs.

Fraud Detection and Financial Risk Management

SMEs often rely on digital payment platforms in regions with limited access to traditional financial services. However, this increases their vulnerability to fraud and financial mismanagement. AI-powered fraud detection systems have helped SMEs mitigate these risks by monitoring transactions in real time and flagging suspicious activities.

For example, a digital payment service provider catering to SMEs in Anambra implemented an AI fraud detection system that analyses transaction patterns for

anomalies. This helped several SMEs prevent fraudulent activities, saving them significant financial losses and building trust with their customers.

AI for Recruitment and Employee Training

Hiring and retaining skilled workers is a common challenge for SMEs in Anambra. AI-driven recruitment platforms have enabled these businesses to streamline their hiring processes by matching job requirements with suitable candidates. Additionally, AI-powered e-learning platforms have helped SMEs upskill their employees cost-effectively.

For instance, a small manufacturing firm in Onitsha used an AI recruitment tool to screen and shortlist candidates based on their qualifications and experience. The tool reduced the hiring process from weeks to days, allowing the business to fill critical positions quickly. Similar to this, SMEs have used AI-driven training platforms to teach employees new skills like digital marketing or financial management, ensuring their competitiveness.

From predictive analytics for inventory and sales forecasting to chatbots for customer support, AI technologies have demonstrated practical applications that address the unique challenges faced by SMEs in Anambra State and similar regions. These tools enable businesses to overcome resource limitations, improve operational efficiency, and deliver better customer experiences. By adopting these technologies, SMEs can unlock new opportunities for growth and sustainability, even in challenging environments.

Conclusion

The study revealed that the integration of AI-based technologies could significantly enhance the sustainability of SMEs in Anambra State. AI can help these companies to be long-term viable by raising operating efficiency, cutting expenses, and boosting decision-making. However, the successful adoption of AI hinges on addressing issues related to awareness, financial constraints, and infrastructure. Working together, stakeholders can build an environment that supports the integration of AI into SMEs, therefore advancing environmental sustainability and economic development in Anambra State.

Recommendations

The results show that major obstacles still exist even if Anambra State's SMEs are starting to see the possibilities of AI. Stakeholders working together will help these businesses be more sustainable when addressing these difficulties. While educational institutions can increase awareness and improve capacity among SME owners, government policies should concentrate on offering financial incentives and assistance for the implementation of AI. The following approaches help SMEs in Anambra State promote sustainable acceptance of AI-based technologies:

1. Governments, educational institutions, and industry associations should create and carry out thorough training courses to improve the digital and technological competency of Anambra State's SMEs' owners, managers, and staff. These initiatives should centre on the managerial abilities needed for their successful integration, as well as the technical features of AI-based technologies.
2. Targeting finance programmes, such as subsidised loans, grants, and tax incentives, could assist SMEs in Anambra State in purchasing and utilising AI-based technology under the guidance of government, financial institutions, and development organisations. This can assist in getting over the financial restrictions often impeding the acceptance of certain technologies.
3. Governments and business associations should invest in building a robust data infrastructure, providing SMEs in Anambra State with guidance and assistance in data collection, storage, and management. This helps to guarantee the availability of high-quality data needed for the efficient application of AI-based solutions.
4. To help small businesses, technology providers, and industry experts work together, the government, academic institutions, and industry groups should help build cooperative ecosystems. This way, everyone can share knowledge, come up with new ideas, and make AI-based solutions that fit the needs of small businesses in Anambra State.
5. Regulatory and Ethical Frameworks: Governments should provide thorough and unambiguous rules to handle the ethical and privacy issues related to the acceptance of AI-based technologies by SMEs in Anambra State. This promotes their sustainable integration with SMEs and helps create confidence in these technologies.

Policy Implication

To ensure the effective implementation of AI-driven solutions for SMEs in Anambra State, the government and stakeholders must adopt a practical, phased approach that accounts for resource limitations, awareness gaps, and the need for capacity building. Below is an expanded outline of how the government and stakeholders can implement recommendations, structured with clear timelines and actionable steps:

Phase 1: Awareness and capacity building (0–6 months)
Campaigns and training: Organise workshops, community forums, and partnerships with tech hubs to educate SMEs on AI benefits and applications like predictive analytics and chatbots.
Resource development: Create simple, practical guides and host 'Tech for SMEs' events to showcase AI tools.
The outcome was an increase in awareness, with 30% of SMEs expressing interest in adopting AI by month 6.

Phase 2: Infrastructure and policy support (6–12 months)
AI hubs: Establish resource centres in Onitsha, Awka, and Nnewi for hands-on training and technical support.
Funding and incentives: Introduce grants, low-interest loans, and tax incentives to subsidise the adoption of AI.
Policy framework: Develop AI-friendly policies, including affordable internet access and regulatory support.
Outcome: Operational AI hubs and financial support systems in place by month 12.

Phase 3: Pilot programmes and scaling (12–24 months)
Pilot projects: Select SMEs across key sectors to test AI tools like chatbots and inventory systems.
Partnerships: Collaborate with tech firms for subsidised AI platforms and mentoring programmes.
Evaluation: Conduct regular impact assessments to refine strategies.
Outcome: By year 2, at least 50 SMEs will successfully use AI tools.

Phase 4: Full adoption and sustainability (24–36 months)
Scaling: Expand AI adoption based on pilot success and replicate use cases across sectors.
Education integration: Incorporate AI into vocational training and university curricula to build local expertise.
Ongoing support: Maintain AI hubs and establish a revolving fund for SME upgrades.
Outcome: Widespread AI adoption and a sustainable support ecosystem by year 3.

Declaration of Conflicting Interests

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Article

Affirmative Action During the Time of Enrolment in Higher Education in India: An Investigation

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Abstract

The effect of the affirmative action policy on higher educational enrolment in India is addressed here. This article tries to identify the factors that play important roles in enhancing the enrolment of young people from ethnically disadvantaged groups, specifically Scheduled Castes (SC), Scheduled Tribes (ST) and Other Backward Classes (OBC) in higher education. Using the probit regression technique, it finds that females from ST communities have a lower chance of enrolling in higher education. Conversely, the probability of young females participating in higher education is higher in the OBC community. At the household level, household income, smaller family size and household location increase the probability of enrolment in higher education among young individuals from the three castes considered. Furthermore, a larger number of higher educational institutions and increased government spending on higher education also contribute to higher enrolment rates for young individuals from these socioeconomically disadvantaged households.

Keywords

Higher education, SC, ST, OBC, NSSO, probit model

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Introduction

Reservation is a system of affirmative action in India. It was created to provide representation in education among historically disadvantaged groups and create an opportunity to be employed as skilled workers in the labour market. In India, public-funded higher education institutions must abide by the reservation policy, which is not obligatory for private unaided institutions. According to the 2011 Census, out of the total Indian population, 18% Scheduled Caste (SC), 8% Scheduled Tribes (ST) and 43% Other Backward Classes (OBC) population were observed. Due to the reservation policy, the representation of students from disadvantaged communities in higher education has improved in India. According to the All-India Survey of Higher Education (2020–2021), the Gross Enrolment Ratio of the students belonging to the SC and ST communities has increased by 28% and 47%, respectively compared to 2014–2015. The overall increase in OBC enrolment is 31.67%. Among the females from SC, ST and OBC categories, 23.9%, 19.1% and 28.6% were enrolled in higher education, respectively.

This article will try to investigate the major beneficiaries of the reservation during their enrolment in higher education in India, that is, whether gender discrimination belonging to economically backward class households is observed in enrolment in higher education or whether students belonging to the creamy layers of SCs, STs and OBC communities are more likely to enrol in higher education or not.

Survey of Literature

The marginalisation of SC and ST communities has led to prolonged deprivation of social, economic and educational opportunities. Reservation policy is an important mechanism for promoting equal opportunities and reducing socioeconomic disparities (Mohanty, 2006). Beyond direct beneficiaries, these policies also positively influence other members of the caste groups through peer effects, role models and increased aspirations (Beaman et al., 2012). Several recent studies have examined the impact of reservation policies on education and employment (Basant & Sen, 2020; Bhattacharjee, 2018; Deshpande & Ramachandran, 2020; Khanna, 2020; Lee, 2018). Bhoi and Lakra (2022) highlight that the aspiration to pursue higher education is a key driver of empowerment among marginalised communities. Weisskopf (2004) argues that reservations in higher education improve SC and ST students' university rankings and encourage enrolment among those who might otherwise forego higher education. Although reservations often benefit a 'creamy layer' of SC and ST students, this does not imply that they fail to meet their intended goals. Bagde et al. (2016) similarly conclude that affirmative action policies effectively increase enrolment among the socially most disadvantaged students. However, using data from the 61st round of the National Family Health Survey (NFHS), Basant and Sen (2010) have found that higher education participation rates among marginalised groups remain lower than the national average. A study by Basant and Sen (2019) focussing on

OBC students identified no significant expansion in enrolment in Southern and North-Central states where quotas already existed, while growth was observed in Eastern states. On the other hand, Bhattacharjee (2018) reports that reservations have increased OBC participation in higher education. Chatterjee and Ranganathan (2021) provide evidence that reservations have a positive impact on securing government and private-sector employment. Notably, reservations have facilitated entry into high-status jobs, suggesting that higher education quotas positively influence employment outcomes. Similarly, Ranahasan and Mehta (2006) found that SCs, STs, OBCs and Muslims are significantly underrepresented in Indian colleges relative to their population share. This underrepresentation is primarily attributed to low higher secondary school completion rates and economic constraints, as reflected in mean per capita consumption expenditure (MPCE). Sundaram (2006), analysing the 55th round NFHS data, found that after completing higher secondary education, economic conditions no longer significantly impact marginalised students' decisions to pursue higher education. Similarly, a study by Ghosh and Kundu (2025) using the 75th-round National Sample Survey Organization (NSSO) data reports that young students from SC, ST and OBC communities have a lower probability of joining higher education compared to the three castes ST communities have less chance to join in higher education than the other two considered communities. Also, Bagde et al. (2016) report that disparities in pre-college preparation, college enrolment and academic performance persist between disadvantaged castes and their more privileged counterparts, with participation gaps being particularly pronounced among women. Swain (2022) reports that NSS 61st round data indicate women from SC, ST and OBC backgrounds have the least access to higher education. Similarly, Ghosh and Kundu (2025) state that young women from the SC, ST and OBC communities have a lower chance of joining higher education.

Despite these findings, limited research has examined whether an enrolment gap exists between male and female students from reserved categories in higher education. Besides that, no study has yet identified which specific household segments within marginalised groups can enhance the possibility of enrolment in higher education.

Research Questions

In modern society, knowledge serves as a powerful tool for empowerment and enabling individuals to achieve greater influence and autonomy. Knowledge also acts as an important instrument to upgrade the social status of minority communities. A robust higher education system with strong minor communities plays a crucial role in enhancing a nation's economic strength. India exemplifies this potential, being recognised for supplying a highly skilled workforce to the global market. In light of these considerations, this study aims to achieve the following objectives:

1. To observe the gender-wise preferences among the disadvantaged socioeconomic households during the time of enrolment in higher

education. Here, households belonging to SC, ST and OBC categories are considered separately. This also helps identify affirmative action's effectiveness among Indian households belonging to backward classes.

2. To examine the household-related factors that can play a role in influencing parental decisions regarding enrolling their young children in higher education institutions. Here, besides household-related factors, state-specific factors are also considered to observe the policies of the state effect during the time of decision. This will also identify whether affirmative action like reservation percolates to the economically poor households in SC, ST and OBC categories.

Sources of Data and Methodology

The main data source for this unit-level study is the NSSO 75th round Household Social Consumption on Education dataset.[1] As this study is a combination of household and state-specific factors; hence, the state-specific data are collected from various sources such as the NFHS-4, the Ministry of Education's Analysis of Budgeted Expenditure on Education (2016–2017 to 2018–2019), the All India Survey on Higher Education Report (2017–2018), state-wise loan disbursement data from State Bank of India (SBI) for degree and diploma courses domestically and abroad, the Periodic Labour Force Survey (PLFS) Annual Report 2017–2018 and police density data from the Bureau of Police Research and Development, Government of India.

Initially, the sample households are categorised based on 28 states, excluding Manipur, Meghalaya and Union Territories. Due to potential variations in state policies, state-specific variables are kept consistent for all sample households within a particular state. The NSSO 75th Round unit-level dataset includes 14,285 first stage units (FSUs) (8,097 villages in rural areas and 6,188 Urban Frame Survey Blocks in urban areas), encompassing 1,19,110 households (64,519 rural and 49,238 urban) and enumerating 5,13,366 individuals (3,05,904 rural and 2,07,462 urban). The survey data includes 2,67,887 males (1,59,411 rural and 1,08,476 urban) and 2,45,479 females (1,46,493 rural and 98,986 urban).

The study focuses on young individuals aged between 18 and 28 years. So, after the dataset is arranged according to 28 states, it is considered the young age group is between 18 and 28 years old. Then again, these sample households are categorised into two groups: those currently attending higher education and those who are not. The extracted sample consists of 1,08,260 young individuals. Finally, to observe the caste-wise scenario, the data is segregated between the three castes: SC, ST and OBC. Hence, the three caste-wise segregated data consist of 19,415 no. of observation for the SC, 10,091 no. of observation for the ST and 44,678 no. of observation for the OBC.

The initial objective of this article is to identify potential factors which can influence a parent's decision for their young children at the time of enrolment in higher education institutions. To do that probit regression technique will be applied here where the outcome variable is binary. It takes the value '1' if the

young individuals are enrolled in a higher education level (post 10+2), and '0' if they are not enrolled in a higher education level.

The probable influencing factors are outlined below, focusing on household-related variables derived from the NSSO 75th round datasets. These variables include gender, residential status, household size, consumption expenditure, computer ownership and institutional distance.

1. Gender: This variable is essential for investigating potential gender biases among parents when deciding to enrol their children in higher education, even getting the benefit of affirmative action. Studies by Kingdon (2002), Kuglen and Kumar (2017) and Rammohan and Vu (2018) indicate that the gender gap in educational attainment arises from differences in human capital investment within households, influenced by the child's gender. In patriarchal societies, parents often prioritise financial resources for their daughters' marriages rather than their higher education. As a result, daughters are frequently steered toward low-cost government colleges, while sons are sent to higher-cost technical or professional colleges (Thasniya, 2014). There is a need to examine the current situation in India. Here, 'Gender' is treated as a dummy variable, with a value of '1' assigned if the young individual is female and '0' if male.
2. Caste: Caste holds significant social importance in the Indian context, as casteism plays a crucial role in shaping the societal structure. Historically, upper-caste individuals have exerted dominance over those belonging to backward castes. Despite various social policies since independence, the status of SC and ST remained at the bottom of the social hierarchy and has been socially discriminated against, exploited and excluded from the mainstream of society since time immemorial in Indian society. To correct the issues of exclusion, discrimination and imbalance in terms of access to capital assets, employment, education, political participation and other spheres, reservations in institutions among the SC and ST and OBC households have been introduced in Indian institutions. However, the situation of SCs and STs has not improved much, including in the 'Higher educational level' category. It is now required to investigate this effectiveness. If a young individual belongs to any of the mentioned castes, the assigned value is '1'; otherwise, it is '0'. Here, General caste is used as the reference category.
3. Re_S: This variable represents the residential location of young students, differentiating between rural and urban areas. In India, urban areas typically undergo more significant development than rural areas, as noted by Sinha (2008) and Agarwal (2009). Urban areas have a higher concentration of higher education institutions, including general degree colleges, universities and technical institutions. According to the All India Survey on Higher Education (AISHE) 2019–2020 report, 56.1% of stand-alone institutions are located in urban regions. Tilak and Chowdhury (2019) also pointed out that women's enrolment in higher education is four times higher in urban areas compared to rural areas. These disparities

suggest that living in a rural area may present challenges for young individuals seeking to enrol in higher education institutions in urban areas, especially for disadvantaged minorities. This variable is modelled as a dummy variable, with a value of 1 indicating residence in an urban area and 0 indicating residence in a rural area.

4. HH_S: Household size refers to the total number of individuals living in a particular household. Larger household sizes are expected to reduce the chance of pursuing higher education due to the financial burden. This issue is particularly pronounced for female students from low socioeconomic status (SES) backgrounds, who often face greater challenges and competition with their male siblings for access to tertiary education, as noted in studies by Kaaya and Waiganjao (2015) and Niu (2017).
5. Con_Ex: In this context, the household's monthly consumption expenditure (in Rs.) serves as a proxy for monthly income. The decision to enrol a young individual in higher education is strongly influenced by the household's income level. Existing literature highlights a gender bias in educational spending, particularly among economically disadvantaged families, as noted by Tilak and Mazumder (2016). This bias suggests that pursuing higher education is especially challenging for young women from lower socioeconomic backgrounds. They often face competition from their male siblings for enrolment in tertiary education, as reported by Kaaya and Waianae (2015) and Niu (2017).
6. Com_O: This variable is a binary indicator that takes the value of 1 if the household owns a computer and 0 otherwise. Computers have become integral to nearly every aspect of life today. In the global context, the Internet has emerged as a crucial and invaluable source of information for both learners and educators, as noted by Makoye (2003). Consequently, computers and the Internet are powerful tools that enable youths to acquire new skills and abilities in higher education. By using computer-based learning systems, young students can enhance their skills from the comfort of their homes at their own pace. An experimental study by Fairlie (2012) found that having a computer at home has a small positive effect on educational outcomes for college students. Therefore, this study expects that computer ownership will encourage parents to enrol their young children in higher education, potentially influencing their daughters' enrolment as well.
7. Ins_D: The variable 'Distance' is assigned a value of '0' if the distance to the nearest higher education institution is less than 5 km and '1' if the distance is 5 km or more. The proximity of higher education institutions plays a crucial role in determining whether families, particularly in rural India, choose to send their children for further studies. In these areas, limited transportation options and concerns about the safety of young girls often hinder their ability to enrol in higher education, especially as educational costs rise. Studies, such as the one by Song et al. (2006), have identified several challenges women face in pursuing higher education,

including poor transportation systems, travel costs, additional expenses, opportunity costs, physical barriers and cultural restrictions on the mobility of adolescent girls. Therefore, a shorter distance between households and educational institutions is expected to increase enrolment by addressing some of the barriers related to transportation and safety concerns.

Some state-specific factors can impact the household's decision to enrol a young individual in higher education. These are used as a proxy to investigate the influence of the neighbourhood effect, which can influence the time of making any household-related decision. Besides that, as each state adheres to distinct policies, the influence on household-level decisions may vary across states. Hence, the following state-specific policy variables are here considered and elaborated below.

8. No._Ins: This data reflects the number of higher education institutions within a state for the academic year 2017–2018, making it a state-specific variable. In India, there are 903 universities, 39,050 colleges and 10,011 standalone institutions (AISHE 2017–2018). It is expected that a higher number of these institutions within a state will correspond with increased enrolment of young individuals in higher education. These institutions include colleges, universities, standalone institutions, as well as engineering and medical colleges. This variable is used both as a policy measure and to explore the potential neighbourhood effect.
9. HE_Ex_S: State financial support for higher education can significantly impact youth enrolment in such programmes. Given the high costs associated with higher education, economically disadvantaged individuals, particularly young people, often struggle to afford these expenses. Research by Kaaya and Waiganjao (2015) and Nwojiewho and Deebom (2017) indicates that government initiatives, such as scholarship programmes, can improve the enrolment of female students in higher education. Thus, it is expected that increased state financial contributions will lead to higher rates of enrolment in higher education.
10. HE_Loan: Higher education, especially technical fields, is known to be exceptionally expensive, often exceeding the costs associated with standard undergraduate and postgraduate programmes (Kosha et al., 2014). This financial burden poses a significant challenge for young people from economically disadvantaged backgrounds. The promise of improved employability is a key motivator for pursuing higher education, making educational loans a crucial factor. In recognition of the importance of supporting educational endeavours, the Reserve Bank of India (RBI) encourages banks to offer educational loans, classifying them as priority sector lending. This study examines the amount of loans sanctioned within a particular state. Data for this variable is sourced from the SBI on state-wise loan disbursements for degree and diploma courses, both domestic and international, for the fiscal year 2017–2018, as reported by the Ministry of Finance. This variable is treated as a policy variable in the analysis.

11. Wom_E: This variable measures the proportion of women who have completed 12 or more years of education, based on data from the NFHS-4 conducted during 2015–2016. This metric acts as an indicator of the overall level of female education in a given state. It is hypothesised that a higher level of maternal education correlates with a greater likelihood of younger household members, particularly young girls, pursuing higher education. Therefore, states with a higher percentage of women having completed 12 or more years of schooling are expected to exhibit increased enrolment rates in higher education among young individuals.
12. Wor_P_R: This variable represents the percentage of the population that is employed and holds at least a higher secondary degree. Data for this variable is sourced from the PLFS 2017–2018 dataset published by the Ministry of Statistics and Programme Implementation, Government of India. The variable is analysed separately for each gender, resulting in two ratios: the male worker population ratio and the female worker population ratio. In India, a significant portion of the workforce is engaged in informal employment, with a higher prevalence among males than females. Therefore, it is anticipated that young males who enter the informal labour market after completing their higher secondary education may be less likely to pursue further education. On the other hand, the lower rate of female workforce participation compared to males is expected to drive higher enrolment rates among females in higher education.

The probit regression technique is here considered to address our research questions. The dependent variable in this study is 'Enrol_HE', a binary variable that takes the value '1' if the individual is currently enrolled in higher education and '0' otherwise. Given the binary nature of the dependent variable, it is not suitable to use the ordinary least squares (OLS) regression technique. When OLS regression is applied to a binary response variable, the resulting model is referred to as a linear probability model (LPM), which serves as a method for estimating conditional probabilities. However, the LPM inherently violates key OLS assumptions, such as homoskedasticity and normality of residuals, leading to biased standard errors and invalid hypothesis tests.

In contrast, logistic regression models, commonly known as logit models, provide a more appropriate framework for modelling binary outcomes. Logit models estimate the probability of an event occurring by modelling the log odds of success as a function of independent variables. This approach ensures that predicted probabilities remain within the [0,1] range and addresses the limitations of the LPM.

Mathematically, it can be written as below:

$$L = \ln\left[P \Big/ 1 - P \right] = Z = b_0 + b_1 + b_2 + \cdots . + b_n \quad (1)$$

Where,
L is the log of the odds ratio,
P is the probability of an event occurring,

Z is the linear combination of independent variables with coefficients.
From this, we can also derive the probability of occurrence of the events.

$$P = 1 \Big/ \left(1 + e^{-z}\right) \tag{2}$$

Equation (2) is also known as the logistic distribution function. As $Z \to -\infty$, the value of P approaches 0, while, as the value of $Z \to +\infty$, the value of P approaches 1.

Although similar to logit models, probit models rely on the probit function rather than the logistic function. The probit model estimates the probability that an observation with specific characteristics falls into a particular category, making it a useful tool for modelling categorical outcomes.

The probit model can be represented using the following formula:

$$P(Y = 1 \mid X) = \Phi(Z) = Z = \Phi\left(b_0 + b_1 + b_2 + \cdots + b_n\right) \tag{3}$$

Where,
Y is the dependent variable and represents the probability that the event will occur (hence, $Y = 1$) given the variable X.
Φ is the cumulative standard normal distribution function.
Z is the linear combination of independent variables (X) with coefficients (b_0, b_1, $b_2 \ldots b_n$).

In the logit model, the logistic function is used in place of Φ, the cumulative standard normal distribution function. The logit model estimates the odds of success for a given event as a function of independent variables, whereas the probit model determines the probability that observation with specific characteristics falls into a particular category. By estimating these probabilities, the probit model is particularly useful for modelling categorical outcomes across a range of classifications. Therefore, in this study, it is best to use the probit regression technique.

In this study, the objective is to observe the caste-wise enrolment scenario in higher education in India. Therefore, three models are considered separately to capture the SC, ST and OBC enrolment scenarios in India. The probit regression technique is the most suitable method for identifying the factors influencing a household's decision to enrol their young children in higher education.

Model 1

$$\begin{aligned} Y_{ij}^{k=SC,ST,OBC} &= \beta_0 + \beta_1 \text{Gender}_{ij} + \beta_2 \text{Re\_S}_{ij} + \beta_3 \text{Con\_Ex}_{ij} + \beta_4 \text{HH\_S}_{ij} \\ &+ \beta_5 \text{Com\_O}_{ij} + \beta_6 \text{Ins\_D}_{ij} + + \beta_7 \text{ No\_Ins}_j + \beta_8 \text{ HE\_Ex}_j + \beta_9 \text{ HE\_Loan}_j \\ &+ \beta_{10} \text{ Wo\_E}_j + \beta_{11} \text{ Wor\_P\_R}_j + \varepsilon_{ij} \end{aligned} \tag{4}$$

Here $Y_{ij}^{SC} = 1$ if the young from the ith SC household of the jth state is enrolled in a higher education institute (between the age group 18–28)

$= 0$ if the ith SC household of the jth state is not enrolled in a higher education institute in that reference age group.

The values of each of the state-specific variables are the same for the sample households for the *j*th state.

Similarly, Y_{ij}^{ST} = 1 if the young from the *i*th ST household of the *j*th state is enrolled in a higher education institute (between the age group 18–28)

= 0 if the *i*th ST household of the *j*th state is not enrolled in a higher education institute in that reference age group.

And Y_{ij}^{OBC} = 1 if the young from the *i*th OBC household of the *j*th state is enrolled in a higher education institute (between the age group 18–28)

= 0 if the *i*th OBC household of the *j*th state is not enrolled in a higher education institute in that reference age group.

In all the above three situations, the explanatory variables are the same.

Results and Discussions

The regression analysis as shown in Table 1, reveals a noticeable gender disparity in higher education enrolment among ST communities in India. Despite the implementation of reservation policies intended to improve access, women from these communities remain less inclined to pursue higher education. Conversely, there is a growing trend of women from OBC enrolling in higher education institutions. The study highlights that various household characteristics significantly influence the probability of young students from SC, ST and OBC pursuing higher education. Residential status, whether the household is located in an urban area or rural area, is an important determinant here. Notably, households located in urban areas tend to have a higher propensity to send their youth to higher education institutions. This is likely due to better access to educational facilities and resources in urban settings. Additionally, the economic status of a household plays a crucial role; families with higher income levels are more likely to afford the costs associated with higher education, thereby increasing the probability of their children enrolling in such programmes. Household size emerges as a significant determinant of higher education enrolment, with larger households exhibiting a lower chance of their youth pursuing higher education. This trend may be attributed to the increased financial burden and resource constraints faced by larger families, which can limit educational opportunities for young members. Furthermore, regression analysis indicates that the presence of a computer in reserved category households significantly enhances the probability of youth enrolment in higher education. In the digital era, computers and Internet access serve as essential tools for skill development, enabling students to engage in self-paced learning from home through computer-based educational resources. Conversely, the distance between a household and higher education institutions poses a substantial barrier to enrolment among students from reserved categories. Greater distances are associated with higher commuting and accommodation costs, exacerbating the financial burden on economically disadvantaged households and further limiting access to higher education.

At the state level, the availability of higher education institutions positively correlates with enrolment rates among SC, ST and OBC communities. States with a

Table 1. Factors Affecting Higher Educational Enrolment of Different Disadvantaged Minorities.

	SCs		STs		OBCs	
Variables	Value of the Coefficient	Marginal Coefficient	Value of the Coefficient	Marginal Coefficient	Value of the Coefficient	Marginal Coefficient
Gender (ref category male)	0.338	0.007	–0.933***	–0.017***	0.368***	0.009***
Residential status (ref category rural)	0.103***	0.234***	0.376***	0.070***	0.185***	0.049***
Consumption expenditure (used as a proxy of income of the ith household)	0.450***	0.102***	0.393***	0.073***	0.358***	0.094***
Household size	–0.640***	–0.014**	–0.737***	–0.013***	–0.042***	–0.011***
Computer ownership (ref category Not owned)	0.486***	0.110***	0.579***	0.108***	0.460***	0.121***
Institutional distance (Ref category <5 km)	–0.138***	–0.031***	–0.129**	–0.024**	–0.368***	–0.097***
No institutions	0.00006***	0.00001***	0.000032**	0.0000006**	0.00005***	0.00001***
State education expenditure (%)	0.0005	0.0001	0.015***	0.002***	0.002	0.0006
Loan amount (Rs. in crore)	–0.0006**	–0.0001**	–0.002***	–0.0004***	–0.001***	–0.0004***
Women's education (%)	–0.003	–0.000	0.006	0.001	–0.002*	–0.0006*
Working male population	–0.010***	–0.002***	–0.008***	–0.001***	–0.009***	–0.002***
Number of observations	19415		10091		44678	
Wald χ^2	1166.89		1015.86		2845.28	
Pseudo R^2	0.07160		0.1308		0.0668	

Note: ***, ** and * indicates level of significance at 1%, 5% and 10%.

greater number of educational institutions tend to have higher enrolment rates, suggesting that increased accessibility and options for higher education can encourage participation from these communities. The study also points out a counterintuitive finding regarding educational loans: higher loan amounts are associated with a decreased probability of young individuals from these communities participating in higher education. This could be due to the fear of accumulating debt or the perceived financial burden of repaying loans, which may deter students and their families from pursuing higher education, despite the availability of financial assistance. While state education expenditure has a small positive effect on STs, it does not appear to significantly impact SCs or OBCs. A higher working male population negatively impacts educational outcomes, suggesting a possible trade-off between labour participation and education. As a whole, the research underscores the complex interplay of social, economic and institutional factors that influence higher education enrolment among India's socially backward communities, highlighting the need for targeted policies that address these multifaceted challenges.

Conclusion

This study underscores the critical role of affirmative action policies, such as the reservation policy of the Government of India, in enhancing access to higher education for socially disadvantaged groups. An analysis of the NSSO 75th round data reveals significant gender disparities in higher education enrolment. Previous studies already show that SC, ST and OBC students are underrepresented in the higher education sector, but considering the gender-wise scenario this study reflects that among the STs females are less likely to join in higher education, whereas among the OBCs females are more likely to join in the same. Considering the various household-related factors, it is found that household income and urban residency notably increase the likelihood of enrolment for youth from backward castes, whereas the distance from educational institutions poses a significant barrier. It is also proved that among the economically affluent households belonging to SC, ST and OBC communities, the possibility of taking the benefit of affirmative action is much higher. State interventions, including expanding the number of higher education institutions and increasing expenditure on higher education, are shown to enhance enrolment opportunities.

Policy Prescription

1. The government should boost financial support through new scholarships and subsidies to improve enrolment, especially for economically and socially disadvantaged youth and girls, reducing gender disparities.
2. A two-child policy can encourage households to allocate more resources per child, enhancing educational opportunities.
3. Beyond education, policies should promote equal opportunities for women in education, healthcare and employment.

Therefore, while affirmative action remains vital, it is equally important for government policies to prioritise the development of educational infrastructure and allocate greater resources to higher education. These measures will further improve enrolment rates among youth from reserved categories, fostering greater educational equity.

Declaration of Conflicting Interests

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Note

1. The considered period for this study is 2017–2018. As the NSSO data on household consumption and education is available only for this mentioned period therefore, considering this fact this is the latest dataset available for this study.

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Article

Effect of Digital Financial Sustainability and Institutional Quality on Economic Growth in Sub-Saharan African Countries

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Abstract

The research examined the impact of digital financial sustainability and institutional quality on economic growth. The research is founded on 26 chosen Sub-Saharan African (SSA) nations, and the data available span 1993–2023. The generalised linear model estimation technique was used. The results show that private sector credit and access to credit to the private sector positively and significantly affect growth in SSA nations. Broad money supply has a positive yet not significant impact on economic growth. Automated teller machine (ATM) penetration level increase and an increase in the account holder population have a positive impact on economic growth, while high dissemination of bank deposit and lending rate has a negative impact on economic growth. It has been found by this study that digital financial sustainability has not played a significant role in economic growth in SSA nations. However, the results of the interactive effect of digital financial sustainability on both political stability and government effectiveness have a positive effect on economic growth in SSA countries. The article suggests institutional quality improvement in the dimension of government effectiveness and political stability and improved access to credit facilities for the achievement of sustainable economic growth in SSA countries.

Keywords

Digital financial sustainability, economic growth, institutional quality, Sub-Saharan African countries

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Introduction

Attaining inclusive and sustainable growth is a critical global concern; however, developing countries need to focus on effectively tackling this phenomenon. The role of digital innovation and financial sustainability (henceforth: DIFS) in the growth process has garnered attention from stakeholders and policymakers alike. DIFS entails financial access usage and penetration. DIFS has been considered a veritable means to attaining Sustainable Development Goals. DIFS possesses the capacity to accentuate the economic growth of developing countries by offering digital solutions that not only improve financial exclusion but also access to financial services (Allen et al., 2016; Kooli et al., 2022).

Digital financial inclusion (DIFI) is the provision of access to financial services using digital solutions. It therefore entails the process of ensuring that financial services are not just accessible to all individuals but are usable by them (Abu, 2024). Digital financial services can be accessed via internet platforms, mobile devices or other digital channels, and can include digital payments, savings accounts, investment options, credit and insurance (Bustinza et al., 2024). Countries that invested more in sustainability record a low level of financial exclusion and are most likely to withstand economic challenges (Khera et al., 2021; Thaddeus et al., 2020; Wysokińska, 2021). The pinpoint is that greater investment in digital solutions may result in broader access to financial services and a more financially and economically resilient economy. Digital finance has the capacity to reduce the level of social deprivation in an economy, which in turn reduces unemployment. Financial deepening and innovation mobilise savings, lower the cost of financial intermediation, improve government expenditure and offer funding for growth (Chinoda & Kapingura, 2024).

In recent years, Sub-Saharan African (SSA) countries have prioritised enhancing digital finance to spearhead and drive inclusive economic growth. However, challenges continue as the growth rate attained by several countries appears to be compromised by a high level of poverty, inequality and unemployment. While generally beneficial for economic growth, the contribution of digital finance to economic growth may be engendered by institutional quality (Emara & Chiu, 2015; Laeven et al., 2015; Nkoa & Song, 2020). This is an indication that institutional quality is crucial for enhancing the economic growth of SSA countries. Improved institutional quality in the form of good governance and political stability in SSA countries promotes economic growth and the well-being of the citizens (Liu & Zhang, 2024; Ozturk & Ullah, 2022).

This study examines the role of digital financial sustainability and institutional quality in the economic growth of SSA countries based on the generalised linear model (GLM) estimation method using data from 1993 to 2023. The results indicate that private sector credit and private sector access to credit have a positive and significant effect on economic growth. Broad money supply exerted a positive effect on economic growth, though not statistically significant. An increase in the penetration rate of automated teller machines (ATMs) and an increase in the number of account holders have a positive effect on economic growth, while a high bank deposit and lending rate have a negative effect on economic growth.

Political stability and government effectiveness interactive effect on digital financial sustainability have a positive effect on economic growth. These findings are insightful because of the potential nexus between digital finance and effective institutional quality, which can guide policymakers in the design of targeted strategies to accentuate economic growth.

Existing studies have examined the relationship between financial development and economic growth. While Kanga et al. (2021), Chen et al. (2022), Song and Appiah-Otoo (2022), Sreenu and Verma (2024), Bu et al. (2023) and Ngong et al. (2024) reported that financial development and innovation is good for growth, Rousseau and Watchtel (2011), Law and Singh (2014), Swamy and Dharani (2019) and Zhu et al. (2020) found that financial development and innovation reported opposing view. Although few studies have linked financial development with instructional quality such as democracy and governance, the role of political stability and government effectiveness remains relatively unexplored. In filling this research gap, this study examines the link between financial development innovation, institutional quality indicators and economic growth.

This study is further structured into four parts. The second section deals with literature review. The third section deals with the research method, the fourth section gives results and discusses findings, and the fifth section sums up the study, concludes and offers policy recommendations.

Review of Literature

Existing growth theories postulate that economic growth in a country is driven by different factors. The Solow Growth Model, which forms the foundation for the modern theory of economic growth, assumes that economic growth is exogenously determined. The model analysed changes in the level of output attributed to labour productivity, savings and technological progress. Exertion of the exogenous growth model was propounded by the Solow–Swan growth axiom. The model explains the role of capital accumulation, labour and increase in productivity largely influenced by technological progress and long-term growth. The neoclassical growth theory postulates that capital accumulation and its efficient utilisation are important for determining economic growth. The theory opines that technology combined with labour productivity increases total output through increased productivity of labour. Adopting a variant of the Cobb–Douglas production function, the relationship as envisaged by the neoclassical growth model is expressed as:

$$Z = AF(\acute{C}, \acute{L}) \tag{1}$$

where:

Z = total output, which is also dubbed gross domestic product (GDP);
$\acute{C}$ = capital;
$\acute{L}$ = labour;
A = level of technology

Schumpeter (1912) advanced the growth theorem by connecting financial development and economic growth. The thesis is that labour, capital, technological progress and fintech drive economic growth. The Schumpeter growth model has been extended by other researchers including Bencivenga and Smith (1991), King and Levine (1993a, 1993b), Aghion et al. (2015) and Bofinger et al. (2021). Thaddeus et al. (2020), Ahmed et al. (2021), Khera et al. (2021), Banna et al. (2020) and Ahmed et al. (2021) contend that digital financial development contributes positively to economic growth. Banna et al. (2020) established that digital financial inclusion contributed to the economic growth experienced by 22 Asian countries between 2011 and 2018. Kanga et al. (2021) examined the impact of fintech on economic growth. It was found that fintech had a positive impact on economic growth.

Cevik (2024) found that fintech plays an important role in economic growth based on the kind of fintech investment. Nevertheless, the net effect still remains statistically significant. As shown, a 1% rise in the average size of fintech caused a 55% rise in GDP. Ngeze and Sei (2024) used quantitative quarterly time series data spanning the Tanzanian era between 2008 and 2022. The findings indicate that fintech has made a positive impact on the national economy and per capita growth. Wu-Po and Ya-Ching (2024) informed us that the positive effect of fintech on economic growth is higher during times of crisis. In general, the results indicate that fintech is significant in mitigating the adverse effects of crises on economic growth. Ngong et al. (2024) made an empirical study of the causality of economic growth and financial technology in the East African Community nations based on 1997–2019 data. The result indicated that there was a bidirectional causality between ATM and economic growth and a unidirectional causation of economic growth to point of sale (POS) and internet banking, mobile banking and government effectiveness to economic growth. This result suggests that in the long run, there is a convergence between economic development and fintech. Thaddeus et al. (2020), however, found that causality only runs from economic development to digital financial inclusion. Additional research like Li and Wong (2018), Beck et al. (2000), Zhang et al. (2023), Chen et al. (2022), Song and Appiah-Otoo (2022) and Bu et al. (2023) also report a statistically significant positive connection between fintech and economic growth.

Zhu et al. (2020) employed a dynamic panel threshold approach and examined the potential non-linearity among finance, innovation and economic growth. It was found that financial development has not been a major driver of economic growth. Swamy and Dharani (2019) analysed the contribution of finance to economic growth in developed countries for the period 1983–2013. The findings offer evidence of long-run non-linearity between finance and economic growth. Rousseau and Wachtel (2011), Cecchetti and Kharroubi (2012), Law and Singh (2014) and Arcand et al. (2015) found that finance contributes minimally to economic growth.

Some research has also confirmed that effective credit supply propels economic growth, whereas low financial development and its resulting inefficient private sector credit system retard economic growth. Amoo et al. (2017) analysed the effect of private sector credit on economic growth in Nigeria through fully modified least

squares. Credit was discovered to promote economic growth. Olowofeso et al. (2015) discussed the effects of private sector credit on economic growth in Nigeria. The research concluded that private sector credit had a positive and significant effect on growth, whereas a higher prime lending rate slows down economic growth.

Fisman and Love (2007) point out that a country with quality institutions and higher levels of financial development will likely experience faster growth. Likewise, Laeven et al. (2015) found that financial innovation boosts economic growth through better institutional quality. Pal et al. (2025) stressed that an economy can only function optimally with a robust institution. High-quality institutions provide an efficient legal and regulatory environment that fosters efficient allocation of financial resources and economic performance. This in turn encourages more people to access digital financial services. However, poor institutional quality hinders the adoption and effectiveness of digital financial services. World Bank (2018) avers that institutional failures most often lead to resource misallocation, market inefficiencies, a high level of financial exclusion and a reduction in economic growth rate. Yiadom et al. (2021) found that efficient institutional quality reduces financial exclusion and poverty rate. Nkoa and Song (2020) reported that institutional quality improves access to financial services. Maruta et al. (2020) assert that as the extent of institutional quality improves, the more the economy grows. Siyakiya et al. (2023) reported that, for an economy's degree of financial development to stimulate economic growth, the institutional quality must be robust. Sreenu and Verma (2024) articulate that the significant impact of fintech on economic growth can be enhanced by the existence of regulatory mechanisms. This implies that the role of fintech in promoting economic growth, especially in developing economies, can be enhanced by strengthening institutions.

From the literature, there are indications that the quality of institutions is paramount to the role of digital financial inclusion to accentuate economic growth. However, there is a paucity of studies linking digital financial inclusion, quality of institutions and economic growth in SSA countries.

Study Method, Data and Estimation Strategy

Methodological Framework Underlying the Model Specification

The model specification of this study is drawn from the Schumpeter (1912) growth theorem. The theoretical exposition of the growth model is that financial development and innovation are linked with economic growth. It is theorised that beyond labour, capital and technological progress, fintech is an engine of growth. The Schumpeter growth theorem provides a suitable framework for analysing the finance and growth nexus.

The study examines the effect of digital financial sustainability and institutional quality on economic growth. Accordingly, variables of interest are financial sustainability, institutional quality indicators and economic growth. Following the Schumpeter (1912) growth model, Equation (1), which provides the theoretical

connection among the variables, can be re-specified to incorporate financial sustainability and institutional quality as:

$$Q = AF\left(K, FINTECH, INSQ, N\right) \tag{2}$$

where:

Q = output (economic growth);
$FINTECH$ = financial technology;
$INSQ$ = institutional quality;
N = control variables

The expanded model expressing the relationship between the dependent and explanatory variables is expressed in panel form as:

$$Q_{i,t} = \beta_0 + \beta_{1i} Q_{i,t-1} + \beta_{2i} DFS_{i,t} + \beta_{3i} INSQ_{i,t} + \beta_{4i} X \times Y_{i,t} + \beta_{5i} \zeta_{i,t} + €_{i,t} \tag{2}$$

where:

Q = output, indicator for economic growth;
DFS = digital financial sustainability;
$INSQ$ = institutional quality;
$X \times Y$ = interactive terms;
ζ = control variable;
€ = error term, with its usual features.

Arising from Equation (2) and considering the variables under consideration in this study, the model for empirical estimation is expressed as:

$$\begin{aligned} ECOG_{i,t} = {} & \beta_0 + \beta_{1i} ECOG_{i,t} + \beta_{2i} PSCR_{i,t} + \beta_{3i} BMS_{i,t} + \beta_{4i} VAH_{i,t} \\ & + \beta_{5i} ATP_{i,t} + \beta_{6i} LDS_{i,t} + \beta_{7i} DFI \times PSA_{i,t} + \beta_{8i} DFI \times GOE_{i,t} \end{aligned} \tag{3}$$

where:

$ECOG$ = economic growth (GDP per capita, annual growth);
$PSCR$ = private sector credit;
BMS = broad money supply;
VAH = number of account holders;
ATP = ATM penetration level,
LDS = lending deposit spread;
$DFI^{*}\ PSA$ = DFI interaction with political stability;
$DFI^{*}\ GOE$ = FDI interaction with government effectiveness.

Data and Estimation Strategy

Data for this study cover 26 SSA countries for the period 1993–2023. The list of countries included in the study is in the Appendix. These countries were selected because they are prominent hubs for tech innovation. Besides, these countries were those that have showcased significant improvement in overall governance.

As showcased in the model for empirical estimation, economic growth is the dependent variable. The explanatory variables are digital financial sustainability and the index of selected institutional quality. For robustness, digital financial sustainability covers financial access usage and penetration, and it is measured by private sector credit to GDP, broad money supply expansion, lending-deposit spread, automated teller machine penetration (ATP), number of active account holders per 100,000 adults and mobile subscription as reported by World Bank and G20 Financial Inclusion Indicator. Institutional quality is measured by political stability and government effectiveness. They provide more insight into the institutional reforms in the selected SSA countries and how they interplay between DIFI and economic development.

As an estimation strategy, this study adopted the dynamic panel regression (system GLM) as suggested by Arellano and Bover (1995). The dynamic panel regression (system GLM) enables the explanatory variable to be treated as potentially endogenous or exogenous.

Empirical Results and Discussion

The results of the various preliminary tests conducted are presented in Table 1.

In Table 1, SSA countries witnessed an average growth rate of 3.18% and a standard deviation of 7.72 for the study period. Also, the least economic growth rate recorded by the countries was 1.01% and the highest growth rate was 5.47%. Private sector credit, broad money supply, ATP level, volume of account holders and lending deposit spread exhibited respective mean values of 15.91%, 26.21%, 25.36%, 28.53% and 8.97%, but deviated by 12.44%, 15.60%, 20.13%, 26.20% and 8.16%, respectively. From the correlation analysis, ATP level is directly related to economic development. The correlation coefficient value is estimated at 0.7588. Broad money supply is directly related to sustainable economic development in SSA countries, and that such relationship is moderate with a correlation value of 0.6576. Furthermore, lending deposit spread and government effectiveness have a low yet negative correlation with sustainable economic development. However, PSCR, volume of account holders and political stability have a low yet positive correlation with economic growth.

Based on the outcome of the various diagnostic tests above, the study adopted the GLM estimation strategy to test the research hypotheses as it is a more suitable inferential statistics faced with normality issues than the fixed effect model. This is premised on the fact that it permits non-normal stochastic and non-linear systematic components. The results are presented in Table 2.

The result in Table 2 suggests that private sector credit had a positive and significant impact on economic growth. This is a pointer that private sector credit induces economic growth in SSA nations. This aligns with the evidence of Amoo et al. (2017) and Olowofeso et al. (2015). These studies have also evidenced that efficient delivery of credit triggers economic growth, whereas deficient financial development and its concomitant inefficient private sector credit mechanism discourage economic growth. Supply of broad money positively affects economic

Table 1. Summary of Descriptive Statistics.

Variables	Mean	Max.	Min.	Std Dev.	Observations
ECOG	3.18	5.47	1.01	7.72	720
PSCR	15.91	70.38	0.01	12.44	720
BMS	26.21	118.95	5.74	15.60	720
ATP	25.36	189.45	0.06	20.13	720
VAH	28.53	100.00	1.10	26.20	720
LDS	8.97	58.33	–7.99	8.16	720

Correlation Analysis

	ECOG	PSCR	BMS	ATP	VAH	LDS	PSA	GOE
ECOG	1.000							
PSCR	0.4267	1.0000						
BMS	0.6576	0.3013	1.0000					
ATP	0.5588	–0.0902	–0.1394	1.0000				
VAH	0.0653	0.2630	0.1258	0.0030	1.0000			
LDS	–0.4656	–0.1507	–0.1416	–0.0734	–0.1610	1.0000		
PSA	0.0640	0.0509	0.0432	–0.2609	–0.0425	0.0901	1.0000	
GOE	–0.0183	0.2372	0.1408	–0.2514	0.1540	0.0504	0.1898	1.0000

Table 2. Generalised Linear Model (GLM) Results on the Effect of Digital Financial Inclusion and Institutional Quality on Economic Growth in Sub-Saharan African (SSA) Countries.

Variable	Coefficient	Std Error	*t*-Statistic	Prob.
C	0.1489	0.0086	5.9591	.0003
ECOG (–1)	0.0124	0.0622	3.2321	.0001
Private sector credit	0.1159	0.0287	1.1001	.0011
Broad money supply	0.1141	0.0105	1.3416	.1800
ATM penetration level	0.1178	0.1417	1.0423	.0007
Number of account	0.1219	0.0939	0.2917	.0001
Lending deposit spread	–0.1272	0.0676	–0.0013	.0092
DFI × *PSA*	0.1900	0.1127	0.0052	.0039
DFI × *GOE*	0.1805	0.2148	0.0089	.0037
R^{-2}	0.6738	Adjusted R^{-2}		.6284
F-statistic	17.78481	Prob. (*F*-statistic)		.0001

growth, albeit marginally. The study validates the supply-leading hypothesis that there is a reciprocal relationship between finance and stable economic development. Also, ATP is positively contributing to economic growth.

ATM, to a large extent, is seen as a new and reliable technology that has significantly contributed to business transactions in urban and rural areas, thus contributing to economic growth. The finding also revealed that economic development growth in the number of account holders relates to a 0.12% growth in economic development. The result is in agreement with Ngong et al. (2024), which also demonstrated that ATM has been responsible for the economic growth of the East African Community states. On the other hand, high widespread of bank deposit and lending rate retarded economic growth. This is an implication that high widespread of bank deposit and lending increases investment that retards economic activities. This justifies the argument that high lending rate undermines economic growth. In an examination of the impact of private credit on economic growth in Nigeria, Olowofeso et al. (2015) also indicated that raising prime lending rate slows down growth.

Generally, the outcome is a reflection of the fact that economic sustainability in the era of technology has a negligible effect on SSA country economic growth.

This corresponds with the work of prior literature such as Swamy and Dharani (2019), Zhu et al. (2020), Cecchetti and Kharroubi (2012), Law and Singh (2014) and Arcand et al. (2015) that fintech does not have a major role to play in economic growth. Our finding, however, contradicts prior works. For example, Thaddeus et al. (2020), Ahmed et al. (2021), Khera et al. (2021), Banna et al. (2020) and Ahmed et al. (2021) established that digital financial inclusion has a positive correlation with economic growth. Kanga et al. (2021) established a positive correlation between fintech and economic growth in 137 countries over the period 1991–2015. Cevik (2024) discovers that fintech significantly impacts economic growth. Ngeze and Sei (2024) similarly discovered that fintech has improved the national economy alongside per capita growth in Tanzania. Scholars such as Li and Wong (2018), Beck et al. (2000), Zhang et al. (2023), Chen et al. (2022), Song and Appiah-Otoo (2022) and Bu et al. (2023) similarly discover that fintech significantly and positively impacts economic growth.

The outcome of the respective interactive impact of financial sustainability, government effectiveness and political stability is a positive impact on economic development. This is an emphasis that with proper institutions, digital financial sustainability can highlight economic development of SSA nations. Our findings are in support of Yiadom et al. (2021) and Sreenu and Verma (2024) that increased institutional quality increases the role of fintech towards economic growth. Fisman and Love (2007) and Laeven et al. (2015) established that financial innovation contributes to economic growth, particularly through increased institutional quality. Siyakiya et al. (2023) have stated that, if monetary development in an economy is to drive economic growth, then institution quality has a convincing presence. This is evidence that the involvement of fintech in supporting economic growth, particularly in SSA nations, can be boosted by improving institutions.

Conclusion and Recommendations

This essay presents evidence on the effects of digital financial sustainability and institutional quality towards economic growth in SSA nations. The research time frame was from 1993 to 2023. The GLM estimation approach was used. The

findings show that private sector credit significantly and positively affected economic growth. This is an indication that private sector credit promotes economic growth in SSA nations. This agrees with the findings of Amoo et al. (2017) and Olowofeso et al. (2015). These works have also revealed that effective provision of credit enhances economic growth, while an inefficient private sector credit system and a low degree of financial development stifle economic growth. Provision of broad money is positively correlated with economic growth, albeit minor. Besides, ATP positively contributes to economic development. ATM is generally seen as an advanced and reliable technology that has highly facilitated business transactions to be very convenient in urban and rural locations, hence promoting economic development. The outcome also showed that a 0.12% increase in economic progress is attributed to growth in the population of account holders. The results are in agreement with Ngong et al. (2024) that ATM has played a great role in economic development in the East African Community member states. There was an extensive spread of bank deposit and lending rate which affected economic growth negatively. This is indicative that an extensive spread of bank deposit and lending rise holds back investment that suppresses economic activity. This underscores the argument that a high lending rate threatens economic growth. In analysing the impact of private credit on economic growth in Nigeria, Olowofeso et al. (2015) also confirmed that a rising prime lending rate postpones growth. Generally, the finding is that digital financial sustainability has a minimal impact on economic growth in SSA countries. This agrees with the results of prior research like Swamy and Dharani (2019), Zhu et al. (2020) and Law and Singh (2014), and Arcand et al. (2015), which state that fintech has not been responsible for any major economic growth. Our research result disagrees with prior research. For example, Thaddeus et al. (2020), Ahmed et al. (2021), Khera et al. (2021), Banna et al. (2020) and Ahmed et al. (2021) mentioned that digital financial inclusion has a positive correlation with economic growth. Kanga et al. (2021) concluded the positive relationship between fintech and economic growth in 137 nations from 1991 to 2015. Some other studies like Li and Wong (2018), Beck et al. (2000), Zhang et al. (2023), Chen et al. (2022), Song and Appiah-Otoo (2022) and Bu et al. (2023) also conclude that fintech had a significant and positive contribution to economic growth. The implication of the simultaneous interactive effect of digital financial sustainability, government effectiveness and political stability is a positive contribution to economic growth. This is a pinpoint that in the case of quality institution, digital financial sustainability can highlight economic growth in SSA countries. Our findings corroborate Yiadom et al. (2021) and Sreenu and Verma (2024) who provide evidence that the quality of institutions increases the role played by fintech in economic growth. Siyakiya et al. (2023) found that for the financial development of an economy to be able to drive economic growth, the institutional quality needs to be strong. This is reflective that institution-building can increase the contribution of fintech towards economic growth, particularly in SSA nations. The research concludes that institutional quality and digital financial sustainability are extremely important to the achievement of sustainable economic growth in SSA countries.

The article suggests institutional quality improvement in the dimension of government effectiveness and political stability and improved access to credit facilities for the achievement of sustainable economic growth in SSA countries.

Scope for Future Studies

This study is limited by its inability to cover all SSA countries. Future studies considering financial sustainability, institutional quality and economic growth are therefore suggested to cover more or all SSA countries.

Declaration of Conflicting Interests

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Appendix: Data Sources.

Data	Measurement	Source
Economic growth	GDP per capita growth, annual %	https://data.worldbank.org/indicator/NY.GDP.PCAP.KD.ZG?locations=ZG
Digital financial sustainability	Digital financial index	https://www.worldbank.org/en/publication/global-findex/brief/financial-inclusion-in-sub-saharan-Africa-data-from-the-global-findex
ATMs penetration level	ATMs per 100,000 adults	https://data.worldbank.org/indicator/FB.ATM.TOTL.P5?locations=S4
Private sector credit	Private sector credit	https://data.worldbank.org/indicator/FS.AST.PRVT.GD.ZS
Money supply	Broad money supply, % of GDP	https://data.worldbank.org/indicator/FM.LBL.BMNY.GD.ZS
Number of account holders	Account ownership at financial institution or with a mobile money-money-service, % of population ages 15+	https://data.worldbank.org/indicator/FM.LBL.BMNY.GD.ZS?locations=ZG
Lending deposit spread	Interest rate spread	https://data.worldbank.org/indicator/FR.INR.DPST?locations=A5
Political stability	Political stability and absence of violence/terrorism	https://data.worldbank.org/indicator/PV.PER.RNK
Government effectiveness	Government effectiveness	https://data.worldbank.org/indicator/GE.EST

List of countries included in the study:

Angola, Cameroon, Comoros, Botswana, Uganda, Cape Verde, Egypt, Zimbabwe, Congo Rep, Guinea, Guinea-Bissau, Ghana, Lesotho, Madagascar, Mali, Malawi, Morocco, Kenya, Nigeria, Rwanda, Namibia, Eswatini, Seychelles, Uganda, South Africa and Zambia.

Article

Role of Microfinance in Women's Empowerment in Rural Areas

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Abstract

Microfinance is at the forefront of economic empowerment and poverty alleviation in underprivileged communities. It is an entirely accepted channel for promoting women's empowerment and eventually realising economic freedom and development. This study highlights the unique role played by microfinance in empowering women in rural areas, a unique state that ranks high in most of the progressive social and demographic indicators. The study's findings indicated the importance of microfinance in women's empowerment. The findings revealed that microfinance plays a unique role in women's empowerment and that all the respondents expressed satisfaction with most aspects of microfinance, such as interest rate, customer service, modes of repayment, financial education and training and procedures involved in approving loans. The study is significant for policymakers and others similarly tasked with developing initiatives to enhance women's empowerment.

Keywords

Microfinance, policymakers, social indicators, women's empowerment

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Introduction

Microfinance is often lauded as a catalyst for poverty alleviation and socioeconomic development, and for creating transformative opportunities for marginalised sectors worldwide; it is said to be the engine of poverty alleviation and socioeconomic development. Women are at the centre of the significant changes in microfinance services. While microfinance has proven effective in enhancing women's

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empowerment socially and economically, its influence on political empowerment remains a topic of debate. Research conducted by Pervin et al. (2023) found that microfinance primarily fosters social empowerment among women, with limited impact on their economic or political empowerment, particularly in decision-making processes. Additionally, Zafarullah and Nawaz (2019) have suggested that while microfinance positively affects women's empowerment, other interventions may play more critical roles in empowering women.

Women's empowerment has increased by improving greater economic sustainability among women in both the urban and rural landscapes through access to microfinance (Sunitha et al., 2020). By providing access to credit and savings accounts, microfinance programmes allow women to establish and expand businesses, while investing in activities that generate income and build assets. Through microfinance, women can escape poverty and reliance and eventually become self-sufficient, establishing financial freedom that improves their and their family's well-being. Women participating in microfinance programmes experience better economic conditions because they develop self-reliant income sources, asset acquisition and increased savings levels, thereby building economic independence (Mengstie, 2022). Similarly, Lyngdoh and Pati (2013) discovered that microfinance positively impacts women's empowerment, improving income, expenditure management, savings, asset ownership, access to livestock and micromachines, family wealth and political participation.

Statement of the Problem

In numerous cultures, women often encounter built-in obstacles that make it difficult to use standard financial services like banks and typical loan providers. These challenges, including bias based on gender, a shortage of assets for security, and not enough knowledge about finances, often force women to the edges of the economy. In many situations, women face challenges. Microfinance, which offers low-income people small loans and other forms of financial support, is a powerful tool for removing these barriers and providing women access to new economic opportunities. When women gain financial freedom and social standing thanks to microfinance programmes, they are more prepared to join community efforts, participate in local groups, and have a say in policies that impact their lives. By giving women a stronger voice and supporting them as leaders, microfinance helps create fairer, more inclusive communities. This research explores the different aspects of microfinance and its potential to empower women in rural areas.

Objectives of the Study

1. To study the role of microfinance in women's empowerment in rural areas.
2. To determine the level of satisfaction of women in rural areas with microfinance.

Research Methodology

This section outlines the research methods employed in the study, justifying their suitability for addressing the research objectives. The study adopted a mixed-methods approach, combining primary and secondary data, sampling and data analysis to ensure a comprehensive literature review and data analysis.

1. Primary data: The study collected primary data through a structured questionnaire designed to align with the research objectives. The questionnaire was distributed to a targeted sample of respondents to obtain firsthand, empirical insights into the key variables under study.
2. Secondary data: Secondary data were gathered from peer-reviewed journals, reports, government reports and credible online databases, which were accessed to provide detailed and current information to substantiate the study's theoretical framework.
3. Sampling: The snowball sampling method was adopted for the data collected from the respondents.
4. Sample size and data analysis: The sample of 120 respondents was computed by power analysis based on pilot study effect size estimates from a 30-sample pilot study. Descriptive and inferential statistics were employed for the data analysis. This ensured effective results while ensuring statistical validity and practicality.

Review of Literature

Several studies affirm that microfinance positively influences women's economic empowerment. Microfinance services empower women by enhancing their income, savings and socioeconomic status, allowing them to contribute positively to their families and society (Dash et al., 2016). Hameed et al. (2018) found that microfinance services can help reduce poverty for rural women and boost their economic and social standing. Likewise, Mengstie (2022) noted that microfinance supports women in becoming economically independent by raising their incomes, helping them buy things and promoting regular savings.

Baruah et al. (2022) found that women experienced a noticeable boost in their economic, psychological, personal and social empowerment after using microfinance services, with economic empowerment being the most highlighted benefit. Mengstie and Singh (2020) expressed that microfinance promotes women's economic empowerment by boosting their independent income, expanding asset ownership and fostering savings. The study highlights the significant impact of factors such as credit amount, age, training, education level and marital status on women's economic development through microfinance. It points out how crucial microfinance institutions are for helping women entrepreneurs grow their businesses. Temba et al. (2023) also reported that microfinance programmes helped women participate in income-generating activities and work towards reducing gender inequality in rural areas.

Microfinance does more than help with money; it also supports social empowerment. Anwar and Aslam (2017) pointed out that women involved in

microfinance felt more confident and had a more prominent voice in their homes and communities. Similarly, Sanyal (2009) mentioned that microfinance helps women make connections and strengthen their influence, which helps them feel empowered overall. This shows that microfinance is vital for encouraging women to work together and support each other in their communities. Likewise, Maîtrot (2021) mentioned that microfinance gives women the tools to take on societal expectations and make choices that can lift them out of poverty. Datta and Singh (2019) pointed out that microfinance helped women boost their incomes and encouraged them to take on leadership roles in community groups. Sahoo and Rath (2016) found that microfinance helped rural women access credit and made them more independent in handling household finances.

Sultana and Hasan (2021) studied the Grameen Bank model and noted that microfinance made rural women more confident, financially independent, and able to speak up in family discussions. Rahman et al. (2017) showed that microfinance positively impacts many aspects of women's empowerment. The results indicate that microfinance significantly contributes to enhancing women's empowerment, consistent with the task's emphasis on the role of microfinance in promoting women's empowerment. Mekonnen and Tessema (2022) found that women with ongoing access to microfinance show better decision-making skills and more control over household resources.

Banerjee et al. (2015) found that microcredit programmes had a negligible impact on income but boosted women's engagement in business and self-employment. Karlan et al. (2016) proved that community-based microfinance helped women feel more financially secure and build group support and decision-making skills. According to Mengstie and Singh (2020), microfinance institutions are pivotal in promoting women's entrepreneurship and business expansion. Chowdhury et al. (2020) argued that, while microfinance can help empower women, how well it works can depend on local factors like gender norms and institutional practices. Mayoux (2001) pointed out that microfinance programmes that build social ties can help empower women. The article expressed that looking closely at the norms and networks pushed in these programmes, especially when helping the most marginalised women, is essential. Neglecting power dynamics and inequalities in favour of reducing programme costs through social capital may hinder the goals of empowerment, financial sustainability and poverty alleviation.

Ranganathan et al. (2021) identified that combining microfinance with additional programmes, known as 'Microfinance Plus', has shown promise in empowering women and addressing intimate partner violence. It shows that, while microfinance is helpful for women, it works even better when combined with other support programmes. They suggest that a better strategy for helping women might involve more than microfinance. Lee and Huruta (2022) described the importance of financial literacy as a mediator in the correlation between women's empowerment and green microfinance. They construct a model wherein green microfinance is the outcome, financial literacy acts as a mediator, and women's empowerment is the exposure variable. Understanding money matters is key to connecting women's empowerment and green microfinance. This shows how important it is to have local financial education programmes for women to support eco-friendly practices in

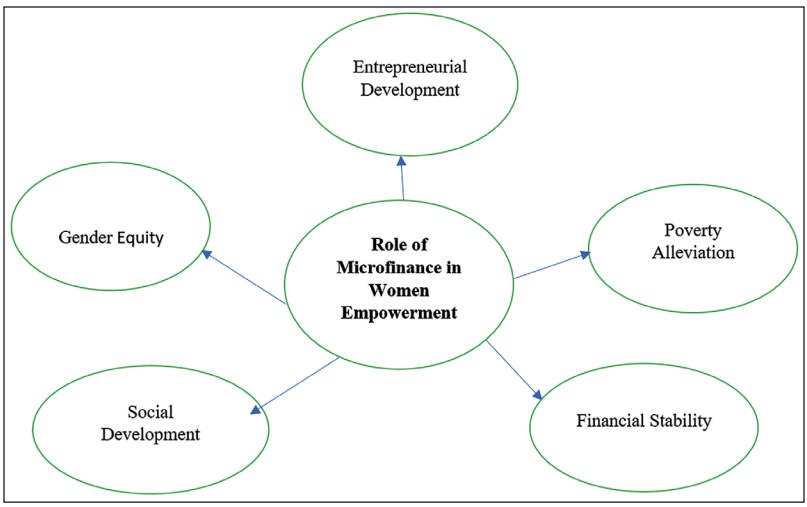

Figure 1. Conceptual Model of Role of Microfinance in Women's Empowerment.

microfinance. Duflo (2012) looked at the significant relationship between economic growth and women's empowerment, which also put forth how development programmes play a role in closing the gender gap and that empowering women, in turn, puts forth progress in general. Examining how microfinance affects women's empowerment requires understanding this crucial link between empowering women and advancing economic development The conceptual model of the role of microfinance in women's empowerment is depicted in Figure 1.

Data Analysis and Interpretation

Demographic Profile of Respondents

Table 1 shows the classification of responses.

Table 1 shows that the demographic profile of the respondents is delineated across various categories, including age, marital status, education level, number of family members, occupation and annual income. In terms of age distribution, the largest proportion of respondents falls below the age of 30, constituting 47.5%, followed by 30–40 years (20.8%), 40–50 years (23.3%) and those above 50 years (8.3%). Regarding marital status, the majority of respondents are married, comprising 68.3%, while single individuals account for 25.0%, and widows make up 6.7% of the total respondents. In terms of education level, respondents with SSLC education constitute the highest proportion at 45.0%, followed by those with a degree (24.2%), plus 2 (15.8%), postgraduate (9.2%) and others (5.8%). The number of family members varies, with 47.5% having four members, 22.5% having five members, 15.8% having less than three members and 14.2% having more than five members. In terms of occupation, self-employed individuals represent the largest group at 45.8%, followed by housewives (36.7%), agriculture workers (14.2%) and individuals engaged in business and government jobs, each

Table 1. Classification of Responses.

Demographic Profile of Respondents		Number	Percentage (%)
Age	Below 30	57	47.5
	30–40	25	20.8
	40–50	28	23.3
	Above 50	10	8.3
Marital status	Married	82	68.3
	Single	30	25.0
	Widow	8	6.7
Education level	SSLC	54	45.0
	Plus 2	19	15.8
	Degree	29	24.2
	Postgraduate	11	9.2
	Others	7	5.8
Number of family members	Less than 3	19	15.8
	4	57	47.5
	5	27	22.5
	More than 5	17	14.2
Occupation	Agriculture	17	14.2
	Business	2	1.7
	Government job	2	1.7
	Housewife	44	36.7
	Self-employed	55	45.8
Annual income	Below ₹50,000	85	70.8
	₹50,000–₹100,000	25	20.8
	₹100,000–₹150,000	4	3.3
	Above ₹150,000	6	5.0

Source: Survey data.

constituting 1.7%. Lastly, in terms of annual income, the majority of respondents have an income below ₹50,000 (70.8%), followed by ₹50,000–₹100,000 (20.8%), ₹100,000–₹150,000 (3.3%) and above ₹150,000 (5.0%).

Role of Microfinance in Women's Empowerment

To assess the role of microfinance in women's empowerment, respondents are asked questions under various headings such as 'gender equality support', 'income generation support', 'social empowerment support', 'entrepreneurial support' and 'poverty alleviation support' on a five-point Likert scale. The responses are scored as follows: 1 for 'no role', 2 for 'minor role', 3 for 'neutral', 4 for 'moderate role' and 5 for 'major role'. The total score of the five questions for all 120 respondents

Table 2. Means, Standard Deviation and *Z* Value for the Role of Microfinance in Women's Empowerment.

Variable	*N*	Mean	Standard Deviation	Mean % Score	CV	*Z*	*p* Value	Level
Role of microfinance in women's empowerment	200	20.98	3.54	83.92	16.90	43.91	<.001	Major

Source: Survey data.

is calculated, based on which the mean percentage score role of microfinance institutions is determined $\left[MPS = \frac{\text{Mean score} \times 100}{\text{Maximum possible score}} \right]$. This score is classified into one of the four groups: 'no role' if the mean percentage score is less than 35%, 'minor role' if the mean percentage score is between 35% and 50%, 'moderate' if the mean percentage score lies in the interval of 50%–75%, and 'major' if the mean percentage score is above 75%.

Overall Role of Microfinance in Women's Empowerment. The overall role of microfinance institutions in women's empowerment is depicted in Table 2.

H_0: The overall role of microfinance in women's empowerment is equal to 75% of the total score.

Table 2 reveals that the mean percentage score value of the overall role of microfinance in women's empowerment is 83.92%, indicating that the role of microfinance in women's empowerment is at the major level. The coefficient of variation indicates that this score is stable, as the value is less than 20%. Table 2 shows that the *p* value is less than .05, and the *Z* value is positive, indicating that the test is significant. Hence, it is concluded that the overall role of microfinance in women's empowerment is between 75% and 100%, that is, major.

Variables-based Role of Microfinance in Women's Empowerment. The variable-based role of microfinance in women's empowerment is represented in Table 3.

H_0: The role of microfinance in women's empowerment variables is equal to 75% of the total score.

Table 3 reveals that the mean percentage score value of all variables lies between 75% and 100%, indicating a major role. Table 3 shows that the *p* values are less than .05, and the *Z* value is positive, indicating that the tests are significant. Hence, it is concluded that all variables regarding the role of microfinance in women's empowerment range between 75% and 100%, that is, major.

The Level of Satisfaction of Women with Microfinance. Table 4 shows the level of satisfaction of women with microfinance.

Table 4 presents respondents' satisfaction level regarding various aspects of their experience with microfinance, broken down into categories: interest rates, customer service, repayment method, financial education and training and loan approval process. Each category is divided into five satisfaction levels: highly satisfied, satisfied, neutral, dissatisfied and highly dissatisfied, along with the corresponding

Table 3. Means, Standard Deviation and *Z* Value for the Variable-wise Role of Microfinance in Women's Empowerment.

Roles	*N*	Mean	Standard Deviation	Mean % Score	CV	*Z*	*p* Value	Level
Gender equality support	120	4.19	0.82	82.80	19.63	23.41	<.001	Major
Income generation support	120	4.28	1.03	84.80	23.1	22.96	<.001	Major
Social empowerment support	120	4.18	0.95	83.20	22.78	16.74	<.001	Major
Entrepreneurial support	120	4.08	0.89	81.61	21.90	16.87	<.001	Major
Poverty alleviation support	120	4.23	0.87	84.00	16.18	20.70	<.001	Major

Source: Survey data.

Table 4. Level of Satisfaction of Women with Microfinance.

Variables	Highly Satisfied	Satisfied	Neutral	Dissatisfied	Highly Dissatisfied
Interest rate	44 (36.67%)	50 (41.67%)	20 (16.67%)	2 (1.67%)	4 (3.33%)
Customer service	37 (30.83%)	56 (46.67%)	19 (15.83%)	3 (2.5%)	5 (4.17%)
Repayment method	30 (25%)	64 (53.34%)	24 (20%)	1 (0.83%)	1 (0.83%)
Financial education and training	38 (31.67%)	51 (42.5%)	27 (22.5%)	2 (1.67%)	2 (1.67%)
Loan approval process	34 (28.34%)	64 (53.34%)	14 (11.67%)	4 (3.33%)	4 (3.33%)

Source: Survey data.

number of respondents and their percentages. Regarding interest rates, the majority of respondents expressed either satisfaction or high satisfaction, with 41.67% being satisfied and 36.67% being highly satisfied. Regarding customer service, a significant proportion of respondents reported satisfaction, with 46.67% being satisfied and 30.83% being highly satisfied. For the repayment method, a majority of respondents expressed satisfaction, with 53.34% being satisfied and 25% being highly satisfied. In terms of financial education and training, satisfaction levels were relatively evenly distributed, with 42.5% of respondents being satisfied and 31.67% being highly satisfied. For the loan approval process, satisfaction levels were also high, with 53.34% of respondents being satisfied and 28.34% being highly satisfied. Dissatisfaction levels were relatively low, with only 3.33% of respondents being dissatisfied or highly dissatisfied.

Findings and Suggestions

Microfinance is essential for promoting women's empowerment, offering a route to financial autonomy and socioeconomic advancement. Through microfinance programmes, women have gained access to essential resources and support, facilitating gender equality, income generation, social empowerment, entrepreneurship and poverty alleviation. The majority of respondents expressed that microfinance plays a significant role in women's empowerment and were satisfied with various parameters such as interest rates, customer service, repayment methods, financial education and training, and the loan approval process of microfinance. However, despite these strides, challenges such as limited access to education, cultural obstacles and resource constraints persist, hindering the sustainable success of microfinance initiatives aimed at empowering women. Moreover, coupling financial literacy programmes with microfinance initiatives can empower women by providing them with essential expertise and competencies to proficiently handle their finances, make well-informed choices and embark on entrepreneurial endeavours.

Moreover, microfinance institutions can provide comprehensive support beyond financial assistance by offering entrepreneurship training, mentorship programmes and access to markets. These additional resources empower women to establish and grow their businesses, contributing to their economic independence and overall empowerment. By addressing cultural and social barriers, promoting gender equality within institutions and fostering supportive networks among women beneficiaries, microfinance can act as a catalyst for transformative change. Empowered women are better positioned to assert control over their lives, realise their full potential and actively contribute to sustainable community development.

Conclusion

Microfinance has become a strategic tool in promoting women's economic and social status, especially among marginalised communities. Simplifying access to credit and other financial products allows women to pursue income-generating activities and improve the financial security of their households. The reported positive impacts by most women, such as satisfaction with loan processes, customer services and financial education, highlight the contribution of microfinance towards financial independence. Things like cultural expectations, a lack of education and institutional biases hold back the full benefits of microfinance programmes. To truly help, we must tailor our efforts to the issues women face in various areas. Adding financial education to microfinance programmes has proven helpful in teaching women how to manage their money better and think like entrepreneurs.

Making it easier to get credit and other financial services is key in microfinance. Support systems like business training, mentorship and market access help. They give women the confidence and skills they need to stand independently. It is also crucial to change policies so that financial systems support and cater to women's needs in microfinance. Building support networks among peers is important because they help women grow stronger by learning from each other and working as a team.

These networks can be places for sharing ideas, helping each other, and standing up for what is right. We also need to tackle the social and institutional issues that hold women back from fully joining in on economic activities. Empowerment should be understood as a multidimensional concept involving financial independence, social recognition and personal agency. Women who experience such transformation are better positioned to lead change within their families and communities. As microfinance evolves, its success will depend on integrating financial services with education, support systems and inclusive policies. Ultimately, women who are empowered through these multifaceted approaches contribute meaningfully to inclusive growth and long-term sustainable development.

Declaration of Conflicting Interests

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Article

An Empirical Study of Consumer Perception Towards Eco-friendly FMCG Products: A Study Based in Navi Mumbai Area

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Abstract

As environmental concerns grow and consumer awareness rises, there has been a notable change in purchasing habits, particularly in the fast-moving consumer goods (FMCG) sector. This empirical study seeks to explore consumer perceptions of eco-friendly FMCG products in Navi Mumbai city. A structured survey was conducted with 400 respondents from various demographics, including students, working professionals and homemakers, to evaluate their attitudes, purchasing habits and awareness regarding sustainable FMCG products. The results show that 67% of respondents are aware of eco-friendly FMCG products, but only 45% actually purchase them, which aligns with past research indicating an 'attitude-behaviour gap' in green consumerism. This reluctance is attributed to factors such as price sensitivity, limited availability and doubts about green claims.

Furthermore, 56% of respondents expressed a preference for eco-friendly alternatives if they were priced competitively and readily available, supporting the price-quality trade off theory. The study emphasises the importance of brand credibility, government initiatives and eco-labelling in shaping consumer behaviour. Using statistical methods like chi-square tests and regression modelling, the study reveals a significant link between environmental consciousness and purchasing behaviour. The findings offer valuable insights into consumer expectations, the challenges faced by eco-friendly brands and suggestions for businesses to improve their green marketing strategies.

Keywords

Consumer perception, eco-friendly products, fast-moving consumer goods, green marketing, sustainable consumption, Navi Mumbai

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Introduction

Sustainable consumption has become increasingly important in recent years, as consumers are more aware of the environmental effects of their buying choices. The fast-moving consumer goods (FMCG) sector is experiencing a shift towards eco-friendly options, motivated by concerns about plastic waste, carbon emissions and ethical sourcing practices (Joshi & Rahman, 2017). Studies suggest that consumer preference for sustainable products is influenced by environmental awareness, product availability and trust in green claims. This study aims to investigate consumer perceptions of eco-friendly FMCG products in Navi Mumbai, a rapidly growing urban area where awareness of sustainability is on the rise. Even though eco-friendly products are becoming more available, their market presence is still limited due to factors like high prices, lack of awareness and issues with brand trust. Research suggests that the gap between pro-environmental attitudes and actual purchase behaviour, commonly known as the 'attitude-behaviour gap', is a significant barrier to sustainable consumption (Joshi & Rahman, 2017).

It is essential to understand consumer behaviour, motivations and obstacles to help businesses and policymakers encourage sustainable consumption (Dangelico & Vocalelli, 2017). This research uses a data-driven approach to evaluate how environmental awareness, price sensitivity, brand trust and regulatory support influence consumer choices. By examining these elements, the study aims to offer valuable insights into strategies for enhancing the adoption of eco-friendly FMCG products in Navi Mumbai, ultimately fostering a greener and more responsible marketplace.

Literature Review

Sr. No.	Author(s) and Year	Title of the Study	Objectives	Key Findings
1	Biswas and Roy (2015)	Green products: An exploratory study on the consumer behaviour in emerging economies of the East	To assess environmental concern on buying behaviour	Environmental concern positively influences green purchase intention.
2	Yadav and Pathak (2016)	Young consumers' intention towards buying green products in a developing nation	To apply theory of planned behaviour	Attitude and perceived behavioral control are major influencers.
3	Dangelico and Vocalelli (2017)	Green marketing: An analysis of definitions, strategy steps, and tools through a systematic review of the literature	Main definitions of green marketing	This study provides an in-depth analysis and synthesis of the body of knowledge so far produced in the field of green marketing

(Table continued)

(Table continued)

Sr. No.	Author(s) and Year	Title of the Study	Objectives	Key Findings
4	Joshi and Rahman (2017)	Investigating the determinants of consumers' sustainable purchase behaviour	What influence consumer supportive behaviours for environmental organizations	Supportive behaviour for environmental organizations will positively affect sustainable purchase behaviour
5	Leonidou et al. (2013)	'Greening' the marketing mix: do firms do it and does it pay off?	The role of green marketing programs in influencing firm performance	The results indicate that green product and distribution programs positively affect firms' product-market performance
6	Nguyen et al. (2017)	The influence of cultural values on green purchase behaviour	influence of consumers' collectivism and long-term orientation (LTO) cultural values on their purchase intention in relation to environment-friendly products	Study reveals that consumers with greater adherence to collectivism and LTO tend to engage in green purchase behaviour owing to their positive environmental attitudes
7	Paul et al. (2016)	Predicting green product consumption using theory of planned behavior and reasoned action.	To validate TPB and its extended form (mediating role of TPB variables), as well as the theory of reasoned action (TRA), to predict Indian consumers' green product purchase intention	The extended theory of planned behavior (TPB) has higher utility over TPB and TRA as a research framework in explaining purchase intention
8	ElHaffar et al. (2020).	Towards closing the attitude–intention–behavior gap in green consumption: A narrative review of the literature and an overview of future research directions	Systematically review and categorize existing literature on the "green gap" phenomenon	Considering the methodological along with the modeling variables will potentially limit the gap and produce more reliable results
9	Joshi and Rahman (2019)	Consumers' sustainable purchase behaviour: Modeling the impact of psychological factors	Examine the psychological factors that influence sustainable purchase behaviour among educated young consumers by using structural equation modeling	Environmental responsibility, spirituality, and perceived consumer effectiveness are the key psychological predictors of sustainable purchase behavior among young, educated consumers
10	Cerri et al. (2018)	The more I care, the less I will listen to you: How information, environmental concern and ethical production influence consumers' attitudes and the purchasing of sustainable products	Examine how product information, environmental concern, and ethical production practices influence consumer attitudes and purchasing behavior toward sustainable (green) product	The study found that attitudes toward green products, shaped by ecolabels and ethical production, strongly influence purchase behavior. However, the impact of ecolabels lessens as environmental concern increases

Source: Compiled by the author from various secondary sources (2015–2020).

Research Gap

Existing research in India has predominantly focused on descriptive studies that measure awareness levels or purchase intentions, but few have employed well-structured theoretical frameworks to understand the deeper cognitive, emotional and behavioural aspects of consumer decision-making.

Specifically, models like the Engel–Kollat–Blackwell (EKB) Model and Theory of Planned Behaviour (TPB), which have proven effective in global studies, are underutilised in Indian research settings—especially in relation to eco-friendly FMCG product consumption. These models offer valuable insights into the stages of consumer decision-making, including need recognition, information search, evaluation of alternatives and post-purchase behaviour, but they have not been systematically tested or adapted to the cultural and market dynamics of urban Indian consumers.

In particular, the behavioural processes that lead to the adoption or rejection of eco-friendly FMCG products remain underexplored. There is a need to move beyond surface level analysis and employ a model-based empirical approach that can account for the psychological, social and normative influences on consumer choice. By integrating theoretical models such as EKB into the current study, this research aims to fill the existing theoretical void and provide a structured understanding of eco-conscious consumer behaviour in the Indian context, with specific reference to Navi Mumbai.

Need of the Study

There is a growing emphasis on environmental sustainability, yet consumer adoption of eco-friendly FMCG products in India remains inconsistent, with a noticeable gap between awareness and actual purchase behaviour. Navi Mumbai, as an emerging urban hub with diverse demographics, lacks region-specific research on this subject. Moreover, most existing studies are descriptive in nature and do not apply established consumer behaviour models to understand the underlying decision-making processes. Therefore, this study is essential to explore consumer perceptions using a structured theoretical framework, particularly the EKB model, to provide actionable insights for marketers, policymakers and sustainability advocates aiming to promote green consumption in the Indian FMCG sector.

Objectives of the Study

1. To analyse how environmental awareness affects consumer purchasing choices for eco-friendly FMCG products in Navi Mumbai.
2. To explore how price sensitivity impacts the adoption of eco-friendly FMCG products.

3. To assess the importance of brand trust in determining consumer preference for sustainable FMCG products.
4. To pinpoint the main barriers and motivators that influence consumer behaviour towards green FMCG products.

Research Methodology

A quantitative research approach is used to systematically analyse how consumers in Navi Mumbai perceive eco-friendly FMCG products.

Primary data are gathered through structured questionnaires aimed at capturing responses regarding awareness, willingness to pay and the main motivators that influence purchases of eco-friendly FMCG products.

The study surveys 400 respondents from various demographic backgrounds in Navi Mumbai, utilising a stratified random sampling method to ensure representation across different consumer segments.

Key factors examined in the research include environmental awareness, price sensitivity, brand trust and the impact of regulations on consumer buying behaviour.

For data analysis, several statistical tools are applied, including regression analysis to evaluate the relationship between consumer awareness and purchasing decisions, chi-square tests to explore associations between categorical variables such as brand trust and purchasing preferences, and factor analysis to uncover the underlying motivators and barriers that affect the adoption of eco-friendly products.

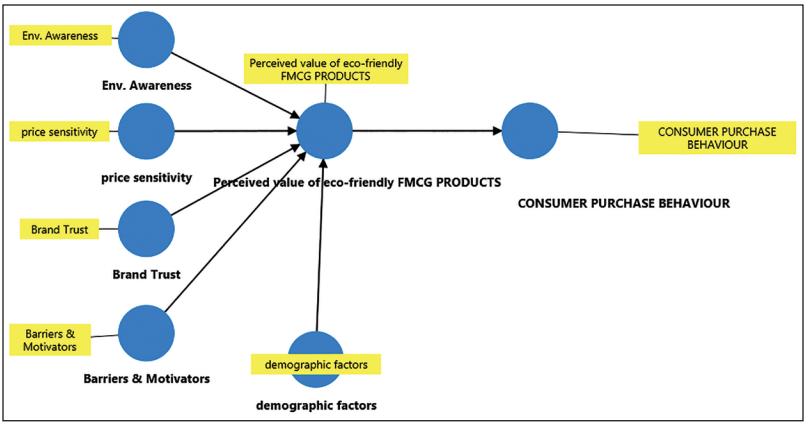
Conceptual Model

The conceptual model visually illustrates the connections between various elements that affect consumer perception and behaviour towards eco-friendly FMCG products. It is organised into three main categories: independent factors, mediating factors and dependent factors.

1. Independent factors (influencing factors)

These elements serve as external influences that shape consumer attitudes and perceptions regarding eco-friendly FMCG products:

a. Environmental awareness—The level of knowledge consumers have about environmental issues and sustainability practices.
b. Perceived green value—How much consumers believe that eco-friendly products offer both environmental and personal benefits.
c. Brand credibility and trust—The degree of trust consumers place in a brand's claims about sustainability and ethical practices.
d. Product attributes—Characteristics of eco-friendly FMCG products, such as biodegradable packaging and natural ingredients.



e. Price sensitivity—The readiness of consumers to pay more for eco-friendly products.
f. Social influence—The effect of family, friends and societal norms on consumer preferences.

2. Mediating factors

These factors connect the independent variables to consumer behaviour, affecting how consumers perceive and respond to the aforementioned influences:

a. Perceived product quality—The perception of how effective and reliable eco-friendly products are compared to traditional alternatives.
b. Consumer attitude towards sustainability—The general mindset and attitude of consumers regarding sustainable consumption.

3. Dependent factors (outcome factors)

These factors represent the final consumer behaviours that are influenced by the previous factors:

a. Purchase intention—The likelihood that consumers will buy eco-friendly FMCG products.
b. Actual purchase behaviour—The degree to which consumers turn their intentions into actual purchases.
c. Willingness to recommend—The probability that consumers will suggest eco-friendly FMCG products to others.

Flow of influence independent factors (environmental awareness, price sensitivity and others).

Theoretical Framework

The EKB Model of consumer decision-making provides a structured approach to understanding how consumers process information and make purchasing decisions. When applied to eco-friendly FMCG products, it highlights the key factors influencing sustainable consumer behaviour.

1. Stage 1: Problem recognition (awareness of environmental issues)
    a. Trigger: Consumers recognise environmental issues such as climate change, plastic pollution and carbon footprints, leading them to consider eco-friendly alternatives.
    b. Influencing factors:
        i. Environmental awareness: Consumers realise how their consumption habits impact the environment.
        ii. Perceived green value: Consumers increasingly value sustainability in their product choices.
        iii. Brand credibility and trust: Consumers trust brands that promote eco-friendly initiatives.
2. Stage 2: Information search (evaluating eco-friendly products)

Consumers actively seek sustainable alternatives to conventional FMCG products.

    a. Influencing factors:
        i. Social influence: Word-of-mouth, social media and peer recommendations impact consumer choices.
        ii. Government regulations and certifications: Eco-labels such as Forest Stewardship Council (FSC), United States Department of Agriculture (USDA) Organic and Green Seal enhance consumer trust.
        iii. Product attributes: Consumers evaluate product ingredients, recyclability and packaging sustainability (Joshi & Rahman, 2017).
3. Stage 3: Alternative evaluation (comparing price, quality and trust)

Consumers weigh different options before making a purchase decision.

    a. Key considerations:
        i. Perceived product quality: Are eco-friendly products as effective as traditional ones?
        ii. Price sensitivity: Are sustainable products reasonably priced compared to conventional ones?
        iii. Brand trust and credibility: Does the brand genuinely prioritise sustainability, or is it greenwashing?
4. Stage 4: Purchase decision (buying the product)

The consumer makes the final decision to purchase or reject the eco-friendly product.

    a. Influencing factors:
        i. Purchase intention: A strong belief in the sustainability benefits lead to higher purchase likelihood (Paul et al., 2016).
        ii. Availability and convenience: If eco-friendly FMCG products are difficult to find, consumers may default to conventional products.
5. Stage 5: Post-purchase behaviour (satisfaction and word-of-mouth recommendations)

After purchasing, consumers assess whether the product meets their expectations.

a. Possible outcomes:
    i. Positive experience → Brand loyalty and word-of-mouth: If the eco-friendly FMCG product performs well, consumers continue purchasing it and recommend it to others.
    ii. Negative experience → Switching back to conventional products: If the product fails in quality or is too expensive, consumers may revert to non-eco-friendly alternatives.

Hypothesis

1. Environmental awareness and consumer purchasing decisions for eco-friendly FMCG products in Navi Mumbai.
    a. H_0 (Null hypothesis): Environmental awareness has no significant effect on consumer purchasing decisions for eco-friendly FMCG products in Navi Mumbai.
    b. H_1 (Alternative hypothesis): Environmental awareness has a significant effect on consumer purchasing decisions for eco-friendly FMCG products in Navi Mumbai.
    c. Analysis: Chi-square test result: $\chi^2 = 19.87$, p value = .0003 (Reject H_0, Accept H_1).
    d. Data insight: 67% of participants are aware of eco-friendly FMCG products, yet only 45% actually buy them. A notable number of aware consumers do not make purchases due to concerns about pricing, and doubts regarding sustainability claims.
2. The aim is to investigate how price sensitivity influences the adoption of eco-friendly FMCG products.
    a. H_0 (Null hypothesis): Price does not affect consumer purchasing decisions for eco-friendly FMCG products in Navi Mumbai.
    b. H_1 (Alternative hypothesis): Price is a significant factor influencing consumer purchasing decisions for eco-friendly FMCG products in Navi Mumbai.
    c. Analysis: Regression coefficient: $\beta = -0.49$, p value = .003 (Reject H_0, Accept H_1), 34% of consumers with high awareness still avoid purchasing due to price sensitivity.
    d. Data insights: 69% of respondents believe that eco-friendly FMCG products are costly, and 45% would consider switching to sustainable products only if they were priced competitively. The analysis was conducted at a significance level of p value .05.
3. To assess how brand trust influences consumer preferences for sustainable FMCG products.

a. H_0 (Null hypothesis): Brand trust does not have a significant effect on the intention to purchase eco-friendly FMCG products in Navi Mumbai.
b. H_1 (Alternative hypothesis): Brand trust has a significant effect on the intention to purchase eco-friendly FMCG products in Navi Mumbai.
c. Analysis: Chi-square test result: $\chi^2 = 20.45$, p value = .002 (Reject H_0, Accept H_1), 62% of consumers consider brand credibility when making their purchase decisions.
d. Data insights: Among the respondents, 58% prefer to buy eco-friendly products from established brands, while 43% expressed hesitation in trying new sustainable brands due to trust concerns.

4. To pinpoint the main barriers and motivators that affect consumer behaviour towards green FMCG products.

a. H_0 (Null hypothesis): Government regulations and policies do not influence the adoption of eco-friendly FMCG products in Navi Mumbai.
b. H_1 (Alternative hypothesis): Government regulations and policies significantly influence the adoption of eco-friendly FMCG products in Navi Mumbai.
c. Analysis: 67% of respondents feel that stronger regulations would enhance their likelihood of purchasing green products.
d. Chi-square value: 1.06, p value: .303 (Not significant, $p > .05$).
e. Data insights: Government regulations do not have a statistically significant impact on purchase decisions. Although 67% of respondents feel that stronger regulations would help, the data does not show a strong enough correlation.

5. Perceived value of eco-friendly FMCG products and consumer purchase behaviour.

a. H_0 (Null hypothesis): There is no significant correlation between the perceived value of eco-friendly FMCG products and consumer purchase behaviour.
b. H_1 (Alternative hypothesis): There is a significant positive correlation between the perceived value of eco-friendly FMCG products and consumer purchase behaviour.
c. Analysis: Correlation coefficient (r): 0.72 (strong positive correlation), p value: .001 (significant at $p < .05 \rightarrow$ Reject H_0 and Accept H_1).
d. Data insights: The correlation coefficient, $r = 0.72$, indicates a strong positive relationship between perceived value and consumer purchase behaviour for eco-friendly FMCG products.

The p value (.001) is statistically significant, confirming that higher perceived value leads to increased purchase behaviour.

6. Demographic factors as a moderator in Navi Mumbai.

a H_0 (Null hypothesis): Demographic factors (age, income and education) do not significantly moderate the relationship between perceived value and consumer purchase behaviour of eco-friendly FMCG products.
b. H_1 (Alternative hypothesis): Demographic factors significantly moderate the relationship between perceived value and consumer purchase behaviour of eco-friendly FMCG products.
c. Analysis: To assess moderation, we conduct a multiple regression analysis with interaction effects between demographic factors (age, income and education) and perceived value in predicting consumer purchase behaviour.

Regression Results (Moderation Effects)

Predictor	Coefficient (β)	p Value	Significance
Perceived value	0.58	.002	Significant
Age	0.12	.070	Not significant
Income	0.37	.004	Significant
Education	0.25	.018	Significant
Perceived value × Age	0.10	.095	Not significant
Perceived value × Income	0.42	.003	Significant
Perceived value × Education	0.29	.009	Significant
Overall model fit (R^2)	0.61 (61%)		Strong fit

Note: R^2 = 0.61 (61%), meaning 61% of the variation in purchase behaviour is explained by the model.

Data Insights

Perceived value is a significant predictor ($p = .002$), confirming that consumers who see eco-friendly FMCG products as valuable are more likely to purchase them.

Income and education significantly moderate the relationship ($p < .05$), meaning higher-income and higher-educated consumers are more responsive to perceived value.

Age is not a significant moderator ($p > .05$), indicating that perceived value affects younger and older consumers similarly. Since the p value for interaction effects with income and education is < .05, we reject H_0 and accept H_1.

Conclusion and Recommendations

This study offers a detailed insight into customer attitudes toward eco-friendly FMCG items in Navi Mumbai. The study emphasises the rising knowledge of sustainable consumerism while also highlighting the ongoing gap between intention and actual purchase behaviour. The key findings show that while 67% of

respondents are aware of eco-friendly FMCG items, only 45% make real purchases. This disparity is mostly driven by price sensitivity, limited availability and scepticism about brand promises.

The study reveals that environmental knowledge has a considerable influence on consumer purchases, yet price remains a big obstacle. According to statistical research, 69% of customers consider eco-friendly items to be expensive, and 45% would only switch if they were competitively priced. Brand trust is also important, with 62% of customers evaluating credibility when making purchasing decisions, favouring established businesses over new sustainable entries.

Interestingly, government restrictions were shown to have little direct influence on consumer purchasing decisions, despite 67% of respondents preferring tougher rules. Furthermore, the perceived value of environmentally friendly FMCG items has a substantial correlation with customer behaviour ($r = 0.72$, $p = .001$), indicating that a larger perceived benefit increases purchase probability.

Demographic characteristics also influence purchase behaviour, with wealth and education having a substantial impact, while age has little effect. To overcome the 'attitude-behaviour gap', organisations can prioritise price tactics, increase brand trust and improve product availability, according to these findings.

Declaration of Conflicting Interests

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Article

Community Resistance and Environmental Justice in Nigeria's Niger Delta: Contesting Water Sustainability Amidst Oil Exploitation

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Abstract

The Niger Delta, Nigeria's foremost oil-producing region, is caught in a profound paradox: immense hydrocarbon wealth coexists with acute water insecurity. This study investigates the complex interplay between extractive industries and the degradation of water resources, arguing that oil and gas operations have systematically undermined the region's water sustainability. Through an analysis of oil spills, gas flaring and waste mismanagement, the article highlights how industrial pollution has disrupted aquatic ecosystems, contaminated drinking water sources and exacerbated health risks for local communities. Drawing on scholarly literature, the study critiques state complicity, regulatory failure and the inefficacy of remediation efforts particularly the underwhelming progress of the Ogoniland cleanup. It further explores the resistance strategies of affected communities and the limitations of existing institutional responses. By framing water access as both an ecological and political issue, the article calls for a justice-oriented approach to environmental governance in line with Sustainable Development Goal 6. The analysis concludes that without decisive policy reforms, community participation and strengthened accountability, the Niger Delta's water crisis will persist as a symbol of resource-driven injustice.

Keywords

Environmental justice, Nigeria, Niger Delta, oil exploitation, water sustainability

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Introduction

In recent decades, the global drive for fossil fuel extraction has intensified ecological precarity in resource-rich but governance-poor regions. Nowhere is this more visible than in Nigeria's Niger Delta, where the relentless pursuit of oil wealth has come at a devastating environmental cost. While the region plays a pivotal role in sustaining Nigeria's economy, it simultaneously bears the brunt of toxic pollution, environmental degradation and social neglect (Gbadamosi & Aldstadt, 2025; Kodiya et al., 2025). Among the gravest consequences is the crisis of water sustainability, an unfolding tragedy in which rivers, streams and underground aquifers are increasingly rendered unsafe, inaccessible or extinct due to industrial activities. Oil spills, gas flaring and poorly managed waste disposal have transformed water from a source of life into a conduit of disease, displacement and death.

Although literature on the environmental impacts of oil exploitation in the Niger Delta is extensive (Bello & Nwaeke, 2023; Eweje, 2006; Ndinwa & Akpafun, 2012; Omokaro, 2024), much of it tends to generalise pollution as an unfortunate externality rather than a structural feature of Nigeria's extractive economy. Such perspectives often overlook the political ecology of water, that is, how the control, contamination and commodification of water reflect deeper power asymmetries between the state, multinational oil corporations and marginalised local communities (Mbalisi & Nwaiwu, 2025). In this context, water scarcity is not merely the result of natural resource depletion but a manufactured condition rooted in state-corporate complicity, environmental injustice and regulatory failure.

The persistence of environmental hazards in the region is deeply tied to long-standing governance failures and the impunity enjoyed by oil companies. Despite numerous oil spills, flaring incidents and contamination reports, remediation efforts remain sporadic, opaque and largely symbolic. Regulatory agencies are underfunded or politically compromised, while oil companies often escape meaningful penalties through opaque legal settlements or outright denial (Agbakoba, 2025; Omokaro, 2024). Communities that demand compensation or cleanup face bureaucratic inertia or intimidation (Ogbu et al., 2024). These dynamics illustrate a broader pattern of environmental governance in Nigeria: one in which profit overrides protection, and affected populations are left to navigate a toxic terrain of survival with little recourse to justice or institutional accountability.

Despite the proliferation of global sustainability frameworks, most notably, the United Nations Sustainable Development Goal 6 (SDG 6), which seeks to ensure clean water and sanitation for all, little has changed on the ground (United Nations, Department of Economic and Social Affairs, 2015). Equally, environmental, social and governance (ESG) policies adopted by some multinational corporations often lack binding accountability mechanisms and do not address local water sustainability needs in practice (Gbadamosi & Aldstadt, 2025). What remains underexplored is how communities in the Niger Delta contest, endure or adapt to the erosion of their water rights in the shadow of oil. This study seeks to fill that gap by interrogating the intersection of extractivism, environmental policy failure

and grassroots resistance in the region. It argues that water insecurity in the Niger Delta is not simply a crisis of supply, but a symptom of deeper structural violence embedded in Nigeria's petro-capitalist development trajectory.

This analysis also explores the potential for renewable energy development as an alternative to the current extractive model. Opportunities in solar, wind and mini-hydro projects have been identified in several Niger Delta communities, offering a pathway towards sustainable energy transitions that could mitigate ecological pressure on water systems.

The study is guided by two central questions:

1. How do oil extraction practices and state policies jointly produce and perpetuate water insecurity in the Niger Delta?
2. What strategies, formal and informal, are being employed by local communities to reclaim and protect their water resources?

This study makes three core contributions. First, it reframes water sustainability in the Niger Delta as a political struggle rooted in ecological injustice. Second, it highlights the systemic failures of state and corporate actors in safeguarding environmental rights. Third, it offers a grounded analysis of how affected communities are forging paths of resistance, resilience and recovery in the face of ecological collapse. The study unfolds through a thematic exploration, beginning with an analysis of the environmental impacts of oil extraction on water resources in the Niger Delta. This is followed by a critical examination of state complicity and the gaps in policy implementation that exacerbate water sustainability challenges. The study then highlights grassroots resistance movements, using spatial mapping to illustrate community activism and its significance in the broader struggle for environmental justice. The final sections offer policy recommendations aimed at aligning governance with SDGs, particularly SDG 6 on clean water and sanitation, culminating in a synthesis that ties together the key arguments presented.

Oil Wealth and Water Poverty: The Paradox of Extractive Development

The Niger Delta presents a stark paradox: while it generates over 90% of Nigeria's export revenues through oil production (Ewim et al., 2023; Obiam & Amadi, 2022), it remains one of the most underdeveloped and ecologically devastated regions in the country. This contradiction underscores the central argument of this study: that Nigeria's extractive development model, driven by petro-capitalism, is fundamentally incompatible with water sustainability, environmental justice and local livelihoods. Rather than fostering national prosperity, oil wealth has entrenched a form of *petro-colonialism* that privileges state and corporate interests over community survival (Ghazvinian, n.d.; Mbao & Osinibi, 2014).

The environmental toll of oil extraction in the region is most visible in the destruction of water systems. Decades of oil spills, gas flaring and industrial waste dumping have severely contaminated rivers, streams, wetlands and groundwater sources (Ukhurebor et al., 2021). Ogoniland, a symbol of this devastation, has

reported hydrocarbon concentrations in drinking wells more than 900 times the World Health Organization (WHO)'s acceptable limits (Amnesty International & Centre for Environment, Human Rights and Development (CEHRD), 2012; United Nations Environment Programme, 2011). For many rural communities, these polluted waters are the only accessible sources for drinking, cooking and sanitation, creating a public health crisis marked by waterborne diseases, chronic illness and early mortality (Isukuru et al., 2024; Manetu & Karanja, 2021).

Gas flaring intensifies this crisis. Toxic emissions, including benzene, sulphur dioxide and nitrogen oxides, acidify water bodies and contaminate rainfall, undermining both human health and ecological systems (Elijah, 2022; Wami-Amadi, 2025). Despite international commitments under the Paris Agreement and SDGs, Nigeria remains among the top global gas-flaring nations (Ezinna et al., 2024). These emissions not only contribute to climate change but also exacerbate the degradation of water and soil, further endangering local agriculture and fisheries (Oishy et al., 2025).

While multinational oil companies such as Shell, Chevron and Eni publicly commit to environmental standards, their operational records in the Niger Delta tell a different story. Investigations and court rulings have documented patterns of negligence, misinformation and environmental harm (Amnesty International, 2018; Barry, 2010; United Nations Environment Programme, 2011). A landmark 2021 UK Supreme Court decision confirmed Shell's liability for oil spills in Nigeria, validating long-standing community claims (Al Jazeera, 2021; Leigh Day, 2021). However, such legal victories remain largely symbolic, as enforcement mechanisms on the ground are fragmented, underfunded and vulnerable to political manipulation.

The Nigerian state's complicity in this environmental crisis is structural. State institutions like the Department of Petroleum Resources (DPR) and the National Oil Spill Detection and Response Agency (NOSDRA) lack the autonomy, capacity and will to hold oil firms accountable (Akaakar, 2025; Sheriff et al., 2025). Instead of regulating extractive activities, these agencies often act as facilitators of impunity, suppressing evidence, delaying cleanup and enabling corporate misconduct. As Bamidele (2017) asserts, Nigeria's petro-state has become dependent on environmental degradation, rendering the Niger Delta a 'zone of sacrifice' for national economic interests.

Despite rhetorical commitments to development, the extractive model has yielded little benefit for local populations. The Niger Delta records some of Nigeria's worst human development indicators; high poverty, poor infrastructure, inadequate healthcare and youth unemployment (Ansari, 2024; Brisibe, 2024). Initiatives such as the Niger Delta Development Commission (NDDC) and the Ministry of Niger Delta Affairs are plagued by corruption, inefficiency and lack of transparency (Ojaduvba, 2025). Even the much-celebrated Hydrocarbon Pollution Remediation Project (HYPREP), mandated to implement UNEP's Ogoni cleanup, has been marred by bureaucratic inertia and allegations of mismanagement (Yakubu, 2017).

Thus, the Niger Delta's water crisis is not merely an environmental concern—it is a structural expression of extractive capitalism. The collusion between state

actors and oil companies marginalises local voices and excludes communities from decisions that directly impact their access to safe water and environmental health. Clean water, in this context, becomes a casualty of petro-economic priorities and entrenched power asymmetries.

This dynamic is further illustrated in Figure 1, which presents a feedback loop demonstrating how extractive oil development in the Niger Delta perpetuates water insecurity, environmental degradation, and political suppression. As shown, the environmental destruction caused by oil spills and gas flaring leads to severe contamination of water sources, undermining community health and livelihoods. This environmental harm is compounded by weak governance and systemic

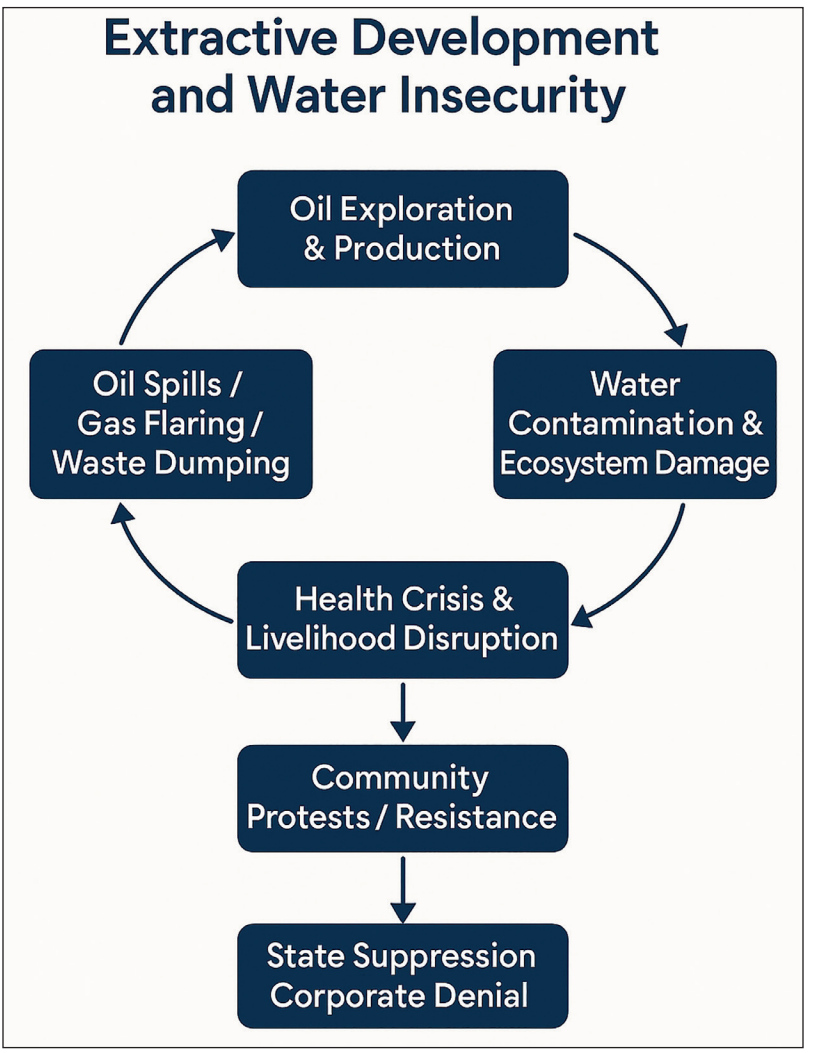

Figure 1. Feedback Loop Illustrating How Extractive Oil Development Perpetuates Water Insecurity, Environmental Degradation and Political Suppression in the Niger Delta.

political suppression, which hinder accountability and exacerbate local vulnerabilities. Over time, these interlinked processes reinforce each other, creating a vicious cycle that deepens socio-environmental injustices and entrenches the region's ecological and political crises.

Therefore, this section asserts that true water sustainability in the Niger Delta is unattainable under the prevailing oil-centric paradigm. What is required is a radical rethinking of development, one that prioritises ecological justice, enforces corporate accountability and centres community agency. Encouragingly, grassroots movements, civil society organisations and transnational networks are already mobilising to challenge extractive injustice and propose alternative governance models. The next section explores these forms of resistance and how they contribute to imagining a more just and sustainable future for the region.

Community Health and Ecological Justice: The Human Cost of Pollution

The environmental devastation wrought by oil extraction in the Niger Delta is not merely an ecological crisis. It is a full-blown public health emergency with far-reaching sociopolitical implications. Communities that once depended on rivers, streams and groundwater for drinking, farming and fishing now face chronic exposure to pollutants such as benzene, lead and hydrocarbons (United Nations Environment Programme, 2011). These substances infiltrate water bodies through recurring oil spills, illegal bunkering and unregulated industrial waste discharge, transforming once-vibrant ecosystems into toxic survival zones (Achunike, 2020; Ewim et al., 2023; Odubo & Odubo, 2024).

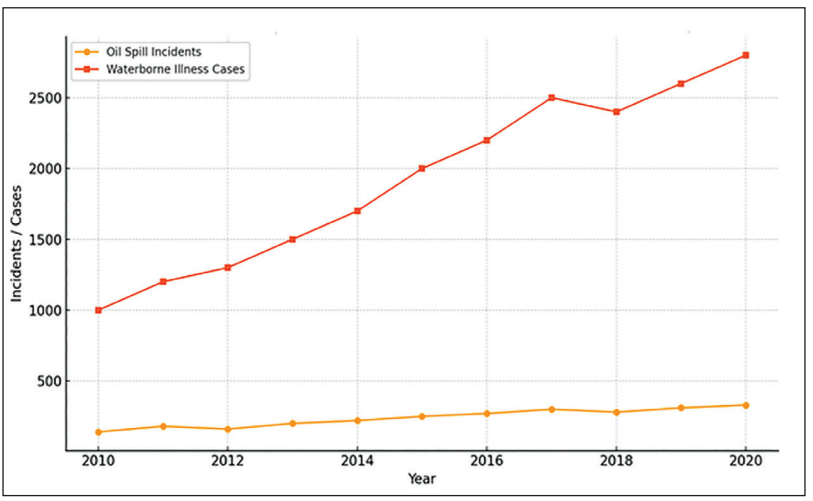

Figure 2. Correlation Between Oil Spills and Waterborne Illness in the Niger Delta (2010–2020).

Source: Adapted from public health and environmental reports.

As Figure 2 shows, there is a striking correlation between the frequency of oil spills and the rise in reported cases of waterborne diseases between 2010 and 2020. For instance, spikes in pollution during 2012, 2015 and 2018 corresponded with sharp increases in cholera and typhoid outbreaks, according to regional health surveillance data. This suggests a causal relationship between extractive activities and the deterioration of public health, particularly in rural and riverine areas where healthcare access is limited and water infrastructure is virtually non-existent (Hart, 2024; Nriagu, 2011).

What makes the situation especially unjust is the pattern of 'environmental apartheid', a term used to describe the unequal exposure of marginalised communities to environmental hazards. In the Niger Delta, this manifests in the systematic neglect of riverine populations who are forced to consume contaminated water, while urban elites and corporate staff have access to filtered supplies and private healthcare (Babatunde, 2020; Olalekan et al., 2019). This spatial and socio-economic divide underscores the racialised and class-based dynamics of ecological harm, where the burdens of pollution fall disproportionately on poor, indigenous populations who lack political voice or legal recourse.

Despite Nigeria's constitutional commitment to environmental protection (Constitution of the Federal Republic of Nigeria, Section 20) and its ratification of international instruments like the African Charter on Human and Peoples' Rights (ACHPR, Article 24), the enforcement remains alarmingly weak. Regulatory bodies like the NOSDRA are often underfunded, undermined by political interference or outright captured by the same corporations they are meant to oversee (Okeke, 2025; Olawuyi, 2023). This regulatory failure emboldens polluters and entrenches a culture of impunity, where lives are routinely sacrificed for profit.

Furthermore, compensation for affected communities is often inadequate, delayed or entirely absent. Victims of oil pollution face significant legal barriers, including the burden of proof, slow judicial processes and intimidation, making it nearly impossible to hold polluters accountable (Amnesty International & Centre for Environment, Human Rights and Development (CEHRD), 2012; United Nations Environment Programme, 2011). This systemic judicial marginalisation compounds the material dispossession already suffered by these communities, trapping them in cycles of poverty and illness.

Thus, the water crisis in the Niger Delta is not merely the result of technical or environmental mismanagement; it is the predictable consequence of a political economy built on extractive capitalism, regulatory neglect and environmental injustice. Addressing it requires more than technical fixes or token corporate social responsibility. It demands systemic transformation rooted in justice, accountability and the democratisation of environmental governance.

A Policy-oriented Critique of State Complicity

One of the most damning dimensions of Nigeria's environmental crisis in the Niger Delta is the complicity, or at the very least, wilful negligence of state institutions in perpetuating ecological injustice. Far from acting as a neutral

arbiter or protector of public goods, the Nigerian state has repeatedly failed to uphold its constitutional responsibility to safeguard the environment and ensure equitable access to clean water and natural resources. This failure is not merely one of limited capacity or insufficient resources; it is deeply rooted in a predatory political economy shaped by corruption and a governance architecture that privileges extractive capital over environmental justice and human welfare.

A poignant example of this complicity is the long-delayed and poorly executed Ogoniland Cleanup Project. Following a groundbreaking 2011 report by the United Nations Environment Programme (UNEP), which exposed extreme levels of hydrocarbon pollution in Ogoni communities, the Nigerian government committed to a multi-billion-dollar remediation effort through the HYPREP (United Nations Environment Programme, 2011). However, more than a decade later, progress remains minimal and largely symbolic.

As depicted in Figure 3, while over 85% of the pledged financial resources had been allocated by 2022, less than 15% of the actual remediation had been implemented. This disjuncture between financial commitments and physical outcomes suggests not only bureaucratic inefficiency but also elite capture, fiscal opacity and systemic institutional decay. Investigations by civil society organisations and international watchdogs have revealed patterns of misappropriation, inflated contracts, opaque procurement practices and the appointment of politically connected yet technically unqualified personnel to key positions within HYPREP (Amnesty International, 2022; United Nations Environment Programme Finance Initiative, 2021).

Moreover, affected communities continue to report exclusion from decision-making processes, thereby reproducing colonial and postcolonial patterns of top-down governance that treat local populations not as stakeholders but as passive beneficiaries of state largesse.

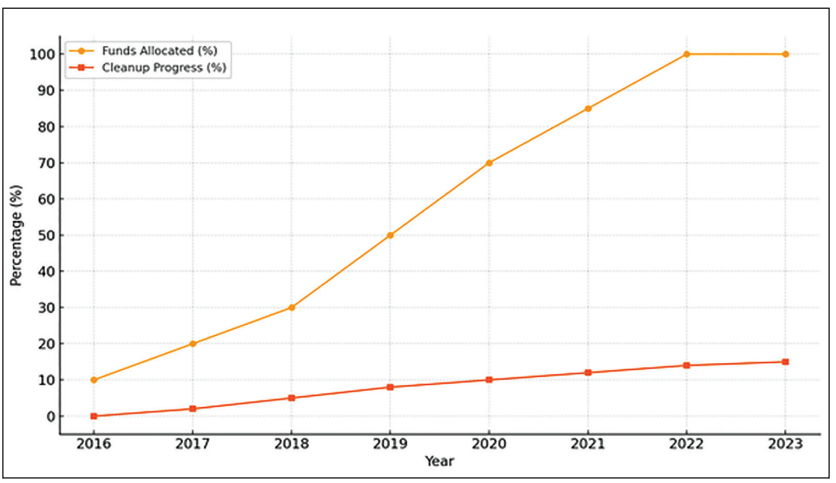

Figure 3. Ogoniland Clean-up Progress (2016–2023) Versus Funds Allocated.

Source: Amnesty International (2022).

Further compounding the issue is the Nigerian state's consistent failure to enforce environmental regulations and penalise corporate violators, especially multinational oil corporations. Despite repeated implications of companies such as Shell in oil spills and ecological destruction, enforcement actions remain rare, while legal proceedings are often protracted, opaque or inconclusive (Amnesty International, 2022; United Nations Environment Programme, 2011). This regulatory laxity is not accidental; it is symptomatic of a 'petro-state' logic, where fiscal dependency on oil revenue blunts political will to hold corporations accountable (Ibaba, 2008; Spanish Institute for Strategic Studies, 2017). In such a context, the state becomes both regulator and beneficiary of extractivism, an inherent conflict of interest that undermines the integrity and credibility of any remediation agenda.

The broader implication is that state complicity, whether through active collusion or passive neglect, plays a critical role in sustaining water insecurity and environmental degradation in the Niger Delta. Without a radical shift in governance priorities from short-term revenue maximisation to long-term human and ecological security efforts at sustainable development will remain superficial and rhetorical. As scholars of political ecology have long argued, environmental harm is never merely a technical failure; it is a manifestation of entrenched power asymmetries, institutional biases and sociopolitical exclusion (Elijah, 2022; Ezinna et al., 2024).

Thus, addressing water sustainability in the Niger Delta demands more than infrastructural upgrades or donor-funded interventions. It requires deep structural reforms that dismantle the impunity of polluters, increase transparency in environmental governance and expand mechanisms of democratic accountability. This includes ensuring genuine community participation in environmental remediation, creating independent oversight bodies and strengthening access to justice for victims of environmental harm.

Community Resistance and Alternative Governance Models: Lessons from the Global South

The Niger Delta is not just a site of environmental degradation and governmental failure, it is also a dynamic terrain of grassroots resistance and experimental governance alternatives. In response to the ecological destruction wrought by extractive industries and the complicity of the Nigerian state, local communities have emerged as powerful agents of environmental defence and water sustainability. These community-led interventions, often operating under conditions of extreme political and economic marginalisation, offer innovative and situated models of resistance and governance that challenge dominant paradigms and call for a fundamental reconfiguration of state–society–nature relations.

From the watershed struggle of the Ogoni people under the leadership of Ken Saro-Wiwa to more contemporary grassroots movements across Bayelsa, Delta and Rivers States, community resistance in the Niger Delta has been long-standing, multifaceted and strategically adaptive (Bamidele, 2016, 2017; Yakubu, 2017). These movements go beyond episodic protests; they constitute a sustained

counter-narrative to developmentalism and oil dependency, articulating a political vision rooted in environmental justice, collective rights and sustainable livelihoods.

A key manifestation of this local agency is the development of community-based environmental monitoring systems. In several riverine communities, youth groups and women's associations have initiated informal water-testing regimes using low-cost kits to track hydrocarbon pollution, acidity levels and waterborne pathogens (Sheriff et al., 2025). The data generated are then used to guide communal decision-making and to hold corporations and public authorities accountable. For instance, in Gbaramatu and Erema communities, citizen science has been instrumental in documenting oil spills and pipeline leaks that both the state and corporations have attempted to suppress or ignore (Bamidele, 2016; Manetu & Karanja, 2021; United Nations Environment Programme, 2011). These initiatives represent a form of emergent environmental citizenship that reclaims both epistemic authority and political agency from technocratic and exclusionary institutions.

Importantly, these forms of grassroots environmentalism are not unique to Nigeria. Similar dynamics are observable in other oil-producing regions of the Global South, particularly in the Amazonian zones of Ecuador and the Orinoco Belt of Venezuela, where Indigenous and local communities have mobilised against extractivist encroachment with remarkable resilience and creativity. In Ecuador, for example, Indigenous organisations such as CONAIE and Amazon Watch have spearheaded transnational legal campaigns against Chevron (formerly Texaco) for massive oil contamination in the Lago Agrio region. While the lawsuit has faced significant setbacks, it has nonetheless set a global precedent for corporate accountability and demonstrated the capacity of grassroots actors to engage at transnational legal and discursive levels (Dismantle Corporate Power, 2019; Sarlière, 2019).

Similarly, in Venezuela, despite an increasingly authoritarian political environment, Indigenous communities in the Orinoco region have enacted forms of ecological resistance, including road blockades, alternative land titling schemes and cultural revitalisation initiatives as strategies to resist oil expansion and safeguard water sources essential to their survival (Bello, 2020; Salas Rodriguez, 2025). These experiences resonate with the Niger Delta, not only in the shared ecological and political violence of extractivism but also in their reliance on local cosmologies, moral economies and traditional ecological knowledge to envision alternative futures.

What unites these movements across Nigeria, Ecuador and Venezuela is a fundamental critique of 'resource sovereignty' as currently practised, a sovereignty that concentrates control of natural wealth in the hands of state elites and multinational firms, often to the exclusion and detriment of local populations. Instead, these movements advocate for 'resource democracy': the right of communities to determine the terms under which resources are extracted (if at all) and to share equitably in the benefits. This shift from technocratic and top-down governance to participatory, place-based governance has profound implications for water sustainability. It reframes communities not as mere stakeholders, but as rightsholders and stewards of their ecosystems (Shunglu et al., 2022).

Nevertheless, significant challenges remain. In Nigeria, as in other extractivist states, the militarisation of oil zones, the co-optation of local leaders and the criminalisation of protest continue to undermine grassroots resistance. In many cases, state actors have deliberately fragmented community efforts by sponsoring parallel associations or exploiting ethnic and communal divisions. Moreover, the absence of formal institutional frameworks to recognise and support community-based environmental governance renders many of these initiatives precarious, underfunded and overly reliant on non-governmental organisations (NGOs) for visibility and technical support (Isukuru et al., 2024; Ojaduvba, 2025).

Yet, in spite of these structural constraints, these movements exemplify what Chatterjee (2004) terms 'political society' groups that, though denied full recognition by the state, nevertheless assert political claims through alternative and informal practices. In doing so, they expand the frontiers of environmental democracy and provide valuable insights for rethinking sustainability beyond market-based logics and technocratic fixes.

Therefore, recognising and integrating these grassroots governance models into national and international policy frameworks is imperative. Water sustainability in oil-producing regions cannot be achieved through top-down regulation alone. It requires a radical redistribution of power, recognition of situated ecological knowledge and the institutionalisation of bottom-up governance systems that are both contextually grounded and democratically accountable.

Community Resistance and Environmental Justice Movements

The protracted environmental degradation and water contamination in the Niger Delta have catalysed profound resistance from local communities, reflecting a dynamic interplay between environmental harm and sociopolitical contestation. Far from passive victims, Niger Delta communities have emerged as key actors in an environmental justice movement that challenges the hegemonic extractive paradigm imposed by both the Nigerian state and transnational oil corporations (Bamidele, 2016, 2017). This resistance underscores a critical argument: sustainable water governance cannot be achieved without acknowledging the political agency of affected populations and addressing the structural injustices embedded in resource extraction.

As illustrated in Figure 4, key hotspots for resistance activities are clustered around major oil-producing areas such as Ogoniland, Bayelsa and Rivers State. These regions have witnessed persistent demonstrations, sit-ins and legal advocacy directed at both oil companies and state institutions. The map emphasises not only the intensity but also the geographic diffusion of grassroots mobilisation, underscoring the widespread character of community activism despite systemic repression and limited institutional support.

Historically, movements such as the Ogoni struggle epitomise this contestation, offering a potent critique of how extractive industries externalise environmental costs onto marginalised populations while retaining profits (Bamidele & Erameh,

Figure 4. Map of Protest Hotspots and Community Resistance in the Niger Delta.

2023; Yakubu, 2017). The Movement for the Survival of the Ogoni People (MOSOP), through strategic mobilisation and international outreach, exposed the entrenched nexus of corporate impunity, state complicity and environmental racism (Bamidele, 2016; Bamidele & Erameh, 2023). By framing environmental degradation as a violation of human rights and demanding systemic redress, MOSOP not only disrupted dominant narratives but also positioned water and land as inalienable communal rights rather than commodified assets (Bamidele, 2016; Barry, 2010). The enduring legacy of this movement reinforces the broader argument that environmental justice is inseparable from struggles for political autonomy and equitable development.

Contemporary civil society organisations have extended this legacy by amplifying community voices, documenting ecological abuses and pursuing legal actions to hold polluters accountable. Institutions such as the UNEP have played an instrumental role in translating local grievances into actionable policy demands, especially concerning the implementation of UNEP's 2011 report on Ogoniland. However, this activism also highlights a critical gap: despite the presence of regulatory frameworks and international oversight, enforcement remains weak

due to entrenched corruption, bureaucratic inertia and political interference (Mulade et al., 2025; United Nations Environment Programme, 2011). The gap between policy formulation and implementation reflects a systemic governance failure to prioritise water sustainability and community well-being over extractive economic interests.

Local communities have responded with remarkable resilience by employing diverse strategies of resistance ranging from non-violent protest and awareness campaigns to grassroots environmental monitoring. Particularly notable is the leadership of women's associations, who foreground the intersection of gender and environmental justice by defending water sources vital for domestic and agricultural survival (Bamidele & Erameh, 2023; Odubo & Odubo, 2024). These initiatives emphasise a key theoretical insight: environmental justice struggles in the Niger Delta are deeply embedded in everyday life and relational networks, not merely abstract policy discourses. Yet the militarised repression of activists reveals the peril of such resistance, as oil firms frequently collaborate with state security forces to suppress dissent, thereby reproducing cycles of environmental violence and social exclusion.

However, while community resistance has secured partial and symbolic victories, its ability to effect systemic transformation remains curtailed by several structural constraints. Elite co-optation of protest leaders dilutes grassroots agendas, while ethnic and political fragmentation within the Delta impedes unified mobilisation. Furthermore, state institutions consistently prioritise oil revenue generation over environmental governance, leading to selective law enforcement and the neglect of impacted communities (Obiam & Amadi, 2022). These dynamics expose a broader political economy problem: the Nigerian state's entanglement with extractivism obstructs meaningful reform and renders water pollution a normalised externality of 'development' (Bamidele & Erameh, 2023). Consequently, resistance must be situated within larger critiques of neoliberal and postcolonial developmentalism that entrench environmental dispossession.

Notwithstanding these challenges, the normative and epistemic significance of community resistance extends beyond immediate policy gains. By reframing water pollution as a matter of social and environmental justice rather than a purely technical or economic issue, these movements disrupt dominant paradigms that subordinate ecological and human rights to profit imperatives. This reframing aligns with SDG 6, which emphasises equitable access to clean water and the inclusion of marginalised voices in governance. In this light, community assertions of water rights constitute radical political acts that reimagine sustainability as participatory, rights-based and place-specific.

More broadly, such movements call for the institutionalisation of *ecological democracy*, a governance model rooted in transparency, participation and local stewardship (Shunglu et al., 2022).

This would require not just decentralisation of environmental decision-making but a fundamental reconfiguration of power between local communities, the state and multinational firms. Genuine participatory governance, strengthened accountability mechanisms and legal recognition of customary ecological knowledge systems are crucial to achieving this goal.

Community resistance in the Niger Delta thus represents both a vital challenge to entrenched environmental injustice and a hopeful foundation for transformative sustainability. The struggles of local populations illuminate the interconnectedness of ecological, political and social dimensions of water governance. Policy reforms grounded in environmental justice, not technocratic fixes, are indispensable for securing long-term water sustainability and upholding the dignity and well-being of Niger Delta communities for generations to come.

Policy Recommendations for Water Sustainability and Environmental Justice in the Niger Delta

Policy failure lies at the heart of the water crisis in Nigeria's Niger Delta. Despite decades of environmental devastation caused by oil extraction, the Nigerian state has consistently prioritised extractive revenue over ecological integrity and human well-being. This failure stems not from the absence of environmental regulations, but from a persistent culture of weak enforcement, elite capture and institutional complicity. Effective policy reform must begin with an honest reckoning with these structural impediments. Without political will and institutional independence, environmental laws will remain symbolic gestures rather than instruments of justice and sustainability.

The Environmental Impact Assessment (EIA) framework, though legally mandated, has often become a procedural formality that rubber-stamps extractive projects. Reforms must transform EIAs from technocratic exercises into participatory processes, where affected communities hold legal power to approve, monitor or halt environmentally hazardous operations. Mandatory public disclosure of environmental data, particularly on water contamination and oil spills, should be institutionalised. Real-time, open-access digital platforms should be developed to facilitate independent monitoring by civil society, researchers and journalists.

At the core of Nigeria's environmental impasse is the unchecked influence of multinational oil corporations, shielded by opaque partnerships and political patronage. This corporate impunity has delayed or derailed crucial remediation efforts, such as the slow and piecemeal implementation of UNEP's cleanup recommendations for Ogoniland. To counter this, an independent Environmental Justice Commission should be established, with legal authority, multi-stakeholder oversight and strong community representation. Such a body could serve as both watchdog and redress mechanism, grounded in legitimacy and transparency.

Grassroots participation in environmental governance remains marginal, despite communities being the frontline victims of water contamination. Existing policies often frame them as passive recipients of aid. Local environmental monitoring networks, currently underfunded and institutionally neglected, should be integrated into Nigeria's formal environmental governance structure. Legal reforms, earmarked funding and technical training are required to institutionalise community participation in water governance, making interventions more locally appropriate, sustainable and democratic.

The credibility of state-led interventions is further eroded by systemic corruption within development institutions, notably the NDDC. Billions of naira allocated for water infrastructure, remediation and community restoration have been mismanaged or siphoned off. Comprehensive institutional reform must include anti-corruption safeguards, transparent procurement processes, independent audits and strong penalties for diversion of public funds. Furthermore, community representation on oversight and procurement boards can enhance transparency and ensure developmental priorities reflect urgent, lived needs, particularly regarding clean water access and pollution control.

Beyond national reforms, international legal instruments and accountability mechanisms offer critical leverage. Given the transnational operations of oil corporations, those headquartered in the Global North should be held legally accountable for environmental harms in their host communities. Recent court victories by Niger Delta plaintiffs in foreign jurisdictions confirm the viability of extraterritorial litigation as a path to justice. In addition, climate finance mechanisms, including those aligned with the 'loss and damage' framework, should prioritise the Niger Delta as a climate sacrifice zone, channelling resources to locally driven water infrastructure and ecosystem restoration efforts.

A truly sustainable water future for the Niger Delta requires a shift from technocratic policy fixes to a justice-oriented ecological paradigm. Environmental degradation here is not simply an ecological concern, but a profound manifestation of social and spatial injustice. Policy must therefore be reimagined as a vehicle for equity, dignity and ecological survival, grounded in Nigeria's constitutional and international human rights obligations, particularly the rights to water, health, life and a clean environment. Aligning Nigeria's environmental policy with SDGs 6 (clean water and sanitation) and 16 (peace, justice and strong institutions) would institutionalise environmental justice as a foundational national priority.

Only through such a multi-scalar, participatory and justice-driven approach can the Niger Delta move from ecological crisis to sustainable renewal. Water sustainability must not be treated as a technical challenge, but as a political imperative demanding structural reform, democratic accountability and reparative action.

Concluding Reflections and Thematic Synthesis

The crisis of water sustainability in Nigeria's Niger Delta is emblematic of the contradictions inherent in resource-dependent and extractivist economies. Environmental degradation, particularly the persistent pollution of water sources, is not a collateral outcome of development but a structural and systemic feature of oil extraction. This study has examined how the entanglement of extractive capitalism, state complicity and corporate irresponsibility has transformed water from a public good into a site of dispossession, resistance and ecological injustice. The Niger Delta today stands not only as an environmental disaster zone but as a political terrain where struggles over access, accountability and survival converges.

A central theme emerging from this analysis is the entrenched logic of extractivism that informs both state policy and corporate practice. Oil operations

in the region have consistently externalised environmental costs onto marginalised populations. Oil spills, gas flaring and hazardous waste disposal are not isolated incidents; they are normalised through a regime of regulatory inertia and institutional capture. This constitutes a form of environmental authoritarianism, wherein the state's silence and inaction serve as mechanisms of rule that enable pollution and shield violators from consequences.

Crucially, this ecological crisis must be situated within the broader political economy of marginalisation. Communities in the Niger Delta bear the greatest burden of environmental harm, yet remain systematically excluded from environmental governance. Their indigenous knowledge systems and stewardship practices are consistently overlooked by state and corporate actors. However, these communities are not simply victims. Through litigation, protest and grassroots innovation, they have developed robust strategies of resistance, challenging the dominance of extractive interests and asserting their right to water and a healthy environment.

The shortcomings of high-profile remediation efforts, such as the Ogoniland cleanup, further illuminate the gap between policy rhetoric and operational reality. Despite substantial funding, progress remains halting, opaque and riddled with allegations of corruption and elite manipulation. The failure of these initiatives reveals not just logistical deficiencies but a crisis of institutional legitimacy. Genuine reform must thus go beyond technical interventions to confront structural governance failures demanding transparency, anti-corruption safeguards and inclusive decision-making frameworks.

This study demonstrates that water insecurity in the Niger Delta is not merely an ecological issue; it is a form of structural violence, produced by policy choices that systematically prioritise profit over people. Governance architectures that allow environmental harm to persist represent a betrayal of constitutional and human rights obligations. In this context, the pursuit of water sustainability must be rooted in a justice-oriented framework, one that addresses underlying power asymmetries, restores community agency and reimagines development in service of ecological and social well-being.

SDG 6, which advocates for universal access to clean water and sanitation, provides a normative benchmark for this transformation. Realising SDG 6 in the Niger Delta requires not just policy alignment but a deep restructuring of environmental governance, full and transparent implementation of remediation projects and the institutionalisation of community-led water governance models. Given the global dimensions of oil extraction, international accountability mechanisms and financial support are also essential. Climate justice frameworks, especially those focused on loss and damage, should prioritise the Niger Delta as a frontline sacrifice zone in need of reparative justice and ecological restoration.

Most importantly, the water crisis in the Niger Delta serves as a litmus test for Nigeria's commitment to environmental justice and sustainable development. It reveals the deeper stakes of SDG 6, not merely as a development target, but as a critical measure of whose lives, territories and futures are deemed expendable in the pursuit of growth. Addressing this crisis is about more than ecological repair; it is about restoring equity, rights and dignity to some of Nigeria's most disenfranchised populations and reasserting the primacy of life over profit.

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Article

Performance Evaluation of Small Funds under Smart Investors

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Abstract

This research examines the effectiveness of mutual fund (MF) operations in Nepal's financial market, specifically analysing how these investment vehicles aggregate capital from varied investor portfolios to optimise smaller fund management strategies. The investigation spans a 4-year period, examining five distinct funds through comprehensive performance measurement techniques. The analysis incorporates multiple evaluation criteria, including market performance benchmarks, Treynor's risk-adjusted ratio, Sharpe's reward-to-volatility measure and Jensen's alpha coefficient to assess fund efficiency. The findings reveal that fund operational expenses and maturity period (fund age) emerge as the primary determinants influencing performance outcomes, demonstrating statistically significant associations ($p < .05$). Conversely, total asset size and fund liquidity demonstrate negligible influence on performance metrics. The evaluation demonstrates that each examined fund successfully exceeds market benchmark performance, with Sanima Equity Fund (SAEF) achieving superior results across measured parameters, whereas Laxmi Equity Fund (LEMF) demonstrates comparatively weaker performance indicators. This investigation provides significant contributions to investment decision-making by revealing the operational characteristics and performance patterns within Nepal's MF sector.

Keywords

Market return, mutual funds, performance evaluation, Sharpe ratio, stock market,

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Introduction

The contemporary global financial ecosystem has witnessed a pronounced shift in investor preferences toward developing economies during the recent decades, primarily motivated by prospects of greater yields and portfolio diversification advantages (Ratner & Leal, 2005). This trend emphasises the critical importance of these markets in diversifying portfolios and in spreading investment risk globally, particularly in emerging markets where mutual funds (MFs) have shown distinctive performance characteristics (Samarbakhsh & Shah, 2021). These financial instruments, distinguished by their mechanism of consolidating capital from heterogeneous investor groups for deployment across diverse security portfolios, provide individual participants with access to professionally supervised investment strategies (Chua & Tam, 2020). This research investigates the multiple dynamics that influence MF performance in Nepal.

The 18th century marked the inception of MFs, which have since evolved to include both closed and open-ended funds. A landmark achievement in this evolution occurred with the formation of the Massachusetts Investment Trust in America during 1924, which introduced the revolutionary principle of ongoing unit creation and redemption mechanisms (Baker et al., 2015). This developmental journey demonstrates the worldwide importance of these investment mechanisms, which have become fundamental components of investor portfolios, delivering professional management of diversified holdings encompassing equities, fixed-income securities and alternative investments.

The equities fund industry grew significantly after the global financial crisis of 2008, with a noteworthy annual compound yield rate of 6.64% till 2018, owing to digitalisation and innovations (Bhandari et al., 2021; Carneiro et al., 2022; Huang & Chang, 2022). This asset accumulation demonstrates the increasing importance of collective investment vehicles within international financial systems. Nepal's developing MF sector continues to grow and adapt, despite global disruptions like the COVID-19 pandemic, which had notable impacts on money-market fund operations in developing economies (Samarbakhsh & Shah, 2021). Nepal's MF sector began with the founding of the 'Nepal Capital Market (NCM) MF in 1993' (Thapa & Rana, 2011). Though collective investment fund schemes are gaining attraction in the Nepalese market, there remains a notable research gap in their performance analysis in the domestic setting (Pant et al., 2022). The context of a volatile international financial landscape and the distinctive characteristics of Nepalese collective investment schemes establish the foundation for a thorough evaluation of performance dynamics within Nepal's MF sector. This work fills a crucial knowledge gap by conducting a thorough empirical evaluation of the performance characteristics of Nepalese MFs, driven by their growing importance in the country.

In achieving the primary aim of evaluating Nepalese MF performance, this study establishes three distinct objectives that specifically acknowledge and address the particular characteristics of the domestic market environment.

Initially, the study seeks to examine yield generation by MFs and benchmark it against market indices while accounting for corresponding risk factors; subsequently, to investigate the comprehensive effectiveness of Nepal's collective investment schemes; and finally, to establish the statistical validity of MF performance measures. Given Nepal's unique market environment, there is a clear need to explore the functioning of collective investment schemes in greater depth. This study not only addresses key research questions but also offers practical value for the country's evolving MF industry. By providing actionable insights for portfolio managers, the research bridges academic understanding with real-world application. Its structured analysis supports both theoretical development and informed decision-making for investors and professionals in the sector.

The structure of the article is organised as follows: Section 'Review of Literature' reviews related literature to establish the study's context. Section 'Research Methodology' outlines the research methodology, emphasising the empirical framework. Section 'Results and Analysis' reports the main findings from the analysis. Section 'Discussion' discusses the results and their broader implications. Finally, Section 'Conclusion' offers concluding observations.

Review of Literature

The MF industry has experienced notable growth in recent decades, prompting increased academic interest in evaluating fund performance. Typically, fund performance serves as a proxy for assessing fund manager capability. Since the 1960s, both practitioners and scholars have explored price prediction and performance analysis using various risk-return metrics and valuation models (Karki, 2017).

Treynor (1965) introduced a reward-to-volatility metric that accounts for both risk and return. Shortly after, Sharpe (1966) proposed an alternative measure—reward-to-variability—based on the ratio of excess returns to standard deviation (SD). Building upon these, Jensen (1968) developed his alpha model, which calculates excess return adjusted for systematic risk, grounded in the Capital Asset Pricing Model (CAPM). These three approaches remain foundational in evaluating MF performance, despite their retrospective nature.

Sharpe (1966) further refined Treynor's framework by incorporating composite indicators. His study, covering 34 US open-end funds from 1944 to 1963, found that average fund returns lagged behind the Dow Jones Industrial Average (DJIA). Jensen's (1968) alpha metric also emphasised risk-adjusted performance, showing that none of the 115 evaluated funds consistently outperformed the market. Dahal et al. (2020) and Elton et al. (2004) stress the significance of considering specific benchmarks and accounting metrics, warning that their exclusion could inflate performance estimates.

McDonald (1974) analysed 123 funds using monthly data from 1960 to 1969, employing several measures including Jensen's alpha, Sharpe and Treynor ratios, and non-risk-adjusted returns. The findings again indicated underperformance

relative to the market. Collectively, these studies advanced the development of more nuanced methods for performance evaluation.

Numerous investigations have provided comprehensive perspectives on MF performance, covering diverse geographical regions and methodological approaches. Recent research highlights how machine learning models are transforming MF performance prediction (Boonprasope & Tippayawong, 2024; DeMiguel et al., 2023). In Pakistan, Alvi and Rehan (2020) explored factors like risk levels, lag returns, Karachi Stock Exchange (KSE)-100 index returns, assets under management (AUM), fund age, income and expenses. Asad and Siddiqui (2019) considered macroeconomic and microeconomic variables, finding limited influence from size and maturity on performance across conventional and Islamic funds. Building on this, collective investment fund performance contributes positively to overall stock market development, which in turn leads to improvements in key macroeconomic indicators, supporting the view that MFs act as financial intermediaries that enhance capital market efficiency and economic growth, consistent with the long-run cointegrated relationships identified between financial and economic variables (Karki, 2012, 2018). Additionally, sustainable investing has become increasingly relevant, with evidence suggesting that institutional investors significantly drive corporate sustainability practices, which indirectly influence MF flows and performance (Kräussl et al., 2023; Marti et al., 2023).

In India, Adhikari et al. (2020) applied 'Sharpe, Treynor and Jensen's methods over a 10-year horizon, finding that most equity-oriented funds outperformed the market. Likewise, Raj et al. (2018) compared State Bank of India (SBI) and Housing Development Finance Corporation (HDFC) funds using standard metrics, concluding that while HDFC delivered better returns, it exhibited higher volatility. Dhanda (2017) used net asset value (NAV) data over 14 years, showing that sector-focused funds often beat benchmarks. Similarly, Radhika and Kanchana (2017) found strong performance in several HDFC schemes, while Megharaja (2017) attributed superior returns to effective security selection by fund managers.

Arora and Raman (2020) highlighted variance in return and risk across 30 randomly selected schemes. In Nepal, Bajracharya (2016) and Rauniyar (2016) both identified liquidity, lagged returns and asset base as critical drivers of fund performance. Ferreira et al. (2013), covering 19 countries, found a positive link between fund size and performance. In Pakistan, Nafees et al. (2011) showed that MFs underperformed relative to the market, while Rehman and Baloch (2015) revealed that expense ratios, turnover and fund size had significant positive impacts. Globally, recent studies affirm that expense ratios are still a reliable predictor of returns (DeMiguel et al., 2023; Li & Rossi, 2021).

A notable research gap persists in Nepal, where most studies have focused narrowly on risk-adjusted returns, with limited exploration of determinants such as fund manager skill in security selection. This study addresses that gap by investigating key performance factors using established risk-adjusted models and presents a conceptual framework (Figure 1) aligned with its objectives.

The conceptual framework for this study comprises fundamental factors, including expense ratios, fund age, AUM, liquidity, returns and NAV for

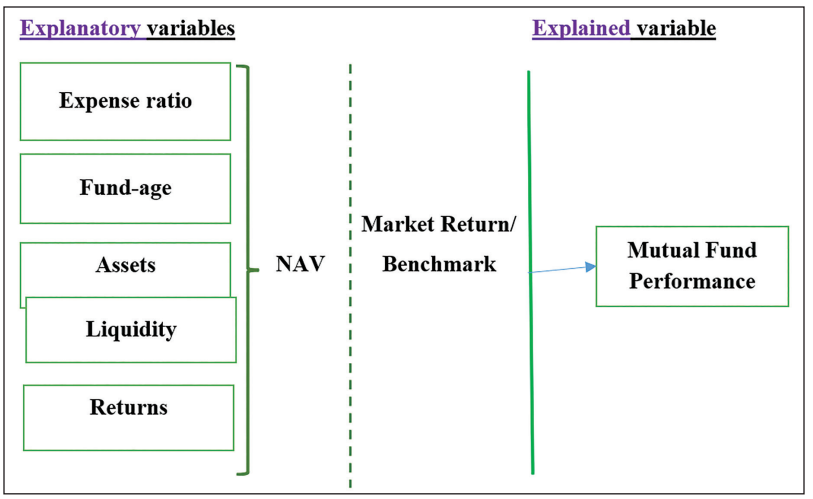

Figure 1. Conceptual Framework.

performance evaluation of MFs. It forms the basis for developing hypotheses that guide empirical analysis specific to Nepal's context.

H_1: There is no significant relationship between fund attributes (expense ratio, age, assets, liquidity and return) and MF performance.
H_2: There is no significant relationship between NAV return and MF performance.
H_3: MF performance exceeds benchmark returns.
H_4: The Nepalese stock market is efficient in its weak form.

These hypotheses aim to clarify how various fund characteristics impact performance, offering a clear path for empirical validation.

Research Methodology

This research adopts a causal-comparative and descriptive methodology to examine fund manager performance, selected due to its exploratory and data-analysis strengths in MF performance assessment. Secondary data analysis forms the foundation of this research approach.

Population and Sample Size Determination

This investigation analyses five MFs, selecting five schemes from 29 operational plans during the research timeframe. Monthly data, including liquidity metrics, asset values, fund maturity, expense ratios, NAVs and performance returns, were gathered via the Nepal Stock Exchange (NEPSE) source and sample MF companies. The examination concentrated on schemes operating for more than 4

Table 1. Selected Mutual Fund Schemes for Analysis.

Fund Manager	Mutual Funds	Date of Establishment	Fund Size (₹) Million
Global IME Capital	Global IME Samunnat Scheme-1 (GIMES1)	2017	1,000
Laxmi Capital	Laxmi Equity Fund (LEMF)	2018	1,250
Nabil Investment	Nabil Equity Fund (NEF)	2015	1,250
Sanima Capital	Sanima Equity Fund (SAEF)	2014	1,300
Siddhartha Capital	Siddhartha Equity Fund (SEF)	2015	1,500

Source: NEPSE and sample mutual funds.

years, accumulating NAV values over 48 months spanning January 2018 through January 2022 (see Table 1).

Data Analysis Methods

MF performance was assessed using Sharpe (1966), Treynor (1965) and Jensen (1968) measures, based on the CAPM framework. The main analytical approaches are as follows.

NAV Returns. It represents the differential between organisational asset values and net obligations, functioning as an MF performance indicator.

$$\text{NAV} = \frac{(\text{assets} - \text{liabilities})\,\text{values}}{\text{Total shares outstanding}} \quad \text{NAV Returns} = \frac{\text{NAV}_2 - \text{NAV}_1}{\text{NAV}_1}$$

Where NAV_1 and NAV_2 represent values at two different time points.

Sharpe Ratio. The Sharpe index serves as a 'risk-adjusted performance indicator' commonly utilised for portfolio evaluation. This metric evaluates portfolio comprehensive risk through SD rather than focusing exclusively on systematic risk components (βs).

$$S_p = \frac{R_p - R_f}{\sigma_p} \tag{1}$$

Where S_p is the Sharpe ratio, R_p is the average rate of return for a fund, R_f is the average risk-free return and σ_p is the SD of the fund. Superior portfolio performance (S_p) compared to market performance (S_m) indicates enhanced fund effectiveness, and conversely.

Treynor Ratio. The Treynor index evaluates risk premiums against return volatility, measured through portfolio systematic risk components (βs). It calculates additional returns per systematic risk (β) unit. This enhanced portfolio

performance (T_p) relative to market performance (T_m) demonstrates superior fund effectiveness and vice versa. The approach assumes diversified multi-asset portfolios eliminate unsystematic risks, retaining only systematic risk (beta). The computation follows:

$$T_p = \frac{R_p - R_f}{\beta_p} \tag{2}$$

Where *Tp* is the Treynor Ratio, *Rp* is the average rate of return for a fund, *Rf* is the average risk-free return and βp is the beta of the fund. Enhanced portfolio performance (T_p) compared to market performance (T_m) demonstrates superior fund effectiveness and vice versa.

Jensen Alpha Test. Jensen alpha quantifies the variance between realised portfolio returns and theoretically expected returns, given a particular systematic risk exposure level. This measurement framework builds upon CAPM theoretical foundations. The computational formula for 'Jensen's alpha determination follows':

$$\alpha_p = R_p - \text{EAR} \tag{3}$$

Where α_p represents Jensen alpha, R_p indicates fund average returns and EAR_p denotes equilibrium average returns. The equilibrium average return (EAR_p) = $R_f + \beta_p (R_m - R_f)$, where R_f represents average risk-free return, β_p indicates fund beta and R_m denotes market index returns. Enhanced alpha values signify improved fund performance through superior returns.

Jensen's (1968) absolute performance measurement methodology was utilised for fund selection assessment within the CAPM analytical frameworks. This approach employs regression analysis, examining relationships between fund excess returns and market excess returns. The Jensen alpha (α) constitutes the regression intercept, representing the mean returns when the market portfolio performance equals zero. Through the 'single beta regression methodology (4), statistically significant positive α values demonstrate superior stock selection capabilities and performance exceeding benchmark standards', whereas negative α values indicate inadequate stock selection practices.

$$Rp_t - Rf_t = \alpha_p + \beta_p \left(Rm_t - R_f \right) + Ep_t \tag{4}$$

Where Rp_t represents portfolio returns at month *t,* Rm_t indicates benchmark returns at month *t,* Rf_t denotes risk-free returns at month *t,* α represents the Jensen performance metric and β_p indicates fund systematic risk. Therefore, positively significant alpha (α) values represent excess mean returns achieved beyond benchmark returns, considering funds' systematic risk levels. This shows the special capability of a fund manager in security price prediction and stock selection. Future studies investigating alternative methods to behavioural frameworks could provide more comprehensive examinations, emphasising additional factors affecting MF performance (Bhattarai et al., 2024; Devkota et al., 2023).

Results and Analysis

To comprehensively understand MF performance dynamics, this investigation employed quantitative analytical frameworks and diverse statistical methodologies.

Performance Classification and Ranking

Initially, the investigation assessed and classified five MFs using key performance metrics, demonstrating strengths and weaknesses regarding their respective competencies and weaknesses. Classifications follow the ascending order of fund assets, operational months (maturity), expense ratios, liquidity, NAV and returns. Funds with the highest assets, operational months (maturity), liquidity, NAV and returns receive first ranking, and conversely. However, regarding expense ratios, funds having the lowest expense ratios receive top classification. Table 2 illustrates classification details.

'Siddhartha Equity Fund (SEF)' achieved superior performance, obtaining the top overall classification through the highest asset values, continuous operation of 51 months, exceptional liquidity and robust returns. 'Sanima Equity Fund (SAEF)', though representing the newest fund with merely 2 months of operational history, demonstrated exceptional performance by achieving maximum return rates of 30.02%. 'Nabil Equity Fund (NEF)' obtained third position, exhibiting balanced performance across diverse parameters, including moderate asset holdings of 1.25 billion rupees ($9.62 million). Conversely, 'Global IME Sammunat Scheme-1 (GIMES1)' showed better cost management through low expense ratios (1.26%) but underperformed in liquidity and asset value, resulting in poor classification. 'Laxmi Equity Fund (LEMF)' achieved the poorest overall classification, predominantly impacted by relatively lower values of assets and moderate rates of return (5.29%).

Descriptive Assessment

Table 3 presents a descriptive study of MF characteristics and market index (NEPSE) performance.

Table 2. Comparative Classification of Five Mutual Funds by Performance Measures.

Name	Asset Rank	Age Rank	Expense Ratio Rank	Liquidity Rank	Rank of Return	Rank of NAV	Overall Rank
GIMES1	5	1	5	5	2	2	4
LEMF	4	3	4	2	5	5	5
NEF	3	2	1	4	4	4	3
SAEF	2	5	3	3	1	1	2
SEF	1	4	2	1	3	3	1

Note: GIMES1: Global IME Sammunat Scheme-1; LEMF: Laxmi Equity Fund; NAV: Net asset value; NEF: Nabil Equity Fund; SAEF: Sanima Equity Fund; SEF: Siddhartha Equity Fund.

Table 3. Statistical Summary of Performance Measures.

Name	*N*	Minimum	Maximum	Mean	Std Dev
Expense ratio	240	0.16	2.86	1.15	0.65
Age	240	2.00	70.00	34.30	15.92
Asset	240	18.80	21.81	21.04	0.38
Liquidity	240	14.30	20.88	19.18	1.25
Return	240	–20.00	160.10	17.85	37.21
NAV	240	7.94	26.01	11.80	3.72
NEPSE index	240	–13.29	19.95	1.79	7.42

Note: NAV: Net asset value; NEPSE: Nepal Stock Exchange.

Mean logarithmic asset holdings achieved 21.04, demonstrating considerable funds on every scheme. Effective cost control resulted in mean expense ratios of 1.15, with GIMES1 standing out for its low ratio. Average fund maturity was 34.30 months, with a remarkable SD of 15.92, emphasising establishment period variations. MFs demonstrated average returns of 17.85%, showing significant variability (SD: 37.21). SEF's constantly higher returns serve to improve overall fund performance. The NEPSE index mirrored market conditions with average returns of 1.79%, highlighting fluctuating market characteristics.

Table 4, demonstrating performance evaluation of five sample MFs throughout the study period from 15th January 2018 to 14th January 2022, indicates significant insights regarding their performance and volatility patterns. SAEF tops with an outstanding average monthly return of 30.02%, fluctuating between a minimum of −4.20% and a maximum of 127.30%, with a SD of 39.73%. GIMES1 comes next, achieving average monthly returns of 22.69%, with broader ranges of −20.60% to 160.10%, and a SD of 53.79%. Comparatively, SEF's average monthly return is 19.62%, NEF's is 11.63% and LEMF's is 5.29%. NAVs vary across funds, with SAEF maintaining the highest NAV of ₹13. Furthermore, during the study period, monthly average returns for all funds reached 17.85%, exceeding NEPSE index average returns of 1.79%. This extensive outperformance emphasises MF effectiveness in yielding investor excess returns, placing them as lucrative investment alternatives. Table 4 also presents the statistical significance of sample fund mean returns, emphasised through simultaneous t-values ($p < .05$) of selected funds for evaluating their performance robustness. Evidence from the table indicates that, excluding LEMF, all funds succeed in generating significantly positive mean returns ($p < .05$) to investors compared to market index performance.

Inferential Analysis

This section investigates the interrelationship between the MFs and market index returns in Nepal, as shown by correlation coefficients illustrated in Table 5. The positive correlation coefficients, spanning from 0.226 to 0.351, suggest consistent positive associations between fund returns and market performance. While most

Table 4. Descriptive Summary of Sample Funds and Nepal Stock Exchange (NEPSE).

Mutual Funds	NAV (₹)	Minimum Return	Maximum Return	Avg Monthly Return	Std Dev (SD)	*t* Value	*p* Value
GIMES1	12.27	–20.60	160.10	22.69	53.79	2.7517	.004
LEMF	10.53	–17.30	61.30	5.29	26.159	1.1098	.136
NEF	11.16	–19.70	92.80	11.63	32.8943	2.156	.018
SAEF	13.00	–4.20	127.30	30.2	39.73	5.0595	.000
SEF	11.96	–3.90	79	19.62	23.7468	5.497	.000
Overall MF	11.78	–20.00	160.10	17.85	37.21		
NEPSE	–	–13.29	19.95	1.79	7.41		

Note: GIMES1: Global IME Sammunat Scheme-1; LEMF: Laxmi Equity Fund; MF: Mutual fund; NAV: Net asset value; NEF: Nabil Equity Fund; SAEF: Sanima Equity Fund; SEF: Siddhartha Equity Fund.

Table 5. Correlation between Fund Returns, Market-index and Study Variables.

Mutual Funds and Variables	Correlation Coefficient	*p* Values
Global IME Sammunat Scheme-1 (GIMES1)	0.226**	.004
Laxmi Equity Fund (LEMF)	0.351	.136
Nabil Equity Fund (NEF)	0.279*	.018
Sanima Equity Fund (SAEF)	0.2354**	.000
Siddhartha Equity Fund (SEF)	0.323**	.000
Expense ratio and return	–0.28**	.000
Age and return	0.608**	.000
Assets and return	0.737**	.000
Liquidity and return	0.022	.739

Note: **Significant at 1% level; * Significant at 5% level.

coefficients remain below 0.5, indicating moderate relationships, it remains essential to recognise that these correlation characteristics contribute meaningfully to understanding fund responsiveness to market fluctuations.

Among the funds analysed, LEMF shows the highest correlation (0.351) with market return, although the *p* value (.136) indicates that this relationship lacks statistical significance. In contrast, funds such as GIMES1, NEF, SAEF and SEF exhibit statistically meaningful associations, as evidenced by their *p* values below .05, confirming the relevance of market performance in shaping fund returns.

When broadening the scope to other influencing variables, strong positive relationships emerge between fund size (assets) and returns ($r = 0.737$), and between fund age and returns ($r = 0.608$). Conversely, the expense ratio demonstrates a significant negative correlation ($r = -0.280$), suggesting that higher operational

costs diminish returns. Liquidity, however, appears to have a negligible connection with returns ($r = 0.022$), and its insignificance is statistically confirmed.

Performance Measurement Indicators

Performance assessment findings on Nepalese MFs reveal impressive patterns, illustrated in Table 6 with fundamental measures—'Sharpe, Treynor and Jensen ratios'. These measurements function as reliable metrics, evaluating investment vehicles against benchmarks to establish their risk-adjusted return capabilities.

The Sharpe Ratio values for all funds are positive, indicating outperformance relative to the market's negative risk-return trade-off. SEF and SAEF lead this category, confirming strong returns per unit of volatility, as supported by prior global findings (Malhotra & Nippani, 2024; Yuan & Yuan, 2023). In terms of the Treynor Ratio, which assesses returns relative to market risk (beta), SAEF again arises as the best performer with a ratio of 21.902, showcasing its efficiency in generating returns in proportion to market risk. Jensen's alpha results reaffirm these rankings, with SAEF displaying the highest excess return (28.50%) beyond what would be predicted by market trends. Despite ranking last, LEMF still reflects a positive alpha, confirming that it has contributed positively after adjusting for risk.

Analysis of Variance (ANOVA) and Post-hoc Comparisons

To test for statistically significant differences in average returns across funds, a one-way ANOVA was conducted. The output, presented in Table 7, indicates significant variations among group means.

Post-hoc tests using the Bonferroni correction ($\alpha = 0.005$) showed significant differences in return means, particularly for LEMF in comparison with SAEF ($p = .0004$) and SEF ($p = .0036$). These statistically significant contrasts suggest distinct return patterns for LEMF versus its peers. Meanwhile, comparisons among other fund pairs do not reveal significant differences, highlighting more homogenous performance levels within those groups.

Table 6. Performance Indicators of Selected Mutual Funds.

Mutual Funds	Sharpe Ratio of Fund	Sharpe Ratio of Market	Treynor Ratio of Fund	Treynor Ratio of Market	Jensen Alpha of Fund	Jensen Alpha of Market	Overall Rank
GIMES1	0.3666	–0.1604	1.6047	–1.2153	21.616	–0.0247	3
LEMF	0.088	–0.1604	2.133	–1.2153	3.51	–0.0247	5
NEF	0.26326	–0.1604	7.1410	–1.2153	10.093	–0.0247	4
SAEF	0.6808	–0.1604	21.902	–1.2153	28.5	–0.0247	1
SEF	0.7011	–0.1604	16.439	–1.2153	17.846	–0.0247	2

Note: GIMES1: Global IME Sammunat Scheme-1; LEMF: Laxmi Equity Fund; NEF: Nabil Equity Fund; SAEF: Sanima Equity Fund; SEF: Siddhartha Equity Fund.

Table 7. Analysis of Variance (ANOVA) and Post-hoc Comparison of Fund Returns.

ANOVA Test						
Source of Variation	SS	df	MS	F	*p* Value	F-critical
Between groups	647.703	1	647.70	13.798	.0059	5.3176
Within groups	375.516	8	46.939			
Total	1,023.219	9				

Post-hoc Test						
Scheme	Groups	Mean	Variance	*T*-stat	*p* (T≤) Two-tail	Bonferroni Correction (α)
LEMF	GIMES1 return	22.685	2,893.438	–2.055	.0439	0.005
	NEF return	11.633	1,082.039	–1.090	.2790	
	SAEF return	30.023	1,578.538	–3.719	.0004	
	SEF return	19.621	563.914	–2.982	.0036	
GIMES1	NEF return	11.633	1,082.039	1.214	.2282	
	SAEF return	30.023	1,578.538	–0.760	.4492	
	SEF return	19.621	563.914	0.361	.7192	
SAEF	NEF return	11.633	1,082.039	2.470	.0154	
	SEF return	19.621	563.914	1.557	.1236	
NEF	SEF return	19.621	563.914	–1.364	.1761	

Note: GIMES1: Global IME Sammunat Scheme-1; LEMF: Laxmi Equity Fund; NEF: Nabil Equity Fund; SAEF: Sanima Equity Fund; SEF: Siddhartha Equity Fund; SS: Sum of Squares; df – Degrees of Freedom; MS- Mean Square; F- F-statistic.

Discussion

This comprehensive examination of Nepal's MF sector and the evaluated investment schemes provides significant insights regarding their operational effectiveness. The descriptive analysis demonstrates that monthly performance figures exceed those of the NEPSE benchmark, while correlation studies indicate moderately positive links between fund returns and overall market performance. Of particular interest, the LEMF demonstrates an absence of meaningful

correlation with market movements, which diverges from Wermers' (2000) research findings and suggests fund-specific characteristics unique to this context. The correlation coefficients demonstrate statistically significant positive relationships connecting fund assets with market performance, and fund maturity with market returns, whereas a negative association exists between expense ratios and market performance, suggesting potential detrimental effects on fund efficiency. These statistically meaningful associations ($p < .05$) challenge the initial hypotheses, H_1 and H_2, which predicted substantial connections between fund characteristics and performance outcomes. The findings support Wermers' (2000) conclusions while contradicting research by Otten and Bams (2002), underscoring the dynamic characteristics of these correlations.

ANOVA testing demonstrates meaningful variations in average returns across the examined funds. Subsequent Bonferroni post-hoc testing underscores the unique position of LEMF, showing substantial differences compared to other investment vehicles. Correlation examination reveals meaningful associations and considerable differences, with SEF demonstrating the most statistically significant correlation coefficient (0.323), supporting findings from Alvi and Rehan (2020) and Bajracharya (2016). Investigation of relationships between predictor variables and market performance reveals important mean variations. Positive mean variations between fund assets and market performance indicate modest influence, whereas negative mean variations between expense ratios and market performance underscore the inverse relationship, consistent with Philpot et al. (1998) and Jan and Hung (2003). Positive mean variations between fund maturity and market performance support Ferreira et al. (2013) findings, confirming a beneficial relationship. The negligible positive effect of liquidity on returns, aligned with Asad and Siddiqui (2019), demonstrates the limited influence of liquidity factors on fund performance.

Extending beyond simple correlations, risk-adjusted performance indicators, including Treynor metrics, Sharpe measures and Jensen alpha, demonstrate favourable performance outcomes. SEF, SAEF and GIMES1 demonstrate leadership in Sharpe ratio performance, supporting hypothesis H_3 and confirming their ability to generate enhanced returns relative to risk exposure. Notably, LEMF demonstrates weaker performance, suggesting a possible risk-return imbalance. The Treynor metric confirms superior performance, with SAEF demonstrating leading efficiency. Jensen's alpha measurements further confirm fund outperformance, positioning the SAEF at the forefront, consistent with existing literature. ANOVA results confirm overall statistical significance, with post-hoc testing revealing specific intra-group variations. LEMF distinguishes itself through significant variations from other funds, reinforcing performance-influencing factors. Regarding performance rankings, SAEF, SEF and NEF establish themselves as leading performers across multiple evaluation criteria. In contrast, LEMF and GIMES1 achieve lower performance rankings. The findings demonstrate that MFs surpass market benchmark performance, indicating both superior management capabilities and the substantial impact of investor behaviour on fund flows and performance (Boonprasope & Tippayawong, 2024). This superior performance also corresponds with recent studies indicating that

developing equity markets may contain inefficiencies that competent fund managers can leverage to create additional returns (DeMiguel et al., 2023; Karki, 2020; Li & Rossi, 2021). This finding refutes hypothesis H_4, suggesting that Nepal's equity market does not exhibit weak-form efficiency.

Conclusion

This study evaluates the MF sector in Nepal, providing key insights into how fund-specific features and market dynamics interact to shape performance. Using a set of statistical and risk-adjusted metrics, the research identifies 'SAEF and SEF as the most efficient schemes, based on variables such as fund size, cost efficiency, fundage and rate of return'. The superior Sharpe, Treynor and Jensen alpha metrics underscore the consistent ability of these funds to outperform market benchmarks, despite operating in an emerging financial system characterised by low literacy, thin market depth and regulatory constraints. While 'LEMF and GIMES1' receive relatively weaker assessments in overall performance, they still contribute positively to certain areas. To improve investor confidence and fund viability, the study recommends enhanced regulatory support, strategic investor education and the development of innovative fund structures. Looking forward, the MF sector holds promise for deepening capital markets and mobilising domestic savings. Further research may consider incorporating behavioural factors and market microstructure variables to better predict fund performance in evolving economies.

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Article

Structural Equation Modelling of Behavioural Factors Influencing Intraday Trading Prospects in Nepal

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Abstract

Intraday trading—buying and selling the same equities within a single trading day—is still absent in Nepal. This study investigates investors' willingness to engage in intraday trading and pinpoints the behavioural factors that shape their stock-trading decisions. Guided by behavioural finance, an exploratory design was applied. Using non-probability sampling, 226 investors in Kathmandu Valley completed structured questionnaires via KOBO Toolbox. Using SPSS–AMOS software, descriptive statistics and structural equation modeling tested the proposed relationships. Herding behaviour emerged as the dominant driver of trading decisions, amplified by information from informal channels such as social media. Traditional heuristics, prospect biases and general market conditions showed little influence on the intention to trade intraday. Regulators and market operators should prioritise trading literacy initiatives and reduce information asymmetry to foster a viable intraday market. Future studies should extend the sample beyond Kathmandu Valley to validate and refine these insights. This study sheds light on the underexplored domain of intraday trading in Nepal and offers unique insights into the behavioural aspects driving traders' decisions, contributing to the literature on stock market dynamics in emerging economies.

Keywords

Behavioural finance theory, decision-making, intraday trading, Nepal Stock Exchange, stock market

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Introduction

Intraday trading is a type of economic activity in which traders purchase and sell the same stocks on the same trading day, and it is also known as a trading method for relatively short-term profit (Baralis et al., 2017; Ryu, 2012). Since 1867, when the first ticker tape was invented, stock trading has been formally started in the USA. However, there were considerable barriers to entry as it was not popular among the population. Similarly, intraday trading became famous with the introduction of electronic communications networks in 1969 (Tulchinsky, 2020). Likewise, in the late 1990s, the development of the Internet generated worldwide growth in online trading, allowing many ordinary individuals to take part in day trading methods that only professional traders had previously been available (Chung et al., 2009).

Before the Internet, there was no such thing as day trading when it came to stocks in Japan, and there were fewer traders. Since the Internet's introduction in 1999, the number of intraday traders has risen. After the USA, the market has grown to become the second largest in the world (Fackler, 2006). Moreover, in China, there is no rule for intraday trading. The trader cannot buy and sell the stock in a day. Previously, there was a rule of day trading, but after the China Securities Regulatory Commission (CSRC) changed the rule to $T + 1$, which means the settlement period is trading day plus 1 day (Guo et al., 2012). Moreover, the intraday price reversal has been seen in the Taiwan stock market. There is a sharp increase in price for 15 min, and it starts to reverse for roughly 30 min. The trader highly reacted in price reversal (Chen & Liao, 2018).

The Nepal Stock Exchange (NEPSE) began operating the Nepalese stock market and legalised stock trading under the Securities Act of 2006. Intraday trading is becoming more popular among traders, and traders are flocking to the Nepalese stock market since an Internet trading system known as the trading management system (TMS) was introduced. Intraday trading is not practised, although Internet trading systems are widely used. Nevertheless, the Securities Board of Nepal (SEBON) and NEPSE have already launched research, but the results have not been drawn yet. Ryu (2012) discussed the prospect of intraday trading, where individual day traders are more likely to experience significant losses regularly and heavily. Excessive intraday trading on the stock market only benefits the market practitioners, who greatly earn from the charges of transactions to individual day traders. Moreover, governments should foresee increasing market liquidity to make it more open and lessen the information asymmetry to attract greater traders. Research may consider strategic order trading by various kinds of traders following day trading, providing a more detailed understanding of this relevant problem (Hsieh et al., 2020; Karki & Khadka, 2024). Some occurrences in one market have a greater impact on a second market than others. Focus on the fixed price determination mechanism for future research during the trading day.

Nepal is a developing country with a small economy, where the stock market is also small compared to other developing countries. Nonetheless, the stock market has had a significant long-term impact on the Nepalese economy (Karki,

2012). Recent empirical studies have emerged following the introduction of intraday trading, focusing primarily on patterns of price, volume and volatility within daily trades. As intraday trading has not been introduced in Nepal, several questions need to be addressed. They are: What are the Prospects of Intraday trading in the Nepalese equity market? What influences the trading decision in Nepalese traders? What are the challenges of the Intraday trading market in Nepal? What are the managerial solutions? This study intends to understand the prospect of intraday trading in the Nepalese stock market and whether they are willing to participate in intraday trading, addressing factors that influence their decision to choose a stock for trading, highlighting the opportunities and challenges that can be faced while trading.

The remainder of this study is organised as follows: The ' Literature Review' section introduces relevant earlier theories and empirical research, providing context for the investigation, while the 'Materials and Methods' section explains and explaining the research methodology, including the empirical technique. The 'Results and Analysis' section presents the study's findings and examines their consequences. The 'Discussion' section discusses these findings, and the 'Conclusion and Recommendation' concludes the study.

Literature Review

Intraday trading has progressed considerably worldwide due to advances in technology and changes in regulations. In the USA, although intraday trading existed informally since the invention of the ticker tape in 1867, it became widely popular only after electronic communication networks like Instinet (1969) and NASDAQ (1971) were introduced, alongside the elimination of fixed commissions in 1975 (Tulchinsky, 2020). The rise of Internet accessibility in the late 1990s further opened day trading to ordinary investors (Chung et al., 2009).

In Asia and Europe, the adoption of intraday trading varies by country. After 1999, Japan saw rapid growth in online trading and is now the second-largest financial market in the world, following the USA (Fackler, 2006). China initially allowed same-day trading ($T + 0$) for both A- and B-shares starting in 1990 but switched to $T + 1$ for A-shares in 1995 and later extended that to B-shares in 2000 (Guo et al., 2012). Taiwan's market experienced notable intraday price reversals and overreactions shortly after market opened (Chen & Liao, 2018). Poland's Warsaw Stock Exchange experienced a boost in algorithmic intraday trading and lower transaction costs following the launch of the Universal Trading Platform in 2013 (Miłobędzki & Nowak, 2018). In Australia, the ASX allows short selling on certain stocks with strict disclosure requirements, showing characteristic patterns in order depth across trading sessions (Helmes et al., 2012).

South Asia presents a different scenario. India's electronic National Stock Exchange operates continuously without market makers, with low transaction costs and rolling settlements that favour intraday trading (Sampath & Gopalaswamy, 2020). Recent reforms, such as share dematerialization and improved transparency, have increased intraday trading opportunities and attracted wider participation (Pati & Rajib, 2010).

Conversely, Nepal's stock market remains in an earlier stage of development. Established in 1993 with trading commencing in 1994 (Shrestha & Subedi, 2014), Nepal still operates with a $T+3$ settlement cycle, limiting real-time trading potential. Despite the adoption of electronic systems like Central Depository System (CDS) and TMS, intraday trading is not yet allowed under current regulations (Dhakal, 2014). Though there has been significant growth in traders and improvements in information technology, the NEPSE has only recently begun to investigate the introduction of intraday trading (Chalise, 2020). Compared to its regional neighbours, Nepal lacks the necessary legal and operational framework for intraday trading, making this study important in addressing the readiness and regulatory needs of Nepal's emerging market.

Theories on Intraday Trading

The researcher employed five theories to acquire a better knowledge of investing in stocks and to assess the trader's decision in intraday stock trading in Nepal. They are: rational expectation theory (Sargent, 1961), greater fool theory (Bogan, 2016; Liu et al., 2017), behavioural finance theory (Hammond, 2015), efficient market hypothesis (Fama, 1970; Mathur, 2020) and modern portfolio theory (Markowitz, 1952). Rational expectation theory gives the trader useful information for purchasing and selling stocks, where the traders buy stocks with the expectation that the price will grow in the future and sell stocks with the expectation that the price will decrease in the future (Karki et al., 2024; Muth, 1961; Sargent, 1961). Likewise, the greater fool theory explains that the essence of a trader (a greater fool) is always willing to pay a higher price for an already excessively expensive asset (Roberts & Beckman, 1973). Similarly, Hammond (2015) revealed that behavioural finance theory counters the efficient market hypothesis with research based on market participants' judgment and decision-making processes. Moreover, the theory of an efficient market hypothesis shows that the market always works efficiently and always trades at fair value, which makes it essentially impossible for the trader to buy stocks with an overvalued or an overvalued rate (Mathur, 2020). Likewise, modern portfolio theory is a risk-averse trader's technique for constructing diversified portfolios that optimise returns while avoiding unacceptable levels of risk (Markowitz, 1952).

After reviewing the numerous theories, the behavioural finance theory appears to be the greatest fit for study as it assists with reasonable defects and provides a plethora of lucrative opportunities for knowledgeable traders who use behavioural concepts to determine which low-cost equities frequently beat the market. Atif Sattar et al. (2020) show that the key contribution of the research was to look at how behavioural factors influence trading decision-making in uncertain settings. Likewise, Cao et al. (2021) in their study try to figure out how behavioural aspects affect individual traders' trading decisions and outcomes. Moreover, Lai's (2019) study reveals that behavioural finance has been used extensively in the financial industry from psychological perspectives, focusing on herding and disposition effects. Likewise, the study of Asad et al. (2018) shows learning more about the

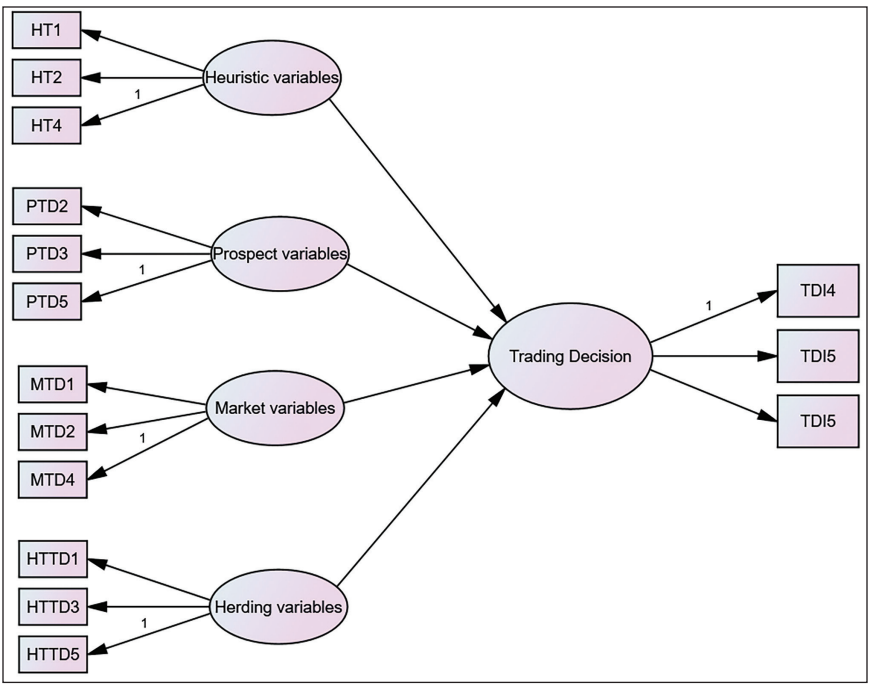

Figure 1. Conceptual Framework.

Source: Adopted and modified from Kengatharan and Kengatharan (2014).

psychological factors that impact individual traders' trading decisions in a developing country. According to Kengatharan and Kengatharan (2014) in their study gives four behavioural aspects that impact individual traders' trading decisions: herding, heuristics, prospect and market.

Figure 1 illustrates the study framework opted by the authors, which was adopted and modified by Kengatharan and Kengatharan (2014). Prospects, Heuristics, Herding and Markets are the four exogenous factors listed, whereas the trading decision is the dependent variable.

Hypotheses Formulation

Heuristic Variables and Trading Decisions of Individual Traders

Heuristics, which are fundamental components of decision-making relying on norms of thumb (Cheng et al., 2016), enable humans to reach conclusions more rapidly than if they were to logically evaluate the information at hand. Furthermore, to reduce mental effort and mitigate the risk of loss in uncertain circumstances, traders utilise heuristic biases, including adjustment, overconfidence, availability and anchoring. However, this approach occasionally results in erroneous judgments, which may contribute to market inefficiency (Abarbanell & Bernard, 2015).

H_1: The heuristic variable significantly influences the trading decisions of individual traders.

Prospect Variables and Trading Decisions of Individual Traders

Escalation circumstances feature some of the most critical and challenging decisions made in trading. In many circumstances, the difficulty in selecting whether or not to spend further resources on a lost strategy leads to a rising commitment process (Whyte, 1993). Prospect theory is a method of analysing unpredictable outcomes and risks that can be employed in different disciplines of economics, such as insurance, finance, the capital market and industry. Each sector has its own set of risks and adjustments. One of the key factors influencing individual decisions is prospect theory (Benartzi & Thaler, 2007). Regret aversion, loss aversion and mental accounting are the prospect variables that affect trading decisions.

H_2: Prospect variable significantly impacts the trading decisions of individual traders.

Market Variables and Trading Decision of an Individual Trader

Trading behaviour is influenced by a variety of market variables, including price fluctuations, political and social news, trend forecasts, information from others, and the significance of individual equities (Waweru, 2008). Traders should pay special attention to stock information and be reminded that, to make reasonable judgments, they must examine market information (Epstein & Freedman, 1994; Ghimire & Karki, 2022). Customer preference, market information, price fluctuations, historical stock trends, underlying stock fundamentals, overreaction to price fluctuations and customer preference are all market variables that impact trading decisions (Nagy & Obenberger, 1994).

H_3: Market variables significantly influence on trading decisions of individual traders.

Herding Variable and Trading Decision of Individual Traders

Herding is characterised by individuals imitating the actions of others, despite possessing private information that would indicate an alternative course of action (Banerjee, 1992). Herding is like repeating previous actions, whether sensible or illogical. The study of Fernández et al. (2011) reveals that traders rely on incorrect information because they are more likely to accept the ideas and decisions of others. When it comes to gathering information and assessing financial concerns, herding mainly impacts individual traders, and thus the herding behaviour may be based on the trading decisions of other traders. Likewise, traders' sentiments towards different publicly traded corporations are influenced by the information available to them (Khelda, 2011; De Bondt & Thaler, 1985).

H_4: Herding variable significantly influences on trading decisions of individual traders.

Trading Decision of an Individual Trader

Trading decisions are impacted by different factors like heuristics, herding, the market and prospect factors, where the individual traders evaluate the rewards of spending in the present scenario against the benefits of investing unused funds to experience faster growth in the future. If the individual decides to postpone trading, the trader will choose a portfolio that maximises long-term benefits (Lin, 2015).

Empirical Framework

Structural equation modelling (SEM) is a powerful statistical tool for predicting relationships between various types of variables, including both observed and latent constructs (Tarka, 2018). Although SEM modelling has been used extensively in multiple sectors of study, there is very little research in the scholarly literature that has been done on the prospects of intraday trading in the Nepalese stock market. Thus, this study uses SEM to try to close the gap in the literature. The conceptual framework and model specification draw on the dimensional approach and SEM (Donaldson, 1999). Generally, the measurement model discussed by Donaldson (1999) is specified as:

$$H = \alpha + \beta\eta + \Gamma\xi + \zeta \tag{1}$$

The endogenous and exogenous variables' latent constructs are linked to observable variables via measurement equations. These equations are described as below:

$$x = \Lambda x\xi + \delta \tag{2}$$

$$y = \Lambda y\eta + \varepsilon \tag{3}$$

where, x = input variables; y = outcome variables; Λy = Observed outcome variables; Λx = observed input variables; η = latent endogenous variables; ξ = latent exogenous variables; δ and ε = measurement errors for x and y, respectively.

In this model, the vector y comprises the observed response variables, while x includes the observed input variables. The vectors δ and ε capture measurement errors associated with x and y. The observed variables x and y are used to compute the factor loadings (Λx and Λy) on the corresponding latent variables (ξ and η), which are unobserved constructs.

The structural model includes:

α: a vector of intercepts,
β: a matrix representing the relationships among endogenous latent variables (η), with zeros on the diagonal and a non-singular matrix ($I - \beta$),
γ: a matrix of coefficients linking exogenous latent variables (ξ) to endogenous latent variables (η),
ζ: a vector of structural disturbances or residuals.

Nevertheless, in the case where errors solely affect the y-variables, the reduced form of the structural model can be represented by Equations (1) through (3) as follows:

$$y = \Lambda y(I - \beta) - 1(T\xi + \zeta) + \varepsilon \quad (4)$$

Variable and Its Definition

The key variables for this study have been carefully identified in alignment with the research objectives. While the primary variables are identified, additional variables have also been incorporated to support the study's analytical goals. Table 1 provides a comprehensive summary of the observed factors that SEM has confirmed.

Materials and Methods

This study investigates investors' attitudes and factors influencing their willingness to participate in intraday trading activity. An in-depth analysis of existing theories and literature has been performed to create a sound foundation for this study, which covers numerous aspects of intraday trading, investor behaviour, market dynamics and related variables.

Study Area and Population

This study is conducted in the Kathmandu Valley, which comprises three districts: Kathmandu, Bhaktapur and Lalitpur, spanning a total area of approximately 570 km^2 (220 $miles^2$). Situated in Province 3 of Nepal, the valley lies between latitudes 27°32′13″–27°49′10″N and longitudes 85°11′31″–85°31′38″E. Kathmandu has a total population of 2,517,023, making it the most populous district in Nepal.

The Kathmandu Valley was selected as the research location (see Figure 2) to learn more about how stock traders participate in stock trading and their intraday trading. The presence of multiple broker offices and a significant number of knowledgeable investors makes it an ideal location for our study. According to CDS and clearing house, the total number of DEMAT accounts till December 2021 is 4,686,672 in Nepal. According to stock brokers of December 2021 total active traders and traders is 925,670 all over Nepal.

Sampling Method, Sample Size, Data Collection and Analysis

This study adopted a non-probability convenience sampling method due to the lack of a reliable and accessible database of active stock traders in the Kathmandu Valley. Without a clearly defined sampling frame, probabilistic techniques such as random sampling were not feasible. Convenience sampling allowed the researcher to target participants who were actively involved in stock trading and accessible within a limited timeframe and resource scope. The sample size for the study was (266.78 + 13.34) = 280.12 (≈280). However, due to a higher non-response rate, only 226 usable data were collected. While this method enabled practical data collection, it inherently limits the generalisability of the findings, because the sample might not accurately reflect Nepal's broader investor population.

Table 1. Constructs and Observed Variables.

Constructs	Observed Variables	Code	Description
Heuristic	Skill and knowledge	HTD1	Possessing knowledge and skills of the stock market helps in outperforming it
	Experience	HTD2	Previous experiences are used to select the next stock for trading
	Overconfidence	HTD4	Feel confident in evaluating current securities prices
Prospect	Risk aversion	PTD2	Increased risk aversion following a previous loss
	Regret aversion	PTD3	Avoid selling during falling prices and readily sell shares at a high price
	Framing	PTD5	Prefer investing in stocks over keeping money in a savings account
Herding	Other traders' choice	HTTD1	The stock type is chosen by other traders
	Other traders buying and selling stock	HTTD3	The stock purchases and sales of other traders
	Information from friends and colleagues	HTTD5	Information from friends and colleagues is highly reliable
Market	Price changes	MTD1	Tendency to overreact to changes in stock prices
	Customer preference	MTD2	Analyse firms based on customer trends and preferences
	Fundamentals ofunderlying stock	MTD4	Evaluate the underlying fundamentals of listed companies
Trading decision	Negative influence	TDI4	Immediate association of 'stocks' with 'possible loss'
	Price history	TDI5	Frequency of stock price change
	company performance	TDI6	Report on profit and performance of listed companies

Note: HTD3, HTD5, PTD1, PTD4, HTTD2, HTTD4, MTD3, MTD5, TDI1, TDI2 and TDI3 were excluded after exploratory factor analysis (EFA) due to factor loadings below 0.5.

Data were collected using a structured questionnaire administered through the Kobo Toolbox platform. The analysis involved both descriptive and inferential approaches. Descriptive statistics were presented using tables, charts and figures, while inferential analysis was conducted through SEM to analyse relationships among latent variables. The tools employed for analysis included Microsoft Excel, Kobo Toolbox, SPSS and AMOS.

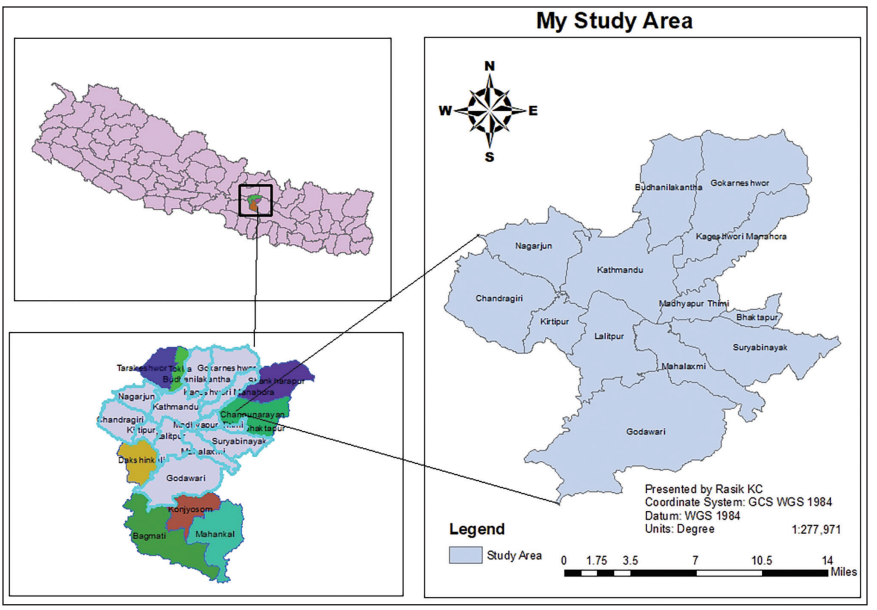

Figure 2. Study Area.

Source: GIS ArcMap 10.2.

Results and Analysis

This study analysed data collected through a structured questionnaire, capturing insights from the investors' perspective. A wide range of analytical tools was employed to perform a thorough examination of the data. These tools comprised descriptive and inferential statistics, tabular and graphical representations, including exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) conducted through SEM using SPSS–AMOS.

Descriptive Analysis

Socio-demographic Characteristics

The study reveals that the majority are male, are mostly unmarried, and have not taken any kind of training related to the stock market. The results of this research corroborate the notion that males are more inclined than females to engage in stock market trading, particularly in stock handling, which necessitates better skills, where the inexperienced and unskilled traders are trading on the NEPSE and are losing money because they have not participated in any kind of stock market training. Additionally, the findings reveal that a majority of Nepalese youth are interested in stock trading, with those with bachelor's degrees being more active in the Nepalese stock market. Aside from stock market participation decisions, education is viewed as a crucial factor in determining risk-taking behaviour among traders. In addition, people participating in stock trading in the

Kathmandu Valley are not only involved in their trade, but they are also involved in their jobs, which also indicates that the stock trading sector is fraught with risk. Lastly, this study also concludes that traders in the Kathmandu Valley utilise their savings to invest in stocks and earn between 30,000 and 50,000 and indicates that average-earning residents in the Kathmandu Valley are highly involved in the stock market (see Table 2).

Traders Profile Overview

This section explores the overall knowledge and expertise of traders through a structured questionnaire, providing insights into the current status and behaviour of participants in the stock market. The findings show that 65.62% have been

Table 2. Socio-demographic Characteristics.

Variable	In Number	In Percentage
Sex		
Male	148	65.49
Female	78	34.51
Age		
Below 20	6	2.65
20–28	84	37.17
28–36	109	48.23
36–44	17	7.5
44–52	5	2.21
52–60	4	1.77
Above 60	1	0.44
Education level		
Secondary	3	1.32
Higher secondary	19	8.41
Bachelor's level	117	51.77
Master's and above'	4	1.77
Profession		
Private service	73	32.3
Student	60	26.55
Government employee	30	13.27
Business	20	8.85
Housewife	18	7.96
investor	12	5.31
Other	9	3.98

(Table 2 continued)

(Table 2 continued)

Variable	In Number	In Percentage
Marital status		
Married	107	47.35
Unmarried	119	52.65
Nature of employment		
Full time	155	68.58
Part-time	17	7.52
Unemployed	52	23.01
Retired	2	0.88
Manage to support trading		
Saving	162	71.68
Family income	58	25.66
Loan from bank	6	2.65
Income per month		
30,000–50,000	89	39.38
10,000–20,000	56	24.78
20,000–30,000	43	19.03
50,000–70,000	18	7.96
50,000–70,000	7	3.1
Above 1 lakh'	13	5.75
Taken training for trading		
Yes	146	64.6
No	80	35.4

trading for 2–5 years and just 0.88% have been trading for 15 years and have already traded their stock 51–100 times which covers 44.25% of traders in the Nepalese stock market whereas only 1.33% of respondents have traded more than 1,000 times in their life which demonstrates the presence fresh traders in Kathmandu's Nepalese market. Likewise, the majority (101) of respondents have traded only 5–10 times during a year and only eight respondents traded above 100 times in the last years; and they contribute only 1–2 h per day (47.35%) to surf in stock market whereas only 7 out of 226 respondents participate full-time in the stock market, with the highest time contribution of 4 h. The Nepalese stock market is open from 11 AM to 3 PM. for only 4 h. It demonstrates that traders place a lower focus on the stock market and usually trade less since they are not solely concerned with trading.

Likewise, the result also revealed that 94 of the 226 respondents use 1–5 lakhs of their money for trading, while the minimal respondents (7) use more than 10 lakhs to trade stocks. It demonstrates that the Nepalese stock market has a large number of minor players. Similarly, 92.04% of respondents want to sell when

profit is high, and only 1.77% want to sell under other circumstances and agree on the fact that they buy stock when the price is falling (86.73%). This indicates the fact that people wish to sell shares based on the current scenario when the price begins to increase in the average position. Respondents were also asked whether they needed preparation before starting trading. It was revealed that 88.94% of respondents accept the lots of preparation needed before starting stock trading, and only 11.06% of respondents oppose this fact, which indicates that they are well prepared for stock trading in the context of the Nepalese stock market. Similarly, traders were asked to analyse the status of the stock market and design a strategy to cope with it through a questionnaire. The majority of 226 respondents (216) agree that studying the stock market and developing a plan to cope with it is vital.

Trading Prospect in the Stock Market

This section describes the general trading system used in intraday trading. The result indicates that 209 respondents are aware of the current trading system, 130 are aware of the share delivery date, 155 are aware of the payment date, 183 are aware of the purchase order and 166 are aware of the sale order, where the respondents are asked to choose more than one option. Thus, it shows that all respondents are aware of the current Nepalese stock trading system and understand the trading mechanism. Likewise, 100 respondents out of 226 want to retain stock for immediate sale, 68 want a short period, and 58 want to hold stock for a long period. This indicates that the majority of traders want their stock to be available for buy and sale immediately, while only a few prefer to hold for a long period. The traders who live in the Kathmandu Valley desire to do their trade as quickly as possible. Moreover, the researcher attempted to ask traders if they wish to profit from such fluctuations and the results indicated that 91.59% of respondents desire to earn a profit, while 8.41% are uninterested in making such a profit and want to trade their stock without owning the stock ownership (75.22% of respondents) preferring the immediate transactions of their stock. It shows that traders residing in Kathmandu Valley want to trade without transferring stock in the DEMAT account and want an immediate transaction system in the stock market.

Moreover, the researchers also aim to discover traders who are prepared to purchase and sell shares on the same day. The study revealed that 80.09% of respondents prefer same-day transactions, while 19.91% do not. Likewise, 75.22% of respondents want to create a second account, while the remaining 24.78% do not want to create a separate account. It concludes that traders in the Kathmandu Valley require a separate account. The researchers also attempt to assess traders' willingness to square off and find that 58.85% of respondents want to square off the stock, and others oppose this fact. Likewise, 61.06% of respondents are willing to take broker-provided facilities, whereas 38.94% are unwilling to accept broker-provided facilities. This indicates that brokers are providing somewhat satisfactory facilities to the traders, including a margin loan facility with a variable interest rate (Bhandari et al., 2021). Leverage is effectively a loan issued by the broker to a trader, where some brokers may restrict the amount of

leverage utilised by rookie traders at first (Heimer & Simsek, 2019). The result indicates that 226 respondents, 204 and 196 respondents are willing to accept the facilities of leverage and loan, respectively, provided by the broker.

Impact of Behavioural Factors on Trading Decision

The traders' behaviour factors must be studied in this part since the research is centred on determining the aspects that influence traders' trading decisions. Five variables assess the significant aspects of stock trading, namely Heuristic behaviour, prospect factors, herding behaviour, market factors and trading decisions. A five-point rating system is used to evaluate these factors: strongly disagree (1), disagree (2), agree (4), neutral (3) and highly agree (5).

Heuristics include explanatory variables such as skill and knowledge, experience and overconfidence. According to the results, the majority of people think that their abilities and stock market expertise will enable them to perform better in the stock market, where their previous experience helps to select the next stock, and agree on the fact that they feel overconfident in the stock price in the future. The average of the Likert Scale is above 4.01 for skill and knowledge, experience and overconfidence, which reflects that there is a response of agreement from traders regarding heuristic factors in trading decisions. A similar research conducted by Shah et al. (2018) explores the association between heuristic biases in trading decisions and perceived market efficiency and found that biases have a significantly unfavourable influence on trading choices made by individual traders actively trading on the Pakistan stock market.

Risk aversion, regret aversion and narrow framing are the explanatory variables under the construct prospect in the research on intraday trading in Nepal's stock market. The result indicates that most people agree that after a prior loss, there is more risk in averseness, although traders analyse the connection between the stocks; thus, the majority of traders agree that they invest their money in the stock market rather than keeping it in a bank. The average of the Likert Scale is above 4.05 for risk aversion, regret aversion and framing, which reflects that there is a response of agree from traders regarding the prospect variable in trading decisions. The similar research conducted by Ding et al. (2004) shows that traders who are confident in the price change seek greater risk. When the information is from the inside of an organisation, the trader feels confident and seeks high risk.

Likewise, herding includes the explanatory variables such as other investors' choice, other investors' buying and selling stock, and information from friends and colleagues. According to the survey, traders concur that they choose their stocks based on what others choose, what traders often trade and that they rely on information about stocks offered by their friends and coworkers. The average of the Likert Scale is above 3.6, which reflects that there is a moderate level of response from traders regarding the Herding variable in trading decisions. As per Dutta et al. (2020), revealed that herding and panic are really the outcome of a profound guilt on the part of the trader, which causes them to panic and herd. Despite this, traders make trading choices using heuristics.

The market contains the explanatory variables such as the fundamentals of the underlying stock, price changes and customer preference (Maharjan et al., 2022). The outcome suggests that traders agree on evaluating customer preference before trading stocks and that they consider a company's fundamentals before trading, but that they overreact when prices fluctuate. The average of the Likert Scale is above 3.6, which reflects that there is a moderate level of response from traders regarding the market variable in trading decisions. A similar study done by Kengatharan and Kengatharan (2014) reveals that the market variable shows a moderate response on individual traders' decision-making.

Similarly, trading decisions contain explanatory variables such as negative influence, price history and company performance. The study's findings show that traders typically keep an eye on stock prices as they fluctuate frequently, evaluate the performance and profitability of listed companies, and then make trading decisions. However, they also acknowledge that poor trading decisions result in constant losses for traders in the stock market. The average of the Likert Scale is above 3.93 for negative influence, price history and company performance, which reflects that there is a moderate level of response from traders.

Challenged in Stock Trading

Respondents are asked whether the traders face challenges during stock trading. The result indicates that 76.55% face the challenge in the Nepalese stock market, whereas only 23.45% said they have not faced any difficulties during stock trading. The major challenges faced by the stock traders in the Nepalese stock market are a lack of brokers' support (67.7%) and TMS crash during trading (61.5%). Other sub challenges are a lack of stock trading awareness (43.81%), Internet connection (43.36%), lack of a good online trading system (36.73%), and lack of financial institution (FI) support (22.57%) (see Table 3). According to the study (Karki et al., 2023; Koirala & Bajracharya, 2002), the challenges that arise in the stock market are the political-economic context, legislative provisions and the dominance of FI.

Table 3. Major Challenges Faced by Stock Traders.

Factors	No. of Respondents	Percentage (%)
Lack of broker support	153	67.7
TMS crash	139	61.5
Lack of stock trading awareness	99	43.81
Internet connection	98	43.36
Inadequate online trading platform	83	36.73
Lack of financial institution support	51	22.57

Source: Survey.

Note: TMS: Trading management system.

Moreover, respondents were asked questions such as where these challenges arise, and the result indicates that they came from technical factors (116) and political factors (131). Likewise, 103 respondents think that challenges are rising from economic factors, and 60 respondents out of 226 confirm that the challenges have arisen from social aspects. Moreover, 157 respondents chose that broker, 118 say NEPSE, 105 respondents say the trader themselves, 83 respondents agree with FIs, whereas only eight respondents say that others, like politics and the finance minister, are responsible for the cause of the problems.

Managerial Solution

This section discusses the managerial approach and input from respondents in order to solve the challenges and obstacles that stock market traders face. Respondents were asked whether managing challenges helps to run the share market smoothly. The result revealed that 164 respondents agree that the challenges and barriers of the stock market are manageable, whereas only 9 respondents do not agree with this fact. Likewise, this study also proposes how the market would work smoothly and revealed that majority (30) of respondents suggest motivating traders, growth of capital market (30), smooth operation of stock market (25), reliable and transparent system (20), efficiency in stock and predictability increase (15), attract people in stock market (15), easy trading system (15) and fair rule and regulation (14) are main aspects that need to be considered for smooth market operation in stock market.

Likewise, the finding documented that large percentage of respondents (95%) suggested to increase the speed of broker, good full support from brokers, FI and capital (50%), making good policies (40%), technology advancement (40%), introducing new trading system like intraday trading, delivery market and so on (30%), increasing the trading days and hours (20%), provide training and awareness program to new traders (15%), and need of one and simple application (50%) (see Figure 3).

Thus, NEPSE and SEBON should work together to enact strict regulations that curb market insider trading. SEBON must enhance its oversight of brokerage firms, as delays and inefficiencies in their services have become a major source of frustration for investors. Traders often face demotivation due to brokers holding shares and funds for extended periods. To address these concerns, SEBON should consider issuing brokerage licenses to qualified FIs, thereby promoting competition and improving overall service quality in the securities market. A similar study conducted by Koirala and Bajracharya (2002) found that the solution for challenges is good corporate governance, transparency and disclosure of information.

Inferential Analysis

This section encompasses various statistical techniques used to analyse the data, including descriptive statistics, EFA, CFA, path analysis, mediation analysis, estimation model and hypothesis testing.

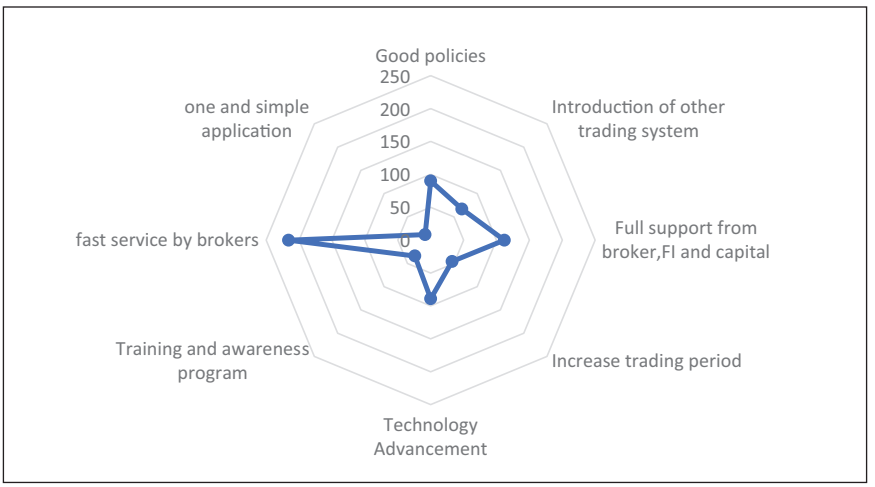

Figure 3. Recommendation to Improve the Trading System.

Source: Field survey.

Descriptive Summary Statistics

The study used the standard deviation, skewness, kurtosis and the mean to summarise the dataset. The mean scores of the respondents ranged from 3.57 to 4.10, with standard deviations between 0.53 and 0.87, indicating moderate variability in responses. Skewness, which reflects the asymmetry of the distribution, ranged between −1 and +1, suggesting a slight negative skew in the data. Kurtosis values fell within the range of −4 to +4, implying that the data distribution is neither excessively peaked nor overly flat, aligning with the acceptable thresholds proposed by Allua and Thompson (2009).

EFA and Common Method Bias'

Prior to conducting factor analysis, the dataset's suitability was assessed using the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity. The KMO value of 0.703 satisfies the minimum threshold of 0.70, confirming adequate sampling adequacy (Iskamto et al., 2020). Furthermore, Bartlett's test yielded a significance value of .000 ($p < .05$), indicating that the correlations among variables are sufficiently large for factor analysis. This indicates that there are no issues of data dependability and validity, and the data is significant for the analysis. Moreover, Harman's single-factor test is used to determine if the study suffers from common method bias; the result indicates that 23.61%, which is less than 50% (Aguirre & Hu, 2019), indicating that the study is free of common method bias.

Measurement Model (Validity of Data) and CFA

To establish convergent validity, the data must satisfy the conditions of composite reliability (CR) greater than 0.70 and average variance extracted (AVE) greater than 0.50. For discriminant validity, the AVE for each construct should exceed the maximum shared variance (MSV), and the square root of the AVE must be greater than the corresponding inter-construct correlations (see Tables 4 and 5). Thus, the result indicates that both convergence and discriminant validity are validated and thus taken data set is reliable.

CFA examines whether a collection of components influences answers in the expected way. The fitness indices CMIN/DF, RMR, RMSEA, IFT, GFI, CFI and TLI were applied to determine whether the model fits the data well. From the study CMIN/DF (2.257 < 5), RMSEA (0.075 < 0.08), RMR (0.023 < 0.08), GFI (0.908 > 0.80), TLI (0.961 > 0.90) and CFI (0.970 > 0.90) respectively, which shows that the study has excellent model fit. Figure 4 presents the structural estimation model.

Hypothesis Testing

As summarised in Table 6, hypotheses H_1, H_2 and H_4 were rejected, demonstrating no statistically significant relationships between the respective variables. In contrast, H_3 was supported, suggesting a meaningful relationship between the constructs involved.

Table 4. Reliability and Validity.

Construct	Indicators	Factor Loading	Cronbach's Alpha	CR	AVE	MSV
Heuristic	HTD1	0.899	0.938	0.833	0.624	0.018
	HTD2	0.910				
	HTD4	0.863				
Prospect	PTD2	0.972	0.984	0.938	0.835	0.013
	PTD3	0.967				
	PTD5	0.965				
Herding	HTTD1	0.903	0.957	0.984	0.953	0.003
	HTTD3	0.961				
	HTTD5	0.912				
Market	MTD1	0.787	0.831	0.959	0.886	0.045
	MTD2	0.730				
	MTD4	0.779				
Trading decision	TDI4	0.848	0.910	0.913	0.778	0.045
	TDI5	0.892				
	TDI6	0.831				

Note: AVE: Average variance extracted; CR: Composite reliability; MSV: Maximum shared variance.

Table 5. Correlation of Latent Variable.

	MSV	MTD	HTD	PTD	HTTD	TDI
MTD	0.018	0.790				
HTD	0.013	0.115	0.914			
PTD	0.003	0.032	0.044	0.976		
HTTD	0.045	0.069	0.101	0.009	0.941	
TDI	0.045	0.133	0.109	0.053	0.212	0.882

Source: Field survey.

Note: HTD: Heuristic variable; HTTD: Herding variable; MSV: Maximum shared variance; MTD: Market variable; PTD: Prospect variable; TDI: Trading decision.

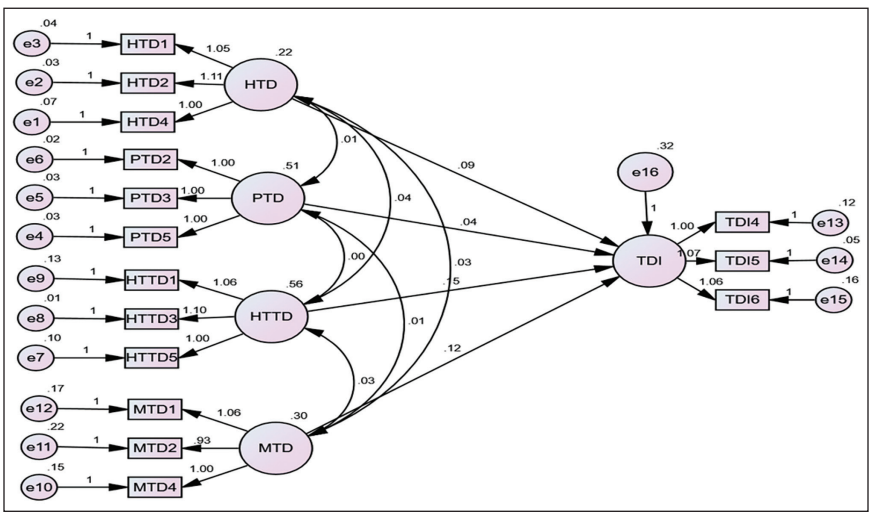

Figure 4. Structural Estimation Model.

Source: SPSS–AMOS.

Note: HTD: Heuristic variable; PTD: Prospect variable; HTTD: Herding variable; MTD: Market variable; TDI: Trading decision.

SEM was employed during the inferential phase to conduct regression analysis, evaluate variable relationships and assess data normality. Five latent constructs were analysed in relation to their observed variables. The model demonstrated a good overall fit, with a chi-square to degrees of freedom ratio (CMIN/DF) of 2.257, which is well below the acceptable threshold of 5. Additionally, the *p* values associated with the relationships between latent and observed variables were found to be below .10, indicating statistical significance. Therefore, the study concludes that the herding variable has a significant influence on trading behaviour, while other proposed relationships lack sufficient empirical support.

Table 6. Path Estimates for Structural Model.

Hypothesis	Estimate	SE	CR	*p*	Significant
H_1: Heuristic variable → trading decision	0.093	0.087	1.064	.287	Insignificant
H_2: Prospect variable → trading decision	0.036	0.055	0.657	.511	Insignificant
H_3: Herding variable → trading decision	0.153	0.053	2.874	.004	Significant
H_4: Market variable → trading decision	0.116	0.079	1.473	.141	Insignificant

Discussion

To explore the relationship between behavioural factors and trading decisions, this study employed reliability tests, multiple linear correlation analysis and SEM. The key constructs examined included heuristics, prospect theory, herding behaviour and market factors. Among the proposed hypotheses, only H_3 is significant, whereas H_1, H_2 and H_4 are insignificant in this study.

The hypothesis (H_3) is accepted as the herding variable affects the trading decision. The stock was chosen by Nepalese traders as a result of other traders' buying and selling choices. Investors choose to trade a stock based on the recommendations of other traders who largely rely on the information from friends, family and colleagues. When traders make judgments based on inaccurate information, they are more inclined to accept other people's opinions and decisions. Herding has the most influence on individual Trading decisions when it comes to acquiring information and analysing financial problems (Hilton, 2001).

While the study provides valuable insights, several limitations must be acknowledged. First, the relatively small sample size limits the generalisability of the findings. Second, the study relied exclusively on a structured questionnaire; incorporating qualitative methods, such as in-depth interviews or focus group discussions, could have enriched the understanding of the psychological and contextual factors behind trading decisions. Third, although COVID-19 severely impacted various sectors, Nepal's stock market experienced an unusual surge during this period, reaching record highs. Pandemic-related constraints limited the ability to collect a larger sample, highlighting the need for future studies with broader data coverage.

Conclusion and Recommendation

This study examined the willingness of investors in the Kathmandu Valley to engage in intraday trading and identified key behavioural factors that influence stock trading decisions. Findings reveal a strong interest among Nepalese investors in intraday trading, despite its absence in the current stock market structure. However, this interest is significantly shaped by behavioural influences, particularly herding behaviour, where traders rely heavily on information from informal and often unreliable sources like social media, friends and family. Other psychological factors, such as heuristics, prospect biases and general market perceptions, showed minimal influence on trading decisions in this context.

In addition to behavioural aspects, structural challenges also emerged as critical barriers to effective trading. These include recurring issues with the TMS, limited broker support, weak technological infrastructure, low awareness of trading mechanisms, and insufficient institutional assistance. To address these obstacles, the study recommends implementing strong regulatory guidelines for intraday trading, enhancing the reliability of trading platforms, providing continuous support and education through brokers and FI, and launching targeted trading literacy programs. These measures are essential not only to support the introduction of intraday trading in Nepal but also to improve overall investor confidence and market efficiency.

This research makes significant theoretical and practical contributions. Theoretically, it extends the relevance of behavioural finance to emerging and frontier markets by demonstrating how social and psychological factors, particularly herding behaviour, dominate investor decision-making in the absence of mature regulatory and informational infrastructures. It challenges the assumption that individual rationality guides investment choices, especially in contexts where financial literacy and reliable data access are limited. Practically, the study offers valuable policy insights for capital market regulators, brokers and FI in Nepal. By identifying both behavioural drivers and systemic barriers to intraday trading, it provides a foundation for designing investor-centred strategies, educational interventions and technological upgrades. Moreover, it opens new avenues for future research to explore investor behaviour in similar developing market settings.

Declaration of Conflicting Interests

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Gender, Firm Dynamics and Education in Accessing Microloan: Commentary on Women Entrepreneurs in North East India

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Abstract

This commentary aims to examine the influence of gender on the accessibility of microloans in North Eastern Region (NER), India. Using data obtained from 200 entrepreneurs from NER, the article employed the logit model to address two key questions: (a) Does gender play an important role in access to finance? And (b) What is the role of Self-help Groups and education in access to finance? In the light of these research questions, findings from 200 small businesses are presented. The findings of the empirical analysis revealed that firm size, educational qualifications and gender of small business owners play a significant role in the accessibility of microcredit from financial institutions.

Keywords

Microcredit, women entrepreneurship, gender, firm size, access to finance

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Originating from the visionary efforts of Professor Muhammad Yunus in the 1980s, notably through the Grameen Bank, microcredit stands as a beacon of hope for aspiring entrepreneurs, particularly women, globally and across the South Asian landscape. Its revolutionary impact not only facilitates the evolution of businesses from informal to formal sectors but also acts as a catalyst for economic advancement. However, within its narrative of success lies a darker face. Scholars

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and human rights advocates have raised criticisms, shedding light on ethical crises within microfinance institutions (MFIs), pointing to exploitative lending practices that create a vicious debt trap and particularly impacting marginalised women.

Various studies and evidence suggest that government oversight plays a pivotal role in establishing ethically responsible MFIs and other financial services in the country. Gender discrimination remains an unsolved puzzle in various sectors, and the financial sector is no surprise either. The rising downtrodden and discriminated women populations in education, business and services further contribute to poverty and a lack of awareness of the services, emphasising the urgent need to dissect gender-based disparities in accessing financial services, specifically microcredit.

Despite continuous efforts through policy suggestions and rigorous government schemes such as the Mahila Udyam Nidhi (MUN), Annapurna and Udyogini schemes, gender disparities still prevail in entrepreneurship, especially regarding access to credit. Women entrepreneurs encounter barriers in securing bank loans due to the discriminatory approach towards female entrepreneurs within financial institutions. Empirical evidence shows that women-owned enterprises face challenges in accessing small-business credit and lack financial knowledge or awareness compared with their male counterparts. However, a systematic and unbiased credit system in some rural regions of India has a demonstrable positive impact on informal and small businesses, particularly encouraging women entrepreneur.

The article concentrates on North Eastern Region (NER), India, because it is urgently necessary to eliminate gender-based disparities and recognise the impact of financial literacy on microcredit accessibility. The region is politically, commercially and demographically isolated from other regions in India. The research problem aims to understand the profound impact of gender and financial awareness on microcredit accessibility in this region. This investigation aims to fill a significant gap in the existing literature by exploring the complex relationships among gender dynamics, financial awareness and the accessibility of microcredit, providing broad insights into the challenges faced by small business owners in NER, India. Therefore, this article aims to address two questions: (a) Does gender play an important role in access to finance? And (b) What is the role of Self-help Groups (SHGs) and education in access to finance?

Table 1 condenses the key insights from various studies, showcasing the diverse findings on gender disparities, discrimination and access to credit and the impact of microfinance on different segments of entrepreneurs in India.

In the light of the research questions mentioned before and the existing literature review, we now report the econometric analysis in Table 2.

Factors Determining Access to Microloan by Women Entrepreneurs in NER

Gender Disparity and Financial Inclusion

The article significantly contributes to the existing literature on gender disparity within the financial system around the world in general and in mainland India in particular. The findings of this study show the prevailing gender bias in the NER

Table 1. Overview of the Existing Literature

Authors	Findings
Patel et al. (2022)	Lower-caste female business owners face barriers in accessing microloans compared to their higher-caste counterparts.
Basumatary et al. (2022)	Limited evidence exists between microcredit and women's empowerment despite credit programme participation.
Chaudhuri et al. (2020)	Women-owned firms encounter disadvantages in small-business credit compared to male-owned firms.
Rehman (2023)	Loan disbursement shares to microfinance institutions shape the sustainability of the microcredit system.
Ghosh and Vinod (2017)	Female-headed households are more likely to access informal loans, less likely to access formal financial credit.
Dasgupta (2006)	Highlights differences in functions and characteristics between microfinance and microcredit.
Srinivasan (2008)	Sustainable SHGs linked to bank access underpin financial services' success.
Lensink and Hermes (2007)	Microfinance and microcredit are often used interchangeably, but their regulatory differences are notable.
Menon and Rodgers (2011)	Access to credit fuels growth and motivation among women entrepreneurs, aiding in expanding their ventures.
Ferri et al. (2018)	Women entrepreneurs face challenges accessing bank loans due to prevalent discrimination in the banking sector.

Table 2. Factor Determining Access to Microcredit (Logit Regression) instead of Probit Regression, it should be Logit Regression.

Variables	Coefficient	Standard Error
Mrt_Sts	−0.483	0.644
Edu	1.803***	0.516
Firm_Size	1.209**	0.488
Gender	2.135***	0.602
SHG_FinHlp	1.336*	0.621
Constant	−13.86	2.088
Log likelihood	−16.86	
Pseudo R^2	0.73	
Observations	200	

Note: ***, ** and * indicate significances at the 1%, 5% and 10% levels, respectively (***$p < .01$, **$p < .05$, *$p < .10$).

of the country, by taking observations from the NER. The theoretical implication lies in highlighting the persistent barrier that hinders financial inclusion.

Role of SHGs

The role and significant impact of the SHGs in moulding women's entrepreneurship in rural and remote regions of India cannot be excluded. Acknowledging this from the existing literature and from the findings of this study, the insights propose theoretical landscape by documenting and advocating the intermediary and collaborative role of the SHGs and financial institutions in building the social infrastructure to help marginalised female entrepreneurs access microcredit.

Firm Dynamics and Education

Firm size and the qualification of the entrepreneur play a significant role as deciding factors in the accessibility of microcredit, along with the gender of the entrepreneur. The findings advocate for contributing to the theoretical understanding of the business landscape in the NER, which is no different from any other region in deliberately excluding its female entrepreneurs from microcredit access. The article draws more compelling insights into understanding the relationship between firm dynamics, individual educational qualifications and the accessibility to microcredit from financial institutions.

Conclusion and Policy Suggestions

The study relying on the data of small and informal business owners revealed that male entrepreneurs are more likely to access microloans than female entrepreneurs, which is consistent with the findings of existing empirical studies. The findings of our article also highlight the complex relationship of factors influencing microcredit accessibility, prominently highlighting educational qualifications, firm dynamics and the collaborative role of SHGs and financial institutions in helping women entrepreneurs in accessing microcredit. Although schemes like MUN by the Government of India have accelerated the growth of women's entrepreneurship in India, a more inclusive financial model aligned with the demographic and sociopolitical ethos of NER entrepreneurs is needed. Thus, considering policy suggestions, the article strongly advocates for an inclusive financial model to alleviate the marginalised female entrepreneurs in the NER in particular and India in general.

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