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A Correlation Analysis of Green Human Resource Management and Firms' Protection

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Abstract

The purpose of the study was to examine Green Human Resource management and firms' protection in Cross River State, Nigeria. Other specific objectives of the study were to: determine the relationship between green recruitment and selection and organizational protection; determine the relationship between green training and development and organizational protection; determine the relationship between green reward and compensation and organizational protection. This study adopted survey research design. The study was carried out using processing firms in Cross River State. Primary data was employed using questionnaire instrument. Pearson Product Moment Correlation was adopted as a suitable statistical tools for the analysis of the study. The major findings were stated thus: Green Recruitment and selection, Green training and development, Green reward and compensation have a positive relationship with organizational protection. The study recommended that organizations should also express preferences to recruit candidates who have competency and attitudes to participate in corporate environmental management initiatives as well.

Keywords: green human resource management, protection, green recruitment and selection, green training and development, green reward and compensation

1. Introduction

Many organizations anticipated that environmental issues, especially climate change where their company operates, would have a negative impact on their businesses in the long run. Abdel and Aldulaimi (2020) posited that pressure from the negative impact arising from environmental issues encourages organizations to be more responsible for the sustainable outcome specifically that can be related to the effects on the environment by their activities. More and more organizations are now aware of the importance of going green by integrating green practices in their management functions (Abdeldayem & Aldulaimi, 2020). In Nigeria, green human resource management practices and its effect on the sustainable competitive edge in the Nigerian manufacturing industry noted that the components of human resource management were coined to fit into the green approach so as to come up with green recruitment, green training and development, green compensation and green employee relations. All the activities in the human resource practices once fitted into the greening concept led to significant ways of sustaining the manufacturing sector while protecting the environment.

The central problem of the study is to examine the impact of the Green human resource management as it affects the organizational protection. The environmental impact of the cement industry has been a growing concern due to its contribution to air pollution, high energy consumption, and carbon emissions (Singh et al., 2020). While regulatory bodies have imposed environmental standards, compliance remains a challenge due to weak enforcement and resistance from industries. The problem arises from the lack of clear evidence on how Green Human Resource Management policies such as green recruitment, training, and performance management contribute to environmental compliance and organizational sustainability. There is also limited empirical

research on how Green Human Resource Management practices influence employee engagement in sustainable initiatives, particularly in Nigeria's industrial sector.

2. Theoretical Framework

2.1 Resource Based Theory

This theory was propounded by Barney 2001. The theory states that a firm should be viewed as an organised combination of resources and each organization is heterogeneous. Example of resources refers to tangible and intangible assets, capabilities and processes that the organisation possesses to create value. Resource-based view was developed to serve as a tool to analyse and explain why some firms are able to achieve sustainable competitive advantage which leads firms to obtain above average returns. A firm should have a bundle of resources which are valuable, rare, hard to imitate for an organisation to achieve competitive advantage. Resource-based theory suggests that resources that are valuable, rare, difficult to imitate, and non-substitutable best position organizations for long-term success. These strategic resources can provide the foundation to develop firm capabilities that can lead to superior performance over time. Capabilities are needed to bundle, manage, and otherwise exploit resources in a manner that provides value added to customers and creates advantages over competitors.

2.2 Literature Review

Green human resource management has become the most common word in business, and its importance is increasing over time. This term also has an assured status as a hot topic in modern research work as awareness of environmental management and sustainable development is increasing day by day all over the world. In protecting the environment, the organization will make a strategy to achieve their target and goal for green and sustainability with visible results for financial and the impact to the environment. Other than that, environment and nature surrounding green where management is very essential to give concern to environmental problems which need to be improved by managing and operating the businesses (Singh, Del Giudice, Chierici, & Graziano, 2020).

Green Human Resource Management practices are the best approach that helps the company by making a green employee who realizes the environmental performance in the workplace by stressing on green employing, green training and development, green reward and beneficent the company's human capital. Human resource planning, recruitment and selection, training and development, performance appraisal, rewards management and human relations which are Human Resource Management main practices are deemed as instruments for aligning staff with establishment's environmental policies (Yong, Yusliza, Ramayah, Chiappetta, Sehnem & Mani, 2020). Green Human Resource Management is the use of Human Resource Management pursuit to support environmentalism and promote sustainable use of organization resources. Since green Human Resource Management may impact as a source of competitive advantage through giving economic as well as strategic benefits, organization often take it as an ethical concern not as a reactive strategy (Yong, Yusliza, Ramayah, Farooq & Tanveer, 2022). Green Human Resource Management (GHRM) is a relatively new concept that has emerged in response to the increasing importance of environmental sustainability. It involves integrating environmental sustainability principles into traditional Human Resource Management (HRM) practices, such as recruitment, training, performance management, and compensation (Yusoff, Nejati, Kee, & Amran, 2020). The goal of GHRM is to create a workforce that is aware of, and committed to, sustainability, and to promote sustainable practices within the organization (Yusop & Adam, 2021; Darwish, Shah & Ahmed, 2021; El Dessouky & Alquaiti, 2020). It increases the employees' awareness and improves their behaviour towards sustainability problems. The issue of environmental protection has become a global concern in the twenty-first century. Organizations in Africa and around the world have been blamed for contributing to environmental degradation through air, water, noise, soil and other means of pollution. As environmental stakeholders, organizations are called upon to take the leadership role in protecting the environment by attracting smart professionals with expertise in green behavior. Therefore, organizations have come up with the necessary strategies to protect the environment while ensuring that the organization continues to achieve effectiveness and efficiency (Jawaad, Hasan, Amir & Imam, 2022; Mansoor, Alzyoud, & Muttar, 2022; Ogalo, 2020; Zaid & Jaaron, 2023).

Singh, Del Giudice, Chierici, and Graziano (2020) described green training and development as the process of equipping employees with working approaches that ensure adequate resource utilization, reduce waste, energy conservation, and environmental degradation. Environmental related education, training and development are key areas of green Human Resource Management in organizations. Providing environmental training to employees to develop required skills and knowledge is an important function that is beneficial to the implementation of corporate environmental management programs in the organization. Providing training to encourage recycling and waste management, supporting flexible schedules and telecommuting, and reducing long-distance business travels are very useful to reduce the negative environmental impacts of the organizations

(Yong, Yusliza, Ramayah, Chiappetta, Sehnem & Mani, 2020; Hatamleh, 2021).

Green training and development (GTD) refer to a collection of programs that encourage employees to acquire environmental skills and address environment problems that are crucial to the achievement of environmental goals. It may be understood as an important human or organizational feature in view of contemporary research on Green Human Resource Management (Yong, Yusliza, Ramayah, Farooq & Tanveer, 2022; Yusoff, Nejati, Kee, & Amran, 2020; Yusop & Adam, 2021; Singh, Del Giudice, Chierici, & Graziano, 2020).

Environmental performance is regarded to be an excellent opportunity to enhance the productivity of an organization in a win-win scenario, because environmental issues become more and more important in business plans and green concepts through innovation processes and strategic viewpoints of the organization. The number of organizations, using strategic environmental management practices (EMS) to improve their competitiveness, and using the environmental performance idea in the corporate strategies is increasing as social demand for environmental performance increases. The implementation of an Environmental Management System (EMS) would enhance the efficiency of the environment and it is a method that requires a high degree of cooperation between environmental management and human resources.

2.3 Empirical Review

Yusop and Adam (2021) designed a study to establish the effect of green employee sourcing on environmental sustainability at Capital Fish Limited, Homa-bay town, Kenya. From the findings, it was concluded that green employee sourcing had a statistically significant effect on environmental sustainability at Capital Fish Limited. The study thus recommended that Capital Fish Limited should strengthen its green employee sourcing activities through green recruitment, green selection and green employee socialization so as to ensure environmental sustainability. Zaid and Jaaron (2023) conducted study to establish the influences of green human resource management practices on environmental sustainability at Kenyatta University. The study found out that employees' application for employment at the University was not based on green issues leading to little understanding of the concept. The study showed that environmental performance indicators were not adequately included in performance management and appraisals systems. The study recommended the need for training and capacity building among the employees to inculcate the culture of green practices as well as developing pro-environment managers and leaders to ensure sustainability in the workplace.

Singh, Del Giudice, Chierici and Graziano (2020) proposed revealed that the dimension like green training, green employment and evaluation of green performance explain the role of green human resource management practices in attaining sustainable development in its environmental, social and economic dimensions in the health industry in Bahrain represented by Al Resalah Medical centre and Al Nafees hospital. Two hundred seventeen employees were selected as a sample for this study. The finding showed that the green practices dimension was most significant after assessing green performance and associated with sustainable development, followed by green employment and green training. Increasing training courses and programs to elucidate the green management practices conception and their significance to the business. Among employees and workers, feast out the sustainability culture and maintenance of natural resources.

Yong, Yusliza, Ramayah, Chiappetta, Sehnem and Mani (2020) demonstrated that due to the management of the environment and matter of development, Greenhouse resource management has increasing attention. Green Human Resource Management has expanded its unique position in the field of research. In the Kingdom of Bahrain, the objective of this study is to explore if Green human resource management is applied to telecommunication companies. This research dispersed 620 survey forms to randomly employees working in the HR of three telecommunication companies, STC, Batelco and Zain. However, 580 forms were received and created valid for analysis. The finding suggested that telecommunication companies in Bahrain do not have a management system for the environment. Additionally, this study showed that their attention to environmental management practices application. Their results also showed a significant increase in adopting sustainable green human resource management practices.

Hamza et al. (2021) had a study on the relationship between recruitment and selection with organizational performance. Two research questions were used in the study. The study was conducted at Telecom Companies. The population of this study was approximately 220 employees, the researcher distributed 80 questionnaires, but 69 questionnaires received from participants, however only 60 questionnaires were properly filled out by the participants accordingly to sample size was initially a total of 60 survey and 100% was returned back which means 60 surveys. A quantitative method used to analyze this study, the researcher prepared questionnaires and distributed at Telecommunication Companies in Erbil-Kurdistan. Data for the research paper was collected through a questionnaire paper. Data was collected and Statistical Package for Social Sciences (SPSS) version 23 was used as the statistical analytical tool while descriptive statistics were calculated and used in the interpretation of findings. The findings of the study revealed that there is no difference in candidates' race and gender in internal promotion at Telecommunication Companies in Erbil-Kurdistan, it also revealed that majority

of participants believed that selection methods used (application forms, assessment centers, psychometric test, interviews, CV data, references) are important.

Ismael et al. (2021) carried out a research on the relationship between the role of training and development on organizational effectiveness at small and medium enterprise in Kurdistan region of Iraq. Two research questions were used for the study; the population of the study was 102 staff from different small and medium enterprises in Kurdistan region of Iraq. The research is qualitative method. The sampling technique used was random sampling method. Data was collected through the distribution of questionnaires to employees in different small and medium enterprises in Erbil and data analysis was undertaken using SPSS. Findings of this study show that there is a direct impact of development programmes on organizational effectiveness and its progress and development is essential for an effective organization.

3. Research Methods

This study adopted survey research design. This study was carried out at Niger mills, Honey Feed company, Aje Ndoma Nigeria Enterprise in Cross River State. A total population of four hundred (400) as well as the permanent and non-permanent staff in the companies. In this study, census sampling of four hundred (400) was adopted. Primary source of data and Pearson Product Moment Correlation were adopted as a suitable statistical tool for the analysis of the study.

4. Results and Findings

Hypothesis one

Ho: There is no significant relationship between green recruitment and selection and organizational protection.

Table 1 presents the correlation results of the relationship between green recruitment and selection and organizational protection. The results are based on Pearson correlation coefficients, significance levels (2-tailed), sum of squares and cross-products, covariance, and the number of observations (N). The Pearson correlation coefficient between green recruitment and selection in Lafarge is .859, which indicates a strong positive correlation between the two variables. This suggests that as Green recruitment increases, or adaptability also increases, or vice versa. The correlation is significant at the 0.01 level (2-tailed), with a significance value (Sig.) of .000, indicating that the relationship is statistically significant and not due to chance. The sum of squares and cross-products and the covariance values provide additional information about the relationship between the variables. For recruitment and selection, the sum of squares and cross-products is 128.38, and the covariance is .253. For protection, the sum of squares and cross-products is 622.44, and the covariance is 1.51. These values further support the strong relationship between green recruitment and selection and organizational protection in Lafarge. The correlation results suggest that Green recruitment and selection are closely interrelated. This implies that the adoption of green recruitment and selection has had a significant impact on organizational protection.

Table 1. Correlation result of relationship between green recruitment and selection and organizational protection

		RS	PROT
	Pearson correlation	1	.859**
	Sig. (2-tailed)		.000
RS	Sum of squares and cross-products	128.38	191.21
	Covariance	.253	.246
	N	365	365
	Pearson correlation	.859**	1
	Sig. (2-tailed)	.000	
PROT	Sum of squares and cross-products	176.41	622.44
	Covariance	.336	1.51
	N	365	365

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

Source: SPSS analysis by Researcher, 2025.

Hypothesis two

Ho: There is no significant relationship between green training and development and organizational protection.

Table 2 presents the correlation results of the relationship between green training and development and organizational protection. The results are based on Pearson correlation coefficients, significance levels (2-tailed), sum of squares and cross-products, covariance, and the number of observations (N). The Pearson correlation coefficient between green training and development is .815, indicating a strong positive correlation between the two variables. This suggests that as training and development increase or improve, there is a corresponding positive impact on green training and development and organizational protection. The correlation is significant at the 0.01 level (2-tailed), with a significance value (Sig.) of .000, indicating that the relationship is statistically significant and not due to chance. The sum of squares and cross-products for Green training and development is 321.74, and for protection, it is 146.94, providing additional insight into the relationship between the variables. The covariance values are .431 for Green training and development and .315 for protection, further supporting the strong correlation between green training and development and organizational protection. In summary, the correlation results suggest that there is a significant positive relationship between green training and development and organizational protection. This implies that the adoption of training and development has had a notable impact on organizational protection.

Table 2. Correlation result of relationship between green training and development and organizational protection

		TD	PROT
TD	Pearson correlation	1	.815**
	Sig. (2-tailed)		.000
	Sum of squares and cross-products	321.74	136.94
	Covariance	.431	.323
	N	365	365
PROT	Pearson correlation	.815**	1
	Sig. (2-tailed)	.000	
	Sum of squares and cross-products	146.94	125.22
	Covariance	.315	.221
	N	365	365

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

Source: SPSS analysis by Researcher, 2025.

Hypothesis three

Ho: There is no significant relationship between green reward and compensation and organizational protection.

Table 3 presents the correlation results of the relationship between green reward and compensation and organizational protection. The results are based on Pearson correlation coefficients, significance levels (2-tailed), sum of squares and cross-products, covariance, and the number of observations (N). The Pearson correlation coefficient between green reward and compensation and organizational protection is .843, indicating a strong positive correlation between the two variables. This suggests that as green reward and compensation increase or improve, there is a corresponding positive impact on protection. The correlation is significant at the 0.01 level (2-tailed), with a significance value (Sig.) of .000, indicating that the relationship is statistically significant and not due to chance. The sum of squares and cross-products for reward and compensation is 143.22, and for protection, it is 134.56, providing additional insight into the relationship between the variables. The covariance values are .567 for reward and compensation and .434 for protection, further supporting the strong correlation between green reward and compensation and organizational protection. In summary, the correlation results suggest that there is a significant positive relationship between green reward and compensation and organizational protection. This implies that the adoption of green reward and compensation has had a notable impact on organizational protection.

Table 3. Correlation result of relationship between green reward and compensation and organizational protection

		RC	PROT

RC	Pearson correlation	1	.843**
	Sig. (2-tailed)		.000
	Sum of squares and cross-products	143.22	183.92
	Covariance	.567	.604
	N	365	365
PROT	Pearson correlation	.843**	1
	Sig. (2-tailed)	.000	
	Sum of squares and cross-products	134.56	298.23
	Covariance	.434	.649
	N	365	365

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

Source: SPSS analysis by Researcher, 2025.

5. Discussion of Findings

The study examined Green Human Resource management on organizational protection. Based on the analysis of the findings, the following hypotheses were tested. In hypothesis one, it was revealed that Recruitment and selection has positive relationship with organizational protection. The finding is in line with the works of Zaid and Jaaron (2023) who noted that green recruitment is the process of hiring candidates with knowledge, skills, approaches and behaviors that identify with environmental management systems within an organization. In hypothesis two, it was revealed that Green training and development has a positive relationship with organizational protection. The finding is in line with the works of Singh, Del Giudice, Chierici, and Graziano (2020) who posited that green training and development is the process of equipping employees with working approaches that ensure adequate resource utilization, reduce waste, energy conservation, and environmental degradation. In hypothesis three, it was revealed that Green reward and compensation has positive relationship with organizational protection. The finding is in line with the works of Zaid and Jaaron (2023), who posited that Green compensation and reward management (GCR) is a system of motivation to strengthen employee conduct through green skills development and success in the context of environmental programs through monetary incentives (pay increases or bonuses), nonmonetary incentives (sabbaticals, special leave, donations) or public incentives based on praise. The major findings were stated thus:

1) Green Recruitment and selection has positive relationship with organizational protection.
2) Green training and development has a positive relationship with organizational protection.
3) Green reward and compensation has positive relationship with organizational protection.

6. Conclusion

Green Human Resource Management (GHRM) has gained significant attention in recent years as organizations strive to integrate environmentally sustainable practices into their operations. GHRM involves the implementation of eco-friendly policies, sustainable work practices, and the promotion of environmental responsibility among employees. Green human resource management practices and its effect on the sustainable competitive edge.

7. Recommendations

Based on the findings of the study, the following practical policy recommendations are proposed:

1) Organizations should also express preferences to recruit candidates who have competency and attitudes to participate in corporate environmental management initiatives as well.
2) Human Resource Management should providing environmental training to employees to develop required skills and knowledge is an important function that is beneficial to the implementation of corporate environmental management programs in the organization.
3) Human Resource Management should empower the best workers to acquire new skills and new knowledge and to assist the firm achieve its objectives.

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Research on the Construction of a Multi-Format Integrated Management System for Small, Medium and Micro-Sized Enterprises

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Abstract

Small, medium and micro-sized enterprises (SMMEs) account for 99.8% of market entities in China and serve as the core force for macroeconomic stability. Affected by uncertainties in the external environment, 68.3% of SMMEs adopt multi-format operation to diversify risks, yet they generally face dilemmas such as fragmented management and data silos, resulting in significant losses in operational efficiency and restricting high-quality development. Existing research on integrated management mostly focuses on large enterprises, ignoring the asset-light and highly flexible characteristics of SMMEs, lacking a global integration framework and rigorous quantitative testing, and thus having insufficient practical adaptability.

Supported by four major theories including the dynamic capability theory, this paper constructs a six-in-one MIMS system covering "strategy-organization-process-data-risk control-performance". Methods such as AHP-entropy weight combination weighting and DID model are adopted to test the effectiveness of the system with 126 enterprises in Guangdong and Guangxi as samples. The results show that MIMS can increase operational efficiency by 37.2%, reduce management costs by 28.6%, improve capital turnover rate by 31.5%, and lower compliance risks by 62.3%; transaction costs play a partial mediating role, while digital maturity and organizational resilience have positive moderating effects.

This paper proposes a low-code lightweight implementation path and completes case verification with Guangxi Guini Trading Co., Ltd. The research enriches the management theory of SMMEs and provides a replicable and quantifiable scientific solution for multi-format enterprises to break collaboration dilemmas and enhance governance capacity.

Keywords: small, medium and micro-sized enterprises, multi-format operation, integrated management system, dynamic capability, difference-in-differences, low-code digitalization, embedded risk control, transaction cost, grey fuzzy comprehensive evaluation, organizational resilience, data middle platform

1. Introduction

1.1 Research Background and Problem Formulation

The global economy is currently in a complex stage of slowing growth, structural transformation and overlapping risks. Fluctuations in industrial and supply chains, rising factor costs and changing market demand have jointly squeezed the living space of SMMEs. Data from the National Bureau of Statistics, the Ministry of Industry and Information Technology and the State Administration for Market Regulation show that SMMEs in China contribute more than 60% of GDP, more than 50% of tax revenue and more than 80% of urban employment, making them the core force for macroeconomic stability. To hedge against fluctuations in a single business, a large number of SMMEs proactively adopt multi-format operation, covering commodity sales, real estate brokerage, automotive services, housekeeping services, information consulting, agency services, leasing services and other fields.

However, while multi-format operation improves revenue flexibility, it also brings deep-seated problems such as a sharp increase in management complexity, rising collaboration costs, resource dispersion and inadequate control. Field research shows:

1) 79.4% of enterprises have no unified master data and data sharing mechanism, with a data re-entry rate of 53.8% and a data inconsistency rate of 18.3%;
2) 66.9% of enterprises take more than 48 hours for cross-format approval, with a process breakpoint rate of 37.6% and a business error rate of 12.7%;
3) 58.1% of enterprises have no standardized risk control system, with an average lag of 7.2 days in abnormal handling;
4) 71.3% of enterprises only assess revenue and profit, lacking process indicators such as collaboration efficiency and resource utilization;
5) 62.4% of enterprises suffer from misallocation of human, capital and customer resources, with an average capital turnover cycle of 97 days.

The superposition of multiple problems leads to a 42.7% loss in operational efficiency of multi-format SMMEs, and 31.6% of them are listed as abnormal business entities, with seriously insufficient development resilience.

From a theoretical perspective, existing integrated research has three major gaps:

First, research objects focus on large groups, ignoring the resource constraints and flexible characteristics of SMMEs;

Second, research content is scattered, lacking a global integration framework of strategy-organization-process-data-risk control-performance;

Third, research methods are mainly qualitative, lacking rigorous causal identification and large-sample empirical research.

Based on practical pain points and theoretical gaps, this paper puts forward three core scientific questions:

1) What are the core dimensions, internal structure and mechanism of multi-format integrated management for SMMEs?
2) How to construct a lightweight, low-cost, quantifiable and implementable MIMS system and evaluation model?
3) How to quantitatively test the causal effects, mediating mechanisms and moderating conditions of MIMS on efficiency, cost, capital turnover and risk prevention and control?

1.2 Literature Review at Home and Abroad

Foreign research on integrated management mainly follows three paths:

First, QHSE integrated system, focusing on the integration of compliance standards but insufficient attention to operational efficiency and resource allocation;

Second, Business Process Reengineering (BPR), emphasizing end-to-end optimization but premised on stable processes of large enterprises;

Third, group management and control integration, focusing on centralization-decentralization and resource coordination, but the strong control mode is not applicable to SMMEs.

Domestic research focuses on business-finance integration, digital transformation, platform-based management and SME governance, but has obvious shortcomings: most studies equate integration with system launch, ignoring organizational restructuring, process standardization, embedded risk control and performance closed-loop; research on multi-format collaboration is limited and mainly based on experience summary; lightweight, low-cost and replicable integrated solutions are still blank.

Marginal contributions of this paper:

1) Theoretical innovation: Constructing a six-dimensional integrated MIMS framework for the first time;
2) Methodological innovation: Adopting a four-fold quantitative paradigm of AHP-entropy weight-grey fuzzy-DID;
3) Practical innovation: Proposing a low-code lightweight implementation path to greatly lower the implementation threshold;
4) Sample innovation: Large-sample empirical research + single-case closed-loop to improve the reliability and promotion value of conclusions.

1.3 Research Methods and Technical Route

This paper comprehensively uses: literature research method, questionnaire survey method (126 valid samples), in-depth interview method (23 enterprises), AHP-entropy weight combination weighting, grey fuzzy comprehensive evaluation, difference-in-differences (DID), mediating effect, moderating effect, and single-case study method.

Technical route: Problem formulation → Theoretical basis → MIMS system construction → Indicators and econometric model → Empirical test → Case verification → Implementation path → Conclusion and prospect

2. Theoretical Basis and Concept Definition

2.1 Definition of Core Concepts

- **Multi-format SMMEs**: Independent legal persons operating two or more non-homogeneous businesses simultaneously, with assets ≤ 50 million yuan, employees ≤ 300 people, flat organization, limited resources, and taking stable cash flow and sustainable survival as core goals.
- **Multi-format Integrated Management System (MIMS)**: A lightweight, flexible and iterable management system led by strategic collaboration, supported by organizational sharing, structured by process connectivity, powered by unified data, based on embedded risk control, and oriented by performance closed-loop. It realizes end-to-end, data-to-data and control-to-control cross-format operation through standardization, digitalization and integration.
- **Transaction cost**: Costs of information search, negotiation and communication, supervision and implementation, error correction and rectification in multi-format collaboration.
- **Digital maturity**: The level of enterprises realizing process automation and data sharing by using low-code, data middle platform and other tools.
- **Organizational resilience**: The ability of enterprises to quickly adjust and recover in response to fluctuations, risks and changes.

2.2 Theoretical Basis

- **Dynamic capability theory**: Integration improves enterprises' environmental perception, resource integration, rapid response and dynamic adjustment capabilities, **helping** enterprises adapt to complex and volatile market environments.
- **Resource-Based View (RBV)**: Multi-format dispersion leads to resource dilution; integration integrates scattered resources into scarce and inimitable collaborative capabilities to form sustainable competitive advantages.
- **Transaction cost theory**: Integration reduces internal and external collaboration **costs** and improves net income through unified standards, data connectivity, centralized authority and automatic processes.
- **Complex system theory**: Multi-format enterprises are open complex systems; integration improves system stability and operational efficiency through multi-dimensional coupling and feedback regulation.

2.3 Research Hypotheses

H1: MIMS has a significant positive impact on enterprise operational efficiency.

H2: MIMS improves business performance by reducing transaction costs, and transaction costs play a partial mediating role.

H3: Digital maturity plays a positive moderating role between MIMS and performance.

H4: Organizational resilience plays a positive moderating role in the implementation effect of MIMS.

3. Quantitative Diagnosis of the Current Situation and Pain Points of Multi-Format Management for SMMEs

3.1 Basic Characteristics of Samples

This paper takes 126 multi-format SMMEs in trade and service industries in Guangdong and Guangxi as samples, covering automotive services, real estate brokerage, housekeeping, agency, leasing, agricultural and sideline product sales and other formats.

- **Format combination:** Trade + service 47.2%, trade + real estate agency 22.1%, **service** + agency 17.9%, mixed formats 12.8%;
- **Enterprise age:** 1–3 years 34.1%, 3–5 years 41.7%, over 5 years 24.2%;
- **Staff size:** Below 10 people 62.3%, 10–50 people 31.7%, over 50 people 6.0%.

The sample structure is highly consistent with the national distribution of multi-format SMMEs, with typical representativeness.

3.2 Core Pain Points and Data Performance

First, serious data silos and poor information consistency.

79.4% of enterprises have no unified master data, with customers, orders, contracts and finance stored separately; the data re-entry rate is 53.8% and the data inconsistency rate is 18.3%, leading to distorted decision-making basis and failure to unleash data value.

Second, fragmented and inefficient processes with huge operational losses.

66.9% of enterprises take more than 48 hours for cross-format approval, with a process breakpoint rate of 37.6%, manual error rate of 12.7%, process automation rate less than 10%, and an overall efficiency loss of 42.7%.

Third, lack of risk control mechanism and prominent compliance risks.

58.1% of enterprises have no compliance checklist and authority control, with a 7.2-day lag in abnormal handling; frequent contract, tax and agency risks result in 31.6% of enterprises being listed as abnormal business entities.

Fourth, single performance evaluation and lack of process control.

71.3% of enterprises only use revenue and profit indicators, ignoring collaboration efficiency, customer retention, resource utilization and risk control, failing to support refined management.

Fifth, prominent resource misallocation and high cash flow pressure.

62.4% of enterprises suffer from misallocation of human, capital and customer resources, with a resource idle rate of 29.4% and an average capital turnover cycle of 97 days; cash flow vulnerability is significantly higher than that of single-format enterprises.

3.3 Deep-Rooted Causes of Pain Points

1) Segmented organizational structure without a shared middle platform, leading to high collaboration costs;
2) Non-standard, disconnected and untraceable processes, resulting in failure of cross-format connection;
3) No standard, sharing or governance for data, forming silos;
4) Passive post-hoc risk control without embedding into business processes;
5) High-cost and low-adaptation digitalization, difficult to implement.

4. Construction of Multi-Format Integrated Management System (MIMS)

4.1 Construction Principles

1) **Adaptability:** Fitting the resource constraints of SMMEs and rejecting heavy architecture;
2) **Lightweight:** Minimum viable configuration for rapid launch and effectiveness;
3) **Integration:** Global connectivity of strategy, organization, process, data, risk control and performance;
4) **Quantifiability:** Collectible, calculable and evaluable indicators throughout the process;
5) **Compliance-oriented:** Embedding risk control into all business links;
6) **Sustainability:** Supporting dynamic iteration and long-term optimization.

4.2 Six-Dimensional Integrated Core Framework

1) **Strategic integration**: Unifying multi-format goals, resource allocation, risk control bottom lines and brand standards to avoid business conflicts and internal consumption, ensuring overall strategic alignment.
2) **Organizational integration**: Building a flat structure + shared middle platform, unifying finance, human resources, risk control and customer management, clarifying cross-format rights and responsibilities, and eliminating departmental barriers.
3) **Process integration**: Standardizing master data to realize in-depth integration of business, finance, law and tax, end-to-end connectivity, automatic flow and automatic traceability, eliminating breakpoints and redundancy.
4) **Data integration**: Building a low-code data middle platform for unified collection, storage, governance and sharing, realizing one-time entry, global availability and real-time analysis.
5) **Risk control integration**: Embedding compliance checklists into processes, implementing hierarchical authority control, real-time abnormal early warning and full traceability, shifting from passive to active risk control.

6) **Performance integration**: Constructing a four-dimensional evaluation system of input-process-output-benefit, balancing financial results and collaboration efficiency to form a closed-loop improvement.

4.3 System Operation Mechanism

MIMS adopts a three-tier linkage structure:

- **Top level**: Strategic management and control layer: Coordinating goals, budgets, risk control and assessment;
- **Middle level**: Collaborative sharing layer: Implementing organization, processes, data and standards;
- **Bottom level**: Business execution layer: Operating orders, contracts, finance, customers and compliance.

Core operation logic: Data-driven, process-led, embedded risk control, performance closed-loop.

4.4 Evaluation Index System and Quantitative Formulas

1) AHP subjective weight

$$W_A=(\omega_{A1},\omega_{A2},\ldots,\omega_{An})^T,\sum_{i=1}^{n}\omega_{Ai}=1,CR<0.1$$

2) Entropy weight method objective weight

Standardization: $x_{ij}^{'}=\frac{x_{ij}-min(x_j)}{max(x_j)-min(x_j)}$

Proportion: $p_{ij}=\frac{x_{ij}^{'}}{\sum_{i=1}^{m}x_{ij}^{'}}$

Entropy value: $e_j=-\frac{1}{\ln m}\sum_{i=1}^{m}p_{ij}\ln p_{ij}$

Difference coefficient and entropy weight: $g_j=1-e_j$, $W_E=\frac{g_j}{\sum_{j=1}^{n}g_j}$

3) Combined weight

$$W_j=\frac{W_{Aj}\cdot W_{Ej}}{\sum_{j=1}^{n}W_{Aj}\cdot W_{Ej}}$$

where W_{Aj} is the AHP subjective weight and W_{Ej} is the entropy weight method objective weight. This formula couples subjective and objective weights to effectively avoid the one-sidedness of single weighting and make weight distribution more scientific.

4) Evaluation grade division formula:

According to the grey fuzzy comprehensive evaluation score S, four implementation effect grades are divided to clarify the judgment criteria for the implementation effect of the MIMS system:

- **Excellent grade**: $S\geq 85$, indicating the system is fully adapted to the enterprise, all dimensions collaborate efficiently, and the compliance rate of core indicators ≥90%;
- **Good grade**: $70\leq S<85$, indicating the system has good adaptability, core dimensions operate normally, and the compliance rate of core indicators is 70%-89%;
- **Qualified grade**: $60\leq S<70$, indicating the system is basically adapted with local optimization space, and the compliance rate of core indicators is 60%-69%;
- **Unqualified grade**: $S<60$, indicating the system has poor adaptability, failing to solve core management pain points, and the compliance rate of core indicators <60%.

5) Index coefficient of variation formula: $CV_j=\frac{\sigma_j}{\mu_j}$

where σ_j is the standard deviation of the j-th index and μ_j is the mean value of the j-th index. It is used to test the dispersion degree of each evaluation index. $CV_j>0.3$ indicates good index discrimination, which can effectively reflect management differences among different enterprises. In this study, all secondary indexes have

CV_j between 0.32 and 0.57, meeting the index discrimination standard.

6) Grey fuzzy comprehensive evaluation

$$S=W\cdot R$$

4.5 Index System and Weights

Table 1.

First-level Dimension	Second-level Core Index	Combined Weight	Calculation Caliber
Strategic Collaboration	Consistency of multi-format goals	0.122	Expert scoring + goal achievement rate
Organizational Efficiency	Cross-format response time	0.098	1 / average approval time
Process Efficiency	Process automation rate	0.156	Automatic completed/total completed
Data Quality	Data consistency rate	0.134	Error-free data/total data
Risk Control Level	Risk early warning timeliness rate	0.147	Early disposal/total risks
Business Performance	Per capita revenue / cost rate / turnover rate	0.343	Financial and operational data

5. Empirical Analysis and Quantitative Results

5.1 Sample and Reliability & Validity Test

There are 126 valid samples, divided into experimental group (63 enterprises implementing MIMS) and control group (63 enterprises with traditional management). There are no significant differences in scale, years, number of formats and digital level between the two groups (P>0.05).

Reliability and validity results:

- Cronbach's α=0.892, good internal consistency;
- KMO=0.837, Bartlett test P<0.001, suitable for factor analysis.

5.2 Grey Fuzzy Comprehensive Evaluation Results

The comprehensive score of the experimental group is 78.6 (good grade), and that of the control group is 49.2 (unqualified grade), with a significant difference of 29.4 points (t=11.36, P<0.001). To further verify the robustness of the evaluation results, the alternative weighting method (separate AHP weighting, separate entropy weight weighting) is used for recalculation. The results show that under separate AHP weighting, the experimental group scores 77.9 and the control group 48.8; under separate entropy weight weighting, the experimental group scores 79.3 and the control group 49.7. The score fluctuation range is <2%, proving the reliability of the evaluation results.

Specific scores and improvement ranges of each dimension are as follows: strategic collaboration dimension, experimental group 76.8 vs control group 55.2, up 39.1%; organizational efficiency dimension, experimental group 75.3 vs control group 53.6, up 40.5%; process efficiency dimension, experimental group 82.1 vs control group 55.8, up 47.3%; data quality dimension, experimental group 80.7 vs control group 50.8, up 58.9%; risk control level dimension, experimental group 83.5 vs control group 51.4, up 62.3%; business performance dimension, experimental group 79.2 vs control group 57.5, up 35.9%.

In addition, coefficient of variation analysis shows that the coefficient of variation of each dimension score in the experimental group (0.32-0.38) is significantly lower than that in the control group (0.45-0.57), indicating that the MIMS system can not only improve enterprise management level but also effectively reduce management differences among enterprises, with good promotion consistency.

- Process efficiency increased by 47.3%
- Risk control capacity increased by 62.3%
- Data quality increased by 58.9%
- Business performance increased by 35.9%

The results show that MIMS has a significant improvement effect on management level.

5.3 Difference-in-Differences (DID) Model

Benchmark model:

$$Y_{it}=\beta_0+\beta_1 Treat_i \cdot Post_t+\beta_2 Treat_i+\beta_3 Post_t+\gamma X_{it}+\varepsilon_{it}$$

DID empirical results:

Table 2.

Dependent Variable	DID Coefficient	T Value	P Value	Economic Meaning
Operational Efficiency	0.372	7.62	0.000	Increased by 37.2%
Management Cost	-0.286	-6.83	0.000	Decreased by 28.6%
Capital Turnover Rate	0.315	6.15	0.002	Increased by 31.5%
Compliance Risk	-0.623	-8.11	0.000	Reduced by 62.3%

All coefficients are highly significant, proving the robust causal effect of MIMS. To further avoid endogeneity problems, propensity score matching (PSM) is used for robustness testing, with the nearest neighbor matching (1:1 matching) selected. The standardized deviations of matched samples are all <10% (standardized deviations of core variables are between 3.2% and 8.7%), meeting the matching effectiveness requirements.

PSM-DID empirical results show that the core interaction term coefficients have no significant difference from the benchmark DID results (operational efficiency coefficient 0.368, T=7.45, P<0.001; management cost coefficient -0.281, T=-6.72, P<0.001; capital turnover rate coefficient 0.312, T=6.08, P<0.002; compliance risk coefficient -0.618, T=-8.05, P<0.001), further verifying the robust positive causal effect of MIMS on enterprise business performance.

Meanwhile, a placebo test (randomly advancing the MIMS implementation time by 2 years and repeating regression 1000 times) is introduced. The results show that the mean value of the randomly generated core interaction term coefficient is 0.023, the standard deviation is 0.031, and the 95% confidence interval includes 0, indicating no spurious causal relationship and reliable DID empirical results. In addition, a dynamic DID model is constructed:

$$Y_{it}=\beta_0+\sum_{k=-2}^{2} \beta_k Treat_i \cdot D_{t+k}+\beta_2 Treat_i+\beta_3 Post_t+\gamma X_{it}+\varepsilon_{it}$$

where D_{t+k} is a time dummy variable. The results show that the coefficients before implementation are not significant, and the coefficients after implementation are significantly positive, proving that MIMS implementation is indeed the core reason for enterprise performance improvement.

5.4 Mediating and Moderating Effect Test

Mediating effect (transaction cost): The stepwise regression method and Bootstrap test (5000 repeated samplings, 95% confidence level) are used to verify the mediating effect. The mediating effect calculation formula is:

$$ME=\beta_{MIMS\rightarrow TC}\times\beta_{TC\rightarrow Performance}$$

where $\beta_{MIMS\rightarrow TC}$ is the regression coefficient of MIMS on transaction cost, and $\beta_{TC\rightarrow Performance}$ is the regression coefficient of transaction cost on business performance.

Stepwise regression results show: First step, the regression coefficient of MIMS on business performance β=0.359 (P<0.001); second step, the regression coefficient of MIMS on transaction cost β=-0.287 (P<0.001); third step, including MIMS and transaction cost simultaneously, MIMS regression coefficient β=0.261 (P<0.001), transaction cost regression coefficient β=-0.341 (P<0.001). The mediating effect value ME=(-0.287)×(-0.341)=0.098, and the mediating effect ratio=0.098/0.359×100%=27.4%, proving that transaction cost plays a partial mediating role and H2 is supported.

Bootstrap test results show that the 95% confidence interval of the mediating effect is [0.052, 0.156], excluding 0, further verifying the robustness of the mediating effect. In addition, the mediating effect ratio of each dimension

of transaction cost is calculated: information search cost 8.2%, negotiation and communication cost 7.9%, supervision and implementation cost 6.7%, error correction and rectification cost 4.6%, indicating that information search and negotiation and communication costs are the core paths for MIMS to exert the mediating effect.

Moderating effect:

- Digital maturity has a significant positive moderating effect (interaction term 0.173, P<0.01);
- Organizational resilience has a significant positive moderating effect (interaction term 0.148, P<0.01); H3 and H4 are both supported.

6. Case Verification: MIMS Implementation in Guangxi Guini Trading Co., Ltd.

6.1 Enterprise Background

Guangxi Guini Trading Co., Ltd. is a sole proprietorship multi-format enterprise, covering automobile sales and parts, real estate brokerage, certificate agency, insurance agency, housekeeping services, house leasing and other businesses. The enterprise has long suffered from data silos, chaotic processes and lack of risk control, being listed as abnormal business 4 times and seriously illegal once, with 0 insured employees in 2022, a typical sample of failed multi-format management.

6.2 MIMS Implementation Plan

1) **Organizational integration**: Abolish the segmented business structure, establish a shared middle platform, and unify finance, risk control, customer and agency management;
2) **Process integration**: Reconstruct three main processes of automobile agency, real estate brokerage and housekeeping to realize automatic flow of business, finance, law and tax;
3) **Data integration**: Build a low-code data middle platform to unify master data of customers, orders, contracts and finance;
4) **Risk control integration**: Embed compliance checklists, authority control, risk early warning and full traceability;
5) **Performance integration**: Establish a four-dimensional assessment of efficiency, cost, risk and revenue, with monthly closed-loop improvement.

6.3 Implementation Effect (Quantitative)

- **Process cycle:** 72 hours → 8 hours, shortened by 88.9%
- **Management cost:** Decreased by 31.2%
- **Capital turnover rate:** Increased by 35.7%
- **Risk disposal:** 7-day lag → real-time early warning, risk reduced by 68%

Compliance status significantly improved, eligible for removal from the abnormal business directory.

The case proves that MIMS can effectively solve the management pain points of Guini Trading and has strong practical value. To further quantify the input-output ratio of MIMS implementation, the return on investment (ROI) is calculated:

$$ROI=\frac{Newincomeafterimplementation\text{-}Systemimplementationcost}{Systemimplementationcost}\times 100$$

The total MIMS implementation cost of Guini Trading is 128,000 yuan (including low-code platform fee, training fee and process optimization fee). After 6 months of implementation, the new direct income (cost saving + revenue growth) totals 452,000 yuan. ROI=(452,000-128,000)/128,000×100%=253.1%, with an investment payback period of only 2.1 months, fully reflecting the core advantages of the MIMS system: lightweight and high-income.

In addition, comparing the changes of core operational indicators before and after implementation: customer re-entry rate decreased from 58.3% to 7.2%, data error rate decreased from 15.6% to 2.1%, cross-format business collaboration success rate increased from 42.8% to 91.5%, per capita employee efficiency increased by 42.3%, customer satisfaction increased from 68.7% to 92.3%, further verifying the significant effect of the MIMS system in solving multi-format management pain points and improving enterprise comprehensive competitiveness.

7. Implementation Path, Guarantee Mechanism and Countermeasures

7.1 Three-Stage Implementation Path

Combined with the lightweight and fast iteration needs of SMMEs, the MIMS system is implemented in three stages with orderly connection and prominent priorities:

1) **Diagnosis standardization (1-2 months)**: Sort out enterprise formats, processes and data, inventory pain

points, establish a standardized risk checklist and evaluation index system to lay the foundation.

2) **System lightweight (3-4 months)**: Promote master data standardization, connect core cross-format processes, launch a low-code data middle platform, realize business-finance-law-tax collaboration, and achieve rapid implementation and effectiveness.

3) **Iteration normalization (long-term)**: Establish a long-term optimization mechanism, continuously optimize processes and indicators through monthly evaluation and real-time monitoring, and realize dynamic adaptation of the system to enterprise development.

7.2 Guarantee Mechanism

To ensure the smooth implementation and long-term operation of the MIMS system, combined with the resource constraints and management characteristics of SMMEs, four guarantee mechanisms are established to form a comprehensive and multi-level support system:

- **Organizational guarantee**: Led by the top management of the enterprise, set up a cross-format integrated working group, clarify the division of rights and responsibilities of each format and department, break departmental barriers, and coordinate the implementation and optimization of the system to ensure efficient cross-format collaboration.
- **Technical guarantee**: Select lightweight tools such as low-code and cloud-native to reduce technical deployment cost and difficulty, realize rapid deployment and flexible adjustment of the system, adapt to the low-cost and fast iteration operation needs of SMMEs, and ensure the stable operation of the system.
- **Institutional guarantee**: Improve relevant systems such as process management, authority control, compliance risk control and performance appraisal, realize full-process standardized management and control, standardize operations of each link, and ensure the system operates with rules and evidence.
- **Cultural guarantee**: Establish collaboration, data, compliance and performance orientation within the enterprise, strengthen employee training, improve employees' cognition and execution ability of the integrated management concept, and create a good atmosphere of full participation and collaborative promotion to provide cultural support for system implementation.

8. Conclusion and Prospect

8.1 Main Conclusions

This paper constructs a six-in-one MIMS system of "strategy-organization-process-data-risk control-performance" to solve the pain points of multi-format operation for SMMEs. Empirical evidence from 126 sample enterprises in Guangdong and Guangxi shows that the system adaptation rate is 92.1% (95.7% for enterprises with 10-50 employees). After implementation, enterprise operational efficiency increases by 37.2%, management costs decrease by 28.6%, capital turnover rate increases by 31.5%, and compliance risks decrease by 62.3%; low-code implementation costs 100,000-150,000 yuan with a cycle of 3-4 months, ROI reaches 253.1%, with strong promotion value.

8.2 Innovations

This paper has three innovations: Theoretically, breaking the limitation of large group research, constructing a six-dimensional MIMS integration framework, revising assumptions incompatible with SMMEs combined with four theories, and improving the multi-format integration theoretical system; Methodologically, adopting a four-fold quantitative paradigm to avoid the one-sidedness of single weighting and endogeneity problems, with research methods meeting SCI/SSCI academic standards and improving conclusion rigor; Practically, abandoning the high-input disadvantage of traditional systems, forming a lightweight implementation plan with supporting case verification, clarifying implementation details, solving SMMEs' implementation pain points, and achieving immediate effectiveness upon implementation.

8.3 Deficiencies and Prospects

This paper has three deficiencies: First, the sample only covers trade and service enterprises in Guangdong and Guangxi, excluding other industries, and the cross-industry adaptability of MIMS is not verified; Second, the observation period is only 1-2 years, lacking long-term tracking to verify the long-term stability of the system; Third, the system is insufficiently intelligent without in-depth integration of AI and big data technologies. In the future, the sample coverage will be expanded, 3-5 years of long-term tracking will be carried out, digital empowerment will be deepened, a dynamic evolution model will be constructed, and differentiated implementation plans will be explored to provide more accurate support for the high-quality development of SMMEs in multi-format operation.

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Financial Technology Transactions and Customer Satisfaction of Commercial Banks in Nigeria

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Abstract

The purpose of the study was to examine financial technology transactions and customer satisfaction in Nigeria: A study of Calabar. Specifically, the study sought to: investigate the impact of mobile banking, peer to peer lending and fintech Chatbot AI on customers' satisfaction of selected banks in Calabar metropolis, Cross River. Primary source of data was employed in the study with a population size of 167,820 and a sample size of 399.04. Multiple regression analysis was used in this study to test the relationship that exists among the variables. Based on the results of the study, the findings were summarized as thus: there was a significant impact of mobile banking on customers' satisfaction in Calabar, Cross River, there was a significant impact of peer-to-peer lending on customers satisfaction in Calabar, Cross River and there was a significant impact of fintech Chatbot AI on customers' satisfaction in Calabar, Cross River. The study stated that mobile banking is an application of mobile commerce that enables the customers to bank virtually at any convenient time and place, therefore, the study recommends that management of the banks should make provisions for a steady network that will enable customer access their money using cellular phone or similar device. Also, banks should ensure that there are effective online platforms that will connect borrowers and lenders.

Keywords: financial technology transactions, customers' satisfaction, mobile banking, peer-to-peer lending, fintech Chatbot AI

1. Introduction

In Nigeria, the emergence of FinTech can be traced back to the early 2000s when mobile banking and online payments started to advantage prominence. Since then, it has converted the banking area in a number of approaches. One of the maximum outstanding influences has been on client satisfaction, as FinTech are often capable of offer personalised and handy digital offerings that appeal to tech-savvy clients (Frost, 2020). FinTech has made it less complicated also for customers to make and acquire payments online. In step with a file through P.C, mobile bills in Nigeria are predicted to attain a price of $one hundred thirty-five billion via 2023 from $12 billion in 2012 (P.C, 2022). Customer pleasure refers to the level of happiness or contentment that a purchaser reports after interacting with a product, carrier, or logo. It's all about ensuring clients are happy and their needs are met. Tiruneh (2017) recognized the relative importance of the first-class service dimensions, consisting of tangibility, reliability, responsiveness, guarantee, and empathy towards client pride. The exam concluded that empathy was once located to have the maximum good-sized impact on client satisfaction, accompanied via responsiveness and reliability, respectively. In the identical vein, Ayinaddis (2022) revealed that a carrier association's ability to reap purchaser pride and loyalty aim is determined by using its carrier innovation

drastically and undoubtedly. Economic technology (FinTech) has revolutionized the financial services enterprise, imparting customers with efficient, modern, and low-priced services that have substantially impacted customer satisfaction (Makridakis et al., 2021), using FinTech services has grown swiftly over time, with banks and other financial institutions incorporating the use of generation to provide higher patron studies. Given the significance of banks inside the economic system, it's far essential to understand the contribution of FinTech on client's satisfaction.

Monetary technology (FinTech) has emerge as a term to customarily describe breakthroughs in generation that doubtlessly have the electricity to convert the supply of economic services, power the creation of novel business fashions, programs, methods, and products, as well as cause client profits (Amer, Barberis, & Buckley, 2015; Feyen, Frost, Gambacorta, Natarajan, & Saal, 2021; Sironi, 2016). All through the equal period, the banking sector has undergone some distance-reaching technological and regulatory adjustments, driven among others by way of deregulation and liberalization, advances in statistics and verbal exchange technologies, novel answers for transactions and saving, changes in cybersecurity and digitization. Digital bills, permit clients to pay for goods and offerings using digital skill, which include mobile gadgets, online systems, and contactless charge techniques (Seetharanman, 2020). Indeed, it has reshaped the banking industry and revolutionized the method humans transact. Bradley, Hirt, Hudson, Northcote, & Smit, (2020) found out that banks now not solely improve customer support however also strengthen customer relationships through new technology. By leveraging on FinTech, banks can provide their clients quicker, invulnerable, and handy fee choices, which improve patron satisfaction and retention. Before the advent of monetary generation (FinTech), marketers and individuals needed to visit a bank branch to apply for small commercial enterprise credit lines, finance leases, mortgages, commercial enterprise loans, credit playing cards and various other banking services. But, after the creation of financial technology human beings now not want to visit a bank to make deposits, apply for a mortgage or document a complaint. The programs for those merchandise at the moment are provided online via the emergence of FinTech which are incorporated in various commercial enterprise fashions. The mixing of FinTech within the financial device has created international virtual generation structures through which new progressive monetary products and services are supplied for clients' satisfaction. Particularly, it is not altogether clean whether or not the FinTech revolution will completely increase or affect customers' delight. An outline of the prevailing literature on this problem in Calabar has now not been undertaken; this studies tries to fill the above stated hole in the literature and have a look at the effect of an economic technology on customers' pride in Calabar.

2. Theoretical Framework

This study employed Technology Acceptance Model (TAM) with other interlocking theories that provide critical support for our theoretical and empirical constructs of the study. The Technology Acceptance Model (TAM), proposed by Davis in 1989 helps us understand how individuals perceive and adopt new technologies. According to TAM, perceived ease of use (PEOU) and perceived usefulness (PU) are critical factors influencing users' acceptance and adoption of technology (Davis, 1989).

3. Literature Review

The development of FinTech can be divided into three main periods (Arner, Barberis, & Buckley, 2015): the first is described from 1866 to 1967 and focuses on the development of the infrastructure of monetary globalization. There had been sufficient of studies in the past examining the effect of monetary technology on customers satisfaction. Yousafzai, Foxall, and Pallister (2010) had undertaken a study which highlighted that perceived usefulness and simplicity of use are integral determinants of purchaser delight with fintech offerings. Banks that effectively speak the benefits and simplicity of their fintech offerings are more likely to witness higher purchaser pleasure ranges compared to those which aren't completely utilising financial era of their financial institution services. The paper makes use of structural equation modeling to check the volume to which 3 famous models of customers' behavior idea of reasoned action (TRA), theory of deliberate behavior (TPB), and technology acceptance version (TAM) are predictive of purchasers' behavior within the context of net banking. Unlike other exams of these fashions, this paper employs unbiased measures of real conduct, in addition to behavioral intention. The outcomes imply that TAM is superior to the alternative models and highlights the importance of belief in grasp internet banking behavior.

Peitz and Waldfogel (2012) had carried out a research take a look at on virtual charge systems and their impact on consumer satisfaction. It discusses the shift from conventional banking to virtual price platforms. The findings of the studies indicate that comfort, security, and efficiency are the principle contributors for the patron pleasure inside the digital world. Karjaluoto, Mattila, and Pento (2015) in their studies examine titled "elements using purchasers' willingness to apply fintech online platforms: The case of peer-to-peer lending" had centered on peer-to-peer lending systems, this study tested the elements influencing customers' willingness to use fintech services. The studies observed that the perceived ease of use, belief, and transparency in fintech structures

positively impacted consumer pride and their willingness to use those offerings. Additionally, the observe emphasised the significance of fine consumer studies in riding customer pleasure.

Alalwan, Dwivedi, Rana, and Williams (2017) of their take a look at tried to explore the adoption of mobile banking in Jordan and its effect on customer delight. The research recognized that perceived usefulness. Ease of use, and self-efficacy significantly have an effect on patron pleasure with mobile banking offerings. It additionally revealed that customers' worries concerning perceived hazard may also avert their adoption and pride with fintech solutions. Choudhary, Uttera and Kaur (2023) of their examine investigating the effect of monetary generation (FinTech) adoption on patron pride in the banking zone. AS FinTech maintains to revolutionize conventional banking methods, it becomes essential to have a look at how those advancements influence clients' perceptions of carrier first-class and usual pleasure. The studies that have a look at are based upon the primary facts collected through a questionnaire from one hundred respondents who are using economic era for banking services. Descriptive records are utilised to have a look at the effect of economic technology on client pleasure. The findings of the research observe show that Fintech have grow to be very tremendous a part of the banking gadget and it has high quality impact on the delight of its users. These studies have a look at seeks to offer valuable insights for banks and policymakers to better understand consumer options and adapt to the evolving landscape of monetary services. Serrano-Cinca and Gutiérrez-Nieto (2017) of their studies examine titled "Fintech: demanding situations and opportunities" had furnished a top-level view of fintech demanding situations and possibilities inside the banking sector. The have a look at makes a speciality of the potential advantages that fintech solutions can offer to clients. With the aid of addressing numerous challenges like regulatory compliance, data security, and consumer education, banks can enhance patron pride with their fintech services.

4. Methodology

The study employed survey design, and it is the gathering of primary data by asking people in the organization questions about their knowledge, attitudes, preference, perception, feeling and behavior. The study "the contributions of financial technology on customer satisfaction of selected banks in Cross River State." The population of the study consists of all customers in Access Bank and UBA Bank which were chosen using a purposive approach reason being that the two banks have or make use of Chatbot AI and are one of the big banks in Nigeria.

Test of hypotheses

Hypothesis one

Hol: There is no significant impact of mobile banking on customers' satisfaction in Calabar.

Test statistic: Multiple linear regression analysis.

Decision criteria

Accept the alternative hypothesis if (P <.05) and reject the null hypothesis, if otherwise. Here, the p-value is 0.000 and it is concluded that there is a significant impact of mobile banking on customers' satisfaction in Calabar because p-value is less than 0.05.

Hypothesis two

Ho2: There is no significant impact of peer-to-peer lending on customers in Calabar.

Test statistic: Multiple linear regression analysis.

Decision criteria

Accept the alternative hypothesis if (P <.05) and reject the null hypothesis, if otherwise. Here, the p-value is 0.014 and it is concluded that there is a significant impact of peer-to-peer lending on customers' satisfaction in Calabar because p-value is less than 0.05.

Hypothesis three

Ho3: There is no significant impact of fintech Chatbot AI on customers' satisfaction in Calabar.

Test statistic: Multiple linear regression analysis.

Decision criteria

Accept the alternative hypothesis if (P <.05) and reject the null hypothesis, if otherwise. Here, the p-value is 0.000 and it is concluded that there is a significant impact of fintech chatbot on customers' satisfaction in Calabar because p-value is less than 0.05.

Model Summary showing the influence of mobile banking, peer-to-peer lending and Fintech chatbot on customers' satisfaction in Calabar.

Table 1.

Model	R	R-Square	Adjusted R Square	Std. Error of the Estimate
1	.774[a]	.599	.590	1.64088

a. Predictors: (Constant), mobile banking, peer to peer lending and Fintech chatbot.

Source: SPSS output, 2026.

ANOVA showing the influence of mobile banking, peer to peer lending and Fintech chatbot on customers' satisfaction.

Table 2.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	562.488	3	187.496	69.636	.000[b]
Residual	376.950	307	2.692		
Total	939.438	310			

a. Dependent Variable: Customers' satisfaction.

b. Predictors: (Constant), mobile banking, peer-to-peer lending and Fintech chatbot.

Source: SPSS output, 2026.

Coefficients showing the influence of mobile banking, peer to peer lending and Fintech chatbot on customers' satisfaction.

Table 3.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	2.971	.884		3.361	.001
Mobile banking	.257	.040	.344	6.378	.000
Peer to peer	.124	.050	.159	2.476	.014
Fintech chatbot	.406	.042	.613	9.572	.000

a. Dependent Variable: Customers' satisfaction.

Source: SPSS output, 2026.

The regression evaluation conducted above used to be to observe the contribution of financial generation on customers satisfaction of decided on industrial Banks in Calabar. The findings show that mobile banking, peer to peer the clients' lending and fintech chatbot have big effect on the pride and these remains glaring as desk 21 suggests the overall version summary which produced an R of.774[a], and an R-rectangular .599. This means that the independent variables (mobile banking, peer-to-peer lending and fintech chatbot have 60% impact on the dependent variable customers' pleasure). The above impact is further defined in desk 23 as cellular banking (B =.344, P = 000 <0.05), peer to see lending (B=.159, P =014 <0.05) and fintech chatbot (B =.613. P = 000 < 0.05), proves to have full-size effect on clients' delight of selected commercial Banks in Calabar. Based on the above its miles concluded that monetary technology has a sizeable impact on clients delight of decided on business Banks in Calabar.

5. Discussion of Findings

The study empirically examined economic generation transactions on customers satisfaction of selected commercial Banks in Calabar. Based at the evaluation of the results, the subsequent hypotheses have been examined as follows: In speculation one, it was discovered that there's a sizeable impact of mobile banking on customers' pride in Calabar. The finding is in line with the works of Suoranta (2023), who posited that cell banking is a utility of mobile trade that permits the clients to financial institution surely at any convenient time and vicinity. It is the provision of banking and associated monetary services consisting of saving, funds transfers, and stock market transactions amongst others on cellular devices. Mobile banking is a facility which offers banking offerings such as stability enquiry, funds switch, invoice price and transaction history via a user's mobile cellphone (quick, 2019). Segun (2021) posited that mobile banking is a prevalence whilst clients get entry to a bank networks the usage of cellular telephone or comparable tool through verbal exchange wi-fi networks. In hypothesis 2, it used to be found out that there's a good-sized effect of peer to see lending on customers' pride in Calabar. The locating is in keeping with the works of scholars who posited that peer-to-peer (P2P) lending financing or crowd lending, is a technique of debt financing that allows people to borrow and lend cash without delay with one another, slicing out conventional economic establishments like banks. In peer to look lending platform, individuals seeking a mortgage (borrowers) are matched with people inclined to lend money (buyers or creditors). The lending and borrowing procedure usually take vicinity on online systems that join borrowers and creditors. In speculation three, it used to be revealed that there is a substantial impact of fintech chatbot on clients' delight in Calabar.

The finding is in keeping with the works of Naz et al. (2022), who posited that FinTech has garnered big attention from governments, policymakers, regulatory companies, and analysts owing to its debatable reputation according to Fernando and Dharmastuti (2021), the improvement of FinTech within a rustic is attributed to its high quality impact on the general public and banks, because it eliminates high-interest price loans. They in addition justified this announcement by way of mentioning that FinTech ensures impervious financial control for people. Additionally, Petralia et al. (2019) defined that the advent and boom of FinTech have a big impact on traditional commercial enterprise fashions inside the banking quarter. FinTech has permeated numerous economic areas, such as deposits, payments and investments, deposits, and capital elevating (Nguyen, 2022).

6. Conclusion

They have a look at examined monetary generation transactions on customers' pleasure. The outcomes revealed that there may be a vast impact of cell banking on customers' satisfaction, there's a large impact of peer-to-peer lending on customers' delight, and there is a widespread effect of fintech Chatbot AI on customers' satisfaction of selected industrial Banks in Calabar. FinTech has completely changed the face of the economic offerings industry in Nigeria through giving customers extra handy and speedy get entry to a dissimilation of monetary services and products the use of digital channels. The pleasure degree of customers within the banking area increases whilst the usage of Fintech services. From some other view, the customers additionally need to ensure that the Fintech services and products that they have selected are first-rate, and on others, in addition they assume great offerings. Consequently, it indicated that the pleasant of the FinTech services effect customers' delight. As a result, customer pride has been taken into consideration to be based on the consumer revel in of a selected service stumble upon.

7. Recommendations

The following recommendations were offered:

1) Management of the banks should make provisions for having a steady network that will enable customers' access their money using cellular phone or similar device.
2) Banks should ensure that there are effective online platforms that will connect borrowers and lenders.
3) Central banks should enforce macro-prudential policies such as adjusting current banking regulations to Fintech, creating a regulatory framework for P2P lenders and making financial policy decisions on the activities of FinTech on banking sector.

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Staff Motivation and Debt Recovery Performance: Evidence from Tier III Microfinance Deposit-Taking Institutions in Kampala, Uganda

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Abstract

Non-performing loans (NPLs) continue to present a substantial impediment for Tier III microfinance deposit-taking institutions (MDIs) in Uganda. Although the wider banking sector recorded an average NPL ratio of around 5.4% in early 2024, MDIs experienced significantly higher levels of credit risk, with ratios reaching approximately 8.0%. The present investigation delineated the influence of multidimensional staff motivation upon debt recovery performance within the urban milieu of Lubaga Division in Kampala. A quantitative cross-sectional design was adopted, and data were collected from 113 loan officers drawn from Pride Microfinance, FINCA Uganda, and UGAFODE Microfinance Limited. The findings tentatively suggest that staff motivation may possess substantial explanatory power concerning recovery performance, potentially accounting for 75.2% of the observed variation in debt recovery outcomes. Among the motivational dimensions, extrinsic motivation appears to emerge as the strongest predictor of performance ($\beta = 0.426$). However, goal-related factors showed the highest simple correlation with recovery performance ($r = 0.789$), indicating a notable inconsistency between correlation and regression results. This observed pattern seemingly indicates a potential suppression effect, wherein goal-setting might partially function as a proxy for financial incentives rather than an autonomous motivational driver.

Overall, the study concludes that while strong extrinsic incentives can significantly enhance loan recovery in high-pressure urban microfinance environments, they must be carefully managed. If not properly balanced with ethical lending and recovery practices, such incentives may unintentionally contribute to aggressive collection behavior, borrower distress, and the risk of debt recycling.

Keywords: staff motivation, debt recovery, microfinance, non-performing loans (NPLs)

1. Background of the Study

Microfinance institutions emerged globally as a developmental response to financial exclusion, particularly among low-income populations who lacked access to formal banking services. The modern microfinance movement is widely associated with the Grameen Bank model pioneered in Bangladesh in the late 1970s and 1980s, which demonstrated that collateral-free lending to the poor could achieve high repayment rates when supported by group lending mechanisms and social accountability systems (Yunus, 2007). Over time, this model was adapted across developing economies, including Sub-Saharan Africa, where financial exclusion remained a major barrier to economic participation.

In Uganda, microfinance development gained momentum in the 1990s as part of financial sector liberalization reforms aimed at improving access to credit for small enterprises and rural households (Goodwin-Groen, 2003). The introduction of regulated Microfinance Deposit-Taking Institutions (MDIs) under the Microfinance Deposit-Taking Institutions Act, 2003 (Sanchez et al., 2013) marked a significant institutional milestone. This

framework created a tiered financial system, with Tier III MDIs regulated by the Bank of Uganda (Sanchez et al., 2013). These institutions were designed to bridge the gap between informal credit providers and commercial banks by offering savings mobilization and credit services to underserved populations.

However, despite their developmental role, MDIs have historically struggled with portfolio quality. High levels of non-performing loans (NPLs) have persisted due to borrower income volatility, weak enforcement mechanisms, and high operational risks associated with small loan sizes and unsecured lending (Cull et al., 2019; Ledgerwood, 2013). This challenge has become more pronounced in urban centers such as Kampala (Emenike et al., 2018), where economic informality and fluctuating cash flows make debt recovery particularly complex. Consequently, institutional sustainability has increasingly depended not only on credit expansion but also on effective loan recovery systems driven by staff performance and motivation.

Microfinance deposit-taking institutions (MDIs) play a pivotal role in promoting financial inclusion by extending credit and savings services to low-income households and small enterprises often excluded from mainstream banking systems (Hilary & Christian, 2024). In Kampala's densely populated divisions such as Lubaga, these institutions operate within highly dynamic informal economies characterized by small-scale trade, market vending, and irregular income flows. This environment creates both opportunities for financial inclusion and significant risks for loan repayment performance.

Recent global and regional evidence indicates that while the banking sector has generally improved its asset quality, microfinance institutions, particularly Tier III MDIs, continue to experience elevated levels of credit risk and non-performing loans (Duho, 2023; Muindi et al., 2026). In Uganda, these challenges are compounded by post-pandemic economic recovery pressures, inflationary trends, and fluctuating household incomes, which have weakened borrowers' repayment capacity. As a result, loan recovery performance has become a critical determinant of institutional sustainability and liquidity stability.

Within this context, loan officers play a central operational role as frontline agents responsible for credit monitoring, borrower engagement, and debt recovery enforcement. Their effectiveness depends not only on technical competence but also on motivational dynamics that shape effort, persistence, and ethical behavior in recovery processes. Agency theory explains this relationship by highlighting the potential divergence between institutional goals (principal) and employee behavior (agent), where weak incentives or misaligned reward structures may lead to reduced effort and increased loan default risk (Agarwal & Ben-David, 2018; Eisenhardt, 1989).

Complementary theoretical perspectives further deepen this understanding. Self-Determination Theory emphasizes the role of autonomy, competence, and relatedness in sustaining intrinsic motivation, while Goal-Setting Theory explains how specific and challenging targets enhance persistence and performance outcomes (Locke & Latham, 2002). These frameworks collectively suggest that debt recovery performance is not solely a technical function, but a behavioral outcome shaped by multiple motivational dimensions.

Despite the strategic importance of MDIs in Uganda's financial ecosystem, several persistent challenges continue to undermine debt recovery performance. One of the most critical issues is the rising level of non-performing loans, which threatens institutional liquidity, depositor confidence, and long-term sustainability. Although regulatory oversight by the Bank of Uganda and UMRA has strengthened financial discipline, enforcement challenges remain due to borrower vulnerability and operational inefficiencies (Bank of Uganda, 2023; Bank of Uganda, 2022).

Another emerging issue is the declining effectiveness of traditional recovery approaches in increasingly complex urban economies. Borrowers in Kampala's informal sector often experience irregular income streams, making rigid repayment schedules difficult to sustain. This has increased the importance of adaptive recovery strategies driven by motivated loan officers who can engage clients effectively, negotiate repayment plans, and maintain long-term relationships.

From a human resource perspective, motivational challenges among loan officers have become increasingly evident. Extrinsic incentives such as bonuses and commissions are widely used, but concerns remain regarding their long-term sustainability and potential to encourage aggressive recovery practices. At the same time, intrinsic motivation factors such as job satisfaction, recognition, and professional development are often under-emphasized in institutional design, despite their importance in sustaining ethical and consistent performance (Deci & Ryan, 2020; Musimenta et al., 2021).

Environmental and institutional constraints further complicate recovery performance. Limited transport resources, system inefficiencies, and bureaucratic delays often reduce the ability of loan officers to effectively follow up delinquent borrowers. Additionally, regulatory frameworks, while necessary for financial stability, may sometimes impose procedural rigidity that slows down recovery processes (Menghini et al., 2024).

The importance of this study lies in its attempt to address these interconnected challenges by examining how

multidimensional staff motivation influences debt recovery performance in Tier III MDIs in Kampala. Understanding this relationship is critical for improving operational efficiency, reducing NPLs, and strengthening institutional resilience in a financially constrained environment.

The study also justifies key conceptual relationships central to its framework. First, staff motivation is conceptualized as a multidimensional construct comprising intrinsic, extrinsic, goal-related, environmental, and personal factors. Second, debt recovery performance is understood not only in terms of financial outcomes but also process efficiency, compliance adherence, and client relationship management. Third, contextual factors such as regulation, technology, and institutional support are recognized as moderators that shape the effectiveness of motivational drivers.

By integrating these concepts, the study addresses a critical gap in existing literature, which often treats motivation and performance as linear relationships rather than dynamic and interdependent systems. This research therefore provides both theoretical and practical contributions by explaining why extrinsic incentives often dominate in high-pressure microfinance environments, while also highlighting the complementary roles of intrinsic, environmental, and personal factors.

In summary, the background demonstrates that although MDIs are essential for financial inclusion, their sustainability is increasingly threatened by weak debt recovery systems influenced by complex motivational and contextual factors. The following sections review relevant literature, present the methodological approach, analyze empirical findings, and provide conclusions and policy recommendations.

1.1 Problem Statement

Microfinance deposit-taking institutions (MDIs) play a critical role in advancing financial inclusion by providing credit and savings services to low-income individuals and small enterprises that are typically excluded from formal banking systems (Cull et al., 2019; Ledgerwood, 2013). In Uganda, particularly in urban areas such as Kampala, Tier III MDIs have become essential financial intermediaries supporting informal sector livelihoods through small-scale lending and savings mobilization (Bank of Uganda, 2023). Despite this important role, these institutions continue to face persistent challenges related to loan portfolio quality, especially high levels of non-performing loans (NPLs), which threaten their liquidity, sustainability, and depositor confidence **(**World Bank, 2022**)**.

Empirical data indicate that, while the broader banking sector in Uganda has demonstrated enhancements in asset quality in recent years, Microfinance Deposit-taking Institutions (MDIs) are subject to comparatively elevated credit risk exposure, attributable to borrower income instability, weak collateral structures, and restricted enforcement capacity (Bank of Uganda, 2023). In urban settings such as Kampala, these challenges are further intensified by the prevalence of informal income generation among most borrowers, fluctuating liquidity, and economic shocks, such as post-COVID-19 recovery pressures and inflationary constraints (International Monetary Fund (IMF), 2023). Consequently, debt recovery performance often remains suboptimal, which may impede institutional profitability and long-term sustainability.

Prior scholarly investigations have sought to elucidate loan performance and recovery outcomes by delineating sundry factors, including credit risk management, borrower characteristics, and institutional efficiency. Nevertheless, a substantial segment of this scholarship appears to have primarily concentrated upon macro-level financial determinants or borrower-side variables, exhibiting insufficient consideration for the behavioral role of employee's instrumental to recovery outcomes; specifically, loan officers (Cull et al., 2019; Ledgerwood, 2013). Where staff-related factors are addressed, studies frequently conceptualize motivation as a singular construct, predominantly emphasizing monetary incentives while often disregarding the more expansive motivational ecosystem, which encompasses intrinsic, goal-related, environmental, and personal dimensions.

Furthermore, empirical evidence from Uganda and similar developing economies appears fragmented and context-specific. Few studies have comprehensively examined how multiple motivational dimensions interact to influence debt recovery performance in Tier III MDIs, especially within urban environments such as Kampala where operational pressures are high and recovery targets are stringent, thereby suggesting a critical gap in the understanding of the relative contribution and interaction of different motivational factors in shaping recovery outcomes.

In addition, existing research has not sufficiently addressed the integration of motivation theories with practical debt recovery systems, particularly how extrinsic incentives, intrinsic satisfaction, goal-setting mechanisms, technological tools, and environmental conditions jointly influence loan officer behavior. This deficiency in integrated frameworks potentially constrains institutions' capacity to devise balanced incentive systems that not only enhance recovery rates but also ensure ethical compliance and long-term sustainability.

It is also evident that while extrinsic motivation is widely applied through commissions and performance bonuses, there is limited empirical consensus on whether these incentives alone are sufficient or whether they

produce unintended consequences such as aggressive recovery practices and weakened client relationships (Gneezy et al., 2019). This leaves a gap in evidence-based policy formulation for human resource and credit management strategies within MDIs.

Therefore, the core problem addressed in this study is that despite the central role of loan officers in debt recovery, Tier III MDIs in Kampala continue to experience high and persistent levels of non-performing loans, suggesting that existing motivational and management strategies are insufficiently effective or poorly aligned with recovery performance objectives.

To address this problem, this study investigates how multidimensional staff motivation, including intrinsic, extrinsic, goal-related, environmental, and personal factors, influences debt recovery performance in selected Tier III MDIs in Kampala. By integrating agency theory and motivation theories, the study provides a more comprehensive explanation of recovery outcomes and offers evidence-based recommendations for improving staff motivation systems, strengthening recovery efficiency, reducing NPLs, and enhancing institutional sustainability.

1.2. Purpose of the Study

The purpose of this study is to examine the influence of staff motivation on debt recovery performance in selected Tier III Microfinance Deposit-Taking Institutions in Kampala, Uganda. The study specifically investigates how intrinsic, extrinsic, goal-related, environmental, and personal motivational factors affect the efficiency, effectiveness, and compliance of debt recovery processes.

1.3 Research Objectives

The study was guided by the need to understand the relationship between staff motivation and debt recovery performance in Tier III MDIs in Kampala, Uganda. It intended to respond to gaps in evidence regarding how different motivational dimensions influence recovery outcomes. This study was directed by the following specific objectives:

1) To examine the effect of intrinsic motivation factors on debt recovery performance in selected Tier III Microfinance Deposit-taking Institutions (MDIs) in Kampala, Uganda.
2) To assess the influence of extrinsic motivation factors on debt recovery performance in selected Tier III Microfinance Deposit-taking Institutions (MDIs) in Kampala, Uganda.
3) To determine the effect of goal-related motivation factors and technology use on debt recovery performance in selected Tier III Microfinance Deposit-taking Institutions (MDIs) in Kampala, Uganda.
4) To evaluate the impact of environmental factors on debt recovery performance in selected Tier III Microfinance Deposit-taking Institutions (MDIs) in Kampala, Uganda.
5) To establish the influence of personal motivation factors on compliance and overall debt recovery performance in selected Tier III Microfinance Deposit-taking Institutions (MDIs) in Kampala, Uganda.

1.4 Research Questions

The present study endeavors to address the subsequent research questions, which not only align directly with its delineated objectives but also serve to guide the formulation of interview protocols:

1) How do intrinsic motivation factors influence debt recovery performance in selected Tier III MDIs in Kampala, Uganda?
2) What is the effect of extrinsic motivation factors on debt recovery performance in selected Tier III MDIs in Kampala, Uganda?
3) How do goal-related motivation factors and technology use influence debt recovery performance in selected Tier III MDIs in Kampala, Uganda?
4) What is the impact of environmental factors on debt recovery performance in selected Tier III MDIs in Kampala, Uganda?
5) How do personal motivation factors influence compliance and overall debt recovery performance in selected Tier III MDIs in Kampala, Uganda?

1.5 Significance of the Study

1) **Academics.** This study may contribute to the existing body of knowledge on motivation and performance through the provision of empirical evidence delineating the influence of multidimensional staff motivation upon debt recovery within microfinance institutions. This analysis could further fortify theoretical understanding through the integration of agency theory, goal-setting theory, and various motivation theories, specifically within the contextualization of Tier III Microfinance Deposit-taking

Institutions (MDIs) in Uganda.

2) **Practitioners/Industry.** The findings may provide assistance to managers of Tier III Microfinance Deposit-taking Institutions (MDIs) in the design of effective staff motivation systems, thereby potentially enhancing debt recovery performance. Furthermore, this inquiry may offer practical insights regarding the equilibration of financial incentives, non-financial motivation, and operational conditions, which may conduce to improved efficiency and a reduction in non-performing loans.
3) **Policy Makers.** The study informs regulatory authorities such as the Bank of Uganda and the Uganda Microfinance Regulatory Authority (UMRA) in developing policies that support sustainable microfinance operations. It guides the formulation of fair incentive structures and strengthened regulatory frameworks for debt recovery practices.
4) **Society.** The study may benefit society through the strengthening of the performance and long-term sustainability of microfinance institutions, entities that assume a pivotal role in the provision of financial services to low-income households and nascent enterprises. Consequently, an improvement in debt recovery mechanisms could enhance financial stability and foster inclusive economic development.

1.6 Scope of the Study

1) **Location.** The study is conducted in selected Tier III Microfinance Deposit-Taking Institutions operating in Kampala, Uganda, with particular focus on institutions located in Lubaga Division due to its high concentration of informal economic activities.
2) **Population.** The study targets loan officers, credit officers, recovery staff, and branch managers involved in loan monitoring and debt recovery processes within selected MDIs.
3) **Variables.** The independent variable is staff motivation, operationalized through intrinsic, extrinsic, goal-related, environmental, and personal factors. The dependent variable is debt recovery performance, measured using indicators such as recovery rate, efficiency, timeliness, and compliance with recovery procedures.
4) **Timeframe.** The study covers the period 2020–2025 in order to capture post-pandemic recovery trends and current operational dynamics within Tier III MDIs.
5) **Limitations.** The study faces limitations such as respondent bias, limited access to confidential institutional data, and time constraints during field data collection. These limitations are addressed through triangulation of data sources, careful design of research instruments, and adherence to ethical research procedures.

2. Literature Review

2.1 Theoretical Review

The theoretical foundations for understanding staff motivation in microfinance institutions are grounded in several complementary frameworks that explain both behavioral drivers and organizational dynamics.

One key perspective is Agency Theory, which explains the potential conflict between loan officers (agents) and the institution (principal). According to this theory, employees may prioritize personal interests over organizational goals when incentives and monitoring systems are weak (Jensen & Meckling, 1976). In the context of Microfinance Deposit-Taking Institutions (MDIs), where loan officers manage high-risk loan portfolios with limited collateral, carefully designed incentive structures are essential to reduce agency costs and discourage opportunistic behavior.

Motivation theories provide further insight into what drives employee performance. Maslow's Hierarchy of Needs suggests that individuals must first satisfy basic needs, such as financial security, before they can focus on higher-level needs like recognition and self-fulfillment (Maslow, 1943). In microfinance settings, this implies that adequate compensation is a prerequisite for deeper commitment to demanding recovery tasks.

Similarly, Herzberg's Two-Factor Theory distinguishes between hygiene factors (such as salary, supervision, and working conditions) and motivators (such as achievement, recognition, and responsibility) (Herzberg et al., 1959). While hygiene factors prevent dissatisfaction, they do not necessarily enhance performance. Motivators, on the other hand, are responsible for driving higher levels of effort and productivity. However, in resource-constrained environments, such as many Sub-Saharan African microfinance institutions, hygiene factors often take on greater importance because unmet basic needs can significantly hinder performance (Islam & Ismail, 2014).

Complementing these perspectives is Expectancy Theory, which posits that employees are motivated when they believe that their effort will lead to improved performance and, ultimately, to desirable rewards (Vroom, 1964).

This theory is particularly relevant in performance-driven environments like microfinance, where clear links between effort, outcomes, and incentives can significantly influence recovery behavior.

Empirical evidence from East Africa consistently supports the link between motivation and loan recovery performance. Studies conducted in Kenya and Tanzania show that extrinsic rewards, such as performance-based bonuses and commissions, significantly improve recovery rates. At the same time, intrinsic factors, including supervisory support, autonomy, and recognition, have been found to enhance employee engagement and job satisfaction.

Goal-related practices also play a critical role. Clear performance targets and regular feedback mechanisms help loan officers track progress and adjust their strategies, especially when supported by digital systems for monitoring repayments. This aligns with Goal-Setting Theory, which emphasizes the importance of specific and challenging goals in improving performance (Locke & Latham, 2002).

In addition, environmental factors such as logistical support, access to transport, and clarity of institutional procedures exert influence upon the determination of recovery outcomes. When these systems are inadequate, even highly motivated staff may encounter impediments to the achievement of effective performance. Personal characteristics, including experience, discipline, and conscientiousness, may additionally bolster compliance and ethical behavior during the recovery process.

In the Ugandan context, existing studies may delineate similar trends while concurrently underscoring salient contextual dynamics. The post-COVID-19 period, for example, appears to have exacerbated workload pressures on loan officers, thereby impeding the sustainment of high performance without adequate incentives and institutional support. These conditions could be construed to reaffirm the salience of balanced motivation systems that combine both financial and non-financial elements.

Despite these contributions, notable lacunae persist. Few studies have specifically scrutinized the prevalence of extrinsic motivation in Tier III MDIs, particularly within urban settings such as Kampala. Additionally, limited research has integrated environmental and personal factors into a comprehensive framework that elucidates the interplay among distinct motivational dimensions.

This study builds on existing literature by synthesizing these perspectives and proposing that, although myriad factors may exert influence upon recovery performance, extrinsic motivation arguably furnishes the most immediate and potent leverage within high-pressure microfinance environments. At the same time, it highlights the limitations of relying solely on intrinsic motivation in low-resource settings and emphasizes the need for integrated approaches that harmonize individual incentives with institutional objectives.

2.2 Review by Study Objectives

2.2.1 Intrinsic Motivation and Debt Recovery Performance (Objective 1)

Intrinsic motivation refers to internal psychological drivers such as recognition, autonomy, professional growth, supportive supervision, and a sense of achievement. In microfinance institutions, particularly Tier III Microfinance Deposit-Taking Institutions (MDIs), these factors are critical in shaping how loan officers approach arduous assignments such as debt recovery. Recovery activities often require persistence, emotional intelligence, and ethical judgment, all of which are may be demonstrably influenced by intrinsic motivation.

Theoretical foundations of intrinsic motivation are rooted in Herzberg's Two-Factor Theory and Maslow's Hierarchy of Needs. Herzberg et al. (1959) argue that intrinsic factors such as achievement, recognition, and responsibility enhance job satisfaction but do not necessarily guarantee improved performance in the absence of adequate external conditions. Similarly, Maslow (1943) posits that higher-order needs, such as esteem and self-actualization—drive behavior only after basic needs are fulfilled. While these classical theories provide a foundational understanding, more recent perspectives such as Self-Determination Theory emphasize that intrinsic motivation, particularly autonomy and competence, can directly influence performance quality (Ryan & Deci, 2020).

Empirical studies in Sub-Saharan Africa provide mixed but insightful evidence. For instance, Musimenta et al. (2021) found that supervisory support and recognition significantly improved employee engagement and reduced burnout among microfinance staff in Uganda. Similarly, Kiggundu et al. (2023) reported that employees who perceived their roles as meaningful demonstrated greater persistence in loan recovery processes. However, other studies suggest that intrinsic motivation alone is insufficient in high-pressure financial environments. Banyarwanda and Ssekiziyivu (2022) observed that while intrinsic factors improved the quality of client interactions, they did not significantly increase recovery rates without accompanying financial incentives.

From a critical perspective, intrinsic motivation appears to play a supportive rather than dominant role in debt recovery performance. It enhances professionalism, ethical conduct, and long-term client relationships but lacks the immediacy required to drive performance under strict recovery targets. Therefore, intrinsic motivation is best

understood as a stabilizing and quality-enhancing factor that requires reinforcement from extrinsic and structural mechanisms.

2.2.2 Extrinsic Motivation and Debt Recovery Performance (Objective 2)

Extrinsic motivation refers to external rewards such as salaries, bonuses, commissions, and performance-based incentives. In microfinance institutions, where performance is closely monitored and tied to financial outcomes, extrinsic motivation plays a central role in influencing employee behavior.

This relationship is well explained by Expectancy Theory (Vroom, 1964), which posits that employees are motivated when they believe their effort will lead to performance and that performance will result in valued rewards. Additionally, Agency Theory (Jensen & Meckling, 1976) highlights the importance of incentive systems in aligning employee actions with organizational goals, particularly in environments where direct supervision is limited.

Recent empirical evidence strongly supports the effectiveness of extrinsic motivation in improving debt recovery performance. Okello and Ntayi (2022) found that performance-based bonuses significantly increased recovery rates among loan officers in East African microfinance institutions. Similarly, Namatovu et al. (2023) reported that commission-based systems enhanced follow-up intensity and prioritization of delinquent accounts. These findings suggest that extrinsic incentives create a direct and measurable link between effort and outcomes, making them particularly effective in high-pressure environments.

However, the literature also raises important concerns. Studies in behavioral economics indicate that excessive reliance on financial incentives can lead to unintended consequences, including unethical practices and short-termism (Gneezy et al., 2019). In microfinance contexts, this may manifest as aggressive recovery tactics that damage client relationships and institutional reputation. Musau et al. (2022) highlight that poorly designed incentive systems can undermine long-term sustainability by prioritizing immediate recovery over client retention.

Comparatively, while intrinsic motivation enhances quality, extrinsic motivation drives quantity and intensity of effort. From a critical standpoint, extrinsic motivation emerges as the most powerful immediate driver of debt recovery performance, but it must be carefully balanced with ethical guidelines and institutional controls to avoid adverse outcomes.

2.2.3 Goal-Related Motivation, Technology, and Recovery Performance (Objective 3)

Goal-related motivation focuses on the role of clearly defined targets, performance measurement systems, and feedback mechanisms in guiding employee behavior. In microfinance institutions, loan officers typically operate under strict recovery targets, which structure their daily activities and priorities.

The theoretical underpinning for this relationship is Goal-Setting Theory (Locke & Latham, 2002), which posits that specific and challenging goals improve performance by directing attention, increasing effort, and fostering persistence. In recent years, technological advancements have significantly enhanced the effectiveness of goal-setting mechanisms. Digital loan tracking systems, mobile collection platforms, and real-time dashboards enable continuous monitoring and feedback.

Empirical evidence suggests that technology plays a critical role in enhancing recovery performance. According to the World Bank (2022), digital financial systems improve transparency and efficiency in loan monitoring, thereby reducing default rates. Similarly, GSMA (2023) reports that mobile-enabled financial services in Africa have improved operational efficiency and data accessibility in microfinance institutions. In Uganda, the increasing adoption of financial technology has strengthened accountability and facilitated real-time decision-making.

Despite these advantages, the literature indicates that the effectiveness of goals and technology is contingent upon their integration with incentive systems. Targets that are not linked to rewards often fail to motivate employees, while technological tools that do not influence performance evaluation are underutilized. Furthermore, excessive monitoring enabled by technology may increase stress and reduce job satisfaction (Tarafdar et al., 2020).

From a critical perspective, goal-related factors and technology function as performance enablers and amplifiers rather than independent drivers. They enhance the effectiveness of both intrinsic and extrinsic motivation but depend on proper alignment with organizational incentives and employee needs.

2.2.4 Environmental Factors and Recovery Process Performance (Objective 4)

Environmental factors refer to the organizational and operational conditions within which loan officers perform their duties. These include logistical support, transport availability, institutional procedures, system reliability, and regulatory frameworks.

Recent literature increasingly emphasizes the importance of enabling environments in shaping performance outcomes. Studies by the African Development Bank (2022) and the International Monetary Fund (2023) highlight that infrastructural and operational constraints significantly affect financial service delivery in developing economies. In microfinance contexts, poor transport systems, system downtimes, and bureaucratic delays can hinder effective debt recovery.

Empirical studies in African microfinance institutions demonstrate that environmental constraints may significantly constrain performance, irrespective of employee motivation. For instance, Musimenta et al. (2021) identified the reduction in effectiveness of loan recovery efforts through inadequate logistical support in Uganda. Concurrently, Nuwagaba (2022) documented the negative impact of delays in approval processes and system inefficiencies upon recovery timelines.

In comparison, whereas motivation theories predominantly focus on individual behavior, environmental perspectives emphasize structural limitations. Crucially, the underestimation of environmental factors frequently occurs within traditional models; nevertheless, these factors possess the capacity to entirely neutralize motivational impetus under unfavorable conditions.

Consequently, environmental factors warrant conceptualization not merely as facilitating elements but as requisite necessary conditions for performance realization. Without adequate institutional support and operational efficiency, even highly motivated employees may not achieve desired recovery outcomes.

2.2.5 Personal Motivation, Compliance, and Regulatory Adherence (Objective 5)

Personal factors such as experience, integrity, discipline, and professional values exert an influence upon the approach of loan officers to their professional duties, particularly in relation to compliance and regulatory adherence. In microfinance institutions, maintaining compliance while achieving performance targets may often constitute a significant challenge.

Recent governance literature delineates the growing exigency of regulatory compliance within financial institutions. According to the Consultative Group to Assist the Poor (CGAP, 2022), adherence to ethical standards and regulatory guidelines proves essential for the sustainability of microfinance operations. Similarly, Basel-aligned financial conduct studies (2023) delineate the inherent risks associated with non-compliance, encompassing reputational damage and pecuniary penalties.

Empirical evidence suggests that experienced and well-trained employees tend to balance performance and compliance effectively. Kiggundu et al. (2023) determined that experienced loan officers' adoption of more strategic and ethical recovery approaches served to preserve client relationships concurrently with the achievement of targets. In contrast, less experienced employees were predisposed to engage in non-compliant practices under duress.

Crucially, the literature delineates a tension between performance incentives and regulatory adherence. High extrinsic motivation may encourage risk-taking and shortcuts, particularly when oversight is weak. The necessity of comprehensive training, mentorship initiatives, and ethical leadership in the cultivation of personal motivation is thus underscored.

Thus, personal factors play a moderating role within the motivational framework, thereby potentially facilitating the attainment of performance that is both sustainable and compliant with institutional and regulatory requirements.

2.2.6 Synthesis and Research Gap

The reviewed literature elucidates the susceptibility of debt recovery performance within microfinance institutions to the influence of a complex interaction of intrinsic, extrinsic, goal-related, environmental, and personal factors. Each of these dimensions consequently offers a differential contribution to performance outcomes.

Extrinsic motivation appears to be a primary determinant of recovery performance, exhibiting immediate and potent effects, while intrinsic motivation serves to augment quality, foster sustainability, and promote employee well-being. Goal-related factors and technology function as amplifiers, providing structure and guidance to performance, whereas environmental factors may delineate the operational feasibility of performance. Conversely, personal factors may facilitate the alignment of performance with ethical and regulatory standards.

However, several gaps persist within the extant body of literature. Specifically, these lacunae include: (1) a tendency for existing studies to scrutinize variables in isolation rather than within an integrated framework; (2) constrained empirical research specifically concentrated upon Tier Three (III) Microfinance Deposit-taking Institutions (MDIs) in Uganda, particularly within urban contexts such as Kampala; (3) insufficient consideration afforded to the relative strength and interaction of diverse motivational factors; and (4) a significant oversight regarding the tension between performance incentives and regulatory compliance.

This study addresses these gaps by adopting a comprehensive approach that integrates multiple motivational dimensions to explain debt recovery performance. It further argues that while all factors are important, extrinsic motivation provides the strongest immediate leverage, but its effectiveness depends on alignment with intrinsic, environmental, and regulatory mechanisms.

3. Methodology

The study adopted a mixed-methods research approach, integrating both quantitative and qualitative methods to provide a comprehensive understanding of the relationship between staff motivation and loan recovery performance in microfinance institutions. Specifically, a convergent parallel mixed design was employed, where quantitative and qualitative data were collected concurrently, analyzed independently, and later merged during interpretation. This design is widely recommended in social science research for enhancing triangulation, validity, and contextual depth of findings (Creswell, 2018).

The study was conducted in three licensed Tier III Microfinance Deposit-taking Institutions (MDIs) in Kampala, namely Pride Microfinance, FINCA Uganda, and UGAFODE, purposively selected due to their strong presence in urban lending and recovery operations. The target population consisted of credit-related staff, including loan officers, recovery officers, and branch credit supervisors. This focus aligns with prior microfinance studies which emphasize frontline credit staff as key actors in portfolio quality and loan recovery outcomes (Jensen & Meckling, 1976; Locke & Latham, 1984).

A total population of 140 staff was estimated across the three institutions. For the quantitative strand, a sample size of 113 respondents was selected using stratified random sampling, ensuring proportional representation across institutions and job categories. Stratified sampling is considered appropriate in organizational studies because it reduces sampling bias and improves representativeness across heterogeneous groups. In addition, a qualitative sample of 12 key informants was purposively selected, comprising 3 branch managers, 6 senior loan/recovery officers, and 3 credit supervisors. Purposive selection is consistent with qualitative inquiry principles, where participants are chosen based on their knowledge and experience relevant to the phenomenon under study (Patton, 2014).

Table 1. Distribution of Respondents

Category of Respondents	**Population**	**Quantitative Sample**	**Qualitative Sample**
Pride Microfinance Staff	50	40	4
FINCA Uganda Staff	55	43	4
UGAFODE Staff	35	30	4
Total	**140**	**113**	**12**

Quantitative data were collected using a structured self-administered questionnaire developed from validated psychometric scales. Motivational constructs were adapted from Deci and Ryan's Self-Determination Theory, while goal-setting variables were informed by Locke and Latham's Goal-Setting Theory (1984). For the assessment of recovery performance, key indicators encompassed perceived repayment rates; the management of portfolio-at-risk (PAR); and trajectories in non-performing loans (NPLs).

Qualitative data were collected using key informant interview (KII) guides and document review, focusing on internal recovery reports, credit manuals, PAR aging reports, and NPL summaries. These instruments enabled deeper exploration of institutional practices and motivational dynamics that could not be fully captured through structured questionnaires.

Quantitative data were analyzed using SPSS version 26, employing descriptive statistics, Pearson correlation, and hierarchical multiple regression analysis. Qualitative data were analyzed using thematic content analysis, involving transcription, coding, categorization, and development of themes. This approach aligns with qualitative research standards that emphasize meaning-making and pattern identification rather than numerical generalization (Braun & Clarke, 2006).

Findings from both datasets were integrated during interpretation using a triangulation strategy, allowing comparison and confirmation of results across methods. Data were presented using tables, thematic narratives, and comparative discussion, ensuring that statistical trends were explained and enriched by qualitative insights. This mixed-method integration enhanced the robustness, depth, and contextual validity of the study findings, consistent with established mixed-methods research practice.

4. Results and Analysis

4.1 Intrinsic Motivation and Debt Recovery Performance (Objective 1)

This section examined how intrinsic motivation factors, such as supervisory support, communication quality, and workplace encouragement, affect debt recovery performance in selected Tier III Microfinance Deposit-Taking Institutions (MDIs) in Kampala, Uganda. Recovery performance was evaluated based on recovery rates and the efficiency of handling delinquent accounts.

The quantitative findings showed that intrinsic motivation factors were generally rated highly by loan officers, with mean scores ranging from approximately 3.8 to 4.5 on a 5-point scale. Correlation analysis revealed a strong positive relationship between intrinsic motivation and recovery performance ($r = 0.654$). However, regression analysis indicated a moderate but statistically significant predictive effect ($\beta = 0.334$), suggesting that while important, intrinsic motivation is not the strongest driver of performance.

These findings were strongly supported by loan officers' lived experiences. One respondent explained:

"When my supervisor gives clear feedback and stands with me on difficult cases, I feel more confident and I am able to recover loans much faster and with less stress. The guidance helps me approach each client strategically instead of pushing blindly. Even when a client becomes stubborn or aggressive, knowing that I have backing from my supervisor reduces anxiety and allows me to remain patient. Teamwork in the branch also plays a very important role because we share experiences and successful strategies during our daily meetings. You don't feel like you are carrying the burden alone. This kind of support makes the whole recovery process smoother and less exhausting."

However, an additional participant articulated a constraint:

"Support from supervisors and colleagues is important and motivating, but without some form of incentive, it becomes very difficult to sustain the pressure of meeting monthly targets especially when you have many non-performing loans in your portfolio. You can have all the encouragement in the world, but at the end of the day you still have bills to pay and targets to meet."

Intrinsic motivation fosters an enhancement of confidence, consistency, and the quality of interactions with clients. However, it primarily appears to fulfill a supportive function rather than serving as the principal determinant of performance. This aligns with Herzberg's Two-Factor Theory (1959), which posits that intrinsic factors may enhance job satisfaction; however, they might not be wholly sufficient to propel performance absent extrinsic remuneration. Similarly, Maslow's Hierarchy of Needs (1943) similarly postulates that higher-level motivational factors manifest efficacy solely subsequent to the gratification of fundamental financial requirements.

4.2 Extrinsic Motivation and Debt Recovery Performance (Objective 2)

The second objective delineated the influence of extrinsic motivational factors, specifically, bonuses, commissions, and salary adjustments, upon recovery performance.

Quantitative results indicated that extrinsic factors attained the highest mean ratings (mean ≈ 4.0) and exhibited the strongest correlation with performance ($r = 0.685$). Furthermore, these factors notably emerged as the most salient predictor within the regression model ($\beta = 0.426$, $p < .001$).

Loan officers unequivocally articulated the centrality of financial incentives. A single respondent elucidated:

"You cannot separate recovery performance from money. If there is no bonus at the end of the month, many people simply relax and stop pushing as hard as they should. Personally, I know that the commission is what really drives me because it directly affects what I take home to support my family. Targets are clearly communicated, but what pushes us to go the extra mile is the financial reward attached to achieving them. Sometimes the pressure for bonuses makes officers become too aggressive with clients, and that can damage relationships, but that is the system we work in and we have learned to operate within it."

Extrinsic motivation is the main driver of effort and persistence in debt recovery. This strongly supports Vroom's Expectancy Theory (1964), which argues that individuals are more motivated when they expect their efforts to lead to valued rewards. It is also consistent with Agency Theory (Eisenhardt, 1989; Jensen & Meckling, 1976), which emphasizes the role of incentives in aligning employee behavior with organizational goals. However, concerns about aggressive recovery practices reflect the "crowding-out" effect discussed by Frey and Jegen (2001), where excessive reliance on external rewards may undermine intrinsic motivation.

4.3 Goal-Related Motivation, Technology, and Recovery Performance (Objective 3)

This objective explored how goal-setting, digital tools, and performance tracking systems influence debt recovery.

Goal-related factors recorded strong mean scores (approximately 4.1–4.3) and the highest correlation with performance ($r = 0.789$, $p < .01$). However, their effect weakened in the regression model ($\beta = 0.171$), suggesting that their impact may depend on other factors—particularly financial incentives.

One loan officer described the situation as follows:

"We use digital dashboards that show our daily targets and progress in real time. Once you meet your target, the system automatically updates your performance for payment calculation. Technology makes it easy to know exactly where you stand every single day. You can track how many clients you have contacted and how much you have recovered. However, at the end of the day, what really matters most is what you earn when you hit the target because the goals only become truly meaningful when they are connected to the bonus or commission."

Goals and technology provide structure, clarity, and immediate feedback, but their effectiveness depends heavily on their connection to financial rewards. This supports Goal-Setting Theory (Locke & Latham, 2002), while also indicating that in this context, goals primarily function as tools that activate and reinforce extrinsic motivation.

4.4 Environmental Factors and Recovery Process Performance (Fourth Objective)

This section delineated the influence of workplace conditions and institutional support systems upon recovery process efficacy. Environmental factors exhibited mean scores ranging from approximately 3.9 to 4.2, thereby manifesting a statistically significant positive effect ($\beta = 0.218$, $p = .015$).

One respondent explained:

"When transport is readily available and the systems are working properly, we can follow up clients on time and close cases much faster. Delays in approvals or frequent system downtime can completely slow down recovery even when you are personally motivated and ready to work. Clear procedures and good logistical support also reduce conflicts with clients. Sometimes you have the drive and the targets, but because of a poor working environment you simply cannot perform at your best level."

Environmental factors act as essential enablers of performance. They determine whether motivation can be effectively translated into results. This is consistent with previous studies emphasizing the importance of institutional support and infrastructure in credit risk management (Jobst, 2018).

4.5 Personal Motivation, Compliance, and Regulatory Adherence (Fifth Objective)

This objective focused upon the manner in which personal attributes, inclusive of experience, discipline, and professional values, exert an influence upon compliance during debt recovery processes. The findings generally indicated moderate-to-high mean scores (approximately 3.9–4.2) and suggested a statistically significant effect upon performance ($\beta = 0.189$, $p = .043$).

A senior officer shared:

"Experienced officers know how to recover money without breaking rules or destroying long-term client relationships. You learn over time that following procedures protects both the client and the institution from bigger problems later. When you are new and the pressure to meet targets is high, it sometimes becomes tempting to ignore small procedures just to close the case quickly and move on."

Personal maturity and discipline are demonstrably critical in the promulgation of ethical and compliant recovery practices; these attributes, in turn, may facilitate a requisite balance between the imperative for performance and the exigency of responsible, sustainable behavior.

4.6 Integrated Discussion of Findings

Overall, the findings suggest the contingency of debt recovery performance in Tier III MDIs is shaped by a combination of interrelated motivational factors as opposed to a singular influence.

Extrinsic motivation appears to constitute the strongest driver of performance, while intrinsic motivation underpins the maintenance of consistency and the cultivation of job satisfaction. Goals and technology furnish structural frameworks and directional guidance, environmental factors facilitate the execution of operational parameters, and personal attributes assure adherence to ethical mandates.

One respondent elucidated this interaction with notable clarity:

"Even if you are motivated, without the right systems, transport, and incentives, recovery becomes very difficult no matter how hard you try."

Overall, extrinsic incentives are the main drivers of effort and performance, while intrinsic factors support satisfaction and consistency. Goals and technology provide structure but depend on rewards to be effective. Environmental factors enable task execution, and personal attributes ensure ethical and regulatory compliance. Evidence from Uganda's microfinance sector suggests that sustainable debt recovery requires a balanced system integrating incentives, institutional support, structured processes, and human factors.

5. Discussion of Findings

5.1 Objective 1: Intrinsic Motivation and Debt Recovery Performance

The findings suggest that intrinsic motivation, particularly supervisory support, effective communication, and teamwork, exercises an important, albeit secondary, influence on debt recovery performance outcomes. While these factors enhance confidence, reduce stress, and improve the quality of borrower engagement, they may not independently constitute the primary impetus for superior performance outcomes.

This suggests that intrinsic motivation primarily strengthens how loan officers approach their work rather than the exertion of effort. Supportive supervision, for instance, facilitates the development of better recovery strategies, remain patient with difficult clients, and sustain professional conduct under pressure. These qualitative improvements contribute to efficiency and consistency but are not, in themselves, sufficient to elevate performance to superior levels.

This pattern aligns with Herzberg's Two-Factor Theory (1959), which distinguishes between motivators (intrinsic factors) and hygiene factors. Intrinsic elements such as recognition and support enhance job satisfaction but do not necessarily increase performance unless supported by external rewards. Similarly, Maslow's Hierarchy of Needs (1943) suggests that higher-order psychological needs only become dominant once basic financial needs are met.

In the context of Tier III microfinance deposit-taking institutions (MDIs) in Kampala, the findings imply that intrinsic motivation acts as a stabilizing force. It improves the quality and sustainability of recovery practices but relies on other motivational drivers—especially financial incentives—to produce robust performance outcomes.

5.2 Objective 2: Extrinsic Motivation and Debt Recovery Performance

In the assessment of debt recovery performance, extrinsic motivation emerged as the most influential factor. Financial incentives such as bonuses and commissions demonstrated a direct influence upon effort levels, persistence, and target achievement among loan officers.

This dominance of extrinsic rewards reflects the highly target-driven nature of microfinance operations, where performance is closely tied to measurable outputs such as recovery rates. The calibration of effort by loan officers appears contingent upon the anticipated financial return, thereby indicating a robust performance–reward linkage.

These findings strongly support Vroom's Expectancy Theory (1964), which posits that individuals are motivated when they believe their effort will lead to performance and, ultimately, to valued rewards. In this case, the clarity of targets and the certainty of financial incentives strengthen this expectancy relationship. The results are also consistent with Agency Theory (Eisenhardt, 1989; Jensen & Meckling, 1976), which emphasizes the role of incentives in aligning employee behavior with organizational objectives.

However, the findings also reveal a critical tension. While incentives increase effort, they may encourage overly aggressive recovery practices that risk damaging client relationships. This reflects the "crowding-out" effect discussed by Frey and Jegen (2001), where excessive reliance on external rewards can weaken intrinsic motivation and lead to unintended behavioral consequences.

Thus, while extrinsic motivation is highly effective in driving performance, it must be carefully managed to avoid undermining long-term sustainability and ethical standards.

5.3 Objective 3: Goal-Related Motivation, Technology, and Recovery Performance

The study found that goal-setting mechanisms and technological tools provide essential structure and direction to the recovery process. Digital dashboards, performance tracking systems, and clearly defined targets enable loan officers to monitor progress in real time and adjust their strategies accordingly.

However, their influence on performance appears to be conditional rather than direct. Goals and technology are most effective when they are linked to financial incentives, suggesting that they function more as facilitators of motivation than as independent drivers.

This finding is consistent with Goal-Setting Theory (Locke & Latham, 2002), which emphasizes that specific and challenging goals improve performance by focusing attention and increasing effort. In this context, technology enhances this process by providing immediate feedback and transparency.

At the same time, the reduced effect of goal-related factors in the regression analysis suggests a mediating relationship, where goals and technology strengthen the impact of extrinsic motivation rather than acting alone. In other words, targets become meaningful because they are tied to rewards, and technology becomes valuable because it makes performance measurable and visible.

Therefore, goal-setting and digital systems should be understood as enabling mechanisms that operationalize

motivation rather than as primary sources of motivation themselves.

5.4 Objective 4: Environmental Factors and Recovery Process Performance

Environmental and institutional factors appear to play a pivotal facilitative function in debt recovery performance. Elements such as transport availability, system reliability, and clear operational procedures are directly instrumental in influencing the capacity of loan officers to effectuate their responsibilities with efficacy.

These findings elucidate the insufficiency of motivation in the absence of a supportive work environment. The performance of even highly motivated officers may, indeed, be impeded by logistical constraints, systemic inefficiencies, or procedural delays, thereby compromising their efforts.

This alignment with existing scholarship underscores the pivotal role of organizational infrastructure in the determination of performance outcomes. Research conducted by Obeng and Krah (2016) and Emenike et al. (2018) suggests the criticality of institutional support systems in the facilitation of effective credit risk management.

In this study, environmental factors may be conceptualized as the mediating construct between motivation and performance. Their influence dictates the translatability of motivational impetus into tangible outcomes. The absence of adequate resources and functional systems appears to significantly diminish the impact of both intrinsic and extrinsic motivation.

5.5 Objective 5: Personal Motivation, Compliance, and Regulatory Adherence

The findings suggest that personal attributes, specifically experience, discipline, and professional values, may exert a considerable influence upon the assurance of compliance and ethical conduct during debt recovery processes.

Experienced loan officers typically possess superior capacity for the reconciliation of performance imperatives with adherence to institutional policies and regulatory frameworks; furthermore, their inclination toward the utilization of appropriate recovery strategies typically manifests in the preservation of client relationships, concurrently facilitating the attainment of desired results.

This observation thus appears to reflect the significant role of professional maturity in the shaping of behavior. While incentives may indeed stimulate performance, personal values and accumulated experience appear to exert considerable influence upon the methodology by which such performance is achieved. Conversely, less experienced officers may exhibit heightened vulnerability to the compromising of standards under duress, thereby underscoring the critical importance of robust training and mentorship programs.

These findings suggest that personal motivation operates as a regulatory mechanism within the broader motivational system. Such motivation may thereby facilitate the achievement of performance in a responsible and sustainable manner, potentially mitigating the risks associated with reputational damage and regulatory non-compliance.

5.6 Overall Discussion

Collectively, the findings suggest that the achievement of debt recovery performance within Tier III Microfinance Deposit-Taking Institutions (MDIs) is not solely attributable to a singular factor; rather, it is influenced by an intricate, interconnected system of motivations and enabling conditions.

Specifically, extrinsic motivation constitutes the primary determinant of effort and results; conversely, intrinsic motivation typically augments job satisfaction and consistency. Moreover, goal-setting and technological advancements demonstrably provide structural frameworks and real-time feedback; simultaneously, environmental factors enable the execution of strategies, and personal attributes generally ensure ethical compliance.

This integrated perspective suggests that effective debt recovery appears to necessitate a balanced approach. Over-reliance on financial incentives may produce short-term gains but risks undermining long-term relationships and ethical standards. Conversely, focusing only on intrinsic or environmental factors without adequate incentives could conceivably lead to suboptimal performance.

In line with recent evidence from the Ugandan microfinance sector, it is posited that sustainable recovery performance may be contingent upon the alignment of incentives, the strengthening of institutional support systems, the leveraging of technology, and the fostering of professional discipline among loan officers.

6. Strategic Solutions and Recommendations

6.1 For MDI Management

A more balanced and forward-looking incentive structure appears essential for microfinance deposit-taking institutions (MDIs) for the sustenance of both portfolio quality and staff performance. Current recovery-driven

reward systems tend to overemphasize short-term loan collection at the expense of long-term client relationships (Pril & Godfroid, 2017; Rigol & Roth, 2021). To address this, MDIs may consider the adoption of a Balanced Scorecard approach, wherein staff appraisal systems extend beyond recovery targets to encompass indicators such as client retention rates, and social welfare outcomes. This would help align employee behaviour with the dual mandate of microfinance, financial sustainability and social impact.

In addition, the prioritization of digital transformation appears judicious. The adoption of mobile-first loan management dashboards, automated borrower reminders, and real-time milestone tracking, can significantly reduce administrative burdens on loan officers. This shift would allow staff to spend less time on administrative documentation and more time on meaningful client engagement, credit monitoring, and problem-solving, which are critical for enhancing repayment conduct.

The adoption of an efficiency wage strategy by Microfinance Deposit-taking Institutions (MDIs) may warrant consideration. Benchmarking salaries against 2024 commercial bank pay levels may help mitigate the persistent efflux of skilled loan officers from MDIs to Tier One financial institutions; moreover, competitive remuneration not only improves retention but also stabilizes institutional memory, an aspect deemed essential for efficacious debt recovery.

6.2 Recommendations for Regulators: The Bank of Uganda (BoU) and the Uganda Microfinance Regulatory Authority (UMRA)

The purview of regulatory oversight ought to extend beyond traditional financial indicators to encompass human capital risk factors. Specifically, institutions, including the Bank of Uganda (BoU) and the Uganda Microfinance Regulatory Authority (UMRA) are advised to integrate the assessment of staff turnover rates and the auditing of incentive systems into the established CAMELS supervisory framework. Elevated staff turnover, particularly, warrants designation as an early warning signal, as it frequently precipitates disruptions in borrower relationships and may foreshadow increases in non-performing loans (NPLs).

Furthermore, the promotion of Small and Medium-sized Enterprise (SME)-specific financial product innovation by regulators is warranted. This endeavor encompasses the encouragement of Microfinance Deposit-taking Institutions (MDIs) to devise tailored loan products, featuring flexible repayment structures and grace periods, which are particularly congruent with the irregular and seasonal cash flow patterns characteristic of small and medium-sized enterprises situated in urban centers such as Kampala.

7. Conclusion

This study posits that staff motivation may constitute a principal determinant of debt recovery performance within Ugandan Microfinance Deposit-taking Institutions, potentially elucidating over three-quarters of the variance in recovery outcomes. While extrinsic incentives remain highly effective in driving short-term performance, particularly in competitive urban environments, the long-term viability of the sector appears contingent upon the adoption of a more integrated approach.

The trajectory of microfinance performance may reside in the judicious combination of financial incentives with advanced digital systems and robust ethical safeguards. When properly structured, staff motivation can be treated not just as a human resource concern, but as a micro-prudential management tool that supports portfolio quality, reduces non-performing loans, and strengthens the role of MDIs in promoting inclusive economic growth in Uganda and the wider Sub-Saharan region.

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Analysis on the "Standard + System" Dual-Drive Model of Enterprise Management Informatization and Its Industrial Application

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Abstract

As digital transformation enters a stage of quality improvement and in-depth development, domestic enterprises are generally plagued by industrial problems including blind construction of information systems, inadequate adaptation of informatization standards, and diminishing marginal benefits from investment in software and hardware. The traditional single empowerment model of information systems fails to solve the dilemmas of data silos, fragmented businesses and inefficient cross-entity collaboration. Based on the dual theory of institution and technology as well as configuration synergy theory, this paper defines the connotation of two core elements: informatization standards and management information systems. It constructs an improved weighted coupling coordination model. Using balanced panel data of 426 large-scale enterprises from 27 provinces and municipalities in China from 2020 to 2024, combined with panel threshold regression and fsQCA configuration analysis, this paper explores the coupling driving mechanism, threshold effect and industrial heterogeneity of the two core elements.

The research draws the following conclusions: First, the average overall coupling coordination degree between standards and systems of domestic enterprises is 0.527, falling into the moderate antagonism and adaptation range. High-tech manufacturing industry has the highest coupling degree, while producer services show the most prominent adaptation deficiencies. Second, the dual-drive coupling can positively empower enterprise informatization performance, with data circulation efficiency playing a chain mediating role. Third, digital human capital and investment in standard compliance present a double threshold effect; the driving efficiency rises by 41.2% after crossing the threshold values. Fourth, high-end manufacturing enterprises, specialized, refined, differential and innovative enterprises, and producer service enterprises are adapted to three differentiated driving configurations, namely rigid management & control, low-cost adaptation and flexible symbiosis. This paper fills the research gap in the coordination between institutions and technologies in the field of digital governance, and provides quantitative evidence for governments and enterprises to jointly build informatization standard systems and adapt business systems.

Keywords: enterprise management informatization, informatization standards, information systems, coupling coordination, dual-drive model, industrial configuration, system interoperability, digital governance, complementary assets, toe framework, data silos, digital investment, institutional coordination, technical adaptation, process standardization, cluster collaboration

1. Introduction

1.1 Research Background

Global digital governance has stepped into an era of standardized compliance management. According to the 2024 Informatization Development Report released by the International Organization for Standardization (ISO), 68.3% of failures in enterprise informatization construction worldwide are not caused by insufficient system computing

power, but by inconsistent data calibers, business interfaces and security specifications. The annual ineffective digital investment of global enterprises resulting from conflicts between standards and system adaptation exceeds 127 billion US dollars. Disordered informatization construction and system compatibility deficits have become common governance challenges across the globe. The global digital paradigm has shifted from the "technology system priority" model to a dual collaborative model featuring "preemptive standard regulation and system-enabled implementation".

China has established a four-level informatization standard system. By the end of 2024, the Ministry of Industry and Information Technology (MIIT) has issued 216 national standards (GB/T) for enterprise management informatization and 379 special industrial standards, covering all business scenarios including financial management and control, production operation and maintenance, supply chain collaboration and data security. The European Union EN digital standards and American ANSI enterprise informatization standards have incorporated system interoperability into access assessment indicators. Institutional standards have become preconditions for the approval, iteration and operation of management information systems.

Based on the 2024 Census on Digital Transformation of Small and Medium-Sized Enterprises conducted by MIIT, 71.4% of large-scale domestic enterprises have deployed four core management systems: ERP, MES, OA and supply chain collaboration systems. The average annual investment in informatization software and hardware per enterprise reaches 1.286 million RMB. However, only 29.7% of enterprises have formulated and implemented supporting internal control informatization standards. For information systems operated without supporting standards, the operation and maintenance costs rise by 53.8% within 1 to 3 years after launch, and the data interconnection rate is less than 35% (Romero D, Goncalves R & Mendonça J P., 2020). The marginal benefits of investment in standalone systems keep declining, forcing enterprises to transform to the collaborative construction model of "standards + systems".

Interconnection among industrial clusters has become a core goal of digital transformation. Survey data of industrial clusters in the Yangtze River Delta and Pearl River Delta show that the failure rate of interconnection among heterogeneous systems of enterprises within clusters reaches 62.1%. The fundamental reason lies in inconsistent cluster standards for business coding, account formats and transmission interfaces. Building a unified universal standard foundation and adapting integrated cluster management systems have become core approaches to cost reduction and efficiency improvement for industrial informatization.

1.2 Domestic and Overseas Research Progress and Research Gaps

1.2.1 Overseas Research Evolution

Overseas relevant research has undergone three developmental stages:

1) **Stage 1 (2010-2016)**: Focused on the performance empowerment of information systems. Researchers adopted the TOE framework to verify the improvement effect of ERP and data middle platforms on enterprise management efficiency.
2) **Stage 2 (2017-2021)**: Concentrated on digital institutional regulations, exploring the restrictive effect of industrial compliance standards on enterprise digital risks.
3) **Stage 3 (2022-2025)**: Turned to the complementary coordination between institutions and technologies, and began to pay attention to the adaptation value of standards and systems, yet failed to analyze the two-way coupling and evolution mechanism.

1.2.2 Domestic Research Evolution

Domestic research is divided into three stages. Early studies focused on the implementation of information systems and digital transformation paths. Mid-term research concentrated on the compilation of industrial informatization standards and the establishment of compliance systems. Current studies sporadically explore the value of standard adaptation, but the research is fragmented. No unified coupling measurement model has been constructed, and empirical analysis based on industrial stratification is insufficient.

1.2.3 Core Conclusions of Bibliometric Analysis

With CiteSpace 6.2 and VOSviewer for two-way visual analysis, a total of 897 core papers from Web of Science and CNKI published between 2018 and 2025 were selected. Clustering results indicate that existing research hotspots mainly focus on three areas: information system performance, digital policies and enterprise transformation behaviors. The node density of the cluster for standard-system coordination is only 0.18, which represents a cutting-edge niche research direction with great potential for innovation. (Van der Aalst W M P., 2021)

1.2.4 Systematic Research Gaps

Current studies have multiple systematic deficiencies. Most scholars separate informatization standards from business systems, overemphasizing the technical empowerment value of information systems while ignoring the

core institutional value of informatization standards in cost reduction, adaptation and risk prevention. In addition, the internal logic of two-way interaction, constraint transmission and dynamic evolution between the two elements has not been clarified. There is a lack of coupling quantitative models adapted to the development characteristics of local Chinese enterprises, and the double threshold effect corresponding to capital investment and digital human resources has not been identified. Existing implementation countermeasures are generally universal and fail to formulate targeted solutions according to the operational differences among manufacturing enterprises, producer service enterprises and specialized, refined, differential and innovative enterprises.

1.3 Research Questions, Boundaries and Core Concepts

Centering on the practical scenarios of informatization of local enterprises, this paper explores the complete dimensional composition of two elements: informatization standards and management information systems, analyzes the internal coupling mechanism and business transmission paths of the two elements under the dual-drive model, calculates the impact intensity and threshold critical values of the coupling relationship on informatization performance, and studies the configurational dual-drive construction modes suitable for enterprises of different business types.

This research adopts balanced panel data covering five consecutive years from 2020 to 2024, and selects large-scale industrial enterprises, service enterprises and specialized, refined, differential and innovative enterprises from 27 provinces and municipalities in China. Special financial industries including banking, securities and insurance are excluded, and 426 valid samples are finally determined. Combined with the research scope, core concepts are defined as follows:

Enterprise management informatization standards consist of four tiers: national mandatory standards, industrial recommended standards, enterprise internal control standards and cluster collaboration standards. They are a general term for normative documents covering four dimensions: data calibers, business processes, security compliance and interface interconnection. Enterprise management information systems are digital carriers for enterprise operation and management, with functions including business execution, data integration, decision analysis and cross-enterprise collaboration. The dual-drive model refers to an informatization construction and governance mode that relies on preemptive standard regulation and system-enabled implementation to realize two-way complementarity, dynamic iteration and coupling symbiosis.

1.4 Research Methods, Innovations and Technical Routes

This paper adopts a mixed research method combining bibliometric visualization, three-level grounded coding for qualitative analysis, improved weighted coupling coordination model, panel fixed effect regression, Bootstrap chain mediation test, panel threshold regression, fsQCA configuration analysis and multi-case comparative analysis. The mixed qualitative and quantitative paradigm conforms to the mainstream empirical research norms of SCI papers.

This research has three dimensions of academic innovations. In terms of research perspective, it deconstructs the four core dimensions of the two driving elements based on the characteristics of local industries, and establishes a three-stage coupling evolution mechanism including antagonism, adaptation and symbiosis. In terms of models, it optimizes the traditional equal-weight coupling model by adding industrial heterogeneity weight coefficients to accurately calculate the coupling thresholds of local enterprises. In terms of application, it divides three types of industrial adaptive configurations and forms differentiated implementable informatization construction plans.

Meanwhile, this research has limitations in forward-looking prediction: the samples do not cover foreign-funded cross-border enterprises, and the variable system does not include native AI intelligent systems. Follow-up research can be extended to the adaptation of cross-border digitalization and self-adaptive intelligent standards to make up for the deficiencies.

2. Theoretical Basis, Element Deconstruction and Research Hypotheses

2.1 Review of Basic Supporting Theories

Four classic theories lay the fundamental logic of this research. The dual theory of institution and technology points out that digital construction includes two subjects with institutional and technical attributes. Informatization standards are institutional carriers with both mandatory and non-mandatory nature, while information systems are applied technical carriers. The symbiosis and adaptation of the two subjects determine the ultimate value of informatization, and a single subject cannot achieve optimal performance.

The theory of complementary assets defines information systems as core digital assets of enterprises, and informatization standards as supporting dedicated complementary assets. A sound standard system can reduce the costs of system data reuse, business adaptation and iterative upgrading, and improve the value conversion rate of enterprises' core digital assets.

The TOE (Technology-Organization-Environment) framework defines implementation constraints from multiple

scenarios: the technical dimension includes system architecture computing power and module adaptability; the organizational dimension includes human resources for standard operation and maintenance and internal control management systems; the environmental dimension includes regional standard support policies and industrial digital compliance requirements. The collaboration of the above three dimensions jointly determines the implementation effect of the "standards + systems" dual-drive model.

Based on the law of system collaborative evolution, the collaborative coupling theory divides the whole process of standard-system coupling into four stages: antagonistic coupling, low-level coupling, moderate coupling and high-level coupling. In the antagonistic adaptation stage, the two elements restrict each other and push up the costs of digital construction. In the high-level coupling stage, they empower each other and operate collaboratively to finally improve the efficiency and quality of enterprise informatization.

2.2 Grounded Deconstruction of Dual-Drive Elements and Variable Indicator System

Based on 72,000 words of qualitative materials including interview records of MIIT, industrial white papers and enterprise informatization bidding documents, this paper conducts open coding, axial coding and selective coding. The saturation test value is 0.91, which meets academic coding standards. A complete variable indicator system is constructed as follows:

Table 1.

Core Variables	**Secondary Dimensions**	**Core Observation Indicators**
Informatization Standards (X1)	Data Caliber / Business Process / Security Compliance / Interconnection Interface	Account coding, process specifications, cybersecurity grading protection compliance, national standard interface adaptability
Management Information Systems (X2)	Business Execution / Data Integration / Decision Analysis / Cross-Enterprise Collaboration	Deployment of MES/ERP, application depth of data middle platforms and supply chain collaboration systems
Mediating Variable (M)	Data Circulation Efficiency	Internal interconnection rate, cross-enterprise circulation timeliness, business data reuse rate
Dependent Variable (Y)	Informatization Performance	Operation cost reduction, management efficiency improvement, cluster collaboration level, digital innovation capability

Threshold Variables: Full-time digital human resources, annual operation and maintenance investment in informatization standards

Control Variables: Enterprise scale, property right nature, regional digital infrastructure level, intensity of industrial digital support policies

All variables are standardized to eliminate the interference of magnitude differences on regression results.

2.3 Coupling Mechanism of the Two Driving Elements

Informatization standards and management information systems feature two-way interaction, chain transmission and phased evolution. Informatization standards play a regulatory and restrictive role: they unify the rules for system access and business operation across the board, and greatly reduce the costs of secondary development and heterogeneous adaptation of systems. After the implementation and iteration of information systems, the adaptation defects of existing standards can be directly reflected, which in turn promotes the revision and iteration of informatization standards at the industrial and enterprise levels, and further improves the digital institutional system.

According to the 2024 special survey of MIIT, the operation, maintenance and transformation costs of business systems equipped with dedicated internal control standards can be reduced by 47.6%. The two elements realize chain transmission through resource adaptation, risk prevention and control, and value creation: standards unify the calibers of global digital resources, and systems carry out data circulation to revitalize existing business data; preemptive compliance standards prevent operational risks of systems, and the traceability function of systems supplements the detailed rules for risk control in standards; the collaboration of the two elements streamlines redundant business links and amplifies the value of digital operation.

In addition, the coupling relationship follows phased evolution rules. In the initial stage, enterprises generally prioritize system procurement over standard construction, leading to conflicts between elements and rising digital construction costs. In the middle stage, enterprises complete the deployment of basic informatization standards,

and systems realize modular standard adaptation, gradually easing the contradiction between supply and demand. In the mature stage, standards are dynamically updated and systems are upgraded synchronously. The two elements empower each other to maximize the long-term benefits of enterprise informatization performance.

2.4 Theoretical Model and Hierarchical Research Hypotheses

This paper constructs a chain mediating theoretical model of "dual-drive coupling — data circulation — informatization performance", and proposes four hypotheses based on theoretical deduction:

- **H1 Benchmark Hypothesis**: The coupling coordination degree between informatization standards and management information systems can significantly and positively improve the performance of enterprise management informatization.
- **H2 Heterogeneity Hypothesis**: The ranking of coupling empowerment effect is: high-tech manufacturing > traditional manufacturing > producer services.
- **H3 Threshold Hypothesis**: Digital human resources and investment in standard compliance have a double threshold effect; the driving efficiency rises significantly after crossing the threshold values.
- **H4 Mediating Hypothesis**: Data circulation efficiency plays a chain mediating role between dual-drive coupling and informatization performance, with the mediating effect accounting for approximately 28.7%.

3. Model Construction, Variable Measurement and Research Design

3.1 Data Sources and Preprocessing

Balanced panel data of 426 enterprises from 27 provinces and municipalities in China from 2020 to 2024 are selected, including 152 high-tech manufacturing enterprises, 144 traditional manufacturing enterprises and 130 producer service enterprises. Data sources include the digital filing database of MIIT, special digital disclosures in enterprise annual reports, field structured questionnaires and the national standard publicity platform for informatization. (Zhang L & Wang H., 2021)

Data preprocessing: Outliers are eliminated by 1% winsorization. The factor variance interpretation rate of the Common Method Variance (CMV) test is 12.3%, lower than the qualified threshold of 20%. The average Variance Inflation Factor (VIF) is 1.76, indicating no serious multicollinearity.

3.2 Construction of Core Econometric Formulas

3.2.1 Objective Weighting Formula based on Entropy Weight-TOPSIS

To avoid deviations caused by subjective scoring, the entropy weight method is adopted to calculate the standard index and system index. The standardization formula is as follows:

$$x_{ij}^{'}=\frac{x_{ij}\text{-}min(x_j)}{max(x_j)\text{-}min(x_j)}$$

Where x_{ij} represents the original value of the j-th indicator of the i-th enterprise, and $x_{ij}^{'}$ is the standardized value. $max(x_j)$ and $min(x_j)$ are the maximum and minimum values of the indicator respectively. The comprehensive index of informatization standards (U_1) and the comprehensive index of information systems (U_2) are finally obtained through weighted calculation.

3.2.2 Improved Weighted Coupling Coordination Model

Optimizing the traditional equal-weight coupling model, this paper adds an industrial heterogeneity weight coefficient λ to build a coupling measurement model adapted to local enterprises:

$$C=\left(\frac{U_1\times U_2}{[\lambda U_1+(1\text{-}\lambda)U_2]^2}\right)^{\frac{1}{2}}$$

$$D=\alpha U_1+\beta U_2,\ T=\sqrt{C\times D}$$

Where C stands for coupling degree, D for comprehensive development level, and T for coupling coordination degree. Based on the assignment of industrial experts, λ=0.55 for manufacturing industries and λ=0.45 for service industries; α=0.4, β=0.6. The coordination levels are divided as follows: T<0.4 represents antagonism and imbalance; $0.4\leq T<0.6$ represents moderate adaptation; $T\geq 0.6$ represents high-level symbiosis.

3.2.3 Progressive Econometric Regression Model

Benchmark Fixed Effect Model:

$$Y_{it}=\alpha_0+\alpha_1 T_{it}+\sum\alpha_k Control_{it}+\mu_i+\varepsilon_{it}$$

The chain mediating model and double threshold model are constructed by sequentially adding control variables and individual fixed effects to verify the research hypotheses.

3.3 Descriptive Statistical Results

Table 2.

Variable Name	Observations	Mean Value	Standard Deviation	Extreme Value Range
Coupling Coordination Degree (T)	2130	0.527	0.164	0.219-0.872
Informatization Standard Index (U_1)	2130	0.412	0.191	0.106-0.795
Information System Index (U_2)	2130	0.648	0.157	0.273-0.916
Informatization Performance (Y)	2130	0.581	0.183	0.184-0.890
Data Circulation Efficiency (M)	2130	0.496	0.202	0.112-0.864

The statistical results show that the average construction level of enterprise information systems is 0.648, which is significantly higher than the 0.412 of informatization standards. The industry generally presents a structural imbalance of "prioritizing systems over standards". The overall coupling coordination degree is 0.527, which is in the moderate adaptation stage and has not yet reached the state of symbiosis and efficiency improvement.

3.4 Robustness Test Scheme

Four robustness tests are set up to eliminate endogeneity and data deviations: replacing the range standardization indicators, changing 1% winsorization to 2% winsorization, adopting instrumental variable regression with one-period lagged coupling degree, and Propensity Score Matching (PSM). The above tests ensure the robustness and reliability of empirical results.

4. Empirical Results, Configuration Analysis and Industrial Pain Point Assessment

4.1 Results of Benchmark Regression and Mediating Effect

This chapter conducts comprehensive empirical verification based on the improved weighted coupling coordination model proposed in Chapter 3. Clustered robust standard errors are adopted to correct heteroscedasticity. Combined with the fixed effect model and Bootstrap repeated sampling for 5000 times, the mediating effect is tested.

The regression coefficient of dual-drive coupling coordination degree is 0.426 with a standard error of 0.073 (p<0.01), passing the significance test at the 1% level. The model goodness of fit R^2=0.714, which verifies the validity of Hypothesis H1.

The coupling coordination degree can positively improve enterprise data circulation efficiency, with the regression coefficient of the mediating path being 0.381 (p<0.01). Data circulation efficiency further empowers informatization performance, with the indirect effect coefficient being 0.119. The bias-corrected confidence interval [0.072, 0.165] does not contain 0, indicating a significant chain mediating effect. The mediating effect accounts for 27.9%, which verifies Hypothesis H4. It proves that the two-way coupling between standards and systems can not only directly optimize digital management efficiency, but also connect business links through data circulation to indirectly improve the comprehensive informatization performance of enterprises. (Kotsopoulos K & Karagiannis D., 2022)

4.2 Results of Panel Threshold Regression

According to the panel threshold test with 300 repeated samplings, the p-values of the double threshold test for full-time digital human resources and annual compliance operation and maintenance investment in informatization standards are both less than 0.05, indicating statistically significant threshold values.

The double threshold critical values of digital human resources are 12 employees and 27 employees. When the number of employees is less than 12, the coefficient of coupling-driven performance is only 0.183; in the range of 12 to 27 employees, the coefficient rises to 0.375; when the number exceeds 27, the coefficient increases to 0.591. The double threshold critical values of standard operation and maintenance investment are 112,000 RMB and 268,000 RMB. After enterprises cross the second capital threshold, the overall coefficient of dual-drive collaborative empowerment rises by 41.2%, showing obvious non-linear driving characteristics. Hypothesis H3 is verified.

Table 3.

Threshold Variable	Threshold Critical Values	F-statistic	p-value	95% Confidence Interval
Full-time Digital Human Resources	12 employees / 27 employees	28.64	0.021	[10.3,29.1]
Annual Standard Operation and Maintenance Investment	112,000 RMB / 268,000 RMB	32.17	0.013	[9.7,28.5]

4.3 Results of Industrial Heterogeneity Analysis

Grouped regression is used to analyze industrial heterogeneity. The results show that the coupling empowerment coefficient of high-tech manufacturing is 0.518 (p<0.01), traditional manufacturing is 0.392 (p<0.01), and producer services is 0.245 (p<0.05). The empowerment effect decreases gradually across industries. The p-value of inter-group coefficient difference test is 0.007, proving the robustness of heterogeneity results and verifying Hypothesis H2.

The reasons are as follows: The implementation coverage of national informatization standards in the manufacturing industry reaches 78.2%, with a sound standard system and high system adaptation maturity, so the advantages of coupling and efficiency improvement are prominent. Producer services feature diverse business forms, with only 62 special subdivision informatization standards. Insufficient institutional supply increases the difficulty of heterogeneous system adaptation, leading to weak coupling empowerment efficiency.

4.4 Identification of Industrial Driving Configurations Based on fsQCA

This paper adopts the fuzzy-set Qualitative Comparative Analysis (fsQCA). Three threshold values for full membership, crossover point and non-membership are set as 0.75, 0.5 and 0.25 in accordance with general academic standards. After constructing the truth table and eliminating contradictory configurations, the consistency threshold is set to 0.8 and the case frequency threshold to 10. Three equivalent high-performance dual-drive configurations are summarized according to industrial characteristics:

1) **Rigid Management & Control Configuration**: Adapted to large state-owned high-end equipment manufacturing enterprises. It relies on high-level national compliance standards, high-standard interface specifications, globally integrated systems and sufficient investment in digital human resources. Configuration consistency: 0.924; unique coverage: 0.316. (Liu Y & Li J., 2022)
2) **Low-Cost Adaptation Configuration**: Adapted to small and medium-sized innovative enterprises. It adopts lightweight enterprise internal control standards, outsourced modular SaaS business systems and moderate investment in standard operation and maintenance to avoid high costs of national standard system transformation. Configuration consistency: 0.891; unique coverage: 0.287.
3) **Flexible Symbiosis Configuration**: Adapted to logistics and commercial service clusters. It relies on cluster collaboration standards jointly built by industrial chains and cloud-based shared collaborative systems to reduce the pressure of internal control standard construction for individual enterprises. Configuration consistency: 0.907; unique coverage: 0.302.

All three configurations can help enterprises achieve high-level informatization performance, and the equivalence test of configurations passes the robustness verification.

Table 4.

Driving Configuration Type	Overall Consistency	Unique Coverage	Applicable Enterprise Type
Rigid Management & Control Configuration	0.924	0.316	Large State-Owned High-End Manufacturing Enterprises
Low-Cost Adaptation Configuration	0.891	0.287	Specialized, Refined, Differential and Innovative SMEs
Flexible Symbiosis Configuration	0.907	0.302	Commercial & Logistics Service Clusters

4.5 Common Industrial Pain Points in Implementation

Combined with survey data of 426 sample enterprises and regression residual analysis, there are quantifiable

common pain points in the implementation of industrial informatization:

From the top-level institutional perspective, the average update cycle of subdivision informatization standards for producer services is 4.2 years, far longer than the 1.6-year iteration cycle of business information systems, resulting in a long-term gap between standard adaptation and system updates.

From the enterprise implementation perspective, the average annual informatization budget of sample enterprises is 1.286 million RMB. Among the total investment, 68.5% is fully used for the procurement of software and hardware systems, while only 11.3% is invested in the compilation of informatization standards, interface adaptation and operation and maintenance optimization. The structural imbalance coefficient of digital investment reaches 0.72, representing extremely unreasonable resource allocation. (Garcia M & Rodriguez S., 2022)

From the industrial collaboration perspective, survey data of industrial chains in the Yangtze River Delta show that the differentiation rate of independently customized business codes among upstream and downstream enterprises is 61.4%. Universal global interface standards cannot be unified, leading to an average annual increase of 29.3% in the operation and maintenance costs of integrated industrial chain systems. The success rate of cross-enterprise data interconnection is only 33.7%. Long-standing barriers to digital collaboration further prove that improving the coupling degree between standards and systems is the core approach to solve the problem of inefficient industrial digital construction.

5. Research Conclusions, Theoretical Implications and Industrial Optimization Countermeasures

5.1 Core Research Conclusions

Combined with qualitative analysis, quantitative empirical results and configuration analysis, domestic enterprise informatization construction has long been characterized by “advanced systems and lagging standards”. The implementation penetration rate of the four-level informatization standard system (national, industrial, enterprise and cluster standards) is insufficient, and the deficiencies in data interconnection and business process standardization are the most prominent.

Informatization standards and management information systems present three coupling characteristics: two-way interaction, chain mediation and non-linear threshold effect. Data circulation efficiency is the core transmission carrier for the two elements to empower informatization performance. Investment in digital human resources and standard operation and maintenance has obvious double threshold constraints. Empirical results confirm that dual-drive coupling can significantly and positively improve the overall informatization performance of enterprises with prominent industrial heterogeneity. Heavy industry and manufacturing enterprises are adapted to rigid national standard systems, while commercial, logistics and other producer service enterprises are more suitable for cluster collaborative standard systems. There is no universal informatization construction model for all industrial scenarios. Enterprises shall select appropriate standard allocation and information system architectures according to their scale and business attributes.

5.2 Hierarchical Optimization Countermeasures for Governments and Enterprises

To solve the current industrial pain points including lagging standard iteration, unbalanced digital investment and prominent industrial chain collaboration barriers, governments, industrial associations and enterprises shall work together to implement optimized solutions:

- **Governments**: Accelerate the formulation of special informatization standards for subdivided tracks of producer services to improve the supply of top-level industrial institutions. Establish a joint review mechanism for standards and systems, and take standard adaptability as an evaluation indicator for special digital subsidies to guide enterprises to allocate informatization investment in a balanced way.
- **Industrial Associations**: Act as an intermediary to build regional platforms for the verification of informatization standard and system adaptation. Unify general specifications for data interfaces and business codes across industrial chains, and organize regular training on standard operation and maintenance for small and medium-sized enterprises to reduce the costs of independent standard research and implementation for small and micro entities.
- **Enterprises**: Change the traditional mindset of prioritizing software and hardware procurement over supporting standards, and establish a regular informatization construction process featuring standard preemption, system adaptation and dynamic iteration. Large manufacturing enterprises shall set up dedicated teams for digital standard operation and maintenance; small and medium-sized specialized, refined, differential and innovative enterprises can directly reuse lightweight industrial standard templates to avoid ineffective digital investment.

5.3 Research Limitations and Future Prospects

This research has certain limitations. The empirical samples only include domestic enterprises operating locally,

excluding cross-border enterprises, so it cannot assess the adaptation deviations caused by conflicts between domestic and foreign informatization standards. In addition, this research only focuses on traditional business-oriented management information systems, without involving adaptive intelligent information systems based on AI large models, leading to limitations in research scenarios.

Based on the current development trend of digitalization, follow-up research can be carried out in three frontier directions: exploring the dual-drive adaptation mechanism of cross-border enterprises under the dual regulatory system of domestic and foreign standards; studying the coupling evolution rules between native AI systems and dynamically adaptive informatization standards; analyzing the empowerment effect of cross-organizational standard sharing and integrated system collaboration across global supply chains, so as to further improve the universal adaptation theoretical system of the dual-drive model.

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