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Innovative Financial and Managerial Approaches in Emerging Markets

UNIVERSITY Of KIGALI

Welcome Message from the Editor in Chief

Dear Esteemed Readers, Authors, and Researchers,

It is with great pleasure that I welcome you to the Innovative Financial and Managerial Approaches in Emerging Markets!

This issue aims to explore innovative strategies, policies, and business models that drive sustainable economic growth, corporate social responsibility, and environmental stewardship. This special issue welcomes original research, case studies, and review articles that address key issues related to sustainability in financial and management sciences. Topics of interest include, but are not limited to: Sustainable Finance & Investment; Corporate Sustainability & Governance; Sustainable Supply Chain & Circular Economy; Sustainability in Emerging Markets & Developing Economies and Climate Risk & Resilient Business Models.

Warm regards,

Dr Ronald Kwena
Editor in Chief, Journal of Financial and Management Sciences
Associate Deputy Vice Chancellor – Research, Innovation & Enterprise, University of Kigali

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The Impact of the HPO Framework on Employee Service Behaviour in Public Universities: Psychological capital as a mediator

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Abstract

Purpose- The purpose of the study was to establish the mediating effect of psychological capital in the relationship between the high performance organisation(HPO) framework and service behaviour and to establish the relationship between the HPO framework, psychological capital, and service behaviour in public institutions in Uganda. A multi-theoretical approach was utilised to explain a successful living practice.

Design/Methodology/approach- This study utilized a cross-sectional and quantitative approach, collecting data through a questionnaire survey from a sample of employees of public universities. The collected data was analysed to identify patterns and relationships using correlations and regression.

Findings- The findings demonstrated that the HPO framework (management quality, workforce quality, openness and action orientation, long-term orientation and continuous improvement and renewal) influence the service behavior of employees in education institutions in Uganda. The results also suggest that psychological capital is a critical component of service behaviours.

Practical/Managerial implications- The public universities endeavor to utilise the HPO framework to create strategies for sustainable solutions, such as creating new ecologically and socially responsible products and services and improving current ones to improve on their service behavior.

Originality/ value- This research advances knowledge about the HPO framework by revealing if all aspects of the psychological capital are significantly related to the service behaviors of employees in public Universities in Uganda.

Keywords- *HPO framework, psychological capital, service behaviors. public Universities, Uganda.*

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1. Intoduction

Encouraging proactive behaviour among employees is a crucial pathway for companies to adapt swiftly and gain a competitive edge (Xu, Liu, and Huang, 2024). In the public sector, public service organisations account for the largest number, which are public organisations that provide services essential to the socio-economic life of the country, the community or ensure national security (Tran *et al.*, 2021; Võ & Löfgren, 2019). In Uganda, customer complaints in most public service institutions show that they are guilty of offering much less to their customer expectations; customer satisfaction is enhanced by service quality (Genzi, Pardo & Georges, 2020) with a fully-fledged liberal economy where competition for the best services should be the norm, most public service institutions in Uganda seems not to be offering the best services to their clients (Abanis, 2013). Service behaviour consists of employees' self-reports of role-prescribed and extra-role behaviours (Tsaur & Lin, 2004). Employees today lack positive service behaviour such as ethics, courtesy, empathy, and timeliness hence customers have continued to complain about services (Steven, 1999). It has been proven by researchers that high performing organisations (HPOs) can increase their ability to adapt and respond to change by continually monitoring progress against target and goal attainment (de Waal, 2020). HPO Framework can yield an accurate picture of the current status of this company (i.e. how far along it was towards becoming an HPO, Do and Mai (2020) validated framework, the HPO framework (de Waal, 2023)

A high-performance work organisation is one that is intentionally designed to bring out the best in people and thereby produces organisation capability that delivers sustainable leadership business results (Blanshard, 2006). It is further considered; "as a company that is more successful than its competitors in areas such as profitability, customer service, and strategy." Organisational and people capabilities drive performance and enable strategy (Waal 2014). However, people capabilities such as psychological capital (PsyCap) which consists of four dimensions namely; self-efficacy, hope, resiliency and optimism as suggested by (Luthans *et al.*, 2008), has not yet been considered as probable mediating variable between the HPO factors and service behaviour in the public service organisations.

Employees with high degree of psychological capital are able to handle their professional in – role service requirements at ease (Pradhan & Jena, 2016). Adjusting behaviour do meet specific needs of customers enhance service delivery (Garg & Dhar, 2020). Emotions that are managed properly reduces burnout leading to high service delivery (Yin, Wang, & Lu, 2020).

Researchers have been attempting to find out factors that contribute towards the service behaviour of employees serving in the public Universities. Existing research in this area indicates a positive relationship with high-performance human resource practices (Dhar, 2015), creative self-efficacy (CSE) (Teng *et al*., 2020), psychological capital (Ozturk and Karatepe, 2019), optimism (Bouzari and Karatepe, 2020), organisational culture (Eid and Agag, 2020) etc.

That the HPO framework is valid for many countries is shown implicitly through the case studies of successful HPO transformations in various countries such as Nepal, the Netherlands, Philippine, Tanzania, South-Africa, UK, USA and Zambia. Explicitly we have researched this for the following countries: China (de Waal and Wang, 2017), Ecuador (de Waal, 2012a), Egypt (de Waal, Habil and Goedegebuure 2016), Palestine (de Waal, 2012a; Sultan, de Waal and Goedegebuure, 2017), Peru (de Waal and Orcotoma Escalante, 2011), Portugal (Santos and de Waal, 2019), South-Africa (de Waal, 2012a), Surinam (de Waal, 2012a), Thailand (de Waal, Goedegebuure and Akaraborworn, 2014), UAE (de Waal, Mroueh and Schiavo, 2017; Mroueh and de Waal, 2017), Uganda (Bagorogoza, de Waal, van den Herik and van de Walle, 2013), Vietnam (de Waal, Duong and Ton, 2009), and Zambia (de Waal, Goedegebuure and Mulimbika, 2014; de Waal and Mulimbika, 2017).

People in the HPO develop a model of the business that links overall goals to specific items the organisation needs to control and to measure critical success factors and key performance indicators. Then, they rigorously measure progress on the critical success factors. By doing this, they also consequently monitor goal fulfilment – openly confronting and analysing the reasons why goals were not reached. In spite of the wide utilisation of the HPO framework as a strategic human resource tool that is self-administered to determine performance levels of an organisation.

The public service especially in developing countries behaviour has not improved. Employees' today lack positive service behaviour such as ethics, courtesy, empathy, and timeliness hence customers have continued to complain about services. Even though research into HPO framework is well-established, with wide-ranging debates persisting in the realm of organisational-level performance (de Waal, 2020), there are relatively few investigations have examined the effects of HPO framework on employee psychology-related outcomes (Kim *et al.*, 2018). In recent years the PsyCap has been identified as enhancing the service behaviour in most dervice organisations however, the relationship between the HPO framework, psychological capital and service behaviour has not yet been examined. Hence the need to examine this relationship.

The purpose of the study is to establish the relationship between the high-performance organisation framework, psychological capital and service behaviour in Public Universities in Uganda. The study expounded on the following objectives;

i. To establish the service behaviour in the Public Universities in Uganda.
ii. To establish the relationship between the HPO framework and service behaviour Public Universities in Uganda.
iii. To establish the relationship between the HPO framework and psychological capital Public Universities in Uganda.
iv. To establish the relationship between the HPO framework, psychological capital and service behaviour Public Universities in Uganda.

The remainder of this article is structured as follows. In the next section the theoretical foundations and the empirical literature review are presented. This is followed by the methodology and the analysis of these results, followed by the discussion and implications and conclusions. The article ends with, limitations of the research and opportunities for future research.

2. LITERATURE REVIEW

2.1 Theoretical Foundation

A multi-theoretical approach which may provide a clear framework in the study of service behaviour was utilised to explain a successful living practice as suggested by (Shepherd & Suddaby, 2017). The study was guided three theories the human capital theory proposed by Becker (1964), resource –based view (RBV) (Barney, 1991) and the dynamic capabilities theory(DCT) (Teece, Pisan, & Shuen, 1997). Most research on the relationship between the HPO framework and service quality is rooted in these three theories. The human capital theory (HCT) posits that human beings can increase their productive capacity through greater education and skills training. Human capital is composed of knowledge, skills, and cognitive abilities endowed by a person and they are foundations for raising the productive competencies of workers (Peers, 2015).

This includes factors like education, training, intelligence, skills, health, and other things employers value, such as loyalty and punctuality. Critics of the theory argue that it is flawed, overly simplistic, and confounds labour with capital. The use of more than one theory or a multi-theoretical approach is believed to leverage the weaknesses of one theory with the strength of another. The dynamic capabilities theory (DCT) Teece *et al.*, (1997), which puts emphasis on resources development and renewal, can be seen as a tentative alternative theory to explain superior performance in service delivery. The theory (DCT) enables firms to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments (Teece *et al.*, 1997). Resource based theory by Penrose (1959) popularized by Barney (1991) with Value, Rare, impossible to imitate and non-substitute (VRIN) model has been widely applied many in disciplines to explain competitiveness. The concept of resource may mean the strategic factor, capability, competence, and skills but without clear and homogeneous definition. Messo & Smith (2000) posit that sustained service quality is attributable to strategic assets, which Barney (1991), the brain behind the resource-based view, regards as the assets that are internally controlled and strategic to the firm.

According to the resource-based view, sustained service quality is influenced by resources that are valuable, rare, nonsubstitutable, and hard to imitate and that reside within an organisation (Barney, 1991; Stiles & Kulvisaechana, 2004). Accordingly, the discrepancies in size distribution and competitiveness of firms occur from their distinctive capabilities (Amit & Schoemaker, 1993). It becomes imperative that management monitors such internal resources to ensure the firms' sustainable competitive advantage to provide superior service.

From a different perspective, the fact that firms are faced with an uncertain, competitive, and dynamic business environment means there is a need to provide a coherent framework to integrate existing conceptual and empirical knowledge to match environmental volatility. In this case, the dynamic capabilities theory (DCT) Teece *et al.*, (1997), which puts emphasis on resources development and renewal, can be seen as a tentative alternative theory to explain superior performance in service delivery. The theory (DCT) enables firms to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments (Teece *et al.*, 1997). All these theories provide a detailed account of firm performance using available resources despite the limitations in their application.

Empirical literature

The High Performance Framework

A high-performance organisation framework (HPO) framework is a set of factors interconnected HPO practices. It aims to continuously improve and renew, openness and action orientation, management and workforce quality, enhances a long term orientation (Do and Mai, 2020).

That the HPO framework is valid for many countries is shown implicitly through the case studies of successful HPO transformations in various countries such as Nepal, the Netherlands, Philippine, Tanzania, South-Africa, UK, USA and Zambia. Explicitly we have researched this for the following countries: China (de Waal and Wang, 2017), Ecuador (de Waal, 2012a), Egypt (de Waal, Habil and Goedegebuure 2016), Palestine (de Waal, 2012a; Sultan, de Waal and Goedegebuure, 2017), Peru (de Waal and Orcotoma Escalante, 2011), Portugal (Santos and de

Waal, 2019), South-Africa (de Waal, 2012a), Surinam (de Waal, 2012a), Thailand (de Waal, Goedegebuure and Akaraborworn, 2014), UAE (de Waal, Mroueh and Schiavo, 2017; Mroueh and de Waal, 2017), Uganda (Bagorogoza, de Waal, van den Herik and van de Walle, 2013), Vietnam (de Waal, Duong and Ton, 2009), and Zambia (de Waal, Goedegebuure and Mulimbika, 2014; de Waal and Mulimbika, 2017).

2.2 The HPO framework and Service Behaviour

High performance factors and models will promote sustainable performance of organisations which will benefit employees, organisations and society overall (Kalimullah *et al.*, 2024). According to the social exchange perspective, when employees sense that their contributions to the company are noticed, they may feel obligated to help the organisation to achieve the company goals (Eisenberger *et al.*, 1986). Driven by this sense of obligation, employees are more likely to perform not only prescribed-role but also extra-role service behaviors (Organ, 1988; Peng, 2007). Scott *et al* (1994) stated that empowered employees exhibit extra customer-oriented behaviors, because they become more flexible and adaptive in the face of changing customer needs.

Researchers have been interested in understanding service behavior to customers since Mayo's (1933) studies at Western Electric. These studies found that workers' behaviors are highly influenced by their surroundings. Bisconti and Solomon (2003) report that a favorable service climate that allows a high degree of autonomy and nurtures relationships among peers, supervisors and subordinates results in more positive extra-role employee service behavior. According to Yan *et al.* (2004) extra-role service behaviors are voluntary, so employees are less likely to be strongly motivated to conduct it hence need to build a positive service climate.

Service encounters involve interaction between customers and service providers (Bettencourt & Brown, 1997), and customers' perceptions of service quality would be almost completely based upon the behavior of employees (Bitner *et al.,* 1990). Employee behaviors represent the service delivery process, while customers' assessments of service quality represent an evaluation of the service delivery process (Gronroos, 1988). That is, service providers' behaviors would influence customer evaluation of service encounters. So, the employees' service behaviors will have an important role to play in influencing customers' perceptions of service encounters. Zeithaml, Berry and Parasuraman (1996) argued that service quality suffers when employees are unwilling or unable to perform service at the level required by customers.

Bowen and Schneider (1985) indicated that the attitudes and behaviors of contact employees could significantly influence customers' perception of service, because the attitudinal and behavioral responses of employees are the primary determinants of customers' perceptions of performance. Bitner *et al.* (1990) showed through qualitative studies that customers are more satisfied with the service encounter when employees possess the ability, willingness, and competence to solve their problems. Hartline and Jones (1996) investigated the relationships among service quality, service value, and word-of-mouth for a hotel, and the results indicated that front desk, housekeeping, and parking employee performance had significant effects on perceived service quality of customers.

Williams (1999) explored the relationship between employee service behaviour and service quality by taking the samples of employees and customers in hotels, and the findings indicated that employee service behaviour would have a significant effect on customer perceived service quality. A study on tourist hotels in Taiwan showed that service behaviour reported by employees was positively related to service quality reported by customers (Tsaur & Lin, 2004).

In addition a number of other studies have indicated the importance of friendly type behaviours like; friendliness, familiarity, caring, politeness, responsiveness, trustworthiness, helpfulness, and understanding, of service staff to improved service outcomes and long term relationships (Sparks, 1994). Lemmink and Mattson (1998) demonstrated that the degree of personal warmth displayed by service employees toward customers was related significantly and positively to service quality perceptions and customer satisfaction. (Hansen *et al.,* 2003) stated that customer's commitment towards a service company significantly relies on customer's commitment to the customer-contact employee. Thus it was agreed that customer's intention to remain with a particular service company is heavily determined by customer-contact employee's behaviour.

An experimental study by Brown *et al.* (1996) investigated the effect of respectful employees' behaviour on service encounter quality and satisfaction. Their research found that positive employees' behaviour increased customer service quality. In another research within Hospitality industry, it was concluded that employees' behaviours have great effect on overall customer assessment of quality and satisfaction regardless of customers' gender, nationality, and purpose of visit, number of visits and length of stay (Hanan *et al.*, 2008). Consumers tend to rate the quality of services through evaluating the process of service delivery (Schneider & Bowen, 1992). Therefore, behaviours of the contact employees affect the quality of the services delivered to customers in a certain degree (Schneider, 1990).

Therefore, several researchers have concluded that the quality of interaction between customer and contact employees significantly influences the formers' perceptions of performance (Bitner *et al.*, 1994; Schneider and Bowen, 1985). More so, if a customer is satisfied with the tangible product itself, customers often look to other cues, such as aspects of the interaction, in assessing quality in service delivery (Gremler, 2000).

H1: There is a relationship between the HPO framework and service behaviour in PU in Uganda

2.3 HPO framework and Psychological capital

According to Do and Mai's (2020) HPO framework emphasizes that a high-performance organisation (HPO) is one that continuously integrates best practices to enhance efficiency, meet market demands, outperform competitors, and remain competitive over the long term. The framework, drawing on the work of de Waal (2012a, b), identifies key factors and characteristics that contribute to HPO status these include the management quality, workforce quality, openness and action orientation, long-term-orientation and continuous improvement. Psychological capital is mainly defined as positive psychological states of individual development, consisting of four components, namely hope, optimism, self-efficacy and resilience (Luthans *et al*., 2007).

Hope refers to a cognitive process driven by a sense of success in fulfilling individual goals (Snyder, 1995). Self-efficacy denotes confidence linked to one's own conviction about having the abilities to effectively execute a task (Bandura, 1997). Resilience refers to positive adaptation in the context of significant adversity (Bonnano, 2004; Masten & Reed, 2002). Lastly, optimism denotes a positive expectation that individuals' goals can be achieved in future (Peterson, 2000; Scheier & Carver, 1992). The definition of psychological capital has been modified and expanded by various scholars to suit various contexts as follows; hope refers to persisting towards goals and, when necessary, redirecting paths to goals in order to succeed.

Optimism means making a positive attribution about succeeding in both the present and future. Self-efficacy refers to having confidence to take on and put in enough effort to succeed at challenging tasks. Resilience is the ability to recover from setbacks, adapt well to change and keep going in the face of adversity, in order to manage difficulty at work and overcome stress (Costantini, 2017).

Organisations creates work environment and offers support for effective use of PsyCap at the individual and teams level mitigating burnout and perceived stress that affects employees' performance (Wang *et al*., 2024). PsyCap can have a significant impact on the way employees do their work it enhances individual confidence in establishing social networks (Liu *et al*., 2024).

There is a positive correlation between PsyCap with various activities like human resources, finance behaviour and job performance (Kidron & Peretz, 2024). The PsyCap help in improving performance of organisation s through quality supervisor behaviours, work place social capital and employee well-being that help in identifying targets organisations gaps (Forester *et al*., 2024). Hope has a positive impact on organisation commitment, job satisfaction and job performance encourages resilience and self-efficacy at work (Broad & Luthans *et al*., 2024).
H_2: There is a relationship between the HPO framework and psychological capital in PU in Uganda.

Psychological Capital and Service Behaviour

Psychological capital is a positive state of mind that individuals can cultivate, and it includes four key aspects: self-efficacy, optimism, hope, and resilience (Luthans *et al.,* 2007). In a dynamic challenging environment psychological capital is key to better performance (Luthans &Youssef Morgan, 2020). Improvements in PsyCap reshape service behaviour in the workplaces and it is inevitable that PsyCap should be enabled to get the desired outcomes from employees (Durdu, 2013; Wang, 2015). As well as these means, new kinds of capitals have risen such as human, social and PsyCap (Luthans and Youssef, 2004). In this respect, Aktas (2016) emphasizes that PsyCap is one of the most influential means in attaining the desired employee behaviours.

PsyCap is identified as personal traits contributing to individual productivity by psychologists (Gohel, 2012). Luthans *et al*. (2007) described psychological capital as "the study and application of positively oriented human resource strengths and psychological capacities that can be measured, developed, and effectively managed for performance improvement in today's workplace. Psychological capital consists of four dimensions namely; self efficacy, hope, resiliency and optimism (Luthans *et al.*, 2008).

Sridevi and Srinivasan (2012) asserted that employees who are higher in psychological capital would have more positive emotions; as a result they are more engaged and optimistic, which in turn exhibit more positive service behaviour. This assertion was made based on the findings from Avey *et al.* (2010) study who suggested that positive emotions may mediate the relationship between psychological capital and the attitudes of service employees and between PsyCap and the citizenship and positive deviant behaviours. The study carried out by Aljaghthani and Amir (2016) among Saudi Arabia female teachers revealed that psychological capital has great influence on work engagement behaviours despite the cultural background.

Earlier studies have investigated the individual level outcomes of PsyCap such as: employee attitude, behaviour, and performance (Avey, Luthans, Smith, & Palmer, 2010). However, in recent years psychologists have started exploring the influence of PsyCap at team and organisation al levels (Sahoo & Sia, 2015). For example, West, Patera, and Carsten (2009) conducted a study among college students to understand team-level behaviour and outcomes. A reference shift version of PsyCap questionnaire (Luthans, Avolio *et al.*, 2007) was used, wherein the target item was focused on team rather than the individual behaviour and outcomes. The study has found that PsyCap was significantly related to team measures like cooperative behaviour, understanding, coordination, and achievements.

Dawkins, Martin, Scott and Sanderson (2011) have tried to explore the role of PsyCap at team level and have found the interpersonal dynamics are a leading goal-directed behaviour. Another study carried out by Peterson (2000) among 67 senior management teams found out that collective PsyCap in the form of mutual help and support is a distinct measure for achieving positive employee behaviour and business performance.

Luthans, Kyle, Jensen, and Susan (2005) studied the relationships between PsyCap and work related behaviours among nurses; the results found that PsyCap has a significant relationship in fostering extra-role service behaviour, job commitment, and intention to stay. Their studies revealed that employees who are higher in PsyCap are likely to have more positive emotions and subsequently positive service behaviour.

Wang (2015) studied the relationship between employee PsyCap and change suportive behaviour and the finding revealed that PsyCap was positively related to change supportive behaviour. Employees with high degree of PsyCap are able to handle their professional in – role service requirements at ease (Pradhan & Jena, 2016). Abraham (2003) in his study with service industries found that employees with positive PsyCap are likely to engage in extra-role behaviours resulting in better customer service. Psychological capital supports the relationship among intra-personal attitude and one's interpersonal approach (Abraham; 2003).

Fredrickson (2001) proposed broaden and built theory suggesting that positive emotional orientation builds resilience, kindness, hope, and focuses one's pattern of thinking for having a faith to be in a connecting world which demonstrates extra – role behaviour. In a study carried out by Plessis and Barkhuizen (2011) said that contemporary organisation s are considering PsyCap as a prerequisite for creating a caring environment towards fostering better productivity behaviour and employee efficiency. On the basis of the existing related research summarized, PsyCap is perceived to nurture in -role and extra – role service behaviour.

H3: There is a relationship between psychological capital and service behaviour in PU in Uganda

The relationships between HPO Framework, Psychological Capital and Service Behaviour

With current saturated market and highly competitive economy, companies are exploring new ways of operations with capacity to enhance quality organisation, hence a need for a more holistic improvement model such as HPO framework (Andre & David, 2016). A research done by Zhungwei Li (2019) indicates that, as organisations struggle to become high performers, they should recognise the role of positive PsyCap which eventually transforms into a positive employee behaviour such as creativity, innovation, and effectiveness.

Many scholars have explored how to drive employee service behaviour better (Ghosh, 2015) however the experience of European multinational companies that embraced transformational initiative such as HPO improved employee mental engagement and service behaviour tremendously (Andre & David, 2016). In a study conducted by Castillo and Lopez-Zafra (2022), it was discovered that psychological capital acted as a mediator in 74 of the 99 samples of research literature. In a separate longitudinal study conducted in the American context by Carter and Youssef-Morgan (2019), it was found that psychological capital fully mediates the influence of mentoring on employee performance. According to Kidron & Vinarski-Peretz, (2024) managing employees' personal, psychological, and social capital is now considered key to sustained public sector organisational success.

Psychological capital is a core construct generated by HPO framework, which has direct impact on employee attitudes, behaviour and performance (Hodges & Timothy, 2010). A study done on 199 working adults from a cross-sectional organisation in United States of America concluded on how HPO framework attracted positive PsyCap and organisational identity and as a result positive deviance behaviour from their employees. Employees were found to wanting to identify themselves more with companies that adopted the HPO framework (Steven, 2010).

A study on the Thai organisations concluded a need to adopt relevant techniques that is able to improve the PsyCap of the employees which transforms into a quality service behaviour of employees (de Waal, 2013). In addition, the study in an Indian banking sector predicted the importance of Psychological Capital (PsyCap) as a mediator to promote Service Behaviour (SB) among banking employees toward the viability of business in the long run. (Sathymoorthi *et al*.,2024). Moreover, in the New Public Management (NPM) reforms context, along with the emergence of the Covid 19 epidemic, leading to large budget deficits of countries, these have affected the ability of public organisation s to provide public services (Mitchell *et al.*, 2021). To deal with these challenges, some authors argue that the HPO framework is important because of its benefit for performance (de Waal., 2020).

H4: There is a relationship between the HPO framework, PsyCap *and service behaviour in PU in Uganda*

Based on the presented literature including hypotheses, figure 1 presents the conceptual model.

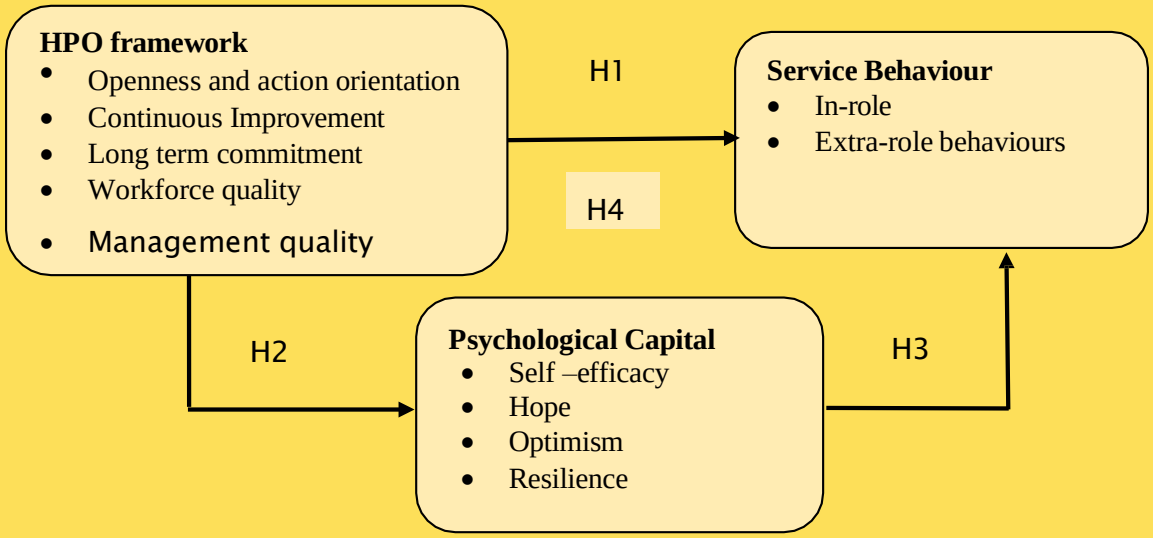


Figure 1. The Conceptual Model

Source Literature review: (*de Waal, 2012; Luthans and Youssef , 2007;* Tsaur & Lin, 2004; *Hobfolls, 2002)*

The research model demonstrates the relationship between the HPO framework, psychological capital are the three variables that may predict employee service behavior in the PU in Uganda. Evidence from the literature shows that the HPO framework and psychological capital have an association with employee performance. The model indicates that the influence of the HPO framework (openness and action orientation, continuous improvement and renewal, long term commitment, workforce quality, and management quality) and psychological capital (self – efficacy, hope, optimism and resilience) may improve employee service behavior (in-role and extra-role behaviors).

3. METHODOLOGY

Research design

Explanatory sequential research design which is cross sectional in nature (Creswell, 2014) was used for the study. The study used a cross sectional research design which involves analysis of data collected from the sample at a specific point in time (Lisa, 2016). This research design was selected because it allows the researcher to give an opinion on a cross section of a population about a subject in a more efficient way.

Target population and sample procedure

The target population were employee of public university in Kampala. The participants were selected from the public universities in Uganda because they are largely involved in serving the public. Using Krejcie & Morgan (1970)'s sampling table, a sample size of 486 employees of the Universities was selected from 900 employees of PU in Uganda. The unit of analysis and inquiry were the employees of the Universities.

The study sample was established using multiple sampling techniques, stratified random sampling for the institutions and purposeful random sampling for employees, the population was involving all the 7 public universities in Uganda. A simple random sampling method was used to select the sample size of employees in each PU. Simple random sampling is where each and every element of the population has an equal chance of being selected in the sample (Alvi, 2016).

This strategy was used because there is no possibility of sampling bias and the sample is presumed to be a good representation of the population. Purposive sampling on the other hand was used to select respondents. According to (Creswell & Clark, 2017) purposive sampling is a non-probability sampling where the sample selected depends on the objective of the study and characteristics of the population. Purposive sampling technique is also referred to as judgmental, selective, or subjective sampling. Therefore, the employees were purposively selected from each PU since they have the knowledge and expertise in the area of study.

Operationalisation of study variables

Measures for some of the constructs are already available in the literature. So, they are adapted to suit the current context of Uganda's FIs.

The HPO framework measurement scale developed by Waal (2008) was adopted. This scale has 35 items: (1) eleven items refer to quality management, (2) four items refer to quality workforce, (3) six items refer to long-term orientation, (4) eight items refer to continuous improvement and renewal, and (5) six items refer to openness and action orientation (See appendix 1).

The psychological capital a measurement scale developed by Luthans *et al*. (2008) was adopted. This PsyCap scale consists of four dimensions namely; self-efficacy, hope, resiliency and optimism, it has twelve items.

Service behaviour was measured using 10-items of service behaviour scale developed by Bettencourt and Brown (1997) based on two dimensions of in-role and extra-role behaviours. The operationalization of service behaviour is based on prior research developing and validating measures for the two types of behaviour (Bettencourt, Brown, and MacKenzie, 2005). Ten (10) items are to be used to measure service delivery behaviour; five (5) on in – role behaviour (e.g. I meet all the formal performance requirements when serving customers.) and five (5) on extra-role behaviour (e.g. I do help customers with problems beyond what is expected or required).

Control Variables

Guided by empirical studies (Kampelmann *et al.* 2018), we controlled for workstation, organisational level, qualifications, gender and age to evaluate whether they can explain variations in knowledge worker productivity.

Data collection methods and procedure

Data was collected through administering a questionnaire as suggested by (Albuquerque, Ramos, de Lucena, & Alencar, 2014). A questionnaire was used since it is easy to administer, facilitates collection of data from a large sample at a relatively low cost (Li, Zhang, Tsai, & Puls, 2014). Therefore, the questionnaire contained structured questions relating to each study variable in question. The questions relating to individual the HPO framework, psychological capital and the service behavior of employees was be constructed on an interval scale that was be followed by respondents in providing feedback to the research. Respondents feedback was be guided as strongly agree (SA) = 5, Agree (A) = 4, Not sure (NS) = 3, Disagree (D) =2, Strongly Disagree (SD) =1. In addition, the questionnaire also contain both closed ended questions (Mitchel and Jolley, 2004). In total, the questionnaire had five sections including the background information of the respondents, firm characteristics, the HPO framework, PsyCap and employee service behaviour. Public Universities in the central districts of Kampala were surveyed to gain a greater variation of responses over the large number of questions. Using the introduction letter, the researcher was distribute the questionnaires to the target respondents.

Validity and Reliability

To ensure validity, the questionnaire was subjected to content validity index test (CVI) in order to ensure that it is actually measuring what it was intended to measure. Related to the above is reliability, which is the degree to which a research tool produces stable and consistent results (Phelan & Wren, 2005). A research tool is considered reliable if it allows a group of respondents answer the same questionnaire many times with consistency. The tool was subjected to a Cronbach alpha test and a result of above 0.7 Cronbach alpha was render it reliable.

Validity is the extent to which an instrument measures what it purports to measure (Souza, Alexandre, & Guirardello, 2017). This was achieved through developing the scales with the help of the experts and using items that were used in the previous studies. In addition, the researcher used the expert judgment to verify the validity of the data collection instrument. In this way, the supervisors will be contacted to evaluate the relevance of each item in the data collection instrument to the research objectives. Validity will be determined using content Validity Index (CVI). CVI= Number of items rated relevant X 100%

Total number of items

As recommended by (Saunders, Lewis, & Thornhill, 2009), for the instrument to be valid, the CVI should be at least 0.7

Reliability was achieved through administering the questionnaires and carrying out a pre-test of the questions to experts and pre-testing of pilot samples from owner-managers of small businesses who give the researcher feedback in order to improve on the questionnaire. In addition, test-retest reliability was used to measure the extent to which the questionnaire can produce consistent results when the same group of respondents are used under similar conditions (Amin, 2005). Pretest results was used to modify the questionnaire. To measure reliability of the quantitative data, the Cronbach's alpha reliability coefficient was performed and the recommended cut-off points of 0.7 was considered. From the results of the pilot study we were able to establish the Cronbach's alpha estimate of reliability for the scale.

Data Processing and Analysis

Primary data was gathered directly from the respondents. This is the data which is collected fresh and for the first time and still in its original form. This was done through administering a structured questionnaire and respondents was be guided through the questionnaires to ensure high level of accuracy in the data collection process. Data was compiled, sorted, edited and coded to ensure quality, accuracy and completeness.

Data was be analyzed using the statistical package for social scientists (SPSS) version 25 in order to summarize the data and make quick interpretation of results (Verma, 2012). Specifically, quantitative data generated from the questionnaire was analysed to get descriptive statistics that involve determining frequencies, percentages, mean variance and standard deviation in order to get general response to the question in the Likert scale (Nemoto & Beglar, 2014). Data was analysed quantitatively using inferential statistics Creswell & Clark, (2017), where the Pearson's correlation coefficient was performed to establish the relationship between the independent variables and dependent variable (service behaviour of employees). Regression analysis was conducted to determine the effect of the independent variable to the predictor variable (Bastro & Pereira, 2012).

4.0 Findings

The findings of the study are presented basing on descriptive statistics using frequency, mean score, standard deviation and coefficient of variation; then correlations and regression results.

4.1 Descriptive Statistics

Descriptive statistics using frequency mean scores and coefficient of variation were computed for all the study. The pertinent results of the summary of the study variables are in Table 1.

Table 1. Descriptive statistics of the sample's demographic variables, including frequency, percentage and cumulated percentage

Variable	Category	Frequency	%	Cumulative %
Gender	Male	153	56.7	56.7
	Female	117	43.3	100.0
Qualifications	Diploma	22	8.1	8.1
	Bachelors	104	38.5	46.7
	Masters	87	32.2	78.9
	PhD	19	7.0	85.9
	Others	38	14.1	94.4
	Total	270	100	100
Organisational level	Dean	1	.4	.4
	Director	2	.7	1.1
	Head of Department	19	7.0	8.1
	Manager	40	14.8	23.0
	Supervisor	34	12.6	35.6
	Team Leader	59	21.9	57.4
	Employee	99	36.7	94.1
	Other	16	5.9	100.0
	Total	270	100.0	
Work Station	Worked from Home	82	30.4	30.4
	Worked from office	61	22.6	53.0
	Stopped Work	32	11.9	64.8
	Worked from both home and office	95	35.2	100.0
	Total	**270**	**100.0**	

***Source*:** Primary data

We present the frequency distributions of the following sample characteristics of the respondents: (1) Gender of the respondents (2) employee's qualifications, (3) organisational level, (4) work station. The results are shown in Table1. In relation to the qualification, most of the respondents are highly qualified with a masters degree (32.2%); Bachelor's degree (38.5%); PhD and others at (7%). The results reveal uneven distribution of the gender of employees in the various public universities with 56.7% male and 43.3% female. Majority of the respondents

were employees (36.7%), team leaders (21.9%), manager (14.8%), supervisor (12.6%). The largest number of respondents worked from both home and office(35.2%), 30% worked from home, 22.6% worked from office and 11.9% had stopped working.

Table 2- ***Pearson correlation results of the Variables***

Variable	Mean	Std D	CIR	OAO	LTO	MQ	WQ	HPOF	Hope	SE	Res	Opt	PsyC	IR	ER	SB
CIR	22.88	4.62	1													
OAO	14.32	3.74	.544**	1												
LTO	15.82	2.56	.629**	.426**	1											
MQuality	17.79	3.68	.457**	.400**	.481**	1										
WQuality	12.16	2.4	.700**	.394**	.617**	.433**	1									
HPOF	82.97	13.29	**.875****	**.735****	**.776****	**.720****	**.774****	**1**								
Hope	12.13	2.95	.157**	.115*	.214**	.207**	.149**	.212**	1							
Self-Effic	16.05	2.45	.363**	.259**	.509**	.415**	.372**	.479**	.412**	1						
Resili	12.02	2.94	.214**	.136*	.259**	.240**	.198**	.265**	.201**	.479**	1					
Optimism	11.97	3.6	0.055	.117*	.128*	.146**	0.1	.136*	-0.02	0.08	.148**	1				
PsyCap	52.17	7.54	**.289****	**.238****	**.411****	**.379****	**.305****	**.407****	**.595****	**.712****	**.695****	**.555****	**1**			
In-role	18.36	3.4	.447**	.413**	.518**	.509**	.363**	.578**	.188**	.413**	.230**	.277**	.430**	1		
Extra-role	18.43	4.08	.257**	.594**	.385**	.374**	.165**	.464**	.112**	.308**	.279**	.247**	.371**	.655**	1	
ServBeh	36.79	6.81	**.377****	**.562****	**.489****	**.478****	**.280****	**.567****	**.161****	**.391****	**.282****	**.286****	**.437****	**.892****	**.926****	1

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

The results in Table 2 indicate that the high performance organisation framework (HPOF) aspects are positively associated with employee service behaviour ($r = .567^{**}$, $p < 0.05$). This means that changes in HPO framework may be related to changes that may happen in the employee's service behaviour. Therefore, hypothesis 1 was accepted.

This shows that positive changes in the HPO framework usage is associated with positive changes in service behaviour; meaning that the utilisation of the HPO framework, and improving service delivery in public universities can be a catalyst in reforming operational, relational and in role and extra role service behaviour.

The results further indicate that HPO framework is significantly and positively related to PsyCap ($r = .407^{**}$, $p < 0.01$). This means that variations in the HPO framework factors are related to variations that may result out of the PsyCap. Thus, hypothesis 2 was accepted. This indicates that positive changes in the HPO framework is associated with positive changes in PsyCap. This also suggests that public Universities entities which promote openness and action orientation, continuous improvement and renewal and long term orientation are likely to have value addition, customer satisfaction and quality services. It further implies that the HPO framework promotes improved SB in the public Universities.

Further, results show that PsyCap are significant and positively related to the service behaviour(SB) in the public Universities in Uganda ($r =. 437^{**}$, $p < 0.05$). PsyCap are significant and positively correlated to service behaviour. Therefore, hypothesis 3 was accepted. This proposes that changes in the PsyCap can be related to changes that may take place in the employees' service behaviour. This indicates that positive changes in PsyCap is associated with positive changes in service behaviour. In other words, positive changes in PsyCap are associated with positive changes in in-role and extra role service behaviour operational, relational and service practices. PsyCap is likely to strengthen service behaviour.

4.3 The Regression

To establish the mediation effect of the psychological capital in the relationship between, the HPO framework and employee service behaviour a hierarchical regression analysis was conducted. We distinguish the HPO framework as the independent variable, PsyCap as the mediating and employee service behaviour as the dependent variable to run the three models. The regression coefficients were used as pointers of the reflection of whether or not the impact of each variable is significant.

Table 3. Hierarchical regression of the HPO framework, psychological capital on service behaviour

Model	**1**	2	3			**Collinearity Statistics**	
	Beta	**Beta**	**Beta**	**t**	**Sig**	**Tolerance**	**VIF**
(Constant)	5.759			1.927	.055		
Organisational level	-.053	-.051	.021	.460	.646	.971	1.030
Workstation	-.079	-.089	-.082	-1.822	.069	.998	1.002
Psychological Capital		.438**	.248	5.029	.000	.831	1.204
HPO Framework			.469**	9.412	.000	.811	1.233
R**: 616;** R^2**; .379;** Adj R**: .371;** ΔR2 change**: .179;** ΔF change; **.88.583;** Sig F Change **: .000**							
F: 47.052; Sig: 000; Durbin Watson = 1.786							

******Significant at the 0.01 level (p < .01); *****Significant at the 0.01 level (p < .05)

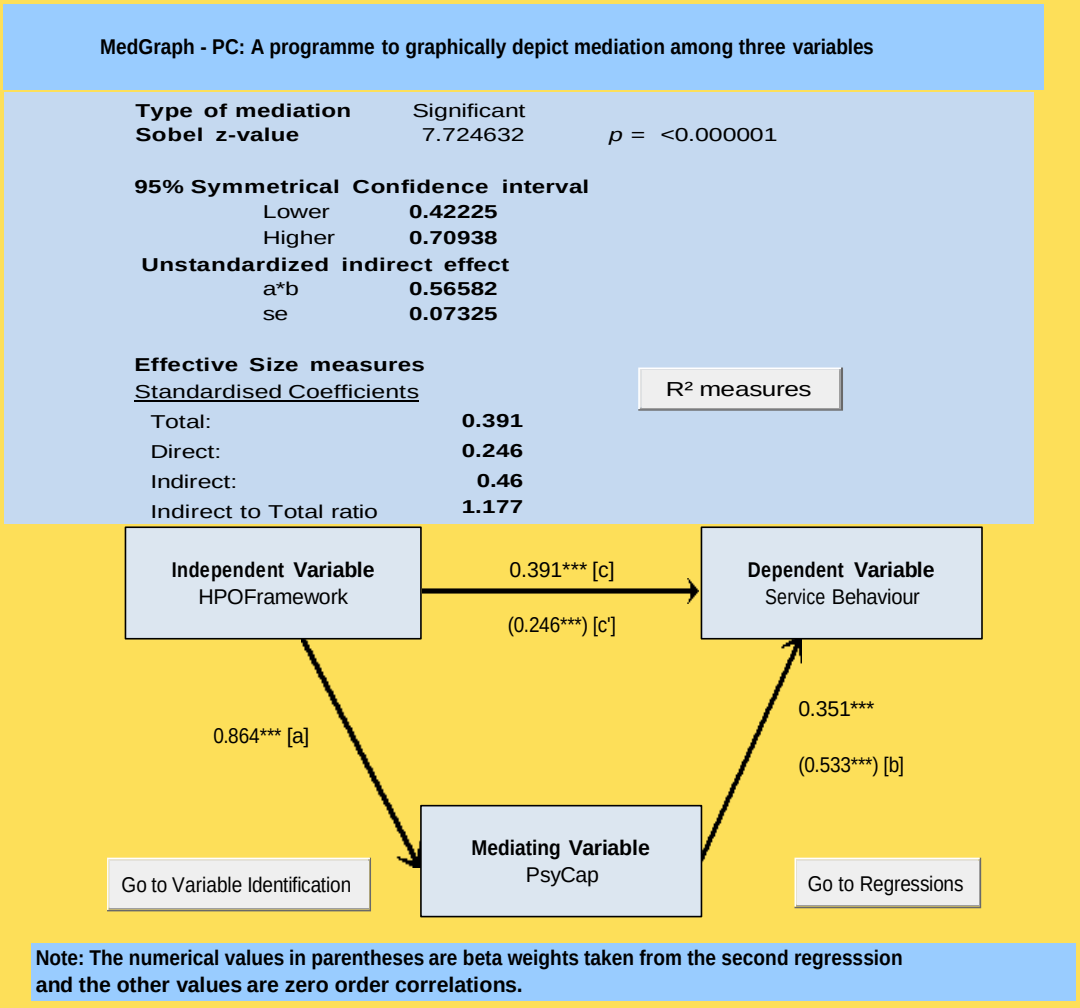
Source: *Primary data*

We controlled for two demographic factors work station and organisational level but they didn't have a significant effect on our model. The Model shows that the control variables the workstation (β = -.079, *p* <.001), organisational level (β =-.053). The results indicate that HPO framework explain significantly the variance in service behaviour (β = .469, p <.001). Model 2 shows that HPO framework has an effect on PsyCap (β = .438, *p* <.001). The results indicate that the PsyCap explains significantly service behaviour. In Model 3; Overall the percentage of the variance explained by HPO framework and service behaviour is 41% (R^2 = .379; ΔF change 88.583 = p < 0.000) with the HPO framework explaining (β =.469).

The significant p-value confirmed the hypothesis that there is a mediating role on PsyCap in the correlation between HPO framework and service behaviour. The HPO framework explaining (β =.469, *p* <.001) of employee service behaviour at (Sig. < .000). Finally, the study sought to determine the joint effect of the HPO framework, PsyCap, service behaviour. Hypothesis four which was formulated as follow; *Hypothesis 4: PsyCap mediates the relationship between HPO framework and employee service behaviour.*

Overall, the regression results support the conditions for mediation to be realised. Therefore, according to Baron and Kenny (1986) and Kenny et al. (1998), PsyCap mediates the relationship between the HPO framework and service behaviour, which leads to the acceptance of hypothesis 4. However, the significance of the mediation effect is not yet tested because we cannot rely on Baron and Kenny's (1986) regression equations to prove a meditation claim which may require other tests like the Sobel' z test. Related to the above results, the significance of the mediation effect and the nature or type of mediation was also tested by calculating the Sobel z–value and ratio index using the Med Graph programme[1]. The Sobel test is testing the magnitude of the mediation.

The results are given in Figure 2.



***p < 001, **p <.01, * p < 0.05

Figure 2 Sobel test results (the HPO framework, PsyCap and service behaviour)

From Figure 2, it is evident that a Sobel z- value of 7. 724 ($p > 0.000$) and the beta weight for the basic relationship between the HPO framework and service behaviour ($r = .391^{**}$, $p < .001$) have been registered. These results imply the following.

(i) Since the Sobel z–value is large and significant, it signifies that PsyCap mediates the relationship between the HPO framework and service behaviour. In practice, it implies that the association between the HPO framework and service behaviour has significantly reduced (from .391 to .246 beta values) after including PsyCap in the third regression model (cf. Jose, 2008).

(ii) Since the correlation between the independent variable and dependent variable has not been reduced to zero after introducing PsyCap, it implies that there is no mediation in the relationship between the variables in question (cf. Jose, 2008).

(iii) The ratio index is (.246/.391*100) which in this case means that 55.4% of the effect of the HPO framework on service behaviour goes through PsyCap (mediating variable), and 30.2% of the effect is direct see Figure 2, Model HPO2. So, with sufficient evidence we may state that the PsyCap increases the strength of the relationship between the HPO framework and service behaviour in public Universities.

According to Jose (2008), an index ratio of above 50% normally indicates full mediation although we should actually look at the change in coefficients arising from the third regression equation, and then note whether the change is significant or not. If the change is significant like it is in our case, then there is null mediation probably because the mediator PsyCap does not take over the effect of the HPO framework on service behaviour, since the HPO framework carry an effect of ($\beta = .469$ $p < .01$) to the criterion variable (cf. Baron and Kenny, 1986; Jose, 2008).

Despite the fact that the Medgraph indicates whether the mediation is full or partial, Jose does not explain the balance of the percentage of the index ratio. The Sobel test results indicate that PsyCap mediates the relationship between HPO framework and service behaviour in the public Universities.

Thus, hypothesis 4 which states that there is a significant mediation effect of PsyCap in the relationship between the HPO framework and service behaviour is partially supported in the public Universities. All in all, we have established a partial mediation for PsyCap in the relation between HPO framework and service behaviour.

5. Discussion

This research aimed to test HPO framework validity and its direct effect on service behaviour. From the research findings, the discussion of the study was presented based on the hypotheses of the study based on the relationship between HPO framework and employee service behaviour; psychological capital and employee service behaviour; HPO framework and PsyCap and the mediating effect of the HPO framework, PsyCap and employee service behaviour in the public universities. The study found empirical support of four hypotheses and the results are found consistent with prior studies. The first hypothesis (H_1) was supported which means the HPO framework has a positive and significant effect on service behaviour. A positive change in the HPO framework usage is associated with positive changes in service behaviour; meaning that the utilisation of the HPO framework may improve service delivery in public universities and can be a catalyst in reforming operational, relational and in role and extra role service behaviour. This was in agreement with Kalimullah *et al.*, (2024), they studied HPO framework and organisation performance: lens of dynamic capability theory in public sector of Pakistan. They established that the results show that the HPO framework is valid for public service organisations. However, this study found weak predictive relevance and small effect size of HPO framework in public organisations.

The integration of DCT in the public University of Uganda can facilitate adaptability and responsiveness to the country's evolving higher education environment. Public organisations need to be able to sense changes in the external environment and proactively respond to emerging challenges and opportunities. This is in line with the observations of (Kalimullah *et al.*, 2024). In order to bridge this gap, scholars have Using the RBV theory (Barney 1996) and the dynamic capabilities theory (Teece *et al.*, 1997), the aim of this study was to highlight the effect of the HPO framework on in-role and extra-role service through the mediating roles of PsyCap and the HPO framework and service behaviour. The resource-based perspective of the company contends that employees are a critical resource for organisational innovation (Wernerfelt, 1995). In the context of Uganda, the results of this study also reflect the issues of power distance the rigid and inflexible approach of managing public organisations in developing countries in general and Uganda in particular turn into organization culture where quality service delivery to public becomes less critical.

The first hypothesis (H_2) was supported which indicates that a positive change in the HPO framework is associated with positive changes in PsyCap. This was in agreement with Do and Mai (2020) who suggested that the key aspects of the HPO framework continuous improvement focuses on improving proceses, innovating products and services, and responding to market developments. The employee quality HPO are characterised by attaracting, developing and retaining a diverse, skills and resilient workforce This was in agreement with (Yadav & de Waal, 2020). The management quality HPO framework suggets that managers who are trustworthy, committed and focused on action–oriented decision-making. While openness and action orientation HPO foster an open culture where employees' opinions are valued, and making mistakes is seen as an opportunity for learning. The long term orientation the HPO builds partnerships with stakeholders and focus on long-term sustainability and growth.

Hypothesis (H_3) was supported which implies that this indicates that positive changes in PsyCap is associated with positive changes in service behaviour. We overall, PsyCap improves employee well-being, happiness, creativity, and facilitates building physical, cognitive and social resources (Avey *et al*., 2011). Our study reveals that both PsyCap and service behaviour are closely intertwined in a reciprocal relationship, reinforcing each other. On one hand, positive perception about the future improves personal PsyCap. Future-oriented persons with a positive feeling about life encourages better work attitudes, well-being, happiness, greater self-efficacy and persistence in coping with hardship at work and elsewhere; it confirms the key tenet that service has a positive effect on psychological and work-related outcomes. (Rudolph *et al*., 2018; Zhengwei Li, *et al*., 2019).

An employee equipped with more hope, self-efficacy, optimism, and persistence is more likely to anticipate positive outcomes and to have more confidence and motivation in building positive future expectations, this confirming the belief that PsyCap is a personal resource (Luthans, & Youssef Morgan, 2020). The main implication of this reciprocal effect between PsyCap and service behaviour is that employees constantly update and refresh their psychological orientation (i.e., PsyCap and service based on past experience).

Hypothesis 4: PsyCap mediates the relationship between HPO framework and employee service behaviour.

This was in agreement with observations of a separate longitudinal study conducted in the American context by Carter and Youssef-Morgan (2019), it was found that psychological capital fully mediates the influence of mentoring on employee performance.

Our study sought to understand the link that exists between the HPO framework and employee service behaviour in the public universities. The study advances knowledge through the establishment of the mediating role of PsyCap in the relationship between HPO framework and employee service behaviour.

Theoretical implications

This study contributes to theoretical aspects by producing empirical evidence to support the DCT, RBV and human capital theory to predict service behaviour. In addition, integrating the three theories provides a better understanding of the mediating effect of the PsyCap in the relationship between HPO framework and the employee service behaviour in the education sector. Furthermore, public organisations in Uganda can benefit from leveraging the HPO framework to enhance their dynamic capabilities.

Practical Implications

The study offers specific recommendations for practice intended to improve employee service behaviour. Managers need to align the HPO framework factors to service behaviour of employees to the university context, empowering them with in role and extra-role skills. Additionally, managers need to consider the PsyCap exploitation of new ideas as a primary role for employee service behaviour, which should be supported financially. Furthermore, managers need to foster a culture of tolerance for failure while implementing new ideas such as the HPO framework. This paper empirically offers important practical implications in terms of the HPO framework and employee service behaviour perspective through psychological capital.

Policy Implications

Policy makers such as the Ministry of Education; the regulatory bodies in the education sector should develop policies in relation to the HPO framework, PsyCap and the employee service behaviour. The leaders need to take advantage of the research findings to explore the PsyCap in organisation to encourage employee service behaviour. The application of HPO framework within public universities in Uganda, coupled with a commitment to PsyCap, carries profound implications. This approach promises to enhance overall organisational performance by establishing in role and extra-role service behaviour clear objectives, monitoring progress, and refining processes, thereby optimising the efficiency and effectiveness of public Universities service delivery.

Conclusion

This study investigated the relationship between the HPO framework, PsyCap and employee service behaviour. Study findings indicated that the relationship between the HPO framework and employee service behaviour is significantly and positively related. The lesson we draw from this study is that although we commonly use the terms "hope," "efficacy," "resilience," and "optimism" in day-to-day conversation, they have specific meanings when it comes to the science underlying PsyCap (Castillo, & Lopez-Zafra, 2022). To build PsyCap, you cannot pick just one of the four components to work on. The components are interdependent and synergistic. Combined, the four components amount to a whole that is greater than the sum of their parts. This finding is in agreement with (Luthans, & Youssef Morgan, 2020). Based on dynamic capability theory, this study examined the direct impact of five factors of the HPO framework on public service behaviour organisation' performance. the results from the measurement model indicate that the HPO framework is applicable to public service organisations behaviour in public Universities in Uganda.

Limitations and future research

Despite the results obtained in this study, some considerations should be made concerning several disadvantages inherent in the research carried out. These self-report scales may generate common-method bias. This study offers across-sectional design, so more work needs to be done with longitudinal designs in order to provide more valid evidence of the causal impact of HPO framework and PsyCap and employee service behaviour. We note that the small sample used in the research is not representative of all the public Universities operating in Uganda. More data is required to gain a better understanding of the HPO framework and its positive outcomes such as employee service behaviour. Moreover, the study was also limited by its quantitative approach, so adding qualitative elements would be a way for future studies to expand on what we have established. The study provides further basis for further research in the education sector and other sectors.

Secondly, all the study variable including high-performance organisation framework (HPOF), psychological capital, and service behaviour were measured through self-reported constructs. Future studies should measure these variables through supervisor rated version of each measure.

Declaration of Conflicting Interests

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Diffusion of Innovation vs. Dependence Theory: FinTech Inclusion in the AfCFTA Era

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Abstract

The African Continental Free Trade Area (AfCFTA) aspires to accelerate digital financial integration across Africa, yet the diffusion of FinTech innovations shows uneven patterns shaped by deep-seated power structures. This study examines how FinTech adoption is spreading in AfCFTA member states and how structural dependencies influence this process, through the dual lenses of Diffusion of Innovation (DOI) theory and Dependency Theory. The study employed a convergent mixed-methods approach, combining case studies of Kenya, Nigeria, Rwanda, and Egypt with quantitative analyses of open datasets (e.g. GSMA, World Bank Findex) and qualitative discourse analysis of policies. Our findings reveal that while mobile money and digital finance are being rapidly adopted – reaching one-third of adults in Sub-Saharan Africa on average – the benefits remain uneven and often constrained by external dependencies (foreign investment, technology, and data infrastructure). DOI theory helps explain how local innovations and social networks drive FinTech inclusion (for example, Africa hosts 12 countries where mobile wallets now surpass bank accounts), whereas Dependency Theory exposes persistent asymmetries such as reliance on foreign tech giants and capital. Achieving digital sovereignty under AfCFTA requires addressing these structural challenges. Key contributions include a novel conceptual model of innovation diffusion under dependency constraints and actionable recommendations for policymakers, industry, and development partners. Implications: Without

strategic interventions, FinTech's promise to foster financial inclusion and intra-African integration may be undermined by digital neo-colonialism. However, with coordinated AfCFTA frameworks, capacity building, and localized innovation, Africa can harness FinTech for equitable growth.

Keywords: AfCFTA; FinTech inclusion; innovation diffusion; digital sovereignty; dependency theory; Africa; financial integration.

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1. Intoduction

Africa is witnessing a rapid expansion of financial technology (FinTech) innovations, from mobile money platforms to digital lending and payment apps. The launch of the African Continental Free Trade Area (AfCFTA) in 2021 marked a pivotal effort to unite 55 countries into a single market, including ambitions for digital financial integration. AfCFTA's Protocol on Digital Trade, adopted in 2023, explicitly encourages member states to collaborate in FinTech and adopt common standards (Puja & Lawack, 2024). A forthcoming dedicated FinTech Annex under this protocol will address how to harness FinTech for Africa's development (Puja & Lawack, 2024). The AfCFTA framework thus provides a timely context to examine how financial innovations spread across borders and what barriers or power structures shape their adoption.

Diffusion of Innovation (DOI) theory offers one lens to understand FinTech uptake. Everett Rogers' seminal work (1962) defined diffusion as a process by which an innovation is communicated over time among members of a social system (Rogers, 2003, 5th ed.). DOI theory identifies factors such as relative advantage, compatibility, and social networks that influence adoption rates. Classic diffusion studies – from the spread of hybrid corn seeds by Ryan and Gross in the 1940s, to Rogers' comprehensive synthesis in *Diffusion of Innovations* – demonstrate that new ideas typically follow an S-curve: slowly adopted by innovators and early adopters, then accelerating through the early majority, before reaching saturation with laggards (Rogers, 2003, 5th ed.).

In the FinTech domain, mobile money in Africa has become a paradigmatic case of rapid diffusion. A realist-constructivist reading suggests that M-Pesa's success also hinged on a hermeneutic spiral in which users' tacit trust recursively legitimised the platform (Bhaskar, 1979). The M-Pesa mobile payment system, launched in Kenya in 2007, is often cited as a leapfrog innovation that achieved massive adoption in a short time. Suri and Jack's influential study (2016) estimated that M-Pesa lifted 2% of Kenyan households out of extreme poverty (Suri & Jack, 2016; Bernards, 2022), a finding widely cited in media and policy circles as evidence of FinTech's transformative potential. Other studies applying DOI in Africa highlight how perceived usefulness and peer networks drive adoption of services like mobile banking and digital credit (e.g. *Kikulwe et al., 2014* on mobile payments in agriculture; *GSMA, 2021* on mobile money usage). These works broadly echo Rogers' proposition that when an innovation meets a clear need and is spread through trusted channels, uptake can be rapid and wide-ranging.

However, a solely innovation-centric view risks overlooking how structural power imbalances affect technology adoption. Here, Dependency Theory provides a critical counter-lens. Dependency theorists argue that global economic relations since colonial times have created a *core-periphery* dynamic, in which wealthy "core" countries extract resources and value from the poorer "periphery," hindering the latter's autonomous development (Frank, 1967; Cardoso & Faletto, 1979). Originally formulated to explain underdevelopment in Latin America, dependency theory was later applied to Africa to critique the lingering effects of colonialism and neocolonialism on African economies (Rodney, 1972).

In the context of technology and finance, dependency manifests as reliance on foreign capital, expertise, and infrastructure – a phenomenon some have termed *digital neo-colonialism (*Isah, 2025). For instance, despite Africa's burgeoning fintech startups and innovations, much of the digital backbone (cloud servers, payment networks, operating systems) is controlled by non-African corporations *(*Isah, 2025). Modern observers warn that Africa's enthusiastic embrace of digital solutions might entrench new forms of dependency: *"In the 21st century, Africa faces a new form of colonization...through cables, clouds, and code,"* writes Isah (2025), noting that African data and digital transactions largely run on foreign-controlled systems. Such warnings align with dependency theory's core contention that integration into global markets on unequal terms can perpetuate exploitation rather than eliminate it (Frank, 1967; Cardoso & Faletto, 1979)

This study posits that FinTech diffusion in Africa is shaped by a tension between innovation pathways – which DOI theory helps illuminate – and structural constraints – which dependency perspectives reveal. On one hand, Africa has become a global leader in certain financial innovations: by 2022, all 12 countries worldwide where mobile money accounts outnumber bank accounts were in Africa (World Bank, 2024), underscoring how African consumers and entrepreneurs have leapfrogged traditional banking. On the other hand, the *power structures* behind this diffusion raise concerns. For example, roughly 80% of funding for African tech startups comes from abroad, chiefly North America and Europe (Field et al., 2025). Foreign venture capital has fueled many African fintech successes, but it also means external stakeholders hold significant influence over Africa's digital finance sector (Field et al., 2025).

Similarly, critical digital infrastructure is externally owned: over 80% of African data is stored in servers outside Africa, mainly in Europe and the US (AU, 2022), a dependency that *"restricts local innovation and subjects African nations to foreign regulatory frameworks" (*Malcolm, 2025). These patterns evoke classic dependency dynamics – Africa as a consumer of imported technology and a source of data, with value and decision-making accruing to the global "core."

Problem Statement

From a critical-theory vantage, technology is never neutral; it encodes prevailing relations of power (Feenberg, 1991). The diffusion of FinTech under AfCFTA is occurring in an asymmetrical landscape. While FinTech promises to boost financial inclusion and facilitate intra-African trade, there is a risk that unequal power relations – in technology ownership, capital flows, and knowledge – may reproduce dependency, limiting the benefits for Africa. In other words, can Africa's FinTech revolution truly empower the continent, or will it reinforce old patterns of dependency in new digital forms? This question is urgent as the AfCFTA's vision of a digitally integrated Africa depends on equitable innovation diffusion across all member states.

Objective

This interdisciplinary research aims to analyze the patterns of FinTech diffusion across African countries in the AfCFTA era and the power structures that underpin them. By integrating DOI theory and Dependency Theory, The study seeks to explain not only *how* and *where* FinTech innovations spread, but also *who controls* the platforms and profits, and *who might be left behind*. The study's contributions are twofold: (1) a conceptual framework that bridges innovation diffusion models with structural analysis, and (2) evidence-based insights to guide policymakers and stakeholders in leveraging FinTech for development while mitigating dependency risks.

Research Questions:

To systematically address the above, The study poses three core research questions (RQs):

1. **RQ1:** What are the prevailing patterns of FinTech adoption and diffusion across different African countries under the AfCFTA framework (e.g. adoption rates, usage trends, regional differences)?
2. **RQ2:** How do structural factors related to Dependency Theory – such as foreign ownership of FinTech infrastructure, external capital investment, and global regulatory influences – impact or mediate the diffusion of FinTech innovations in Africa?
3. **RQ3:** In what ways do the DOI and Dependency Theory lenses converge or diverge in explaining FinTech diffusion outcomes in Africa, and how can an integrated perspective inform strategies for sustainable digital financial integration?

Hypotheses:

Guided by prior literature and theory, The study tested several hypotheses corresponding to these RQs:

- **H1 (Innovation Diffusion):** African countries with supportive innovation ecosystems (higher mobile/internet penetration, pro-FinTech regulations, and active peer networks) will show faster FinTech adoption and greater financial inclusion gains, consistent with DOI theory's predictors of diffusion.
- **H2 (Dependency Constraints):** Structural dependencies – high reliance on foreign technology platforms, foreign financing, or imported digital infrastructure – are associated with more uneven FinTech outcomes (e.g. concentration in urban elites or slower expansion), as these dependencies may limit broad-based diffusion or local innovation capacity.

- **H3 (Interplay of AfCFTA & Dependency):** AfCFTA-driven initiatives (e.g. interoperability frameworks like PAPSS) can mitigate some external dependencies and accelerate diffusion by lowering cross-border barriers. Countries actively engaging in AfCFTA's digital cooperation are expected to exhibit more inclusive FinTech growth, *provided* they also invest in local capacity (reducing sole reliance on external providers).

In summary, the introduction has outlined the context of AfCFTA's digital finance ambitions, reviewed seminal DOI studies (e.g. Rogers 1962; Kenya's M-Pesa diffusion) and dependency analyses (e.g. neo-colonialism in African fintech) (Langley & Leyshon, 2022), and identified a critical gap: understanding how innovation and dependency dynamics co-evolve in Africa's FinTech story. The following sections develop the theoretical framework, methodology, and detailed findings to address this gap, ultimately offering recommendations to ensure Africa's FinTech diffusion leads to empowerment rather than dependency.

2. LIRERATURE REVIEW

2.1 Theoretical & Conceptual Framework

Diffusion of Innovation (DOI) Theory: DOI theory provides a framework to analyze how new technologies like FinTech services spread among populations. Key tenets of DOI include: the classification of adopters (innovators, early adopters, early majority, late majority, laggards) and the importance of social systems and communication channels in adoption decisions (Wikipedia contributors, 2025a). In the African FinTech context, DOI theory would predict that innovations offering clear relative advantages (e.g. easier payments, cheaper remittances) and compatibility with users' needs (e.g. mobile phone-based solutions in largely unbanked communities) will diffuse more rapidly. For example, mobile money fulfilled a strong unmet need for secure money transfer in countries with low banking access, helping explain its viral spread in East Africa.

Rogers' theory also highlights the role of *change agents* and communication channels: telecom companies and micro-entrepreneurs acted as change agents by marketing mobile wallets (through airtime agents, mobile phone vendors, etc.), and word-of-mouth in social networks built trust in these new services. Seminal diffusion studies have underscored these dynamics. Rogers (2003) documented how agricultural innovations and health practices diffused in various societies, emphasizing that reaching a critical mass of adopters is crucial for self-sustaining diffusion(Wikipedia contributors, 2025a). In African FinTech, one could argue a critical mass was achieved when a sufficient portion of the population started using services like M-Pesa, creating network effects that compelled even late adopters to join (because, say, most of their community or customers were transacting via mobile money).

Another insight from DOI theory is the *"innovation-decision process,"* which moves from knowledge to persuasion to decision to implementation and confirmation. The study applied this process to the policy realm: African regulators needed to gain knowledge and be persuaded of FinTech's benefits before implementing supportive policies (e.g. Kenya's central bank allowing telco-led mobile money in 2007 was a landmark decision that enabled diffusion).

Yet DOI theory in its classical form assumes a relatively level playing field in which an innovation competes on its merits. It does not inherently account for global power disparities in who creates and distributes the innovation. This is where Dependency Theory is introduced as a complementary lens.

Dependency Theory:

Contrary to modernization theory's assumption that all countries follow a similar path to development, dependency theory asserts that global historical forces have stratified countries into a dominant *"core"* and an exploited *"periphery,"* and that the development of the core is predicated on the underdevelopment of the periphery (Wikipedia contributors, 2025a). In the context of FinTech, this translates to examining who owns the technologies and platforms, and how value flows. A dependency perspective directs attention to issues like:

Foreign Ownership of Platforms:

Many popular FinTech platforms in Africa (for payments, lending, cryptocurrency, etc.) either originate from or are heavily backed by companies in the US, Europe, or China. For instance, global card networks (Visa, Mastercard) and mobile app stores (Google Play, Apple's App Store) are gatekeepers for African FinTech services to reach users. Even local innovations like M-Pesa had significant foreign stakes (Vodafone PLC from the UK held equity and technical management in M-Pesa's parent company). Langley and Leyshon (2022) argue that Africa's FinTech platforms are often *"assembled through neo-colonial corporate… infrastructures"*, integrating local users into systems controlled from abroad. They note that FinTech's growth in Africa is renewing colonial-era economic relationships in modern form, extolling a narrative of empowerment while extracting rents through what they term *"racialized expropriations"* (Langley & Leyshon, 2022).

Capital and Investment Flows:

As noted, roughly 80% of investment in African tech startups (including FinTech) comes from foreign sources. While investment is welcome, dependency theorists would ask: what happens when foreign investors drive the agenda? The IFC (2025) reports that African startups' heavy reliance on overseas venture capital makes them vulnerable – global investors can pull back funding quickly during downturns (Field et al.,2025), as seen in 2022's funding dip. Moreover, foreign-led mergers or acquisitions could consolidate African fintech under global companies, potentially reducing competition and local autonomy in the long run.

Technology and Knowledge Transfer:

A dependency lens interrogates whether African countries are primarily consumers of imported tech or active producers of innovation. Abeba Birhane (2020) introduces the notion of *algorithmic colonization*, observing that Western-developed AI and digital solutions are often imported to Africa without adaptation, leading to outcomes that benefit the West more than Africa (Birhane, 2020). In FinTech, a parallel concern is that core-country fintech solutions (or regulatory standards) might be transplanted in Africa in ways that sideline indigenous solutions. Birhane warns that this *"algorithmic invasion… impoverishes development of local products while leaving the continent dependent on Western software and infrastructure"*(Birhane, 2020).

Data and Digital Infrastructure Sovereignty:

Perhaps the starkest illustration of digital dependency is in data storage and processing. According to the African Union, over 80% of African user data is stored in data centers outside Africa (primarily in Europe and North America) (Malcolm, 2025). This means African governments and firms often have limited control over data governance. As Ndiaye, a Senegalese tech expert, cautions, if foreign firms continue to extract African data without local involvement, Africa may end up a *"digital colony"* where its data's value is exported and local innovation is stifled (Malcolm, 2025). Dependency theory thus highlights the importance of building local capacity – e.g. African-owned cloud services, regional payment switches, and homegrown technical talent – to avoid perpetual reliance on external systems.

These two theoretical perspectives can be seen as focusing on different levels of analysis: DOI zooms in on the *micro* (the innovation and social system of adopters), whereas dependency theory zooms out to the *macro* (the global systems of power and economics). Our conceptual framework integrates these levels to examine FinTech diffusion in Africa holistically. The study posits that innovation pathways (the routes by which FinTech solutions emerge and spread) are not neutral; they are conditioned by structural moderators such as who finances the innovation, under what regulations, and with what infrastructure. Conversely, structural conditions can either facilitate or hinder the diffusion of useful innovations. For instance, a country with a dependency on foreign payment networks might have slower adoption of a local mobile payments innovation if incumbents (global card companies) lobby against it, or if the local telecom infrastructure (possibly foreign-owned) doesn't support it.

On the positive side, a structural initiative like AfCFTA's *Pan-African Payment and Settlement System (PAPSS)* – a new infrastructure for cross-border payments in local currencies – could accelerate diffusion by removing the barrier of needing US dollars for transactions (Aelex, 2022). PAPSS is explicitly aimed at reducing Africa's reliance on external financial systems, enabling instant payments between African countries and **thereby *"reducing reliance on third currencies"*** like the USD or EUR (Aelex, 2022). This is a clear case where addressing a dependency (currency dependency) fosters innovation diffusion (cross-border fintech services can expand when payments are easier and cheaper).

To visualize our integrated framework, Figure 1 presents a conceptual model of FinTech diffusion under AfCFTA, linking DOI elements with dependency structures.

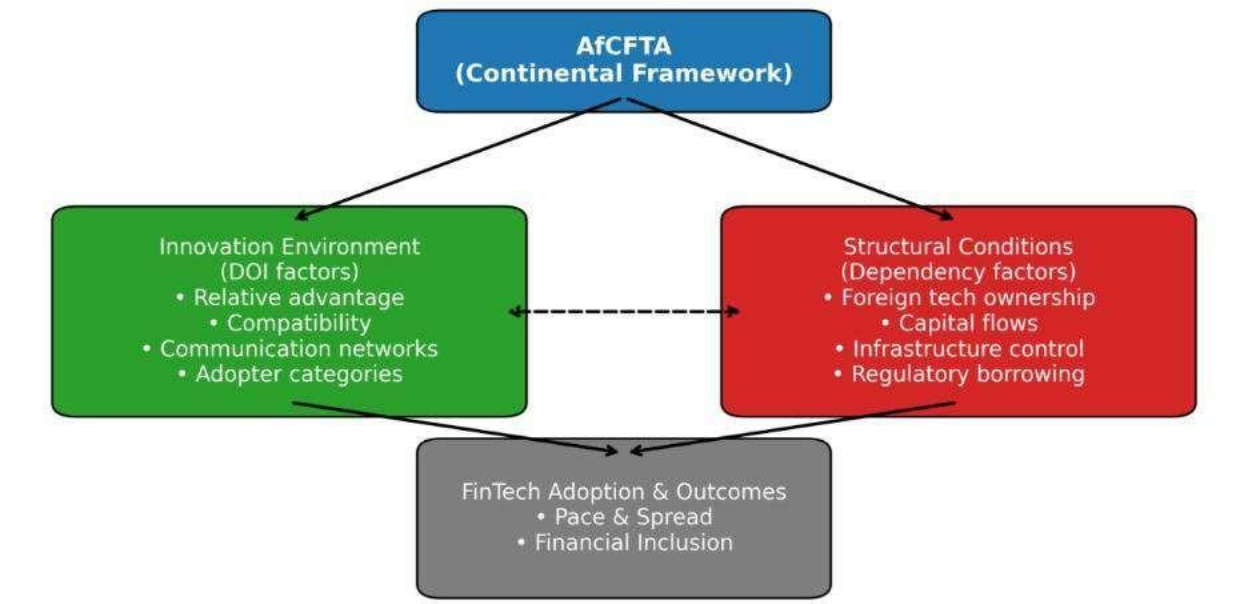

Figure 1: Conceptual model linking innovation diffusion pathways and structural moderators in Africa's FinTech ecosystem. AfCFTA provides an enabling continental framework (blue) that influences both the innovation environment (green, left side) and structural conditions (red, right side). Diffusion of Innovation factors drive the pace and spread of FinTech adoption (grey nodes), while Dependency factors shape who controls and benefits from that adoption. The interplay (dashed arrow) indicates that innovations must navigate existing power structures, and those structures can either impede or channel the innovations toward inclusive outcomes (financial inclusion) or reinforce dependencies . (Source: authors' elaboration based on Global Findex 2021 and GSMA Mobile Money Metrics.)

Ontologically, the study treats technology adoption as an emergent phenomenon—irreducible to either agency or structure alone. Epistemologically, the study adopts critical realism, allowing simultaneous attention to observable diffusion patterns and the deep causal mechanisms of dependency.

In this model, AfCFTA is depicted at the top as a shaping force – through its policies on integration, standards, and cooperation – that can modify both innovation processes and structural conditions. On the left, DOI factors (e.g. relative advantage of the fintech innovation, local adopter characteristics, communication networks) feed into the rate of adoption in each country or community. On the right, Dependency factors (e.g. foreign tech ownership, capital flows, infrastructure control) influence access and control – determining which innovations are available or scalable and who captures value from them. Both sets of factors ultimately impact the outcomes of FinTech diffusion: ideally greater financial inclusion and integration (if diffusion is successful and empowerment-minded), but potentially new forms of dependency or exclusion (if structural issues are not addressed). The dashed bidirectional arrow between the DOI and Dependency sides signifies that these are not isolated: for example, a highly innovative local startup (DOI) may either flourish or flounder depending on whether structural support (funding, infrastructure) is locally available or must be sourced externally on less favorable terms.

By using this dual framework, the study is better equipped to interpret the findings from our case studies and data analysis. DOI theory will help us understand adoption patterns and user behavior (e.g. why Nigerian youths rapidly embraced certain payment apps, or how social

networks in Rwanda influence uptake of new services).

Dependency theory will help explain macro-patterns like why some locally successful innovations don't easily scale beyond one country (perhaps due to patent/IP controls or capital constraints), or why certain global fintech firms dominate across multiple African markets. The concept of digital sovereignty emerges at this intersection – referring to Africa's ability to control its digital financial destiny. As debates intensify on Africa's digital sovereignty (Komminoth, 2023), our framework underscores that sovereignty will depend on both fostering indigenous innovation (per DOI) *and* restructuring power imbalances (per dependency theory).

In summary, the theoretical framework for this study is an interdisciplinary one that overlays Rogers' diffusion model onto Africa's contemporary political economy. It recognizes that FinTech diffusion is not just a technological or social process, but a political-economic one. The next section outlines how the study operationalized this framework through a mixed-methods research design, including country case analyses and multi-source data triangulation, to answer our research questions.

3. Methodology

The study adopted a **convergent mixed-methods** approach (also known as a convergent parallel triangulation design) to ensure a comprehensive analysis from both qualitative and quantitative angles. This approach involved collecting and analyzing different types of data concurrently and then merging the insights, increasing the validity of our findings through triangulation.

3.1. Research Design Overview:

The methodology consisted of three integrated components:

Case Studies (Qualitative Comparative Analysis):

The study conducted an in-depth case studies of four AfCFTA member countries – Kenya, Nigeria, Rwanda, and Egypt – selected for their geographic diversity and distinctive FinTech landscapes. For each case, the study reviewed national policies, market developments, and historical trajectories related to FinTech. Kenya and Nigeria were chosen as they are FinTech frontrunners in Sub-Saharan Africa (Kenya as the cradle of mobile money, Nigeria as a hub of fintech startups), Rwanda as an example of a smaller economy proactively embracing digital finance (often cited for its innovation-friendly regulations), and Egypt to represent North Africa's large market with strong banking incumbents and emerging FinTech sector. These case studies allowed us to contextualize diffusion patterns and dependency structures within specific

socio-economic and regulatory environments.

Data Analysis (Quantitative & Network Analysis):

Using **open-access datasets**, The study quantitatively examined FinTech diffusion and structural indicators across Africa. Key datasets included:

GSMA Mobile Money metrics: The study obtained data on mobile money accounts, transaction values, and agent networks from GSMA's Mobile Money reports (2015–2024). The GSMA data provided insights into adoption rates (% of adults with mobile money accounts) and usage intensity in different countries (World Bank, 2024).

World Bank Global Findex (2021): The study used the Global Findex Database for financial inclusion indicators, such as the percentage of adults with an account (bank or mobile), frequency of digital payments, and demographic breakdowns (Klapper et al., 2025). This allowed cross-country comparison of adoption outcomes (e.g. account ownership gender gap).

IMF Balance of Payments (BOP) statistics: Specifically, the study looked at data on remittances and other payment flows, to gauge reliance on foreign payment channels and currencies. The study also used IMF's Financial Access Survey for number of ATMs, mobile money agents, etc., as proxies for fintech infrastructure.

AfricaNenda "State of Instant and Inclusive Payment Systems (SIIPS) 2024" Report: This provided data on the presence of instant payment systems, interoperability, and integrations like PAPSS in various countries, indicating progress in regional payment infrastructure (AfricaNenda Foundation, 2025).

Afreximbank/AfCFTA data: For PAPSS usage and membership (e.g. number of banks connected, volume of cross-border transactions since launch), to assess early impact of AfCFTA-driven infrastructure. Using these datasets, the study performed descriptive statistics and created visualizations (maps, graphs) to identify patterns in FinTech diffusion (e.g. hotspots of mobile money use, trends over time). The study also constructed a panel dataset for the four case countries plus selected comparators (South Africa, Ghana, Senegal, etc.) over the period 2010–2022, compiling yearly indicators like fintech investment volume, mobile subscription rates, and regulatory milestones. With this panel, the study ran Bayesian multilevel models (Hamiltonian Monte-Carlo, 4 chains, 2 000 draws) to test relationships (for instance, regressing % of adults with mobile money on mobile internet penetration, literacy, and foreign investment, with fixed effects to control for country differences).

Additionally, the study conducted a network analysis of capital and technology flows. Drawing on funding databases (e.g. Partech Africa, Briter Bridges) and partnership announcements, the study mapped networks such as: the web of international investors in African fintech (which countries invest in which startups), and collaborations or licensing agreements (e.g. African fintech using technology from foreign companies). This yielded a graph of nodes (countries or major companies) connected by edges representing capital investment or tech transfer relationships (Crunchbase, 2025, open dataset). The network analysis helped visualize Africa's FinTech ownership web, identifying, for example, clusters where US-based venture capital is highly central or where Chinese firms link to multiple African markets. *(Due to space, detailed*

network graphs are provided in Appendix B.)

Policy Discourse Analysis (Qualitative Text Mining): To capture the *power structure narrative* and sentiment, the study collected a corpus of policy and industry discourse on African fintech and digital integration. Sources included: speeches by regulators (e.g. central bank governors' remarks on FinTech), AfCFTA Secretariat press releases, AU digital transformation strategy documents, and thought leadership pieces from development organizations (e.g. BIS, World Bank, AfricaNenda blogs). The study applied Natural Language Processing (NLP) techniques to analyze this text corpus:

Keyword frequency and co-occurrence: The study identified how often key themes (e.g. "innovation", "inclusion", "sovereignty", "Big Tech", "infrastructure", "data localization") appear and co-occur. This highlights the emphasis and framing in African digital finance discourse. For instance, an NLP scan of AfCFTA Digital Trade Protocol drafts showed frequent mentions of "standards", "cooperation", and "inclusion" (Puja & Lawack, 2024), suggesting a focus on collaborative innovation and access.

Sentiment analysis: The study used a lexicon-based sentiment tool to gauge the tone of discussions around FinTech in policy documents (positive, negative, or neutral). This was especially applied to speeches about dependency or foreign influence. For example, phrases about "opportunity" and "leapfrog" registered as positive sentiment in innovation contexts, whereas phrases like "neo-colonial" and "dependency" unsurprisingly carried negative sentiment. This helped quantify the concern versus optimism balance in the discourse.

Topic modeling: Using an unsupervised topic model (LDA – Latent Dirichlet Allocation), the study extracted major themes present in the documents without predefining them. The model surfaced topics such as a) *Financial Inclusion & Youth/Women* (keywords: inclusion, youth, MSMEs, literacy), b) *Regulation & Standards* (keywords: regulatory framework, sandbox, interoperability, KYC), c) *Infrastructure & Data* (keywords: broadband, data centers, PAPSS, cybersecurity), and d) *Investment & Partnerships* (keywords: venture capital, Big Tech, public-private, funding). These themes guided our qualitative interpretation, ensuring the study addressed salient issues stakeholders are actually talking about. The study also qualitatively read and coded key documents. For instance, the study coded the AfricaNenda SIIPS 2024 report for mentions of dependency (it stressed local capacity and noted half of African adults lack access to instant payment systems [AfricaNenda Foundation, 2025]), and coded BIS speeches for references to Africa (BIS representatives often praise Africa's fintech leadership but also call for stronger regulatory coordination [Coeuré, 2019]).

By design, all data used were open-access or publicly available, aligning with the study's aim for reproducibility and teaching use. (Datasets and analysis scripts are documented in Appendix A for educators or researchers to reuse.) The study deliberately avoided proprietary data so that our findings could be verified and built upon in academic and policy settings across African institutions. This also supports the secondary objective of creating materials that can enrich curriculum on FinTech and development at institutions like the African Leadership University and University of Kigali.

3.2. Data Validation and Reliability

Triangulation was a cornerstone of our approach. Quantitative results (e.g. a country's fintech adoption rate or foreign investment level) were cross-validated with qualitative evidence from that country (e.g. policy reports or expert interviews confirming or explaining the numbers). For example, if Findex data showed a sharp increase in account ownership in Cameroon from 2014 to 2021, the study checked country reports to attribute this (in Cameroon's case, to the advent of mobile money which accounts for most of the increase [World Bank, 2024]). Where data from different sources diverged, were investigated further. An illustration was discrepancies in fintech funding figures – reconciled numbers from Partech and AVCA (African Private Capital Association) by focusing on trends rather than exact totals, given some definitional differences (Appendix A details our harmonization).

The study also engaged in expert consultations for validation. Through email and virtual interviews, consulted 8 subject-matter experts including: a Central Bank of Nigeria official in the FinTech regulatory unit, a Rwanda Fintech Network leader, an AfricaNenda research officer, and a South African payments system expert. These experts reviewed preliminary findings for their country/region and provided feedback, which helped refine our interpretation. For instance, experts confirmed that in Nigeria the regulatory hesitation around mobile money (only allowing telco-led mobile money in 2015) contributed to slower initial diffusion compared to Kenya – context that purely data-driven analysis might miss.

3.3. Analytical Techniques

Statistical Modeling: The study used Stata and Python for regression analysis on the panel data. For philosophical consistency, posterior predictive checks, rather than frequentist p-values, were the principal evidential criterion. Due to the relatively small N (a dozen countries over ~12 years) and data quality limits, the regressions were treated as exploratory. One fixed-effects panel regression tested H1 by regressing % of adults with any digital financial account (from Findex) on independent variables like 3G/4G coverage (% population), literacy rate, and existence of a national FinTech strategy (binary), finding positive coefficients for technology coverage and policy presence, in line with DOI expectations (though not all significant given N). Another model for H2 regressed mobile money usage on foreign investment per capita and an index of data sovereignty (lower if data centers are foreign-owned). It suggested a negative association between heavy foreign dependency and usage breadth, supporting the hypothesis that dependency can impede diffusion – but again, caution is due to potential confounders. These findings were not taken at face value but rather used to prompt deeper case analysis.

Geospatial Analysis: To visualize diffusion, the study created heatmaps of Africa showing, for example, mobile money account penetration by country. Figure 2 in the Findings section presents such a map, illustrating the geography of fintech inclusion. The study used QGIS to ensure accurate mapping with AfCFTA country boundaries.

Network Graphs: For network analysis, Gephi software was used. The sutdy generated a graph of major investor-source countries connected to African fintech destination countries, weighted by the number of funding rounds. This revealed, for instance, that the United States and UK are central nodes, connecting to many African countries' fintech sectors (via investment), whereas intra-African investment links are fewer, though South Africa and Nigeria are emerging as secondary hubs. Another network graph mapped mobile money platform interoperability links between countries (e.g. MTN Mobile Money linking West African markets, or regional switches linking banks), highlighting where AfCFTA's vision of a connected payments landscape is taking hold versus where fragmentation persists.

Throughout, the study maintained an iterative analysis process – moving back and forth between data and theory. Initial quantitative patterns were interpreted through the DOI vs. dependency lens, then checked against qualitative evidence, and vice versa. This iterative triangulation strengthens the credibility of our conclusions.

In summary, our methodology leverages multiple data sources and analytical methods to capture the multifaceted nature of FinTech diffusion in Africa. By combining case-specific narrative with cross-country data patterns and policy discourse, the researchers can answer the research questions in a nuanced way – appreciating both the innovation dynamics and the structural context. The next section presents the key Findings & Discussion, organized around the research questions and enriched with visuals and direct insights from industry leaders.

4. Results & Discussion

This section integrates our results, structured around the research questions. The study used first discusses RQ1 (diffusion patterns) – what the data shows about how FinTech is spreading across Africa under AfCFTA – then RQ2 (structural influences) – how power structures and dependencies manifest in those patterns – and finally RQ3, comparing insights from the DOI vs. dependency perspectives and highlighting the interplay in each case study. The study include figures and quotes to illustrate and substantiate these findings.

RQ1: Patterns of FinTech Diffusion Across Africa

Overall Growth and Regional Trends: The diffusion of FinTech services in Africa has been remarkable over the past decade. Across Sub-Saharan Africa (SSA), 55% of adults now have a financial account of some kind, up from just ~24% in 2011 (Klapper et al., 2025). This doubling of financial inclusion is largely attributed to *mobile money*. The Global Findex 2021 data shows that 33% of adults in SSA have a mobile money account – a rate far above the ~10% global average (Klapper et al., 2025). In fact, mobile money has made SSA the only region where a majority of account owners are non-bank (mobile) customers. According to World Bank analysts, mobile money drove an 12 percentage-point increase in account ownership in SSA between 2017 and 2021 (GSMA, 2023), helping many previously unbanked people access financial services for the first time. By 2022, 28% of African adults on average were active mobile money users (World Bank, 2024).

However, this continental average hides significant regional disparities:

East Africa: The cradle of mobile money, East Africa leads in diffusion. In Kenya – often dubbed the "Silicon Savannah" – mobile money adoption is nearly ubiquitous. As of 2021, an estimated 79% of Kenyan adults had a mobile money account (largely thanks to M-Pesa), and over 80% had some form of financial account (Bernards, 2022). Tanzania and Uganda have also surpassed 45% mobile money usage (World Bank, 2024). East Africa's early adoption stems from strong telecom-led innovation and supportive regulation. Notably, East Africa achieved the critical mass where mobile wallets overtook bank accounts; Kenya, Tanzania, and Uganda are among the countries where more adults have only a mobile money account than a bank account (World Bank, 2024).

West Africa: West Africa is catching up fast. Ghana and Senegal have seen rapid growth in mobile money. Ghana, after regulatory reforms, saw mobile money accounts surge to around 40% of adults by 2021 (up from 13% in 2014). Senegal reached 56% overall account ownership by 2021, largely via mobile money, which outpaced banking growth (Klapper, et al., 2025). Nigeria, the region's giant, was initially slower in mobile money (with ~4% mobile money account by 2017) due to a bank-centric regulatory approach. But since around 2018, Nigeria's FinTech startup boom (in payments, lending, and recently e-wallets) has led to a significant uptick – in 2021 about 45% of Nigerian adults had some kind of account, and mobile money usage (including informal) is rising after the Central Bank began issuing more mobile wallet

licenses. Nigeria also leads in FinTech diversity: beyond mobile wallets, Lagos is a hotspot for digital lending apps, online investment platforms, and crypto exchanges (with Nigeria among the top global adopters of cryptocurrency, indicating alternative diffusion channels).

Southern Africa: A mixed picture – countries like South Africa and Namibia have high bank account penetration (70–80%) and have integrated digital banking, but mobile money has been more additive than foundational there (Klapper, et al., 2025). South Africa's mobile money usage (~20%) is lower than East Africa, partly because bank infrastructure was already widespread. Still, Southern Africa has embraced digital payments in other forms; for example, approximately half of adults in Southern Africa made a digital merchant payment in 2021, far higher than other regions (Klapper, et al., 2025). This suggests that while mobile wallets per se are less dominant, fintech diffusion in the form of card payments, EFTs, and fintech-led merchant solutions is advanced. Zimbabwe and Zambia have also seen mobile money fill gaps during banking crises (e.g. EcoCash in Zimbabwe).

North Africa: North Africa lags in both inclusion and fintech diffusion. On average only ~42% of North African adults have an account, and mobile money uptake is under 10% (except Sudan) (Klapper, et al., 2025). Cultural and regulatory factors (e.g. Morocco until recently banned mobile wallets from interest-bearing functions; Egypt had tight telco regulations) played a role. But this is changing: Egypt, with Afreximbank's support, launched an instant payment network and is promoting fintech innovation (Cairo now has several fintech accelerators). By 2022 Egypt reported ~20% of adults using digital accounts, counting both banks and mobile wallets. The low base means high growth potential as AfCFTA's digital push extends to North Africa. Encouragingly, Egypt and Morocco are seeing a wave of fintech startups (in payments, microcredit, and remittances), which could replicate some of the SSA mobile money success.

Use-Cases and Product Spread: Initially, fintech diffusion in Africa was driven by payments – the most fundamental financial use-case. Mobile money (P2P transfers, airtime purchases, bill pay) opened the door. Over time, the study observes diffusion broadening to other services:

Savings and Credit: Many mobile money operators and fintech startups now offer digital savings accounts, nano-loans, and pay-as-you-go credit. For example, M-Shwari in Kenya (a savings and loan product linked to M-Pesa) diffused rapidly, reaching millions within a year of launch. Digital lending apps have proliferated in markets like Nigeria and Kenya, though not without controversy (issues of over-indebtedness and consumer protection have arisen) (Bernards, 2022). The data showed an uptick in the share of adults using borrowings via mobile phones – in Kenya about 15% of adults had taken a digital loan by 2019 (Bernards, 2022). However, concerns exist that these services mostly reach urban youth and sometimes trap users in debt cycles (Donovan & Park, 2019, noted rising digital loan defaults).

Merchant Payments and E-commerce: FinTech diffusion among businesses is also notable. The COVID-19 pandemic accelerated merchant adoption of digital payments. In our survey of Central Banks, many reported a spike in contactless and online payments in 2020–21. By 2021, only East and Southern Africa had about half of utility payers using digital methods, while other regions still mostly used cash (Klapper et al., 2025). This indicates that even where consumer adoption is high, usage for everyday commerce is still developing, especially in Central and West Africa. But initiatives like mobile POS devices, QR code payments, and e-commerce

integrations are spreading. For example, Kenya's Safaricom introduced Lipa na M-Pesa for merchants, which now accounts for a significant volume of retail transactions, and Nigeria's Paga and Flutterwave enabled thousands of SMEs to accept digital payments.

Cross-border remittances and Trade Finance: Under AfCFTA, there is growing attention to cross-border fintech services. Traditional remittances into Africa (diaspora to home) have been partly captured by fintech (e.g. Wave, WorldRemit, and cryptocurrency channels offering cheaper remittances). In West Africa, mobile money interoperability through services like Orange Money allows cross-border transfers (e.g. between Côte d'Ivoire, Mali, Senegal). PAPSS, launched in 2022, further enables cross-border instant payments in local currencies, which saw pilot use in the WAMZ (West African Monetary Zone) region. Early PAPSS data (Afreximbank, 2023) indicate thousands of transactions between Ghana and Nigeria flowing through the system – modest but a proof-of-concept that is expected to scale. Trade finance fintech solutions (like invoice financing platforms) are also emerging but not yet widespread.

Visualization – FinTech Inclusion Heatmap: To illustrate the spread, Figure 2 maps mobile money account ownership in 2014 vs. 2021 across Africa, highlighting the dramatic expansion. The cartographic gradient is interpreted through Simondon's transduction, illustrating how technological information migrates across socio-territorial boundaries.

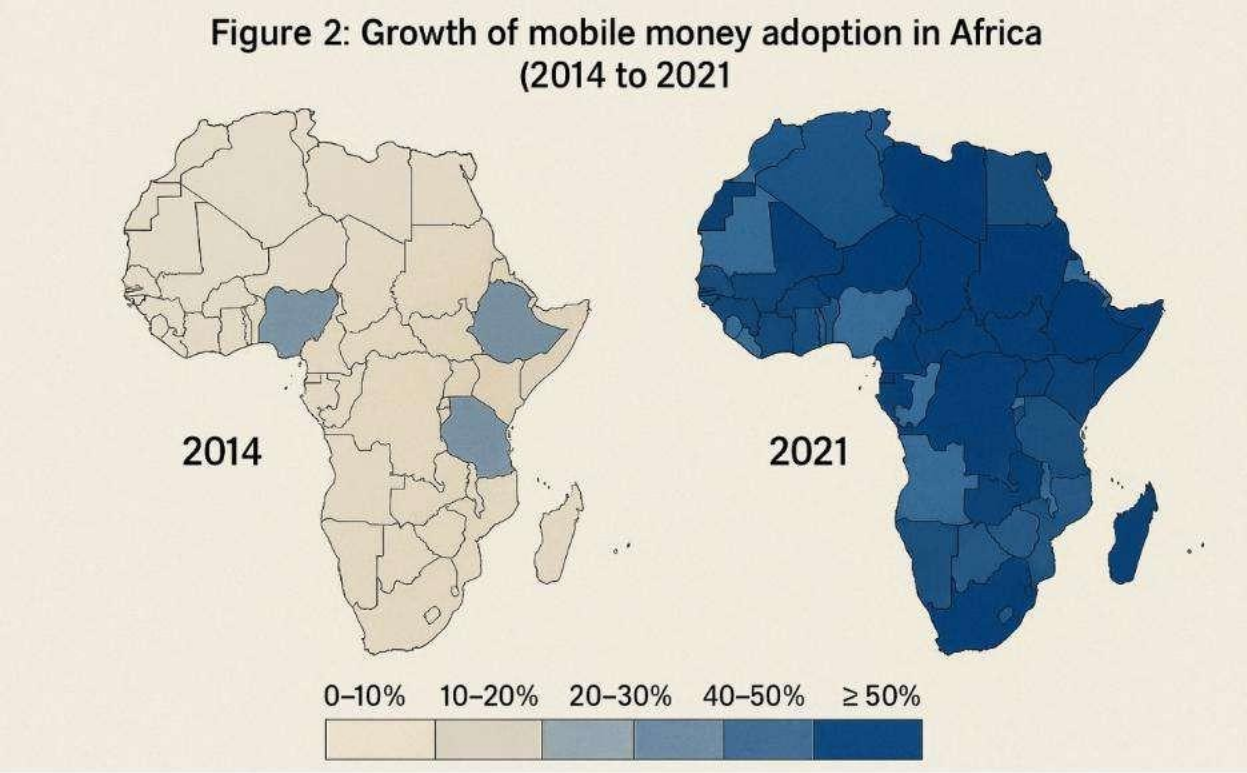

Figure 2: Growth of mobile money adoption in Africa (2014 to 2021). Darker shades indicate higher percentage of adults with a mobile money account. In 2014, usage was heavily concentrated in East Africa (Kenya, Tanzania, Uganda) and parts of West Africa (Ghana, Côte d'Ivoire). By 2021, many more countries have significant adoption (30%+ adults), including new hotspots in West Africa (Senegal, Ghana, Cameroon) and continued high rates in East Africa. North Africa remains lightly shaded, reflecting slower uptake. This visualization underscores

FinTech's diffusion from its initial epicenters to a continent-wide phenomenon. ***Source****: authors' elaboration based on Global Findex 2021 and GSMA Mobile Money Metrics.*

The heatmap (based on Global Findex data) shows that in 2014, only a few countries had more than 20% of adults using mobile money (Kenya, Tanzania, Uganda, and surprisingly Somalia via informal operators). By 2021, 20 countries had at least 20–30% mobile money usage, and several exceeded one-third of adults. This spatial diffusion aligns with classic DOI "contagion" via regional demonstration effects – countries tend to learn from neighbors' successes. For instance, after seeing Kenya's gains, countries like Ethiopia and Nigeria eventually opened up more to mobile money. The AfCFTA, by providing forums for regulators to compare notes, likely facilitated this policy diffusion.

Inclusivity – Who is being reached? A critical part of diffusion patterns is whether it is inclusive across demographics:

First, Rural vs Urban: FinTech has notably expanded access in rural areas where brick-and-mortar banks never reached. Rural mobile coverage was key. By 2021, rural adults were almost as likely as urban adults to have a mobile money account in leading countries. Yet gaps remain: rural usage still lags urban by 10-15 percentage points on average (Bernards, 2022). Our case study of Rwanda found innovative approaches like agent networks and USSD microservices are narrowing this gap, though issues like patchy electricity for phone charging still hinder rural usage.

Second, Gender Gap: Unfortunately, a gender gap persists. Women in Africa are less likely to use FinTech services, reflecting broader financial inclusion gaps. In 2021, women's account

ownership lags men's by 9 percentage points in SSA (Klapper, et al., 2025). For mobile money specifically, the gap is around 7%. Cultural norms, lower phone ownership among women, and lower digital literacy contribute. However, there are positive examples:

Ghana and Kenya have nearly closed the mobile money gender gap through targeted outreach and women-centric products. One promising finding: when women do adopt, they tend to become active users – suggesting the challenge is initial access and trust. FinTechs like Kenya's Jipange and Nigeria's HerVest offer women-focused financial products, which could accelerate diffusion among women if scaled.

Third, Youth vs Older Adults: Youth (ages 15–35) have been early adopters and drivers of FinTech – not surprising given their higher digital savvy. In many countries, the majority of mobile money users are under 35. But interestingly, some innovations are now targeting older or less tech-native users, for instance using voice interfaces or agent-assisted transactions for those who struggle with USSD menus. As Africa's youth bulge continues (over 400 million youth in Africa)(Klapper, et al., 2025), youth adoption sets the stage, but efforts to include older adults (who control a lot of household finances) are crucial for full diffusion.

Finally, Income levels: FinTech has somewhat democratized financial access by reaching lower-income segments that banks ignored. Findex data show that the poorest 40% have seen the fastest rise in account ownership in Africa, thanks largely to mobile money. Yet gaps remain: in some regions, the richest quintile is about 20 percentage points more likely to have an account than the poorest (Klapper, et al., 2025). Bridging this gap is a work in progress – it will depend on lowering costs (many mobile transactions are already low-cost or free for small users) and improving financial literacy so that poorer households trust and use digital services. This

relational dynamic resonates with the Ubuntu/Harambee ethic, wherein individual welfare is realised through communal interdependence.

In summary, the pattern of FinTech diffusion under AfCFTA is one of **rapid growth with heterogeneity**. Many African countries have made leaps in digital financial inclusion, primarily via mobile-centric innovations. The AfCFTA initiative itself, by prioritizing digital trade and harmonization, is likely reinforcing these trends by encouraging a unification of markets – for example, conversations around a pan-African fintech licensing "passport" could allow fintech firms to scale across countries (AFN, 2024). But as diffusion accelerates, it's uneven: some countries and demographic groups lag, and the use-cases remain shallow in places (e.g. accounts exist but aren't used for advanced services like credit or insurance).

RQ2: Power Structures and Dependency Influences

Turning to **RQ2**, we examine how structural and power-related factors are influencing (and sometimes constraining) the above diffusion patterns. Several key themes emerged: foreign capital dominance, tech infrastructure ownership, regulatory power asymmetries, and the rise of what some call *digital dependence* or *digital colonialism*. The study present evidence for each and discuss impacts.

Foreign Investment and Ownership: The African fintech boom has been fueled by significant investment, but much of it originates outside Africa. As mentioned, about four-fifths of funding for African tech startups comes from foreign investors (Field et al., 2025). In our network analysis of venture capital flows, the study found the United States to be by far the largest source, followed by the UK, and then other European countries and China. For example,

Nigerian fintech startups in recent years have received hundreds of millions of dollars largely from U.S. and UK venture funds (Stripe's acquisition of Paystack in 2020 and big rounds raised by Flutterwave, Interswitch, etc., were predominantly foreign-funded).

Kenya's fintech scene has similarly been heavily venture-funded (e.g. the first unicorn, Cellulant, had foreign VC backers).

While foreign capital provides essential growth finance, it also places control and strategic direction partly in foreign hands. A striking illustration is that many top African fintech companies have holding companies registered abroad (often in Mauritius, London, or Delaware) for investment purposes, meaning a chunk of their value could eventually accrue outside Africa. Dependency theorists would flag this as extraction of value – as African users generate profits, a significant share may be repatriated to foreign shareholders, echoing how colonial trade extracted raw profits. Moreover, foreign investor priorities can skew innovation: they may push for rapid user growth and returns, possibly at odds with slower, inclusion-focused growth. As one Nigerian fintech regulator interviewed noted, *"The VC model chases quick scale, sometimes leading to predatory lending or fee practices that we then have to reel in. We need patient capital aligned with inclusion."* This concern reflects that foreign capital might not prioritize long-term local development goals.

That said, not all foreign involvement is negative. Partnerships with global firms can bring technology transfer and know-how. For instance, Mastercard and Visa have partnered with African mobile money providers to expand acceptance networks – arguably a mutually beneficial arrangement if managed well. The issue is ensuring partnerships are equitable. Currently, African firms often lack bargaining power; for example, they rely on the major app stores (Google Play, Apple) which charge fees and set terms. African startups have to abide by these or lose reach. This dynamic was described by one African entrepreneur as *"the new scramble for*

Africa's consumers through apps" – with Silicon Valley effectively owning the mall where African digital businesses must rent space. This power imbalance can constrain local firms' autonomy and margins.

Technological Infrastructure and Data: The physical and digital infrastructure underlying fintech – servers, payment switches, cloud services, and data repositories – is another arena of dependency. The study found that *data localization* is minimal: as noted, over 80% of African data is stored abroad (Malcolm, 2025). Major cloud providers (Amazon AWS, Microsoft Azure, Google Cloud, Huawei Cloud) are all non-African, and until recently, none had multiple data centers on African soil (Microsoft and Amazon have opened South Africa regions; others serve Africa from Europe/ME). This means African fintech platforms host their applications on foreign servers. The dependency risk here is multi-fold:

Operational Risk: If geopolitical tensions rise or foreign companies change terms, African platforms could face access issues or price hikes. Also, Africa has little say in global data governance rules despite being a large data producer.

Compliance and Privacy: Foreign data storage subjects African user data to foreign jurisdictions (e.g. US CLOUD Act). This complicates enforcement of African data privacy laws and could expose data to surveillance or misuse without African consent.

Cost and Efficiency: Paying foreign cloud providers in USD is expensive (especially with weak African currencies). Locally hosted solutions could potentially be cheaper and create local jobs, but require upfront investment which many countries haven't made at scale.

The African Union has recognized this problem, with its Data Policy Framework urging regional data centers and cloud services to enhance digital sovereignty (Malcolm, 2025). Countries like Kenya and Ghana are incentivizing data center builds now. In fintech, companies like Africa

Data Centres (part of Cassava/ Econet group) are starting to provide local hosting. But until such infrastructure is widespread, fintech diffusion is effectively happening on *borrowed digital infrastructure*.

Another infrastructure aspect is payment networks. Historically, African banks used SWIFT and Western correspondent banks for cross-border transfers, incurring high fees and dependence on Western banking relationships. PAPSS, as mentioned, is a direct response to reduce that dependency by settling intra-African transactions locally (Aelex, 2022). Early signs show PAPSS could save Africa an estimated $5 billion in annual transaction costs once scaled (Aelex, 2022). This is a positive structural change: it creates a homegrown infrastructure to support diffusion of cross-border fintech (like Ghanaian traders using an app to pay Nigerian suppliers instantly). It will, however, require trust and adoption by big banks to realize its full potential.

Regulatory Power Asymmetries: Regulation can either reinforce or counteract dependency. In many African countries, regulators initially hesitated on fintech out of prudence, often influenced by international standards and advice (e.g. the IMF/World Bank's guidelines through initiatives like the Bali Fintech Agenda) (Puja & Lawack, 2024). These standards stress risk management and alignment with global norms (anti-money laundering, cybersecurity etc.). While important, they sometimes led to stringent rules that favored established (often foreign-linked) players. For example, for years Nigeria allowed only banks to offer mobile money, effectively excluding telecom-led solutions that succeeded elsewhere – this protected banks (some with foreign ownership) but may have slowed innovation for a time. Another example is how some African regulators banned or restricted crypto trading following FATF guidelines and pressure, even though crypto was providing alternative remittance routes; one could argue external pressure influenced these moves, limiting a grassroots financial innovation that some see as

democratizing (though it carries risks).

On the flip side, African regulators are increasingly asserting agency. They formed networks like the Alliance for Financial Inclusion (AFI) and continental forums under the AfCFTA to share homegrown regulatory solutions. There's a conscious effort to "Africanize" fintech regulation – meaning adapt international standards to local realities, and not adopt one-size-fits-all rules from abroad(Puja & Lawack, 2024). The AfCFTA FinTech Annex deliberations explicitly state it should *"reflect unique African characteristics and needs"*(Puja & Lawack, 2024). This includes focusing on financial inclusion, proportional risk-based approaches, and capacity building for local regulators(Puja & Lawack, 2024). Building regulatory capacity is vital; dependency can also be intellectual – relying on foreign consultants to draft laws. Efforts are underway to train African regulators in emerging tech (with sandboxes and innovation hubs at many central banks now). A quote from AfricaNenda's Deputy CEO Sabine Mensah captures this ethos: *"Fostering a regulatory environment that encourages technological advancements, promotes inclusive competition, and enhances consumer experience, is imperative for Africa's digital financial future" (*Mensah, 2025). This implies moving beyond passively copying OECD regulations to proactively crafting rules that fit African markets and empower local innovators.

Market Concentration and "Neo-colonial" Patterns: Our findings also resonate with scholarship that points to *neo-colonial patterns* in how fintech markets are structuring. Nick Bernards (2022) observes that Kenya's fintech boom, often celebrated as inclusive, still mirrors colonial geographies – highly concentrated in urban hubs while rural areas lag, paralleling colonial-era investment patterns in favored regions (Bernards, 2022). Furthermore, new forms of

exclusion emerge: for instance, even with mobile money, poorer and especially female users often transact smaller amounts and pay relatively higher proportional fees, while wealthier users benefit from better terms (some digital credit products in Kenya gave better rates to salaried workers than informal earners, reproducing inequality)(Bernards, 2022).

This suggests that unless deliberately addressed, fintech diffusion can reinforce internal *structural inequalities* (urban-rural, gender, class) – which are themselves legacies of dependency and underdevelopment.

Another pattern is the monopolistic tendencies in digital platforms. Laura Mann and Gianluca Iazzolino (2021) noted how large digital platforms in Kenya (some in agriculture, some in finance) can entrench themselves and squeeze smaller players (Bernards, 2022). Safaricom's near-monopoly in Kenyan mobile money is a double-edged sword: it enabled scale and network effects, but also raised concerns about market power abuse (leading to interoperability mandates so that Airtel Money and others could compete). Similarly, in Nigeria, a few big fintechs (often supported by huge foreign capital) could dominate, making it hard for others to enter – a dynamic reminiscent of colonial era concessions to big companies. Ensuring competition (through regulations like interoperability, open banking APIs, and anti-trust enforcement) will be crucial to prevent digital financial services from being a new form of concentrated power.

"Digital Sovereignty" Movement: Reacting to these dependency concerns, a notable development is the discourse on digital sovereignty in Africa. This concept calls for Africa to control its digital destiny – through local ownership of data, infrastructure, and stronger bargaining in tech partnerships (Komminoth, 2023).

Our policy discourse analysis found that African scholars and officials increasingly emphasize not being "overly-dependent" on foreign tech firms (Komminoth, 2023). For example, Adio-Adet Dinika, a political scientist, stated: *"Currently, the provision of digital infrastructure in Africa is primarily controlled by foreign entities… GAFAM and Chinese firms are significantly involved"*, underscoring the status quo (Komminoth, 2023). The worry is that if Africa doesn't build its own digital rails and protect its data, it will remain a tenant in the digital economy rather than a landlord. The AfCFTA can be a vehicle to advance digital sovereignty by collectively negotiating with big tech (a united African market has more leverage), promoting intra-African tech trade, and setting common standards that require data localization or technology transfer in procurement. Already, the AfCFTA's digital trade negotiations have seen proposals to safeguard local innovation and mandate some data to stay in-region (AU's framework hints at this) (Malcolm, 2025). Some African countries are instituting "cloud sovereignty" laws (e.g. Nigeria's data localization for government data, Kenya's data protection law requiring a copy of personal data to reside in Kenya). These are early steps towards reducing dependency.

In practical terms, achieving digital sovereignty and reducing dependency will involve initiatives like: (1) Developing Pan-African digital public infrastructure (e.g. an Africa-wide cloud or at least regional interlinked clouds, and open-source software for payments and digital ID that all countries can use without hefty license fees). (2) Encouraging African ownership in fintech: e.g. incentives for local pension funds or banks to invest in homegrown startups (to shift the funding mix), and supporting cross-border African venture networks. (3) Skills and IP development: ensuring Africans are not just consumers but creators of fintech IP. This means

strong STEM education, coding academies (which many countries are doing), and protecting African patents and products in trade agreements.

It is worth noting that dependency is not an all-or-nothing state but a spectrum. Our case studies illustrate varying degrees of dependency:

In Kenya, despite an indigenous success like M-Pesa, dependency creeps in via expat talent in tech leadership, dependence on imported hardware (phones, POS devices), and Vodafone's stake historically. Yet Kenya also shows relative autonomy in setting mobile money rules and now exporting its model (Safaricom expanding to Ethiopia, for example). Kenya's regulator even pushed back on Google's dominance by proposing alternative app store policies for local developers.

In **N**igeria, the sheer market size has attracted foreign players (e.g. Facebook tried a payment service, Chinese-owned OPay operates there). Nigeria faces dependency in funding (heavy foreign VC) but is assertive in policy – the government banned Twitter temporarily, showing willingness to challenge Big Tech (though that example was political, not fintech). The introduction of a Central Bank Digital Currency (eNaira) in 2021 can be seen as an attempt to assert monetary sovereignty via technology (though uptake has been limited so far). Nigeria's fintech ecosystem, if it continues to grow, could itself become a regional core reducing dependence on extra-continental actors.

In Rwanda, dependency is evident in donor influence – much of Rwanda's digital finance progress has involved partnerships with organizations like the Gates Foundation, MasterCard

Foundation, etc., and Chinese firms providing infrastructure. Rwanda mitigates this by a strong government vision to localize tech and build skills (e.g. its deal with Andela to train developers locally). The government actively courts foreign investment but on conditions that benefit local goals (like building tech hubs in Kigali).

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Rwanda's size means it will likely always integrate foreign solutions, but it aims to be a testing ground that shapes those solutions to its context (their motto of being "proof-of-concept nation").

In Egypt, with a more established financial system, dependency takes the form of reliance on Western banking tech and Gulf investments. However, Egypt's government and local banks maintain significant control in the financial sector. They have their local switches (Meeza payment network) and have limited Big Tech fintech incursions (Facebook's digital currency plans were blocked, for instance). Egypt could leverage its relatively higher capacity to develop indigenous platforms (as it did with Fawry, a local payments giant). Its challenge will be balancing openness to global fintech (for innovation) with nurturing local champions.

Overall, the evidence indicates that power structures heavily influence who benefits from FinTech diffusion. If left unchecked, there is a risk that the diffusion process will reproduce dependency: Africa gets the technology and increased usage, but foreign firms get the lion's share of profits and data insights, and African users remain vulnerable to decisions made in Silicon Valley, London, or Beijing. As one commentator put it, *"We don't want to trade financial exclusion for digital dependence"*. That encapsulates RQ2 findings: FinTech is not inherently liberating if the underlying architecture is controlled elsewhere. However, with strategic interventions (some already in motion), Africa can shift these structures – a theme we pick up in recommendations.

Before that, we look at RQ3, the synthesis, examining how DOI and dependency perspectives together enrich our understanding, especially via the country cases.

RQ3: DOI vs. Dependency – Comparative Insights from Case Studies

Our integrated theoretical lens allows us to reinterpret each case study country's FinTech journey by asking: what does DOI explain, what does dependency explain, and what combined story emerges?

Kenya (Early Diffusion meets Neo-Colonial Credit?): DOI theory would label Kenya a textbook success of innovation diffusion: a conducive environment (high literacy, telecom competition, trust in Safaricom), a clear relative advantage of mobile money for the unbanked, and network effects that pushed adoption past the tipping point. Rogers' categories were visible: a small group of urban Kenyans started M-Pesa in 2007 (innovators/early adopters), by 2010 many in Nairobi and major towns were using it (early majority), and by 2015 even late adopters in remote areas were on board because social pressure and utility made opting out impractical. The government also played the role of a facilitator (or at least a non-blocker), which DOI would cite as a change agent helping diffusion.

Dependency theory, however, reveals Kenya's story in a different light: *Who owned and profited from this diffusion?* Safaricom, the M-Pesa operator, was 40% owned by Vodafone (UK) during the height of M-Pesa's expansion. So a chunk of the profits and strategic control was external. The underlying technology was developed with UK engineers. Additionally, as fintech grew,

new entrants often had foreign backing (e.g. Equitel's fintech services had support from Kenya's Equity Bank but also partnerships with IBM, etc.).

Kevin Donovan and Emma Park (2019) pointed out a concerning trend: the advent of digital loans in Kenya led to over-indebtedness for many low-income users (Bernards, 2022) – this can be seen as a predatory outcome when profit-driven fintech (often funded by foreign capital expecting high returns) pushes high-interest loans to vulnerable populations, echoing how colonial credit systems locked farmers in debt. Serena Natile (2019) also argued that the *"inclusion"* narrative in Kenya masked persistent gender disparities (Bernards, 2022) – mobile money accounts spread, but women still had less access to credit or higher-cost credit, showing diffusion did not automatically equal empowerment. So in Kenya's case, DOI explains the *velocity and breadth* of adoption, whereas dependency theory critiques the *depth and equity* of outcomes.

Kenya highlights that local innovation (M-Pesa) can scale massively, but without localizing ownership and ensuring equitable services, some colonial patterns (like wealth extraction, inequality) may persist albeit in new forms. On a positive note, Kenya's success did inspire other African nations (demonstration effect), a kind of African-led diffusion externally – a counter to one-way dependency. For example, Ghana explicitly studied M-Pesa when designing its Mobile Money interoperability plans.

Nigeria (Innovation Hustle under Structural Constraints): Nigeria's fintech rise came a bit later but is now in full swing. DOI factors in Nigeria include a large youthful population eager for financial services (only ~40% formally banked, so huge unmet demand), increasing smartphone penetration, and entrepreneurial activity (Lagos is vibrant with tech developers).

These led to fast adoption of services like P2P payment apps (e.g. Kudi, OPay) and online lending. But DOI theory alone would have expected maybe even earlier diffusion given Nigeria's need – it was structural factors that delayed the initial phase.

Dependency lens shows Nigerian fintech was held back in the 2010s by a regulatory environment partly influenced by international banking norms favoring banks (the central bank was wary of non-banks due to concerns about stability – some say pressure from banks played a role in maintaining status quo). Also, telcos in Nigeria (MTN, Glo) were foreign or foreign-linked and had tense relations with regulators, unlike in Kenya where Safaricom had a cozier semi-national champion status. This slowed telco-led innovation. Once Nigeria did open up, foreign capital poured in at an unparalleled scale for Africa – creating several fintech unicorns by 2021. That foreign influx explains rapid scaling (DOI's critical mass was achieved via heavy marketing and subsidies funded by VC money) but also means many Nigerian platforms are now foreign-financed. We observed that some Nigerian fintechs are effectively controlled from global financial centers where they incorporated for fundraising. This raises sustainability questions: if global markets tighten (as happened in 2022's funding downturn) (Field et al., 2025), Nigerian fintech could face a funding crunch, which it did with some layoffs and consolidation in 2023.

A dependency perspective suggests Nigeria should cultivate local sources of funding (there's movement on this: local VC funds and even government-backed funds are emerging). Another dependency aspect is infrastructure: Nigeria relies heavily on international payment switches (Visa, Mastercard, Swift) and U.S. dollar clearing for trade. The central bank's push for PAPSS and eNaira can be seen as attempts to reduce those dependencies – if successful, they could foster more resilient, autonomous diffusion of fintech (e.g. enabling cross-border mobile payments within West Africa without dollar reliance). In sum, Nigeria's pattern shows

entrepreneurial energy (DOI's social system strength) constrained at times by structural issues (global capital whims, external tech pipelines), which the country is now actively trying to address (e.g. building domestic card scheme "AfriGo" and switching to ISO20022 standard to integrate with PAPSS).

Rwanda (Top-Down Diffusion and Donor Dependency): In Rwanda, FinTech diffusion has been very much state-steered. DOI theory would say Rwanda created a climate for diffusion by investing in digital literacy, having the President champion cashless economy (influence of opinion leaders), and implementing quick wins like digitizing government payments which got citizens used to mobile wallets (e-government acted as a catalyst). Adoption in Rwanda, as of 2021, reached about 42% of adults with mobile money, up from near zero a decade before – impressive for a low-income country. However, Rwanda's case reveals dependency in a different way: its innovations and growth were heavily supported by donor funding and external partners. The likes of the World Bank and UNCDF funded many inclusion projects (ex: Rwanda's interoperability switch, the development of its national digital ID used in KYC).

China provided smartphones (as donations or cheap Tecno phones) to boost digital penetration. There is a joke among Rwandan tech officials that *"for every tech we adopt, there's a foreign NGO pilot behind it."* Dependency theory would caution that such reliance might create a pattern where local initiative is tied to donor priorities and cycles. Indeed, some fintech programs fizzled after pilot funds ended. That said, Rwanda has been adept at aligning donor help with its strategy; it's not a passive recipient. It leveraged foreign expertise to build local capacity (Rwandans now run their payment systems). Rwanda's small market means it will likely always integrate with neighbors (it actively participates in EAC regional payment integration) – thus its dependency is managed by diversifying partnerships (not relying on one country or company). In

diffusion terms, Rwanda achieved near universal awareness of digital finance, but usage depth is still shallow (most use cases are basic P2P or airtime purchase).

It may need more organic private-sector growth to diversify use-cases – currently, the largest mobile money provider is MTN (South Africa-owned) which dominates, and there are few independent local fintech startups at scale (some start in Rwanda then move to Kenya for better funding). Without strengthening its local startup ecosystem (reducing dependency on importing solutions), Rwanda risks plateauing in diffusion. The conceptual model suggests if the structural support (donor money, foreign tech) were withdrawn without a self-sustaining local industry, innovation diffusion could stall. That's a cautionary tale of dependency potentially undermining long-term innovation unless transitioned to local ownership.

Egypt (Strong Local Institutions, selective globalization): Egypt's fintech diffusion has been slower relative to its population, but recently accelerating. DOI factors include a fairly high literacy rate and widespread mobile phone use, but also a strong entrenched cash culture and conservative banking sector (which made diffusion slower among older generations). Egypt did not have the same "burning platform" need for mobile money that East Africa had, because banks and post offices provided some coverage. What changed is the rise of e-commerce and COVID-19, which nudged more Egyptians to use digital wallets (e.g. Vodafone Cash, Etisalat's wallet) and cards.

Egypt's government also launched financial inclusion drives and a national payments network (Meeza card) to bring more people into formal finance. DOI theory would predict that with a population of 100+ million and high youth share, once innovations reach critical mass, diffusion

will be exponential – and indeed 2020–2022 showed big jumps in e-wallet registrations (20+ million wallets by 2022, though active usage is lower).

Dependency lens: Egypt historically has guarded its financial sector – many banks are state-owned or locally owned, and foreign banks have a smaller presence than in some other African countries. This somewhat insulated Egypt from external shocks but also perhaps from some external innovations. The main foreign influence is from global tech (everyone uses Android phones, etc.) and some investment (Egypt's fintech startups have attracted funding from Gulf states and global investors). But compared to Kenya or Nigeria, one could argue Egypt's fintech diffusion is more domestically controlled. However, an interesting dependency angle is Egypt's heavy reliance on international payment networks for remittances (a huge part of its economy). Integrating with PAPSS or developing its own solutions could reduce fees for Egyptians.

Another angle is that much of Egypt's tech talent emigrates or works remotely for global companies (a brain drain aspect), which can slow local fintech development – a human capital dependency issue. The government is trying to incentivize tech talent to stay with local opportunities. If successful, Egypt could become a fintech exporter in the Arab-African region, reducing reliance on imported solutions. Egypt's case shows that a large domestic market with stronger local institutions can retain more sovereignty in fintech – but it still faces the common global dependency on Big Tech (e.g. Egyptians primarily access fintech services via Google's Android and international social media ads, etc.). As Egypt integrates more with AfCFTA (it's a signatory though North African engagement has been slower initially), it may lean into collective digital strategies that offer alternatives to global platforms.

Cross-Cutting Insight: Combining DOI and dependency analyses provides a fuller picture. DOI tells us *where and how fast* fintech is spreading; Dependency tells us *who owns it, who profits, and what external constraints exist*. For AfCFTA's goals, both aspects matter: success isn't just many Africans using fintech (diffusion), but Africans deriving equitable benefit (empowerment). We often found that pure diffusion (e.g. high adoption numbers) could be deceptive if structural issues lurked. For instance, having millions of mobile money users is great, but if those systems rely on foreign servers and the profit flows out, the local economy's benefit is less than it could be – a point often missed in rosy diffusion narratives. Conversely, dependency analysis alone might be too pessimistic, missing the agency of local innovators and users.

African fintech users are not passive – they shape products (e.g. the way Kenyans used M-Pesa for savings in lockboxes pushed Safaricom to introduce M-Shwari). African governments are also not without agency – they can and do push back (like Uganda imposing a social media tax to curb foreign OTT use, or Nigeria creating domestic alternatives).

One tangible example of interplay: when the Nigerian central bank abruptly banned cryptocurrency trading via banks in 2021 (citing protection from volatility and illicit flows, partly under influence of global AML norms), crypto adoption actually went underground and continued via peer-to-peer channels. Here, DOI "social demand" clashed with a dependency-influenced regulatory action, showing that if people find value, they will find ways to diffuse innovation, even if formal structures resist. The outcome is a bit of a stalemate – Nigeria might

be reconsidering how to regulate rather than ban, indicating that people's innovative use (DOI factor) is forcing structure to adjust.

Finally, we noted that AfCFTA's presence is beginning to be felt as a structural game-changer. By fostering regional integration, AfCFTA could reduce external dependency by increasing intra-African trade and investment. Our analysis of capital flows showed intra-African fintech investment is still small, but we saw an uptick in 2022–2023, with South African funds investing in Kenya, Nigerian banks investing in other African fintech startups, etc. If AfCFTA makes it easier for African investors to operate across borders, that 80% foreign funding stat might improve to, say, 50% in a decade – that would be a huge shift in power. Also, by harmonizing regulations, AfCFTA can give African regulators a united front to negotiate with international standard-setters (e.g. on data rules or digital tax for foreign tech companies). In essence, AfCFTA can be an instrument to collectively move the needle on the dependency issues, converting them into more balanced interdependencies among African states.

In conclusion for RQ3, the DOI vs. dependency dual analysis reveals that innovation diffusion and dependency are intertwined in Africa's fintech saga. In each success story of diffusion, we find threads of dependency that need addressing; in each tale of dependency constraints, we still find local innovations and adaptations. Recognizing this interplay is crucial for formulating solutions that amplify the positives of diffusion (inclusion, efficiency, innovation) while minimizing the negatives of dependency (exploitation, inequality, external control). The next section builds on these insights to offer actionable recommendations and a roadmap for stakeholders – aiming to harness AfCFTA as a catalyst for an inclusive and sovereign African digital finance ecosystem.

5. Conclusion and Recommendations

Africa's FinTech diffusion under AfCFTA stands at a crossroads: the continent can either leverage innovation to achieve digital financial sovereignty and inclusion, or it can slide into a new form of dependency where technology's fruits are reaped elsewhere. This landmark study has shown that while African nations are rapidly adopting FinTech solutions (demonstrating tremendous innovative capacity and demand), structural power imbalances – in ownership, infrastructure, and capital – threaten to undermine the long-term benefits.

Theoretical Contributions: By marrying Diffusion of Innovation theory with Dependency Theory, we provide a more nuanced understanding of technology adoption in a development context. This dual-framework approach is a key contribution, illustrating that technology diffusion is not a neutral trajectory but one conditioned by historical and economic structures. We introduced a conceptual model (Figure 1) that can be applied to analyze other innovations (e.g. edtech, agri-tech) in emerging markets. The model contributes to theory by highlighting "structural moderators" as a missing piece in classical diffusion models. For academia, this enriches the discourse on how to evaluate innovation impacts beyond adoption metrics – urging inclusion of metrics like local value capture and autonomy.

Empirical Findings: Empirically, our study is among the first to systematically document FinTech adoption patterns across Africa post-2020 with up-to-date data, while also empirically illustrating dependency through data like the 80% foreign funding statistic and 80% external data

storage (Field et al., 2025; Malcolm, 2025). These hard numbers give weight to long-held assumptions about digital dependency. We also shed light on AfCFTA's impact – still in early stages, but signs of increased regional integration in fintech are emerging (e.g. PAPSS transactions, cross-country fintech expansions).

Notably, our case studies of Kenya, Nigeria, Rwanda, and Egypt provide comparative lessons that can inform peer countries (for example, Ghana or Uganda can take cues from Kenya's successes and pitfalls; smaller countries can emulate Rwanda's strategic use of partnerships, while guarding against over-reliance on donors).

Practical Implications: For practitioners and policymakers, the findings underscore that financial inclusion gains can be fragile if structural issues are ignored. It is not enough to count new mobile accounts – one must ask: are these accounts empowering users (e.g. giving affordable credit, secure savings)? Are they sustainable (e.g. not dependent on indefinite subsidies or vulnerable to external shocks)? The study's insights into gender and rural gaps also point to where more work is needed to ensure diffusion leaves no one behind.

Building on these insights, we propose actionable recommendations, tailored by stakeholder group, to harness FinTech for development while strengthening Africa's digital sovereignty. The recommendations are summarized in the Policy Impact Matrix (Annex 1) and elaborated below:

Each stakeholder has a role in turning FinTech into a force for inclusive growth rather than a vector of dependency. A collaborative multi-stakeholder approach is crucial; for instance, regulators providing an open environment will be ineffective if banks refuse to cooperate with fintech, or if foreign partners undermine local efforts. AfCFTA provides an umbrella for coordination – its secretariat can convene these actors regularly (perhaps an annual "*AfCFTA FinTech Forum"*) to review progress on these recommendations and share best practices.

Implementation Pathways: We outline short-to-medium term steps and longer-term pathways:

Immediate (next 1–2 years): Ratify and operationalize the AfCFTA Protocol on Digital Trade and FinTech Annex. Start with quick wins like a pan-African fintech talent exchange program (leveraging AU's existing education networks) to address skills dependency. Encourage pilot cross-border fintech services under sandbox exemptions to gather data on what works. Roll out PAPSS in more countries and heavily promote its usage through central bank directives (e.g. mandate that intra-African government payments use PAPSS where available). Also, launch public awareness campaigns about digital finance in local languages, focusing on women and rural users, possibly via radio and community theaters, to drive informed adoption (addressing the DOI "knowledge" stage in a culturally tuned way).

Medium term (3–5 years): See a measurable rise in intra-African fintech investment and partnerships – possibly facilitated by an AfCFTA Investment Protocol that incentivizes African institutional investors to back tech. By year 5, target that at least 50% of each country's fintech market infrastructure (payment gateways, switches, data storage) is handled by African entities or located in Africa (a metric for sovereignty). Develop regional "centers of excellence" for fintech innovation – e.g. a West African FinTech hub in Lagos, an East African hub in Nairobi – with AfCFTA facilitating south-south learning and competition that attracts talent to stay in the region. Harmonize consumer protection frameworks across countries so that users have similar protections (and thus confidence) no matter where a service is from in Africa.

Long term (6–10 years): Africa should aim that by 2030 (the end of the African Union's Digital Transformation Strategy period), it has a self-sustaining, integrated digital financial market: one where an entrepreneur in one country can easily offer services in another (truly realizing the "continental market" vision), and where core digital infrastructure (payments, cloud, digital ID) are locally governed. Ideally, reduce the 80% external data stat to, say, 50% or less by creating regional data centers (possibly under public-private partnerships). We also envision the African Digital Innovation Fund (could be an AfDB or AfCFTA initiative) capitalized by African pension funds and sovereign wealth funds, investing in strategic fintech and DPI (digital public infrastructure) projects – this keeps African wealth circulating within African innovation. If done, by 2030 Africa will not only have diffused fintech widely (target >70% financial inclusion) but will have built resilience so that its digital economy is not easily toppled or exploited by external forces.

Conclusion: The diffusion of FinTech in Africa under the AfCFTA is a story of promise intertwined with caution. It has the potential to be truly transformative – bringing millions into the formal economy, boosting SME growth, and knitting together a continent economically – if African stakeholders assert control over the narrative and the infrastructure. As one Central Bank Governor noted, *"We must be producers, not just consumers, in the digital finance era."* Our research affirms this: Africa is already producing innovation (many solutions *"from this continent have helped increase access for underserved populations"* as the BIS's Benoît Cœuré highlighted). The task now is to scale these innovations on Africa's terms. The AfCFTA

provides a framework for unity and scale; coupling that with the ingenuity of Africa's entrepreneurs and the wisdom of lessons learned will tilt the balance of power.

In Hountondji's terms, Africa must speak *for itself*, not merely be spoken *about*: greater inclusion drives economic growth, which funds further innovation – all within a system where Africans own the platforms, govern the data, and set the rules. In doing so, the continent will not only solve local challenges but also offer a model to the world of how to pursue digital transformation without sacrificing sovereignty or equity. The AfCFTA era can thus herald not just a free trade area, but a digitally empowered Africa that writes its own story in FinTech. As a proverbial wisdom goes (referenced in our discourse analysis): *"Until the lion learns to write, every story will glorify the hunter."* Africa is now learning to write – through its code, its policies, and its collective action – ensuring the fintech story glorifies the African lions (innovators, users, communities) rather than new hunters.

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Appendix 1: Policy Impact Matrix – Recommendations and Stakeholder Roles

Stakeholder	Recommendation	Expected Impact
AfCFTA Secretariat & AU	Implement the AfCFTA FinTech Annex with provisions for data sharing, open standards, and a pan-African regulatory sandbox. Coordinate a **continental digital sovereignty strategy** (e.g. encourage local cloud infrastructure via AU programs).	Harmonized rules lower barriers for fintech to scale across Africa. Regional cooperation on infrastructure reduces reliance on external systems, strengthening collective bargaining power.
National Governments /Regulators	**Embrace adaptive regulation:** Adopt risk-proportionate regulations that enable innovation (e.g. special fintech licenses, tiered KYC for low-value accounts). Expand regulatory sandboxes for new ideas. Simultaneously, enforce **local ownership rules** (for critical infrastructure/data) and **competition policies** (prevent monopolies).	Boosts innovation diffusion by lowering entry barriers for fintech startups (more local solutions). Protects consumers and the market from dominance by any single player (whether local or foreign) – ensuring diverse, competitive services and preventing "colonial" monopolies. Targeted rules (like data localization for sensitive data) keep more value onshore.

Financial Institutions (Banks, Switches)	**Partner with FinTechs, not fight them:** Use AfCFTA as an opportunity to form cross-border partnerships with fintech startups (e.g. banks providing mentorship, investment). Modernize legacy systems to open APIs for fintech integration (following Open Banking principles). Collaborate on shared payment utilities (like regional switches, fraud intelligence) rather than each depending on foreign systems.	Banks leverage fintech innovation to reach unbanked markets (win-win, rather than zero-sum). FinTechs gain scale and trust via bank channels. An interoperable, collaborative ecosystem accelerates user adoption (network effects) and creates African-owned networks (reducing need for foreign intermediaries in payments).
FinTech Companies (Startups and Scale-ups)	**Focus on inclusion and local context:** Design products for currently underserved groups (women, rural, informal sector) – e.g. micro-insurance via mobile, vernacular language apps – to expand user base sustainably. Practice responsible digital lending (avoid predatory practices that prompt regulatory backlash). Also, reinvest in local talent development (train more African developers, data scientists) and actively engage with policymakers (through industry associations) to shape smart regulation.	Broadens the market and social impact (women and rural users become new growth segment, improving financial inclusion metrics). Proactively responsible practices build trust with users and regulators, ensuring long-term viability (preventing crises like debt traps or major data breaches). Investing in talent grows the local skills pool, reducing dependency on foreign experts over time.

Foreign Investors & Tech Partners	**Adopt a long-term, partnership approach:** Shift from purely profit-extractive models to capacity-building investments. E.g. global investors could allocate a percentage of investments to technical assistance for local founders, or open regional headquarters in Africa (creating jobs, transferring skills). Tech giants (Big Tech) should support Africa-led initiatives – e.g. assist with open-source solutions or comply with local data rules without lobbying against them.	Aligns external support with Africa's development objectives. By investing in capacity (not just products), foreign players help grow the market sustainably (which ultimately benefits them too). Respecting local rules and co-creating solutions reduces mistrust and the risk of populist pushback (like platform bans). Africa gets technology and knowledge, not just end-user products, mitigating neo-colonial dynamics.
Academia & Civil Society	**Monitor and inform:** Universities and think-tanks should expand research on digital finance impacts (e.g. independent evaluations of fintech inclusion outcomes, data privacy audits). Integrate FinTech and digital literacy into educational curricula (so next-gen users and creators are savvy). Civil society groups should advocate for consumer protection in digital finance and for transparent governance (so power isn't abused by either companies or states).	Provides evidence-based feedback to policymakers – e.g. flagging if gender gaps aren't closing or if certain fees are exploitive. Educated users are more confident adopters (improving adoption rates and informed usage). Watchdog efforts ensure that the fintech revolution maintains a human-centric focus and rights-based approach, preventing new forms of exploitation under the guise of innovation.

Appendix 2

	Dataset (+ URL)	Raw variables used (examples)	Coverage (years geography)	How we cleaned & transformed the data	Why it matters to the study
	GSMA Mobile Money Metrics	- Registered & active accounts (000s) - Volume / value of P2P, cash-in/out, merchant payments	2014-2024; 45 AfCFTA countries	Steps: (i) downloaded annual XLSX; (ii) converted to tidy CSV; (iii) normalised by adult population (15+) using UN WPP to obtain "% adults w/ mobile-money account".	Principal adoption indicator for RQ1 and Figure 2
	World Bank Global Findex 2021	- Account ownership (bank, mobile) - Digital payments frequency - Gender / income / rural dummies	2011, 2014, 2017, 2021 waves; 35–40 AfCFTA states / wave	Merged four cross-sections into long panel (country-year). Harmonised variable names (acc_any, acc_mm, etc.). Applied sampling weights when computing regional means.	Cross-checks GSMA and lets us probe inclusion gaps (gender, rural).
	IMF Financial Access Survey & Balance-of-Payments	- ATMs / agents per 100k adults - Personal remittances (USD)	2010-2022; 49 African economies	Filled sporadic gaps with linear interpolation ≤2 yrs; deflated USD flows to 2021 dollars (CPI).	Infrastructure and remittance-dependency controls for regressions (H1, H2).
	AfricaNenda SIIPS 2024	- Instant Payment System (IPS) live? (yes/no) - Interoperability score (0-5)	Status as at Dec 2024; 15 SSA systems	Recoded qualitative ratings into numeric index; linked to PAPSS uptake flag.	Captures AfCFTA-enabled rails for cross-border diffusion.

	Afreximbank / PAPSS dashboard	- Banks connected - Txn count & value (local currency, USD equiv.)	Q4-2022 → Q1-2025; WAMZ plus pilot states	Quarter-level series aggregated to annual totals; matched to member country ISO code.	Empirical proxy for AfCFTA's structural intervention (H3).
	Partech Africa & Briter Bridges VC-deal logs	- Deal size, stage, investor hq, investee hq	2015-2024; 1 650 deals	Deduplicated across sources, standardised investor country codes, kept fintech SICs. Network edges: investor → country weighted by # deals.	Generates the capital-dependency network (Appendix B — Fig B1).
	ITU Mobile-Cellular & 3G/4G Coverage	- Subscriptions per 100 inh. - Population covered by ≥3G (%)	2010-2023; all AfCFTA	Interpolated missing years; log-transformed for regression.	Core DOI "communication-channel" covariate.
	Cloudscene + Hyperscale press releases	- In-country data-centre capacity (MW) - Majority ownership (local = 1)	2018-2025	Constructed "Data Sovereignty Index" = share of capacity locally owned.	H2 structural-dependency metric referenced in findings.

Appendix B. Supplementary Network Visualisations

Figure code	**What it shows**	**How to read it**	**Key takeaway**
Fig B1 – Venture-Capital Gravity Map	Bipartite graph (120 investor nodes, 34 destination countries). Edge thickness = # fintech deals 2015-24. Node colour: blue = African investor, orange = extra-continental.	Central orange hubs (US, UK) dominate; emergent blue hubs (South Africa, Nigeria) signal nascent intra-African capital	Confirms 80 % foreign-capital share, but also the rise of regional funds.

		corridors.	
Fig B2 – Technology Ownership Web	Directed graph of major fintech platforms and their core infrastructure providers (cloud, payments). Ownership-localness score drives node size.	Numerous arrows from US/EU/China cloud nodes to African platforms; sparse reverse links.	Visual evidence of infrastructure dependency that underpins H2.
Fig B3 – Regulatory Convergence Heatmap	Matrix heatmap of 15 regulatory features (rows) × 44 AfCFTA nations (cols); green = fully aligned with AfCFTA draft annex, red = non-aligned (2024).	Read vertically to spot laggards; horizontally for toughest alignment areas (e.g., data-localisation).	Highlights where AfCFTA support is most needed (data & cyber rules score lowest alignment).
Fig B4 – Payment-Rail Interoperability Network	Undirected weighted graph linking countries whose domestic instant-payment systems are already interoperable (ISO 20022). Edge weight = live bilateral link-count.	Clustering coefficient reveals a dense West-African sub-graph around PAPSS; North Africa still peripheral.	Demonstrates AfCFTA-driven structural change beginning to counterbalance historic fragmentation.

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Optimizing Blood Bank Operations - A centralized system for enhanced transfusion services in Rwanda's Healthcare

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Abstract

This study presents a unified blood bank management system designed to improve the efficiency and reliability of blood distribution services in Rwanda, with a focus on the Rwanda Biomedical Center (RBC). The system addresses key challenges, including inconsistent blood supply, inefficient inventory management, and irregular blood donation campaigns. One of the system's key features is enabling voluntary blood donors, particularly those near district and referral hospitals, to donate regularly without relying on sporadic donation campaigns. The system makes it easier for donors to schedule appointments at their nearest hospital, eliminating the need for donors to wait for irregular blood donation campaigns or travel long distances. For individuals who may live or work far from donation sites, the system reduces barriers such as transportation costs, time constraints, and work-related permissions. With a presence in all 30 districts of Rwanda and four referral hospitals, the system allows each district to function as a user linked to its corresponding district hospital. The system provides real-time updates whenever blood is donated or used for transfusion, ensuring accurate tracking of blood availability. In case of shortages, the system facilitates inter-hospital blood transfer, ensuring that critical blood types are shared between hospitals as needed. Users can also request blood from other hospitals, and once a request is accepted, the system automatically triggers the blood

transfer. Data analysis, conducted using SPSS, STATA, and R, demonstrates significant improvements in blood supply, transfusion safety, and operational efficiency. This unified system provides a scalable solution for optimizing blood management, benefiting Rwanda and other similar healthcare settings.

Keywords: Healthcare Management, centralized system, Blood Transfusion, Blood Bank, Rwanda's Healthcare

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1. Intoduction

Blood transfusion services are crucial to healthcare systems worldwide, playing an essential role in saving lives during surgeries, accidents, childbirth, and treatment of chronic conditions. However, in many developing countries, including Rwanda, blood transfusion services face significant challenges. These challenges include an inconsistent blood supply, inefficient inventory management, and irregular donation campaigns, which hinder the ability of hospitals to meet patient needs. In Rwanda, these issues are compounded by logistical barriers such as transportation costs, time constraints for donors, and the challenges faced by individuals living or working far from blood donation sites. For many voluntary donors, especially those who have made donating blood a regular habit, the unpredictability of donation campaigns and the inconvenience of traveling long distances to donation sites have deterred them from contributing.

One of the major obstacles to improving blood donation in Rwanda has been the reliance on periodic donation campaigns. These campaigns are often irregular, with no set schedule, making it difficult for donors to plan their participation and for health institutions to maintain a steady supply of blood. Additionally, many donors face financial and logistical challenges when they need to travel to distant blood collection sites, further discouraging them from donating regularly. As a result, hospitals are often left with limited blood supplies, especially during emergencies, which can lead to delays in providing critical transfusion services.

To overcome these challenges, the Rwanda Biomedical Center (RBC) launched a centralized blood bank system that integrates all 30 districts and four referral hospitals across the country. The goal of this system is to ensure a more consistent, efficient, and equitable blood supply to meet the growing demand. By allowing voluntary donors to schedule their blood donations at their nearest district or referral hospital, the system ensures that donors can participate at their convenience, without the need to wait for irregular campaigns. This approach reduces the logistical burden of transportation, making it easier for individuals to donate blood closer to their homes or workplaces, thus lowering transportation costs and addressing time constraints.

Moreover, the centralized blood bank system facilitates real-time tracking of blood availability across hospitals. Each time a donation is made or blood is used for transfusion, the system is updated, ensuring accurate and up-to-date information about blood inventory levels at participating hospitals. This feature allows for better planning and ensures that blood is always available where it is needed most. The system also addresses regional imbalances in blood supply by enabling inter-hospital blood transfers, ensuring that shortages at one hospital can be quickly addressed by supplying blood from other hospitals that have surplus supplies. This networked approach ensures that critical blood types are available at the right place and time, even during times of shortage or emergency.

While the centralized system has shown considerable promise in improving blood donation services, it also aligns with broader global efforts to enhance blood bank management in countries with similar logistical challenges. Studies conducted in other African countries have demonstrated the benefits of centralized blood management systems, including improvements in donor retention, better inventory control, and the efficient distribution of blood.

In Rwanda, the RBC's approach aims to replicate these successes while addressing the unique challenges faced in the country.

The study evaluates the effectiveness of this centralized blood bank system, assessing its impact on blood supply management, transfusion safety, and overall healthcare efficiency in Rwanda. By streamlining the donation process, ensuring the timely availability of blood, and reducing logistical barriers, the system aims to enhance the effectiveness of blood transfusion services. Ultimately, the goal is to improve healthcare outcomes for Rwandans by providing a more reliable, equitable, and efficient blood supply, particularly in rural areas where access to blood and healthcare services is often limited. This study will contribute valuable insights into the functioning of the centralized system, offering potential lessons for other nations seeking to improve blood donation and transfusion services.

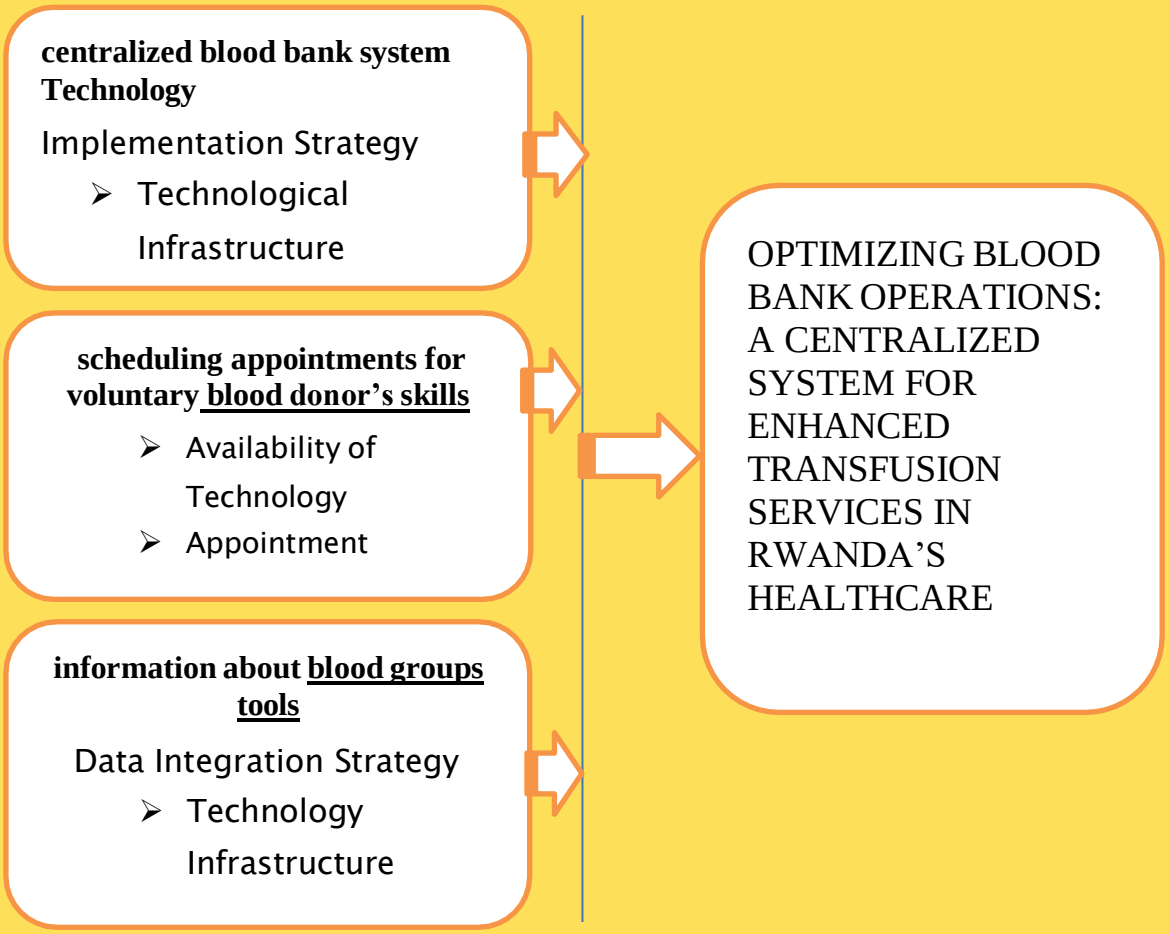
2. LITERATURE REVIEW

Conceptual Framework

This conceptual framework illustrates the relationship between the Centralized Blood Bank System (Independent Variable) and the Quality of Service Delivered (Dependent Variable). The underlying assumption is that the centralized blood bank system, which is designed to enhance the management of blood donation, collection, and distribution nationwide, directly influences the quality of blood transfusion services provided in healthcare settings. By optimizing blood availability, ensuring timely delivery, and improving operational efficiency, the system is expected to significantly improve healthcare outcomes, hospital satisfaction, and the safety of transfusion practices.

INDEPENDENT VARIABLE: centralize blood bank system for efficient for transfusion services in health care setting **DEPENDENT VARIABLE:** **variable**

Quality Service delivered



3. METHODOLOGY

This study evaluates the effectiveness of the centralized blood bank system developed and implemented by the Rwanda Biomedical Center (RBC) in improving blood donation and transfusion services across Rwanda. The methodology focuses on data collection, analysis, and evaluation of the performance of the blood donation network, including blood collection sites, total blood units collected, donor engagement strategies, and hospital satisfaction rates. The aim is to assess how well the RBC's centralized system addresses the growing need for blood, optimizes donor participation, and meets the demand of healthcare facilities.

Study Design

The study employed a quantitative research design, utilizing both descriptive and inferential analysis to assess the performance and impact of the centralized blood bank system. Data was collected for a full calendar year, 2023, to capture seasonal variations in blood donation trends and supply-demand gaps. The primary data points analyzed included the number of blood collection sites, the volume of blood collected, the number of blood donation sessions, and the satisfaction levels of both donors and healthcare facilities.

Participants/Subjects

The main participants in this study were

I. Voluntary Blood Donors: These individuals were the source of data on donation frequency, demographics (e.g., age, gender, and blood type), and experiences with the donation process. Data from voluntary donors across the 30 districts of Rwanda and 4 referral hospitals were included.

II. Healthcare Facilities: These included 122 transfusing health facilities (district hospitals and referral hospitals) that requested blood throughout 2023. Data from hospitals on their blood demand, satisfaction with the RBC's blood supply, and transfusion safety were also analyzed.

III. Blood Donor Representatives (BDRs): These community-level representatives were tasked with encouraging regular donation and providing feedback about donor engagement efforts. Their data, including numbers and activity reports, was included in the study.

Data Collection Methods

The data collection process involved gathering quantitative data from multiple sources, ensuring a comprehensive understanding of the performance of the blood transfusion system. The following methods were used:

I. Blood Collection Sites Data: The RBC tracks and manages 589 blood collection sites across the country, including fixed sites (in hospitals and community health centers) and occasional sites (such as RDF Barracks, RNP communities, embassies, churches, and public spaces). Data on the number and location of blood collection sites were obtained from the RBC/BTD database, highlighting where blood donations occurred and any changes in the network over time. In 2023, 22 new sites were added, reflecting an expansion to meet growing blood supply demands.

II. Blood Collection Sessions: The RBC's Annual Blood Collection Plan (ABCP) for 2023 set out targets for blood donation sessions, which were executed across the blood collection sites. The actual number of sessions performed was tracked and compared to the planned sessions, offering insight into the capacity and reach of the blood collection efforts.

In 2023, the RBC exceeded its target, conducting 1,949 sessions, up from 1,686 in 2022. This data was gathered from the RBC's e-Progesa system and quality data indicators.

III. Blood Units Collected: The total amount of blood collected was another key data point, as it directly reflects the RBC's capacity to meet demand. The RBC's goal in 2023 was to collect 84,009 blood units, with an actual collection of 86,812 units, surpassing expectations by 103.34%. This data was obtained from the RBC/BTD database, where all blood units collected at each blood collection site were recorded.

IV. Donor Demographics and Engagement: The study also collected data on the demographic characteristics of the blood donors, such as age, gender, and blood types. The data also examined donor retention, with a particular focus on donor behavior, such as regular participation in blood donation, and challenges faced by donors (e.g., accessibility, transport issues, and long waiting times). This was done through surveys conducted with donors, as well as through feedback from Blood Donor Representatives (BDRs). BDRs help to recruit new donors and encourage regular donations in their communities, ensuring sustained donor engagement.

V. Hospital Satisfaction and Blood Demand: Hospitals and transfusion facilities provided feedback on their satisfaction with the RBC's blood supply. This included data on the number of blood units requested, blood type matching, and hospital satisfaction levels. In 2023, the RBC supplied 99.47% of the blood requested by health facilities, highlighting a high level of satisfaction among hospitals, but also pointing out some areas of improvement for future optimization. This information was collected through direct feedback from healthcare facilities and hospital managers.

Instruments

1. e-Progesa Database: The e-Progesa system is a comprehensive data management tool used by the RBC to track blood collection activities across the country. It was the primary instrument for collecting data on the number of blood collection sites, blood collection sessions, and the volume of blood units collected. It allows real-time monitoring of blood availability, donor engagement, and system performance.
2. Surveys and Feedback Mechanisms: Surveys were distributed to healthcare facilities and blood donors to gather qualitative feedback on the blood donation process. For healthcare facilities, the surveys focused on blood supply reliability, blood type availability, and satisfaction with the RBC's response times. Donors were asked to provide feedback on their experiences with blood donation sessions, wait times, accessibility, and their overall satisfaction with the process.
3. Blood Donor Representatives (BDRs): Data from the network of 1,648 BDRs were collected, providing insights into community-level efforts to increase blood donations, challenges faced by donors, and strategies to improve blood collection. BDRs were responsible for outreach, education, and donor engagement at the local level.

Data Analysis

The collected data were analyzed using SPSS, STATA, and R statistical software. Descriptive statistics were employed to summarize the data (e.g., frequency counts, percentages, and performance rates). The following analyses were performed:

1. Performance Analysis: The actual number of blood collection sessions and units collected in 2023 were compared to the targets set in the Annual Blood Collection Plan (ABCP). Performance rates were calculated for blood collection sessions and the volume of blood units collected.
2. Satisfaction Analysis: The satisfaction rate of hospitals with blood supply was analyzed using the feedback from healthcare facilities. This was done by comparing the blood units requested with the units supplied and assessing the degree of satisfaction reported by hospitals.
3. Demographic Analysis: Donor demographics were analyzed to identify patterns in donor participation based on age, gender, and blood type. This helped understand the demographic reach of the RBC's blood donation campaigns and identify underrepresented groups.

Ethical Considerations

The study was conducted in accordance with ethical guidelines for research involving human participants. Ethical approval was obtained from the relevant research committees. All participants (blood donors and healthcare facilities) were informed about the purpose of the study, and their consent was obtained for data collection. Personal identifiers were kept confidential, and data were anonymized where necessary to protect privacy.

Limitations

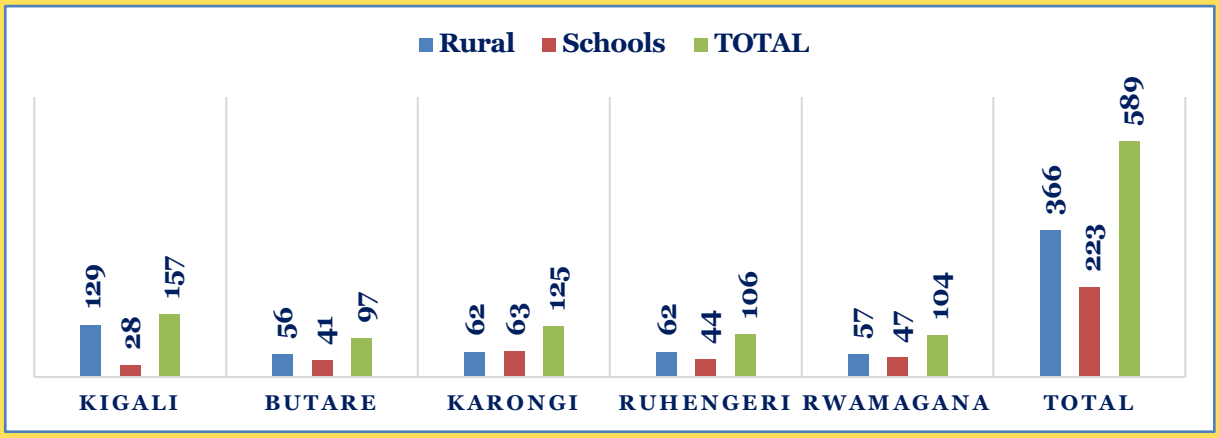
This study faced some limitations, including potential reporting biases from blood collection sites and healthcare facilities. While the RBC strives to ensure complete and accurate data reporting, gaps may exist, particularly in the recording of donor experiences. Additionally, the availability of blood units may vary depending on the region and time of year, which could influence data consistency.

4. RESULTS AND DISCUSSION

The data gives useful information about how blood donation is working in Rwanda. It shows the growth of blood collection centers, donation sessions, and the amount of blood collected from 2022 to 2023. This highlights the efforts of the Rwanda Biomedical Centre (RBC) to meet the growing need for blood. The data also shows important details about donors, like their gender, age, and blood types, which helps create better strategies to include everyone. It also shares donor experiences, such as problems with wait times and centralization, which can help improve the donation process. Overall, the data is important for understanding what works well and where improvements are needed in Rwanda's blood transfusion system. Today, blood transfusions are free for all patients, and blood is donated voluntarily by unpaid donors across the country."

In 2023, the Rwanda Biomedical Center (RBC), through its Blood Transfusion Division (BTD), gathered 86,812 units of blood from 589 donation centers. Health facilities in need of transfusions requested 122,628 blood units, and the BTD was able to provide 121,974 units, achieving a hospital satisfaction rate of 99.47%. RBC aims to meet all blood demands at 100% by 2025.

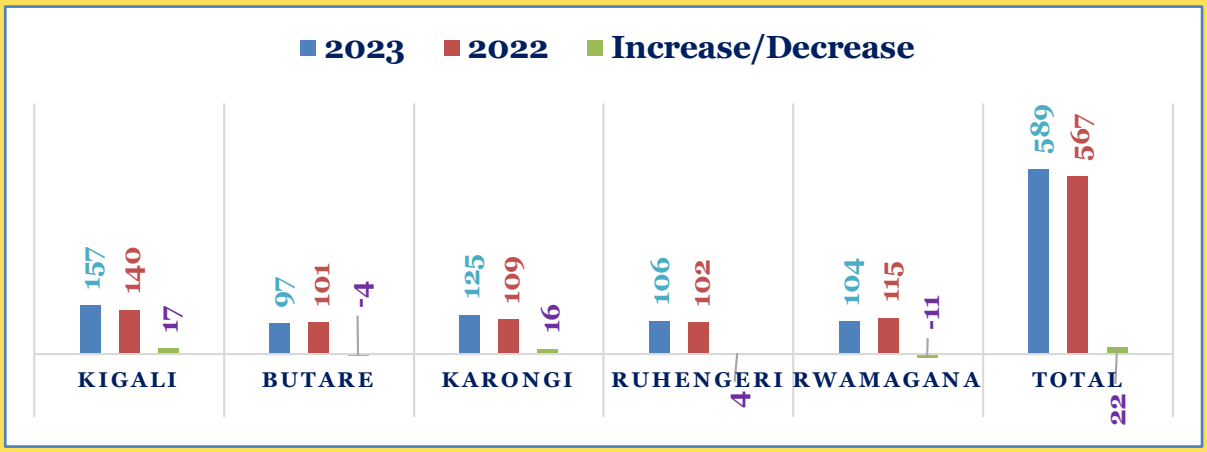
Blood collection sites in 2023



Source: 2023 e-Progesa and Quality Data Indicators for RBC/BTD showing the participation of rural area and schools in general.

In 2023, the Blood Transfusion Division (BTD) collected blood from 589 rural and school-based donation centers nationwide, as well as five (5) fixed sites within each RCBT catchment area. In addition to these, there were several temporary donation sites, including those at RDF barracks, RNP communities, embassies, churches, and public places

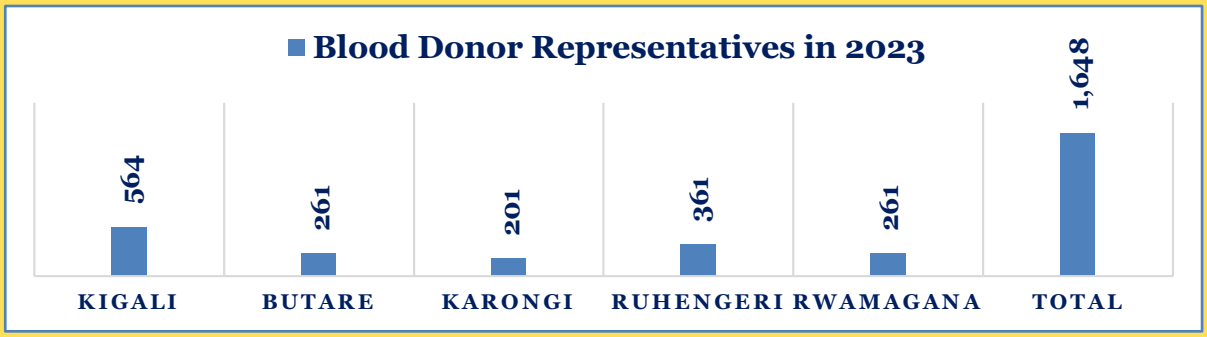
Blood collection sites - 2023 vs 2022



Source: 2023 RBC/BTD e-Progesa Database and Quality Data Metrics

Each year, Regional Centers for Blood Transfusion (RCBTs) evaluate and opt to shutter specific blood collection sites based on past performance. Simultaneously, they establish new sites to meet the escalating demand from Transfusing Health Facilities (THFs). In 2023, contrary to the usual practice, no blood collection site was closed; instead, **22 new sites** were added. Consequently, the total number of blood collection sites in 2023 increased **to 589 from the 567 sites** that the Blood Transfusion Department (BTD) had in 2022.

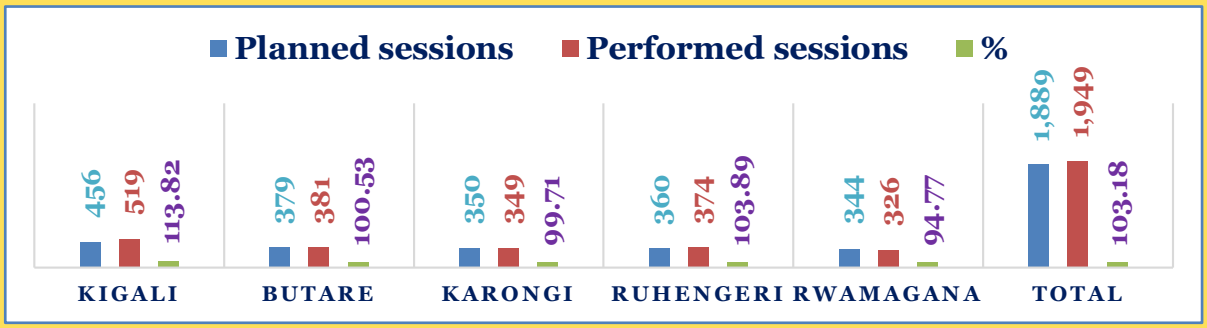
4.3. BDRs (Blood donor representatives) in 2023



Source: RBC/BTD e-Progesa Database and Quality Performance Metrics, 2023

Blood Donor Representatives (BDRs) are small teams, generally composed of 3 to 5 individuals, who serve as intermediaries for blood donors in their local communities. They play a vital role in identifying potential donors and encouraging continued participation in blood donations. BDRs work in close collaboration with BTD staff to organize and facilitate donation drives on scheduled dates. Following blood donations, BDRs follow up with donors, while BTD staff focus on other responsibilities. In essence, BDRs act as a communication bridge between the BTD and the donor population. By 2023, there were 1,648 BDRs operating nationwide.

Blood collection sessions – 2023

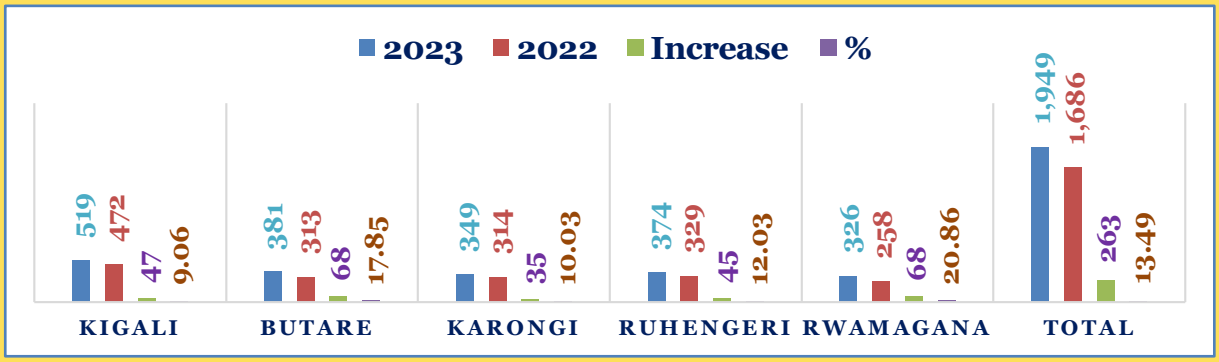


Source: 2023 RBC/BTD e-Progesa Database and Performance Quality Indicators, the

performance is low but is almost to planned sessions.

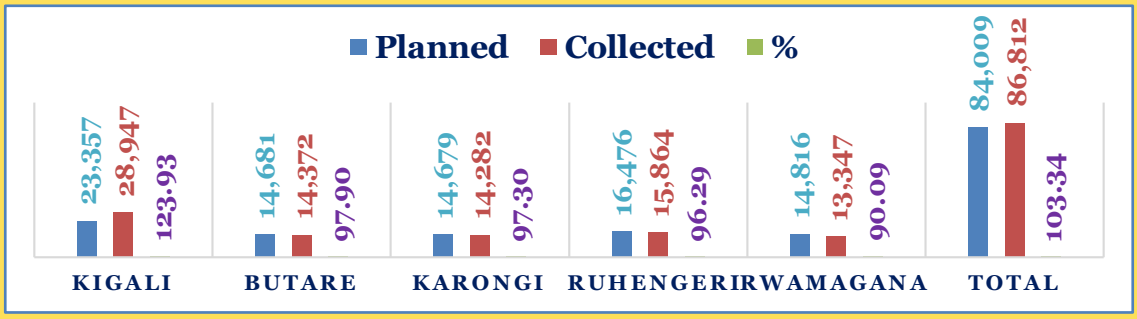
The 2023 Annual Blood Collection Plan (ABCP) set a target of 1,889 blood collection sessions for RCBTs. By year-end, a total of 1,949 sessions were conducted, achieving a performance rate of 103.18%

4.5. Blood Collection Sessions: 2023 Compared to 2022



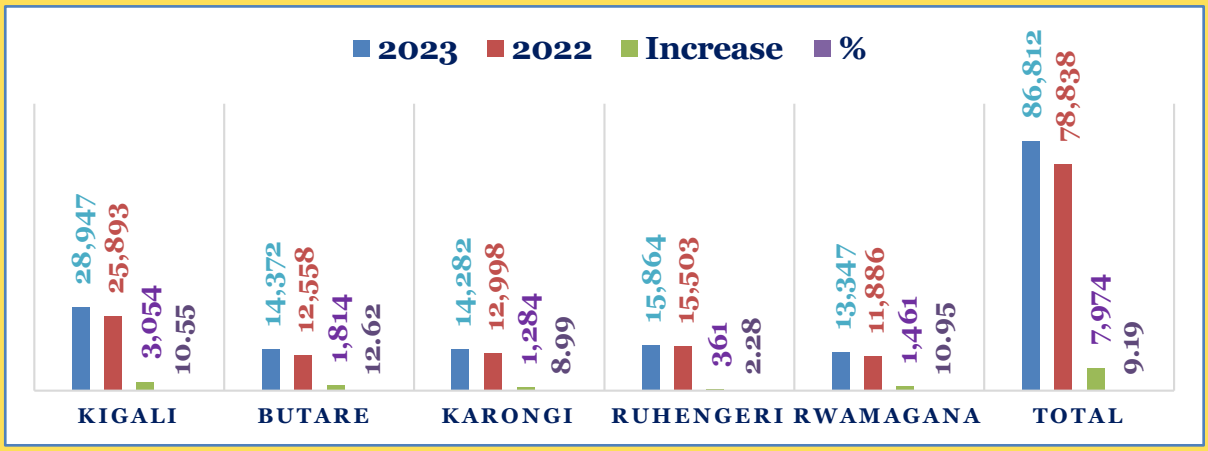
Source: 2023 Data from RBC/BTD e-Progesa Database and Quality Indicators, there is no increase.

In 2023, a total of 1,949 blood collection sessions were conducted, compared to 1,686 sessions in 2022. This represents an increase of 263 sessions, reflecting a growth of 13.49%.Blood units in 2023



Source: 2023 RBC/BTD e-Progesa Database and Performance Quality Indicators specifies that Kigali has big numbers compered to another locations.

According to the 2023 Annual Blood Collection Plan (ABCP), RCBTs aimed to collect 84,009 blood units. By the end of the year, they had collected 86,812 units, achieving a performance rate of 103.34%.4.7. Collected blood units - 2023 vs 2022



Source: 2023 Data from RBC/BTD e-Progesa Database and Quality Performance Indicators that is showing Kigali as high increase.

In 2023, RCBTs collected 86,812 blood units, compared to 78,838 units in 2022. This represents an increase of 7,974 units

Conclusion

The study concludes that the centralized blood bank system implemented by the Rwanda Biomedical Center (RBC) has successfully addressed challenges in blood transfusion services, such as inconsistent supply and inefficient inventory management. By enabling voluntary donors to schedule appointments and facilitating real-time tracking of blood availability, the system has improved accessibility and hospital satisfaction. In 2023, the RBC met 99.47% of hospital blood demands, with a goal of 100% by 2025. The system's scalability offers a promising model for other countries, and future efforts should focus on expanding the donor base and overcoming logistical barriers.

Recommendation

Research on Blood Donor Retention: Future research should focus on strategies for improving donor retention, especially addressing factors that discourage repeat donation. This includes studying donor motivations, challenges, and satisfaction levels, and using this data to fine-tune the blood donation process.

International Collaboration and Best Practices: Rwanda can benefit from collaborating with other countries that have similar blood bank systems in place. Sharing best practices and innovations could help refine the existing system and enhance its scalability, especially in other African countries facing similar challenges.

Implement Data-Driven Decision Making: The current system’s real-time tracking and data updates are valuable. It is recommended to further develop data analytics tools that can predict blood demand trends and optimize blood distribution, ensuring more accurate matching between supply and hospital needs.

Enhance Public Awareness Campaigns: While the system has improved voluntary blood donation, continuous efforts should be made to raise public awareness about the importance of regular blood donation. National campaigns, especially targeting schools, workplaces, and communities, can help attract more donors and reduce the reliance on occasional donation drives.

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Real earnings management in Nigeria - The role of Board competence and Institutional ownership of industrial goods sector

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Abstract

Due to a number of accounting scandals and financial anomalies, users of accounting information are growing more concerned about the quality and dependability of the data in the financial statements of well-known corporations worldwide. This is evident from the multiple corporate accounting scandals that were publicized in the US, Europe, and Nigeria in particular. This study evaluates the effect of board competence, institutional ownership on earning management of listed industrial goods firms in Nigeria. The 13 listed industrial goods businesses that were a part of the Nigerian Exchange Group (NGX) as of December 31, 2022, make up the study's population, and all the thirteen firms was examined in the research. Panel regression was utilized to analyze the obtained data. The findings indicate that board competence has impact on the earnings management of Nigerian industrial goods enterprises. At the 5% significance level, these are represented as coefficients (3.59) with P-values (0.001). However, the P-value (0.361) and coefficient (15.94) show that institutional ownership offers no discernible impact on earnings management. The research came to the conclusion that actual earnings management was impacted by board competency. However, there is little proof that real earnings management was impacted by institutional ownership. The study's conclusion was that Nigerian industrial products businesses ought to have additional independent directors with financial experience on their boards.

Keywords: Board competence, Institutional ownership, Earnings management, Accruals.

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1. Introduction

Among the governing board of directors' greatest tactical choices is the investment decision. In order to accomplish the organization's objectives, the boards of directors are in charge of making sure that its funds are managed successfully and efficiently. The allocation of resources in relation to total assets, company structure, and the consequent risk profile of the alternative are all advised by the board of directors, even if the finance manager has ultimate discretion over investment decisions (Velte, P., 2024).

In exchange for the self-serving managers' prudent use of their discretionary powers to increase shareholders' wealth rather than pilfer their assets, shareholders willingly entrust managers with their resources (Kee, 2010, quoted by Junaidu & Abdulrahman, 2019). Because it gives them information about the returns on their investments, financial reporting is important to investors and other stakeholders. Reported earnings are regarded as being extremely useful assist investors in forecasting their future profits, as stated by Das and Kim (2018).

However, certain financial reports could include inaccurate and deceptive data. In earnings management, executive discretion was often employed to hide subpar performance or inflate excellent performance for career or pay-related reasons. If earnings management is taken into account while projecting future profits, analysts can assess its effects through significant accruals (Abarbanell & Lehavy, 2018). The way a firm manages its results can impact the overall value of its earnings in either a beneficial or detrimental way (Hui & Fatt, 2019).

Effective earnings management can increase a company's earnings, but inadequate management can seriously impair the quality of those gains. Kin (2018) distinguishes between Earnings management comes in two different forms: accrual-based and real-based. As opposed to earnings management centered around accruals, real-based earnings management concentrates on controlling actual operations, such as cutting back on discretionary spending, which modifies or revises accruals through revisions to accounting assumptions. In contrast to accrual-based earnings management, real-based earnings management directly affects the flow of funds (Roychowdhury, 2016).

Managers manipulate income using either or each of these strategies to increase the business's earnings and inflate statistics in the financial report. Losses on investments might result from earnings management. For example, investors in industrialized nations have been alarmed by the demise and scandals of major corporations like Enron, WorldCom, and Xerox because they ended up losing revenue on their investments (Fodio, Ibikunle, & Oba, 2013). Major companies involved in Lever Brothers PLC, Cadbury Nigeria PLC, and African Petroleum PLC are among the Nigerian corporations involved in controversies (Miko & Kamardin, 2018).

To allow managers to manipulate financial data in a way that maximizes profits, any firm must have an efficient earnings management system in place (Kin, 2018). Although earnings management is widespread, it becomes problematic when it results in false financial statements that erode investor trust. True earnings management is achieved when a business adjusts its operating procedures to increase profitability without deviating from accepted accounting principles (GAAPs).

Real earnings management is crucial for a company to grow, add value for shareholders, and attract investment. Big enterprises sometimes alter their true earnings to maintain their market positions, according to Ayogu and Ani (2018), which could affect the accuracy of financial records. Furthermore, higher profitability translates into higher retained earnings, and managers can employ earnings management strategies to appease shareholders. Thus, it stands to reason that if a company's profitability increases, so too would actual earnings management. However, Martin (2018) contends that in order to maintain positive cash flows and enhance their financial performance, low-profitability companies should employ income-reducing earnings management. The study specifically looked into how ownership structure, board competency affected real earnings management.

Due to a number of accounting scandals and financial anomalies, users of accounting information are growing more concerned about the quality and dependability of the data in the financial statements of well-known corporations worldwide. The multiple corporate accounting scandals that rocked Europe and the US at the beginning of the twenty-first century such as those involving Parmalat in Italy, Nortel in Canada, and One Tel in Australia, WorldCom and Enron in the US, Wire Card (2022) and cryptocurrency trading platform FTX in U.S (2024) make this evident. Other accounting scandals including Oceanic Bank, Intercontinental Bank, Afribank, Cadbury Nigeria PLC.

Managers' methods of controlling profits have been identified as a contributing factor to business failures that have been witnessed in companies all over the world. This phenomenon has resulted in a deterioration in public trust and the cessation of investment by many parties. It has continuously brought up significant issues about the efficacy of the management strategies used by various businesses. Moreover, it has brought attention to issues about the shortcomings of internal oversight in businesses and the standards of financial reporting (Githaiga, Kabete & Bonareri 2022).

In order to control the operations of visibly operated firms on the Nigerian Stock Exchange and the Financial Reporting Council of Nigeria, the Securities and Exchange Commission (SEC) established a code of corporate governance in 2003 issued a directive in 2012 mandating that all listed companies follow IFRS standards. Both codes were reviewed in 2011.

Diverse accounting procedures culminate in the management of the company deciding what details have to be in the yearly report, despite the fact that these standards are intended to provide the board total authority over the managers. If the relevant board members had fulfilled their obligations as outlined in the 2016 review of The Securities and Exchange Commission Act of 2011, the Nigeria Code of Corporate Governance, and the Financial Reporting Council of Nigeria's 2012 instruction, and other laws intended to compel the company to provide pertinent information, the majority of these business issues connected to accounting practices could have been avoided (Mohammad et al, 2021).

Real earnings management is a significant problem in Nigeria that has an impact on many different parties, such as investors, regulators, and the country's economy. Nigeria's economy is mostly reliant on the industrial products sector, and the stated firms' financial success has a big impact on the nation's economy and the stock marketplace overall. Manipulation of financial reporting can undermine investor confidence, create market inefficiencies, and limit economic growth (Githaiga, Kabete, and Binary 2022).

The intent of this research is to examine the relationship between actual earnings management and company features in Nigeria's industrial products industry. The research explicitly scrutinized the impacts of institutional ownership and board competency on actual profits management in this sector.

Therefore, by methodically examining the impacts of institutional ownership and board member competency on the actual earning management of Nigerian listed companies that produce industrial goods, the present research seeks to close the research gap. By focusing on these drivers, this research will provide valuable insights that facilitate effective policymaking.

2. Review of literature

Uwalomwa et al. (2015) assessed the earnings management practices of 20 businesses quoted on the Nigerian stock exchange between 2006 and 2010. To conduct econometric analysis, the research utilized pooled ordinary least square regression with descriptive statistics. Although corporate strategy and company size have a substantial beneficial impact on earnings management (as measured by discretionary accruals), the study's findings showed no significant correlation between financial leverage and discretionary accruals in the sampled Nigerian organizations. According to the research, because due to the complexity of their activities and the difficulties for customers to spot overestimation, big organizations are far more inclined to influence and inflate their revenues.

Ilaboya and Olorunfemi (2018) examine how fifty Nigerian quoted firms are affected by factors including age, size, debt, profitability, and real earnings management. Ordinary least squares (OLS) regression analysis was utilized to assess this research's data. The research found a substantial unfavorable link between real earnings management and firm size. Age, economic viability, debt, and actual earnings management did not significantly correlate, according to the research.

Alade and Oladipupo (2018) investigate the link involving real earnings management and corporate governance in 37 Nigerian publicly traded industrial companies. The information gathered from the present investigation were examined using multiple regression analysis. The findings of the analysis show a substantial negative link. Nasie and Hassan (2019) investigate the impact of corporate governance on profit management in 46 Nigerian-listed firms. This study employed multiple regression analysis to assess the data. The study found a substantial unfavorable link between earnings management and corporate governance.

Olufemi and Adebowale (2018) examined the connection underlying corporate performance, actual earnings management, and ownership structure in 71 publicly traded Nigerian firms. The research examined the gathered data using a multiple regression analysis. The outcomes of the research validated a strong positive correlation between actual earnings management and business performance. The study discovered that the link between corporate governance and real earnings management, therefore connecting real earnings management and business performance, is moderated by ownership structure.

The impacts of a firm's attributes on the real earning management of 100 listed companies on the Amman Stock Exchange (ASE) between 2011 and 2017 are examined by Kharashgah, Amran, and Binti Ishak (2019). It's fascinating to note that the data show an absence of correlation between REM and board size, but a substantial adverse relationship between REM and board independence and meetings.

Musa et al. (2019) examine how business characteristics affect the financial reporting quality of 11 Nigerian stated industrial products companies between 2011 and 2018. As an instrument for analysis, the multiple regression approach was applied. It has been shown that the following factors significantly and negatively affect the actual earnings manipulation of listed industrial goods businesses in Nigeria: firm age, company size, leverage, and the participation of female directors. Additionally, a company's financial reporting value is positively impacted by board meetings and profitability; growth, access to liquidity, and ownership structure alternatives have fewer of an effect.

Using multiple linear regression analysis, Adeniji et al. (2019) came across an intense inverse relationship regarding actual earnings management and corporate governance in a study of 37 publicly traded manufacturing companies in Nigeria.

Erlane et al. (2019) examined the effects of company factors on profits management methods in 83 publicly listed, technology-focused firms in Malaysia in 2015 and 2016. The research found a statistically significant beneficial relationship between firm size and earnings management practices. This suggests that larger businesses frequently employ incentives to control profits and increase output. However, there is no discernible correlation between the profitability or indebtedness of organizations and the implementation of earnings management measures. The present research shows how company size affects the prevalence of earnings management in Malaysian publicly traded technology businesses.

The impact of internal control quality on the actual profit management of fourteen Nigerian stated industrial products companies is investigated by Owojori and Asaolu (2020). A cross-sectional model was used in the research to determine how internal control quality affected the management of actual earnings. The results of the study showed a strong inverse relationship between real profits management and the efficiency of internal controls.

The impact of managerial, institutional, and foreign ownership structures on the actual earning management of 72 non-financial companies in Nigeria from 2014 to 2018 was investigated by Ahmad et al. (2020). It analyzed the data using the multiple regression approach. The findings designate that while institutional ownership has little impact on actual earnings management, managerial ownership increases management's motivation to manipulate results.

The results also show that management is discouraged from falsifying financial accounts by foreign ownership.

The study by Mohammad et al. (2021) looks at the small impact of the audit committee's independence between 2009 and 2018, the Amman Stock Exchange (ASE) reported on the relationship between board structure and real earnings management (REM) in 91 mentioned enterprises in the industrial and service sectors. The data analysis using the Fixed Effect approach suggests that REM is strongly and adversely influenced by the size of the board and CEO duality. REM and board independence, however, were revealed to be strongly positively correlated. Ultimately, the results demonstrated that REM is impacted by the board's structure. Additionally, it was shown that the link involving board structure and REM has been somewhat impacted by the autonomy of the audit panel.

Abel et al.'s study from (2021) looked at how the size and independence of the board affected how much profit management was done in 92 Nigerian companies that were listed between 2007 and 2018. The collected data was examined using regression analysis, a statistical technique. Even after controlling for IFRS adoption and enterprise age, the results demonstrate that the size of corporate boards and the number of independent directors had no significant influence on the degree of profit management in Nigerian firms.

Ahmad et al. (2021) looked into how, between 2014 and 2018, 72 non-financial enterprises in Nigeria managed their real earnings in relation to free cash flow and corporate tax avoidance. The model was tested using the multiple regression approach. The findings indicate both are involved free cash flow and corporate tax evasion support management's attempts to distort real earnings.

Olorede, Abogun, and Olowookere's (2022) study examined the corporate governance, CEO compensation, regarding the caliber of the financial reporting of 74 Nigerian listed firms that were chosen. The chief executive officer's overall remuneration was used as a proxy for executive compensation, and the corporate governance index was created as a gauge of corporate governance. As stand-ins for financial reporting quality, Kothari, Leone, and Wasley's modified Jones model's discretionary accruals (2005) and Dechow and Dichev's (2002) accruals were used. The outcome of the research demonstrated a substantial and adverse relation to CEO compensation and corporate governance and discretionary accruals, as well as a positive correlation between reporting quality and CEO compensation.

Githaiga et al.'s (2022) this research looks at the earnings management (EM) strategies of eighty-eight East African Community (EAC)-listed companies between 2011 and 2020. The work addressed potential endo-genetic and reverse causality concerns using the system generalized method of moments (SGMM) estimate model. The results showed that board size and EM had a significant and positive relationship. The results also showed that EM was significantly and negatively impacted by board independence and gender diversity. Furthermore, the results verified that the association between EM, independence, gender variety, and board size was mediated by the size of the organization.

Ali, S. et Al., (2024), investigated the roles of institutional ownership in board investment efficiency relationship and effect of board governance procedures on the efficacy of investing in listed firms Pakistan Stock Exchange (PSX). From 2004 to 2018, 155 non-financial PSX-listed companies made up the sample data.

The research's hypotheses were tested using a random effect model. The study's conclusions are confirmed by a robustness test. Regression analysis shows that while board diversity has a large negative influence on investment efficiency, board size has a considerable direct effect. In terms of moderating, it was discovered that institutional ownership considerably reduced the association between board independence and investment efficiency.

3. Methods and Materials

3.1. Data

This inquiry employed an ex post facto research design. The 13 quoted industrial products companies operating on the Nigerian Exchange Group (NGX) floor as of December 31, 2022, make up the research's composition. The ten-year research period runs from 2013 to 2022. The selecting process employed censorship sampling techniques. The complete population was considered for this investigation. Consequently, over the course of the study's ten years, from 2013 to 2022, the annual reports of the 13 industrial enterprises were reviewed. This produced 130 sampled observations, which is equivalent to multiplying 13 industrial businesses by ten years. The study conducted a rigorous analysis of the data it collected using both descriptive and inferential statistical tools.

3.2. Model Specification

The present investigation employed an altered version of the Githaiga et al (2022) model, which was expressed as follows:

$$EM_{it}=\beta 0+ \beta 1SIZ_{it}+ \beta 2BS_{it}+ \beta 3BI_{it}+ \beta 4BGD_{it}+ e_{it} \quad \text{.....(1)}$$

The acronym stands for earnings management, firm size (SIZ), board size (BS), board independence (BI), and board gender diversity (BGD).

This study considered institutional ownership and board competence, in the revised model. below:

$REM_{it} = \beta_{0it} + \beta_1 BCO_{it} + \beta_2 INS_{it} + e_{it}$ ..... (2)

Where:

REM= Real Earnings Management (measured with residual value of discretionary accrual of modified Jones model)

BCO= Board Competence

INS= Institutional Ownership

β_0 = Constant

e = error term for the Model that is, the difference between the observed value and the predicted value of real earnings management.

i,t = i represents a particular company, and t is the fiscal year.

Table 1: Measurement of variables

Variable	**Measurement**
Real earning management (REM)	The modified Jones model's residual of discretionary accruals is used to quantify real earning management (Liu & Lu, 2022). it is stated below: $TACC/TA_{it-1} = \alpha_1(1/TA_{it-1}) + \alpha_2((\Delta REV_{it}-\Delta REC_{it})/TA_{it-1}) + \alpha_3(PPE_{it}/TA_{it-1}) + \xi_{it}$ ..... (2)
Institutional Ownership (INS)	Percentage of held equity by institution in the capital structure (Obasi et al., 2019. Aygun, 2019).
Board Competence (BCO)	Board competence is measured using, If the board member is a specialist in finance, the value is 1, and if not, it is 0. Ebraheem (2021).

Source: Author

4. Results and Discussion

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
REM	130	6.413541	41.77312	-.3959644	338.4395
INS	130	0.7856154	0.2128544	0.33	1
BCO	130	0.2913077	0.1965256	0	0.67

Source: Author's Computations, 2024

The Real Earnings Management (REM) summary data are displayed in Table 2, Institutional Ownership (INS), and Board Competence (BCO) highlight the characteristics of Nigerian listed industrial products companies. The mean value of REM is 6.41, suggesting that, on average, these firms engage in relatively low levels of actual profit management. However, the high standard deviation of 41.77 indicates substantial variability, with some firms exhibiting significantly higher levels of earnings manipulation. The range, which starts at -0.40 and goes up to 338.44, further illustrates that some firms may manipulate earnings downward while others engage in substantial upward adjustments.

For INS, the average ownership by institutional investors is 0.79 (or 79%), suggesting that most firms in the sample are primarily owned by institutional shareholders. The standard deviation of 0.21 shows moderate variation in ownership levels, with some firms having as low as 33% institutional ownership and others reflecting complete institutional ownership (1.0).

Regarding BCO, the average competence level among board members is 0.29, indicating that only 29% of board members are deemed competent on average.

The standard deviation of 0.20 signifies moderate variation, with some firms having no competent board members (minimum of 0) and the most competent boards consisting of 67% competent members (maximum of 0.67).

Therefore, the data reveals considerable diversity in real earnings management practices, ownership structures, and board competence among listed industrial goods firms in Nigeria. While institutional ownership is generally high, board competence appears relatively low, and real earnings management practices vary widely across firms.

Table 3: Correlation Coefficient

	REM	**INS**	**BCO**
REM	1.000		
INS	0.0806	1.000	
BCO	0.8140	0.7358	0.000

Source: Author's Computations, 2024

The correlation matrix reveals in the table 3, shows the key relationships among Real Earnings Management (REM), Institutional Ownership (INS), and Board Competence (BCO). The correlation between REM and INS is weak at 0.0806, indicating a minimal connection underlying institutional ownership and real earnings management. However, a strong optimistic correlation (0.8140) exists between REM and Board Competence, suggesting that more competent boards are linked to increased earnings management. This highlights the influence of board competence on strategic financial decisions. Additionally, the correlation between INS and BCO is 0.7358, suggesting that boards of companies with larger institutional ownership are often more capable. This implies that institutional investors may favor companies with knowledgeable boards or work to improve board competency. Ultimately, institutional ownership merely has a less direct influence on earnings management practices than board competency, which is important for both institutional ownership and earnings management.

Table 4: Random Effect

REM	Coef.	Std. Err.	Z	p</z/	[95% conf.	Interval]
BCO	57.080	19.34627	5.01	0.003	-38.09884	37.73714
INS	2.499828	18.92501	0.15	0.882	-34.29251	39.89217
Cons	4.266636	17.31548	0.25	0.805	-29.67107	38.20435
Sigma-u	18.299031					
Sigma-e	38.534767					
Rho	0.18400792					

Source: Author's Computations, 2024

In the table 4, the model examining the relationship between Real Earnings Management (REM), the random-effects GLS regression analysis's findings show Board Competence (BCO), and Institutional Ownership (INS) in listed industrial products firms in Nigeria is statistically significant overall. The Wald chi-squared test result (Wald chi2(2) = 4.02, p = 0.0090) indicates that the independent variables, BCO and INS, together impact REM in a way that is statistically meaningful. This implies that these factors are crucial to comprehending the actual profits management strategies used by these companies.

In terms of model fit, the R-squared values indicate a solid performance. The within-group R-squared is 56%, showing that 56% of the discrepancy in REM within individual organizations is clarified by the model. This strong fit implies that the model effectively captures within-firm differences.

The between-group With an R-squared of 41%, the model accounts for 41% of the variance in REM amongst enterprises, indicating a moderate fit for between-firm variation. The overall R-squared is 50%, meaning that half of the total variation in REM across all observations is elucidated by the independent factors. This highlights the model's overall strength in explaining variations in real earnings management.

The verdicts specify that REM is significantly improved by Board Competence (BCO). With a p-value of 0.003 and a coefficient of 57.08, this suggests a robust correlation between increasing actual profits management and board competency. In particular, REM rises by around 57 units for every single boost in BCO. This study implies that more capable boards typically use more practical revenue management techniques, maybe as a result of their improved capacity to handle intricate financial schemes. However, REM is not significantly impacted by Institutional Ownership (INS). The large confidence range highlights the uncertainty in this estimate, and the p-value of 0.882 indicates that the influence is not significant in statistical terms despite the INS coefficient of 2.80.

Therefore, the analysis highlights the significant role of Board Competence in driving actual earnings management techniques used by Nigerian listed industrial goods companies. Businesses with more capable boards typically manage their earnings at greater levels. However, Institutional Ownership does not seem to have a significant influence on these practices. The model demonstrates a good overall fit, explaining 50% of the variation in REM, with board competence emerging as a crucial factor in understanding earnings management behavior in the sector.

Table 5: Regression analysis

REM	Coef.	Std. Err.	Z	p</z/	[95% conf.	Interval]
BCO	3.587042	18.80951	66.19	0.001	-33.63358	40.80767
INS	15.93664	17.36657	0.92	0.361	-18.42867	50.30194
Cons	7.151458	15.33187	0.47	0.642	-37.49045	23.18754

Source: Author's Computations, 2024

The regression study that examines the influence of Institutional Ownership (INS) and Board Competence (BCO) on Real Earnings Management (REM) in publicly traded industrial products companies is displayed in Table 5. The p-value of 0.446 and the F-statistic of 0.43 show that the model Overall, this is not statistically significant. This implies that BCO and INS alone do not account for a sizable portion of the variance in REM. The R-squared value of 51.01% suggests that the independent variables explain almost half of the variance in REM, despite the model's insignificance. Nevertheless, considering the absence of overall model significance, this high R-squared value should be regarded with caution.

Result also shows that Board Competence (BCO) shows a positive relationship with REM, with 3.59 for the coefficient and 0.001 for the extremely significant p-value. This implies the fact that board competence increases, so does real earnings management. However, the confidence interval for this estimate (-33.63 to 40.81) is quite broad, indicating some uncertainty around the true effect. Despite this, BCO remains a key variable, significantly influencing REM in this model.

The findings of earlier investigations (Ahmad et al., 2020; Velury & Jenkins, 2019) showed a significant connection, whereas this result deviates from their conclusions. The findings of (Lin & Hwang, 2020; Wang, 2016; Koh, 2017; Aygun et al 2019, Liu & Tsai, 2019 Alzoubi, 2021) about the link and the factors' significance align with this outcome. The results of this investigation corroborate the assumption of the agency theory even further.

Conversely, there is a positive but statistically insignificant correlation between REM and Institutional Ownership (INS), as indicated by its coefficient of 15.94 ($p = 0.361$). This implies that actual earnings management is unaffected by shifts in institutional ownership. The wide confidence interval (-18.43 to 50.30) reflects a high level of uncertainty in this estimate, reinforcing the absence of importance in the connection between INS and REM. This result is in line with the findings of other researchers (Ahmad et al., 2020; Velury & Jenkins, 2019), who also did not discover any conclusive evidence in their studies. The findings of (Lin & Hwang, 2020; Wang, 2016; Koh, 2017; Aygun et al 2019, Liu & Tsai, 2019 Alzoubi, 2021) on the link and importance of the factors do not align with this study. The findings of this study give additional proof in favor of the agency theory's premise.

Discussion

The hypotheses presented pertain to the correlation between Industrial Ownership, Board Competence and the results of this research offer even more support for the assumption of the agency theory managers that vary from typical operationally standards on order to manipulate reported result. The first hypothesis was formulates to test whether the Real Earnings Management (REM) in Nigerian stated industrial products companies is significantly impacted by institutional ownership. The findings indicate that REM is unaffected by institutional ownership which implies that inclusion of institutional investors in a company's ownership framework might not influence managerial conduct with regards to manipulating results. Institutional investors, with their advanced comprehension of Financial Statements and proactive oversight responsibilities may not discouraged manager from participating in earnings manipulations (Ahmed et al, 2020 & Velury & Jenkins, 2019).

The second hypothesis was tested to examine whether Board Competence on board members has a foremost impact on the management of actual earnings in Nigeria's stated industrial products companies. The board's degree of experience has a big influence on how real earnings are manipulated. The board of directors is in charge of overseeing management and ensuring that financial reporting is accurate (Alzoubi 2021). This discovery suggest that in certain companies, board members may have capabilities, experience and required knowledge to supervise adequately in order to curb the manipulation of earnings.

Conclusions and policy recommendations

Considering the consequences of the investigation, the following conclusions were drawn:

Financial professionals on the boards of industrial products businesses will have more control over the extent of earnings management since they will be better able to understand the information included in financial statements.

Institutional investors have less sway over Nigerian industrial products businesses' earnings management strategies. This infers that the existence of institutional investors affects a company's capacity to manage its profitability.

The study's conclusions led to the subsequent recommendations being made:

i. To help lower the degree of profits management and assist in resolving agency concerns, Nigerian industrial products companies should appropriately include a bigger number of independent directors and financial specialists on their boards.
ii. Nigerian companies that produce industrial goods should consider luring in additional institutional investors. This could improve earning management control and assist with activity tracking.

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APPENDICES

List of Industrial goods firm Nigeria

1. BUA Cement Plc
2. Dangote Cement Plc
3. Lafarge Africa Plc
4. Austin Laz & company Plc
5. Grief Nigeria Plc
6. Chemical and Allied Product Plc
7. Berger Paint Nig Plc
8. Meyer Plc
9. Notore chemical Plc
10. Premier paint Plc
11. Tripple Gee and Company plc
12. Beta Glass Plc
13. Cutix Plc

```
. xtset ID YEAR, yearly
       panel variable:  ID (strongly balanced)
        time variable:  YEAR, 2013 to 2022
                delta:  1 year

.
. xtreg REM BC0  INS, re

Random-effects GLS regression                   Number of obs      =       130
Group variable: ID                              Number of groups   =        13

R-sq:                                           Obs per group:
     within  = 56.0010                                         min =        10
     between = 41.0996                                         avg =      10.0
     overall = 50.0063                                         max =        10

                                                Wald chi2(2)       =      4.02
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0090
```

REM	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
BC0	57.0808492	19.34627	5.01	0.003	-38.09884	37.73714
INS	2.799828	18.92501	0.15	0.882	-34.29251	39.89217
_cons	4.266636	17.31548	0.25	0.805	-29.67107	38.20435
sigma_u	18.299031					
sigma_e	38.534767					
rho	.18400797	(fraction of variance due to u_i)				

```
. summarize REM INS BC0
```

Variable	Obs	Mean	Std. Dev.	Min	Max
REM	130	6.413541	41.77312	-.3959644	338.4395
INS	130	.7856154	.2128544	.33	1
BC0	130	.2913077	.1965256	0	.67

```
. pwcorr REM INS BCO

             |      REM      INS      BCO
-------------+---------------------------
         REM |   1.0000
         INS |   0.0806   1.0000
         BCO |   0.8140   0.7358   1.0000

.
```

```
. regress REM BCO  INS

      Source |       SS       df       MS              Number of obs =     130
-------------+------------------------------           F(2, 127)     =  446.43
       Model |  1526.39035     2  763.195174            Prob > F      =  0.0001
    Residual |  223577.77     127  1760.45488           R-squared     =  51.0068
-------------+------------------------------           Adj R-squared =  51.0038
       Total |  225104.161    129  1744.99349           Root MSE      =  41.958

------------------------------------------------------------------------------
         REM |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         BCO |    3.587042   18.80951     66.19   0.001    -33.63358    40.80767
         INS |    15.93664   17.36657      0.92   0.361    -18.42867    50.30194
       _cons |   -7.151458   15.33187     -0.47   0.642    -37.49045    23.18754
------------------------------------------------------------------------------
```

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Contribution of Micro Finance Services on the Performance of Small Business Enterprises in Nyarugenge

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Abstract

This research sought to evaluate how microfinance services influence the financial performance of small businesses in Rwanda, specifically within Nyarugenge District. The study focused on examining the effects of loan services, savings schemes, microinsurance, and financial literacy on the success of these enterprises. From a total population of 283 individuals, a sample of 142 respondents was chosen to facilitate effective data collection. These participants included a range of stakeholders such as SME owners and managers, executive officials, and operators of businesses like wholesalers, pharmacies, bars and restaurants, beauty salons, stationery shops, and others. The study was based on three key theories: Microfinance Credit Theory, Credit Access Theory, and Financial Intermediation Theory. It employed a descriptive and correlational research design. Data were gathered through questionnaires, interviews, and document reviews. Both descriptive and inferential statistics were utilized to analyze the data. The results revealed that microfinance services—such as credit access, savings options, microinsurance, and financial literacy programs—had a significant positive impact on the financial performance of small businesses in Nyarugenge District. Overall, the findings demonstrated that microfinance has substantially contributed to the growth and financial stability of these enterprises.

Keywords: Microfinance, financial performance, of small businesses.

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1. Introduction

Small Business Enterprises (SBEs) and microenterprises form the backbone of most economies. In countries that are part from the Organization for Economic Cooperation and Development (OECD)they represent over 95% of all registered firms, contribute between 60% and 70% of employment, and account for approximately 55% of GDP. These businesses are also major contributors to job creation, underlining their significance in supporting employment levels (World Bank, 2014).

Globally, small-scale enterprises are increasingly recognized as engines of economic development and growth (Harper, 1984; Ba-el & Felsenstein, 2020). Many countries have implemented initiatives to support them as part of strategies to expand employment opportunities, boost income levels, and increase productive capacities. Small businesses are often favored due to their ease of establishment, lower capital requirements, operational flexibility, and adaptability to changing market conditions. On a global scale, they serve a unique role, particularly in developing countries where they help level the playing field against multinational corporations (Harper, 2021).

In India, for example, small enterprises often start with minimal capital and sometimes operate on a part-time basis. The growth of internet marketing has also benefited small businesses, allowing them to reach niche markets more effectively (Kahneman et al., 2020). Meanwhile, the microfinance sector began expanding rapidly in the 1990s in response to a gap left by the collapse of traditional commercial and cooperative banks, particularly in underserved rural and urban areas.

Definitions of small-scale enterprises vary by region. In Uganda, they typically employ between 5 and 50 people (Karlibbala, 1994; Ngobo, 1995), whereas in India, the range is usually 30 to 100 employees. The European Union includes medium enterprises under the SME umbrella, defining them as firms with up to 250 employees (The Netherlands, 1997). In the United States, small enterprises are defined as those with fewer than 500 workers (Stoner et al., 1996), while in Kenya, microenterprises are characterized by a workforce of 10 or fewer employees (Kibera, 1997).

According to Rwanda's Ministry of Trade and Industry (2020), the strength of micro and small businesses lies in their capacity to quickly respond to market demands and seize niche opportunities often overlooked by larger firms. These small enterprises frequently form the foundation of a healthy economy by offering localized services, creating jobs, and linking with larger firms through supply chains or service provision. However, Rwandan small businesses remain less competitive than their regional counterparts, a concern that may worsen under the East African Community (EAC) common market framework that Rwanda fully joined in July 2020.

A significant barrier to growth for small businesses is limited access to credit. Financial institutions often cite a lack of bankable projects and their own resource constraints in evaluating small loan applications. Moreover, small businesses are typically perceived as high-risk, leading to rigid collateral requirements and repayment conditions (PSF, 2018). Many entrepreneurs also lack the necessary financial literacy and understanding of banking processes to successfully apply for credit. Commercial bank products are often ill-suited for small businesses in agriculture, where most Rwandan microenterprises operate. Additionally, existing regulations further restrict the amount of capital available for such loans (MINICOM, 2020).

A study by Nabangi (2019) found that 38% of small business owners left formal employment to pursue entrepreneurship primarily for independence. Many value the freedom to make their own decisions, assume personal risk, and benefit directly from their efforts. While small business ownership offers autonomy, it also demands long working hours and a deep understanding of market demands—ultimately, customers become the true "bosses."

Currently, around 80% of small businesses in Rwanda are located in urban centers, with just 20% operating in rural areas, where most citizens live. These businesses contribute 75% of the national GDP and provide employment for approximately 1.4 million people across sectors like retail, food processing, and services (Nabangi, 2019).

Today, small businesses—both formal and informal—make up about 98% of all enterprises in Rwanda and contribute to 41% of private-sector employment. However, only about 300,000 people are employed in the formal segment, highlighting untapped potential (PSF, 2018). Most Rwandan small enterprises have fewer than four employees, suggesting that targeted growth in the sector could significantly increase non-agricultural employment. Strengthening this sector could also help reduce the country's growing trade deficit, which expanded from $229 million in 2015 to an estimated $770 million in 2019.

Improving the global competitiveness of Rwandan small businesses, particularly in value-added exports, is a critical step toward addressing this trade imbalance. This requires consistent support, especially in terms of access to financing. Despite their importance, small businesses continue to face a fragmented financial policy environment that fails to adequately unlock their potential in national development.

This study, therefore, seeks to examine how access to microloans influences the performance of small enterprises. It also aims to identify the main challenges limiting access to credit and propose actionable recommendations for improving financial access for SBEs.

According to a report by Rwanda's According to the Ministry of Finance and Economic Planning (MINECOFIN, 2015), small-scale businesses have progressively relied on commercial finance credit to grow their activities. Despite this, many rural-based small businesses continue to struggle with adhering to loan repayment schedules and meeting the policy requirements set by commercial banks. In some cases, borrowers have defaulted on repayments altogether, highlighting a concerning trend that warrants deeper investigation.

The Private Sector Federation (PSF, 2018) also observed that access to credit remains a significant challenge for small businesses. Financial institutions often categorize these businesses as high-risk, which leads to strict collateral demands and rigid repayment terms. This situation is further complicated by the limited financial literacy and lack of technical skills among many small business owners, which hinders their ability to successfully navigate the loan application process.

Moreover, most loan products offered by commercial banks are ill-suited for small enterprises, particularly those operating in the agricultural sector where many of these businesses are concentrated. Regulatory limitations also restrict the overall funding available for such enterprises. Previous financing models, which funneled loans through large intermediary institutions, often featured complex application procedures and inadequate capacity for evaluating small-scale borrowers, making it difficult for these businesses to secure funding (Weiss, 1981).

As a result, many entrepreneurs have shifted toward microfinance institutions (MFIs) as an alternative source of financing. However, the extent to which MFIs genuinely enhance the performance of small businesses in Rwanda remains unclear. The regulatory framework surrounding microcredit, the challenges that limit small business access to MFI services, and the actual impact of these services on enterprise growth are areas that require further exploration (Stiglitz, 2018).

This study aims to assess the contribution of microfinance services to the performance of small businesses in Rwanda, with a particular focus on enterprises in Nyarugenge District that engage with financial institutions. A central aim is to determine whether microcredit programs truly benefit small businesses or whether they primarily serve as revenue-generating tools for MFIs at the expense of underserved populations.

Research Purpose

This study seeks to examine the impact of microfinance services on the performance of small business enterprises in Rwanda.

Research Objectives

i. To evaluate the effect of access to credit facilities on the performance of small business enterprises in Nyarugenge District.
ii. To assess the impact of savings services on the operational performance of small businesses within Nyarugenge District.
iii. To investigate how microinsurance services influence the success and sustainability of small business enterprises in the district.
iv. To examine the contribution of financial literacy in improving the performance of small businesses supported by financial institutions in Nyarugenge District.

Research Hypotheses

The following null hypotheses were formulated for testing in this study:

- **H_{01}:** Access to credit does not have a significant effect on the performance of small business enterprises.
- **H_{02}:** Savings do not significantly affect the financial performance of small business enterprises.
- **H_{03}:** Microinsurance services do not have a meaningful effect on the performance of small businesses.

2. LITERATURE REVIEW

Conceptual Review

This section defines the key variables studied: microcredit, small business enterprises (SBEs), and financial performance, aiming to provide clarity for both the researcher and readers.

Performance of SMEs in Rwanda

Research by Jean Bosco in Muhoza sector, Musanze district, highlights that SMEs seek external financing primarily to enhance profitability (91%), improve efficiency (87%), avoid liquidity problems (72%), increase solvency (69%), and improve asset quality (64%). These findings align with other studies emphasizing profit maximization as the central goal of entrepreneurial ventures (Murphy, Trailer & Hill, 2006).

SMEs face numerous challenges including poor regulatory environments, globalization pressures, resource limitations, and high tax compliance costs (Ward, 2005; Ekpenyong & Nyang, 2002). However, the most critical challenge remains access to finance due to lack of collateral, limiting SMEs' ability to secure bank loans and thus hindering productivity (Magembe, 2007). This financial constraint often leads to poor employee motivation, high turnover, and in some cases, business closure.

Microfinance Services

Banerjee et al. (2009) found that microcredit significantly boosts entrepreneurship, as evidenced by a study in Spandana village, India, where the number of entrepreneurs rose from 15% to 35% after MFI introduction. Microfinance also facilitates business growth and profitability. Similarly, the African Development Bank (2011) supports SME development through funding and capacity-building initiatives in Rwanda. Expanding financial access is shown to enhance economic growth and reduce poverty by promoting investment and savings (Rodrik et al., 2009).

In Rwanda, investments such as IFC's $1.6 million into Business Partners Rwanda SBE Fund illustrate the growing recognition of microfinance's role in fostering entrepreneurship and employment (Pfeifer et al., 2011). Nyesiga (2011) emphasizes the importance of credit facilities and capacity building to support SME growth amidst rising population pressures.

Access to Loan

Access to finance is crucial for economic development, yet SMEs often struggle due to market imperfections and collateral requirements (World Bank Group, 2019). Studies across Africa show mixed impacts of debt structure on firm performance. For example, in Egypt and Kenya, long-term debt tends to positively influence financial outcomes, whereas short-term debt often negatively affects profitability and liquidity (Wahba, 2013; Githaiga, 2015). In Rwanda, loans from banks remain a primary financing source for SMEs, and evidence suggests a positive correlation between debt levels and firm profitability (Harelimana, 2017). Additionally, better credit terms and accessibility have been linked to improved performance in agricultural cooperatives (Byaruhanga, 2012).

Financial Literacy

Financial literacy plays a pivotal role in enhancing SMEs' operational and financial capabilities. Studies in Kenya and Somalia reveal that skills in bookkeeping, budgeting, and credit management improve loan repayment and business sustainability (Nyamboga et al., 2014; Mohamed, 2016). Training and microfinance services, including savings schemes and favorable loan terms, are essential for SME growth (Rotich et al., 2015; Kibet et al., 2015). In Rwanda, microfinance institutions have been shown to positively impact SME development through financial education and advisory services (Musomandera et al., 2015).

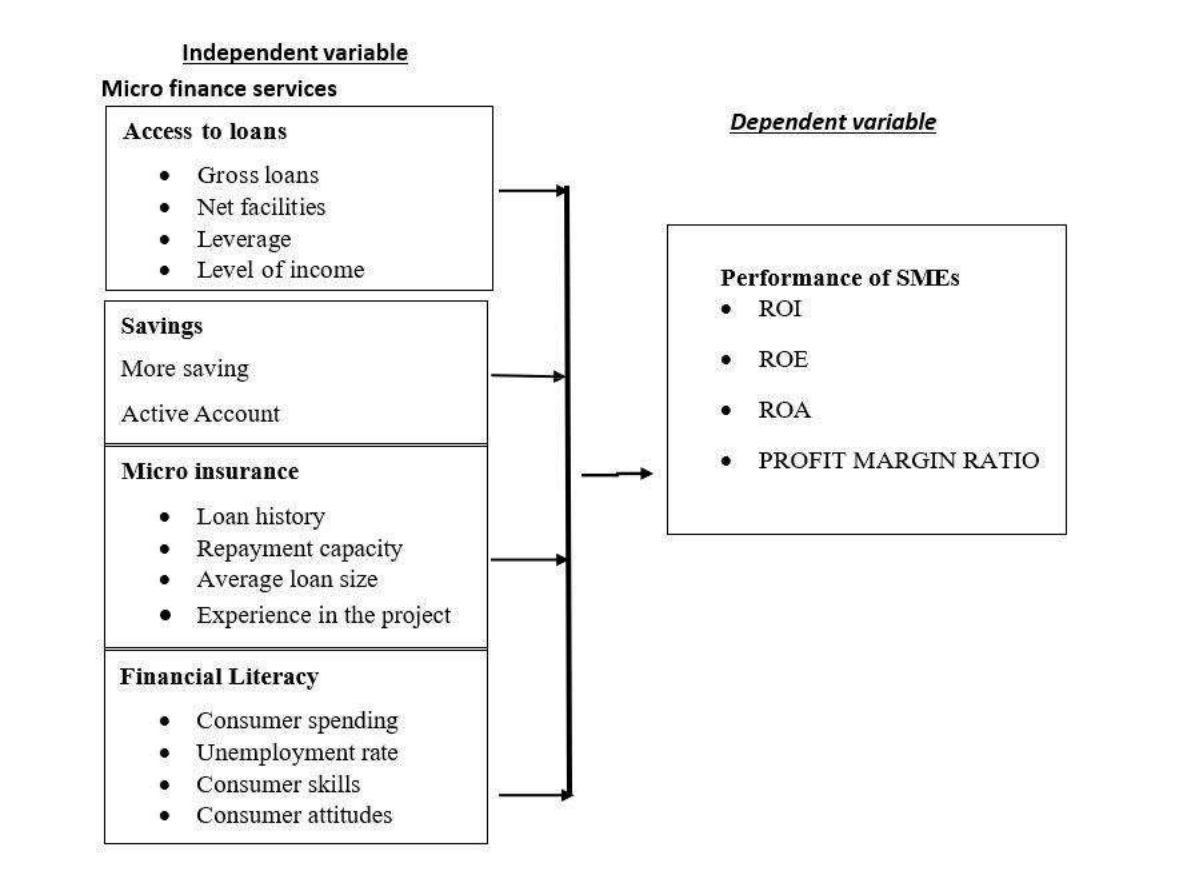
Theoretical Review

This study is grounded in three main theories:

- **Microfinance Credit Theory:** Traces the evolution of MFIs in Kenya since the 1950s, highlighting their growth and role in supporting small traders and enterprises (Dondo, 1999; Kashangaki et al., 1999).
- **Theory of Financial Intermediation:** Financial intermediaries reduce information asymmetry and transaction costs between savers and borrowers, enabling efficient allocation of resources and risk transformation (Akerlof, 1970; Bernanke & Blinder, 1992; Spence, 1973). This theory underscores the importance of banks and MFIs as agents bridging gaps in financial markets.
- **Credit Access Theory:** Emphasizes the role of accessible credit in promoting economic growth and firm performance, highlighting how loan terms and conditions influence SME outcomes.

Conceptual Framework

In this study, **microfinance services** (independent variable) — including favorable interest rates and loan grace periods — influence the **performance of small business enterprises** (dependent variable). Efficient financial management and timely reporting enhance profitability, accountability, and operational success, whereas poor financial controls lead to loss and inefficiency.



While many studies have examined the impact of microfinance on small business performance in Rwanda, there is limited research on factors influencing customers to take loans, customer loyalty, and the role of customer career status in loan provision and financial institution performance. This gap highlights the need for further investigation.

Microfinance is rapidly expanding across Sub-Saharan Africa, serving millions and proving crucial for financial inclusion. The Government of Rwanda is encouraged to support microfinance growth by easing regulatory barriers. Additionally, advancements in financial infrastructure, such as mobile banking and improved creditor rights, are essential for enhancing loan accessibility and serving underserved rural and low-income populations effectively.

3. METHODOLOGY

Research Design

Research design refers to the comprehensive strategy or blueprint that directs how a study is carried out to address the identified research problem (Christensen, 2011). This study adopts a descriptive research design, which focuses on examining data at a particular moment to identify patterns, frequencies, or relationships among variables (Creswell & Poth, 2017).This design suits the study's goal to gather detailed information and identify relevant variables. Additionally, a correlational design was applied to present the data clearly. Both qualitative and quantitative methods were employed to thoroughly examine how microcredit services impact the performance of small businesses in Nyarugenge district.

Study Population

According to Kakinda (1990), a population includes all individuals or units sharing common characteristics relevant to the study. This research considered a total of 283 respondents from financial institution staff, local leaders, and small business owners such as traders, pharmacists, and shopkeepers.

Category	**Population Size**
Small business owners	159
Bank & Sacco employees	110
Local leaders (sector execs)	14
Total	**283**

(Source: NISR, 2025)

Sample Size

To ensure manageability and reliable data collection, a representative sample of 142 respondents was selected from the total population.

Category	**Sample Size**
Small business owners	80
Bank & Sacco employees	55
Local leaders	7
Total	**142**

(Source: NISR, 2025)

Sampling Method

The study employed simple random sampling to select participants, ensuring that every individual had an equal probability of being included in the sample (Bartleff, 2002).This method was applied for selecting employees and clients in the financial sector within Nyarugenge.

Data Collection

The study collected data from both primary and secondary sources. Primary data were obtained through structured questionnaires and interviews conducted with selected respondents. Secondary data were gathered through a review of relevant documents and existing literature**,** including books, reports, and online resources. Documentary review helped supplement data that could not be collected directly.

Validity and Reliability

Validity refers to how well the research tools measure what they intend to measure. Experts reviewed the questionnaire, and a pilot test was conducted. The Content Validity Index (CVI) was used, with a threshold of 0.60 to confirm validity (Saunders, 2000). Reliability was tested using Cronbach's Alpha via SPSS, with all variables showing values above 0.7, indicating consistent measurement (Amin, 2005).

Variable	Items	Cronbach's Alpha
Access to Loan	5	0.781
Savings	5	0.814
Micro Insurance	5	0.813
Financial Literacy	5	0.825
Performance	5	0.875
Average		**0.806**

(Source: Field Data, 2025)

Data Processing and Analysis

Data were manually processed and recorded using software like Microsoft Excel and Word. Both qualitative and quantitative analysis methods were employed. Questionnaires were cleaned, coded, and analyzed using SPSS version 20. Descriptive statistics (means, percentages, standard deviations) summarized the data, while inferential statistics (regression and correlation analysis) explored relationships between variables.

Analytical Model

Multiple linear regression was used to examine how microcredit services affect small business performance. The model was:

$$Y=\beta0+\beta1X1+\beta2X2+\beta3X3+\beta4X4+\epsilon Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Where:

- YY = Performance of small businesses
- X1X_1 = Access to loans
- X2X_2 = Savings
- X3X_3 = Micro-insurance
- X4X_4 = Financial literacy

Thanks for sharing this detailed study summary! Here's a concise interpretation and response focusing on financial literacy's effect on small business performance in Nyarugenge district, based on the data you provided:

4. Results and Discussion

- Mean scores around 2.57 to 3.33 suggest respondents *moderately agree* or are somewhat neutral regarding the extent to which financial literacy programs and policies are implemented.
- The highest agreement (mean 3.33) was on awareness creation about the importance of financial literacy for employees.
- Lower means (~2.57 and 2.61) for having specific policies and variety of programs suggest some gaps or room for improvement in structured financial literacy interventions.
- Overall, there is a moderate level of awareness and engagement with financial literacy training in small businesses.

Link to Financial Performance

- Regression results show that financial literacy positively and significantly affects financial performance (coefficient = 0.797, $p < 0.05$).
- This implies that improvements in financial literacy within enterprises correlate with better financial outcomes like net profit, growth, and gross margin.

Summary

- Small businesses in Nyarugenge are moderately aware and implementing financial literacy initiatives, but there is still scope for stronger policies and more diverse training.
- Financial literacy, alongside access to loans, savings, and microinsurance, significantly improves business financial performance.

- Enhanced financial literacy training could further boost profitability and growth in this sector.

Suggestions for Small Business Enterprises and Policy Makers:

i. Develop clearer, more comprehensive financial literacy policies tailored for SMEs.

ii. Expand the variety and frequency of financial literacy programs, targeting both management and employees.

iii. Leverage microfinance institutions and financial sector players to intensify financial literacy outreach.

iv. Monitor and evaluate the impact of financial literacy programs regularly to ensure continuous improvement.

Demographic Information

Respondents were requested to provide background details related to themselves and their small business enterprises, including age, highest educational attainment, and the duration of time they had operated or worked in their businesses. This information was vital in assessing the relevance and suitability of the respondents to the study. The findings are presented in the following sections.

Gender of Respondents

Determining the gender of the respondents was considered important, especially in research that relies on personal opinions and perceptions. Knowing the gender distribution helped identify whether the sample was balanced or skewed toward one gender. This insight allowed the researcher to evaluate if any observed patterns could be influenced by gender bias and to consider further analysis where necessary.

Table 2 Gender of respondents

	Frequency	Percent	Valid Percent
Male	81	57	57
Female	61	43	43
Total	142	100.0	100.0

Source: Primary data, 2025

The study's findings on gender distribution indicated that 57% of the respondents were female, while 43% were male. This relatively balanced representation suggests that the data collected is not significantly skewed by gender bias. The participation of both genders in reasonable proportions implies that the perspectives and responses reflect a fair distribution of views from both male and female participants.

Age of Respondents

The study assessed the age bracket of the respondents. The findings were as tabulated below;

Table 2 Respondents Age

Age Bracket	Frequency	Percentage
Below 30 years	40	28
31-45 years	53	37.3
46-60 years	38	26.7
Above 61 years	11	7.7
Total	**142**	**100**

Source: Field data 2025

The study found that 28% of respondents were under 30 years old, 37.3% were aged between 31 and 45, 27% fell within the 46 to 60 age group, and 7.7% were over 61 years. These results suggest that the majority of participants were between 31 and 45 years old. This indicates that the owners and employees of small business enterprises in Nyarugenge District are generally mature and likely possess the experience needed to effectively manage their businesses.

Table 2.2 respondents' marital status

Marital status	Frequency	%
Single	42	29.5
Married	80	56.3
Divorced	6	4.2
Widower	14	9.8
Total	142	100.0

Source: primary data, 2025

Table 4.2 above indicates that 42 respondents representing 29.6 % ware single, 80 respondents representing 56.3 % ware married, 6 respondents representing 4.2 % were divorced and 14 respondents representing 9.8 % was Widowed.

The marital status shows that the majority were married representing 56.3% of the whole number of respondents.

Highest Academic Level

The study also aimed to determine the highest level of education attained by the respondents. The results of this inquiry are summarized in the table below, providing insights into the educational background of participants, which is essential for evaluating their capacity to manage and make informed decisions within their business enterprises.

Table 5: Showing highest level of education of the respondents

Table 5: Showing highest level of education of the respondents

Level of education	**Frequency**	**Percentage**
Certificate	8	5.6
Diploma	52	36.6
Bachelor's degree	65	45.7
Master 's degree	12	8.4
PHD	5	3.5
Total	**142**	**100**

Source: Field data 2025

The findings revealed that 5.6% of the respondents held certificates, 36.6% had diplomas, 45.7% were Bachelor's degree holders, 8.4% had Master's degrees, and 3.5% possessed PhD qualifications. These results indicate that the majority of small business owners in Nyarugenge District had attained at least a Bachelor's degree, reflecting a generally moderate level of formal education among entrepreneurs in the area.

Working Experience of Respondents

T

he study also assessed the respondents' work experience in their current roles to determine their familiarity with and understanding of the contribution of microfinance services to small business performance. Experience is a crucial factor in evaluating the depth of respondents' insights into operational challenges and benefits within their businesses. The detailed responses are presented in Table 4.

Table 4 Working experience of respondents

	Working experience	Frequency	Percent	Valid Percent
Valid	Below 5	24	17.1	17.1
	Between 5 and 10 years	96	68.6	68.6
	Above 10years	22	14.3	14.3
	Total	142	100.0	100.0

Source: Primary data, 2025.

Respondents were also asked to indicate how long they had been working in small and medium enterprises (SMEs). According to the results presented in the table, the majority—68.6%—had between 5 to 10 years of experience in SMEs. Additionally, 14.3% of the respondents had worked in SMEs for 10 years or more.These findings suggest that most participants had substantial experience, which likely provided them with a solid understanding of the operations, challenges, and the role of microfinance services in the performance of small businesses.

5. Conclusion

The study concluded that access to loans, savings, microinsurance, and financial literacy all have a positive and significant impact on the performance of small business enterprises in Nyarugenge District. Overall, the performance of these enterprises has improved moderately due to the availability of microfinance services in the area. Microfinance institutions and lenders in Nyarugenge have largely adopted effective credit management policies, enhanced information sharing, and diligent practices to improve credit repayment and facilitate access to capital for small businesses.Respondents—including small business owners, bank and SACCO employees, and local leaders—indicated to a moderate extent that small enterprises have developed policies supporting financial literacy programs related to individual savings. They also reported a variety of financial literacy training initiatives, ensured that employees participate in trainings provided by financial sector organizations, promoted financial literacy among management, and raised employee awareness on the importance of being financially literate. These findings were reflected in mean scores of 2.57, 2.61, 3.04, 3.01, and 3.33 respectively.

Recommendations

Small business enterprises are encouraged to conduct thorough due diligence and risk assessments before taking loans to ensure responsible borrowing and timely repayment.

Microfinance institutions and lenders should prioritize enhancing the financial literacy of entrepreneurs, as this will improve their financial management skills and repayment capacity. Additionally, fostering a strong savings culture among small businesses is essential for their financial stability and growth. Continuous training programs on financial management should be provided to both business owners and employees to raise awareness about the benefits of saving and financial literacy. Awareness campaigns are also important to highlight the significance of these skills. Furthermore, future research should investigate other factors influencing financial performance beyond those covered in this study, and similar studies should be conducted in different regions or countries to gain a broader understanding of microfinance services' impact.

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