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A Comparative Assessment Of Digital Transformation And Operational Efficiency In Zambian Commercial Banks: Evidence From STANCHART, ZANACO, And FNB

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Abstract
Commercial banks in Zambia are rapidly adopting digital technologies, yet the extent to which these initiatives enhance operational efficiency remains empirically unclear, especially amid recurring system downtimes and rising cybersecurity threats. The aim of this study is to bridge this empirical knowledge gap and investigate the impact of digital transformation on operational efficiency in Zambian banks, using STANCHART, ZANACO, and FNB as case studies. Using a mixed-methods approach, the study combines staff and customer responses to provide a comprehensive evaluation. The findings indicate significant disparities in digital infrastructure stability, with FNB demonstrating superior system uptime and reliability, attributable to advanced redundancy mechanisms. In contrast, STANCHART and ZANACO experienced more frequent disruptions, undermining operational efficiency. Cybersecurity has been quite a pervasive concern; neutral ratings dominate the scene in all three banks, reflecting uncertainty as to the robustness of measures in place. Except FNB, all banks continue to suffer recurring breaches requiring modern threat detection and blockchain solutions. The challenges to digital transformation were evident, with ZANACO and STANCHART struggling with infrastructural deficits, low digital literacy, and limited management support. The study concludes that while digital transformation offers transformative potential for operational efficiency and financial inclusion, Zambian banks need to address systemic infrastructure gaps, enhance cybersecurity frameworks, and invest in customer education in order to fully realize these benefits.

Keywords: *Digital transformation, operational efficiency, system downtime, cybersecurity, digital banking, financial inclusion.*

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I.Introduction

Digital transformation has become a key driver of change in banking operations worldwide. It involves the use of advanced technologies to improve how financial services are delivered, making operations more efficient, accessible, and customer oriented. In banking, digital transformation goes beyond basic digitisation and includes changes in processes, organisational practices, and customer interaction. It often involves technologies such as artificial intelligence, big data, and blockchain. Vial (2019) defines digital transformation as a fundamental change in organisational processes and capabilities enabled by technology to achieve competitive advantage. For banks, this shift has become necessary to remain relevant in an increasingly digital economy.

Operational efficiency in banking refers to the ability to optimise processes, reduce costs, and improve service quality while making effective use of resources. In Zambia, commercial banks such as STANCHART, ZANACO, and FNB have adopted various digital technologies to improve efficiency, service delivery, and competitiveness. This shift has been driven by global digitalisation trends, fintech growth, and changing customer expectations. Deloitte (2021) reports that banks pursuing digital transformation strategies achieved cost reductions of up to 40 percent and improvements in customer satisfaction of about 20 percent. In Zambia, the move toward cashless transactions and mobile banking has intensified pressure on banks to adapt. The Bank of Zambia (2020) reports that over 60 percent of bank transactions are now conducted through digital channels. Despite these gains, digital transformation in Zambian banks faces several challenges. Cybersecurity is a major concern, as digital platforms have become frequent targets of cybercrime. The Bank of Zambia (2020) indicates that more than half of surveyed banks experienced cyber incidents, resulting in financial and reputational losses. High implementation costs also limit adoption, particularly for smaller banks, due to the expense of technology acquisition, staff training, and infrastructure maintenance. In addition, low digital literacy among customers, especially in rural areas, restricts effective use of digital services. ZICTA (2020) notes that this gap has slowed adoption and forced banks to invest in customer education. Regulatory frameworks further influence digital

transformation outcomes. While institutions such as the Bank of Zambia and ZICTA promote digital banking, gaps in regulations on data protection, cybersecurity, and fintech integration create uncertainty. This limits banks' ability to fully exploit digital technologies while maintaining compliance and customer protection. Although global research on digital transformation and operational efficiency is extensive, Zambia remains underrepresented. Few empirical studies focus specifically on the Zambian banking sector, and comparative analyses across banks are limited. Cybersecurity, customer-centred digital design, and the interaction between regulation, infrastructure, and digital outcomes are also underexplored. Addressing these gaps is important both academically and practically, as digital transformation directly affects bank efficiency, customer trust, and financial stability in Zambia's evolving banking environment.

Research Objectives

The aim is to investigate the effect of digital transformation on operational efficiency in Zambian commercial banks, with focus on selected three commercial banks: STANCHART, ZANACO, and FNB, in quest to identify successes and challenges, as well as possible strategies which could help in promoting efficiency within the Zambian banking sector. The Specific objectives were to:

1. To compare system downtime between STANCHART, ZANACO, and FNB to establish which of these banks has very stable and reliable digital infrastructure that offers less service disruption.
2. To ascertain the pervasiveness and impact of cybersecurity incidents in STANCHART, ZANACO, and FNB, establishing the level of effectiveness cybersecurity measures have in each respective bank in terms of influence on digital operations.
3. To identify challenges facing the implementation of digital transformation in STANCHART, ZANACO, and FNB.

The article begins with an introduction that presents the research problem, objectives, and significance of the study. It then reviews relevant literature and outlines the theoretical framework guiding the analysis. The methodology section explains the research design, data collection, and analysis procedures. The paper concludes with the presentation and discussion of findings, practical implications, and directions for future research.

II. Literature Review

Theoretical foundations

Digital transformation in banking is commonly explained using the Technology Acceptance Model (TAM) and the Resource-Based View (RBV). TAM explains technology use through perceived usefulness and perceived ease of use (Davis, 1989). In banking, TAM has been widely applied to study customer and employee adoption of digital services such as mobile and internet banking. Empirical studies show that system reliability, ease of navigation, and trust significantly influence digital banking adoption, particularly in developing countries (Martins et al., 2019; Liébana-Cabanillas et al., 2020).

The Resource-Based View explains performance differences across firms based on how well they manage internal resources (Barney, 1991). In banking, digital infrastructure, cybersecurity capacity, data systems, and skilled IT staff are strategic resources that influence operational outcomes. Studies show that banks with stronger digital capabilities experience fewer service disruptions and better operational efficiency than competitors with weaker internal systems (Mikalef et al., 2019; Chae et al., 2020). Together, TAM and RBV explain both adoption behaviour and performance differences arising from digital transformation.

Digital transformation and operational efficiency in banking

Prior studies largely agree that digital transformation can improve operational efficiency in banking. Digital systems automate routine processes, reduce manual errors, and lower transaction costs (Aydiner et al., 2019; Verhoef et al., 2021). Global evidence shows that banks with higher digital maturity achieve faster service delivery and lower operating costs (Deloitte, 2021).

However, findings from developing economies are less consistent. Studies report that poor infrastructure, frequent system failures, and limited technical skills often reduce the expected efficiency gains from digital transformation (Pramanik et al., 2019; Boufounou et al., 2022). In Sub-Saharan Africa, Mwiya et al. (2017) find that digital adoption without stable infrastructure increases operational strain rather than efficiency. This suggests that operational efficiency depends on the quality and stability of digital systems, not just their availability.

System downtime and infrastructure reliability

System downtime is repeatedly identified as a major constraint in digital banking. Studies show that frequent service disruptions increase operational costs, reduce staff productivity, and weaken customer trust (Barnes, 2003; Boufounou et al., 2022). Reliable infrastructure, supported by redundancy systems and proactive maintenance, is associated with higher uptime and improved operational performance (Gomber et al., 2017).

In the Zambian context, empirical evidence is limited. Chibesakunda (2021) notes that banks investing more consistently in digital infrastructure report improved service reliability. However, comparative analysis across banks operating within the same regulatory and infrastructural environment remains scarce. This limits understanding of how infrastructure differences affect operational efficiency among Zambian commercial banks.

Cybersecurity and digital banking operations

Cybersecurity is a critical factor in digital banking performance. Prior studies show that cyber incidents disrupt services, delay transactions, and create reputational damage (Gupta & Xia, 2018; Jakob & Wamsler, 2023). Banks experiencing frequent security breaches often face higher operational risk and reduced customer confidence (Sufian & Kamarudin, 2021).

In developing economies, cybersecurity challenges are intensified by skills shortages, high implementation costs, and rapidly evolving threats (Rahmalia et al., 2024). In Zambia, recent studies report rising cases of cyber fraud, phishing, and identity theft, which directly affect digital banking operations (Kawimbe & Kwalombota, 2024). Despite growing investment in security controls, staff and customer confidence in cybersecurity measures remains uncertain.

Organisational and customer-related challenges

Beyond technology, organisational factors strongly influence digital transformation outcomes. Studies highlight management support, staff training, and change management as key determinants of successful digital implementation (Verhoef et al., 2021). Weak leadership commitment often results in delayed upgrades and fragmented digital strategies (Mwiya et al., 2017).

Customer-related challenges are also significant. Low digital literacy, usability problems, and fear of cyber fraud limit effective use of digital services, especially in developing countries (Rahmalia et al., 2024). Regulatory frameworks further shape outcomes; while regulation promotes stability, slow approval processes may delay system upgrades and innovation (Kawimbe & Kwalombota, 2024).

Limitations in existing literature and rationale for the study

Existing literature has several limitations. First, most empirical studies focus on developed economies, limiting relevance to countries such as Zambia. Second, few studies provide comparative analysis across banks within the same national context. Third, prior research often examines infrastructure, cybersecurity, or customer experience separately, rather than assessing their combined effect on operational efficiency.

There is also limited integration of staff and customer perspectives in evaluating digital transformation outcomes. These gaps justify the present study, which compares STANCHART, ZANACO, and FNB to examine how system downtime, cybersecurity, and implementation challenges influence operational efficiency. Addressing these gaps provides a clear basis for the research questions guiding this study.

Conceptual Framework

This study is guided by a conceptual framework that explains the relationship between digital transformation and operational efficiency in commercial banks. The framework clearly distinguishes between the independent variable and the dependent variable, as illustrated in Figure 2.1.

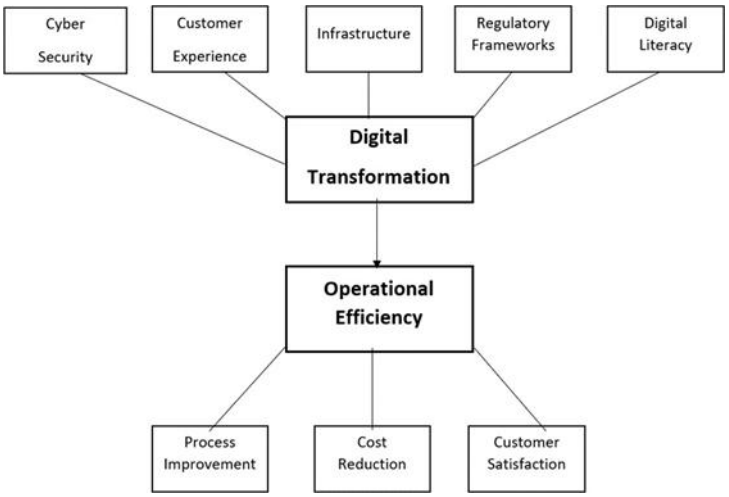

Figure 2.1: Conceptual Framework

Independent Variable (Digital Transformation)

The independent variable represents the key dimensions that shape digital transformation in banking. These variables influence how effectively digital systems function and are implemented:

- Cybersecurity refers to the protection of digital banking systems, transactions, and customer data from cyber threats. Strong cybersecurity reduces system disruptions and operational risk.
- Customer Experience relates to the ease, reliability, and consistency of digital banking services. Positive customer experience supports higher usage of digital channels.
- Infrastructure includes digital platforms, network connectivity, hardware, and system capacity required to support digital banking operations (Gomber et al., 2017).
- Regulatory Frameworks refer to the rules and standards governing digital banking, including data protection, system security, and compliance requirements.
- Digital Literacy reflects customers' ability to understand and use digital banking services effectively, which influences adoption levels (Chibesakunda, 2021).

Dependent Variable

Operational Efficiency is the dependent variable of the study. It reflects how well banks convert digital initiatives into improved operational performance. Operational efficiency is measured through the following indicators:

- Process Improvement, which captures automation, speed, and accuracy of banking processes (Amiri et al., 2023).
- Cost Reduction, which reflects lower operational costs resulting from reduced reliance on physical branches and manual transactions (Aydiner et al., 2019).
- Customer Satisfaction, which reflects customer perceptions of service convenience, reliability, and overall quality (Verhoef et al., 2021).

The framework assumes that improvements in the independent variables strengthen digital transformation, which in turn enhances operational efficiency. Differences in these variables explain variations in operational efficiency across banks.

III. Methodology

This study used a cross-sectional comparative design to examine how digital transformation affects operational efficiency at STANCHART, ZANACO, and FNB. The design allowed comparison between banks at one point in time and suited the limited resources of the study. Data were collected from selected branches in Lusaka, Ndola, and Kitwe, where digital banking activity is relatively strong. The study population included employees involved in digital work and customers who actively use digital banking services. The sample consisted of 45 employees, with 15 from each bank, selected through purposive sampling to ensure relevant experience. In addition, 150 customers were selected through convenience sampling, with 50 from each bank. Employees with less than one year of experience and customers who do not use digital services were excluded. A mixed-methods approach was used. System downtime data were obtained from IT records and employee input. Cybersecurity effectiveness and customer satisfaction were measured using five-point Likert-scale questionnaires. Quantitative data were analysed using SPSS, while short qualitative comments helped explain the results. Ethical issues were addressed through informed consent, anonymity, and secure data storage. The main limitations were possible sampling bias, focus on urban areas, self-reported data, and a short data-collection period. Despite these limits, the approach was suitable for comparing digital transformation outcomes across the three banks.

IV. Findings / Results

Responses were collected using structured, closed-ended questions presented on a Likert scale. The analysis uses comparative tables and percentages to highlight differences and trends across the banks, followed by interpretation of findings.

Objective 1: System Downtime and Digital Infrastructure Stability

Table 4.1: (Staff n=45; Customers n=150)

Frequency of System Downtime

Response	Staff			Customer		
	STAN	ZANACO	FNB	STAN	ZANACO	FNB Cust.
Very Often / Very Frequently	20%	13%	13%	12%	14%	16%
Often / Frequently	27%	27%	13%	24%	20%	20%
Occasionally	27%	33%	20%	40%	36%	36%
Rarely	20%	13%	40%	14%	20%	20%
Never	7%	13%	13%	10%	10%	8%

Reliability of Digital Systems

Response	Staff			Customer`		
	Stcht	Zanaco	FNB Staff	ST Cust.	ZA Cust.	FNB Cust.
Very Poor	13%	13%	7%	12%	10%	8%
Poor	20%	27%	13%	20%	24%	20%
Neutral / Fair	27%	20%	27%	30%	30%	30%
Good	27%	27%	33%	24%	26%	30%
Excellent / Very Satisfied	13%	13%	20%	14%	10%	12%

Responsiveness to Service Issues *(Customers only)*

Response	ST Cust.	ZA Cust.	FNB Cust.
Very Poor	10%	10%	8%
Poor	20%	20%	16%
Neutral	30%	30%	36%
Good	24%	26%	28%
Excellent	16%	14%	12%

- Frequent system downtime (very often/often) was reported by 47% of STANCHART staff, 40% of ZANACO staff, and 26% of FNB staff, showing clearer infrastructure stability at FNB.
- Rare or no downtime was reported by 53% of FNB staff, compared to 27% at STANCHART and 26% at ZANACO, confirming stronger uptime at FNB.
- Among customers, disruptions occurring often or very often affected 36% at STANCHART, 34% at ZANACO, and 36% at FNB, indicating that customer-facing systems still experience interruptions across all banks.
- Positive system reliability ratings (good or excellent) were highest at FNB staff (53%), compared to 40% at STANCHART and 40% at ZANACO.
- Customer responsiveness ratings (good or excellent) were similar but slightly higher for FNB (40%), compared to 38% at STANCHART and 40% at ZANACO, suggesting marginally better issue resolution at FNB.

Objective 2: Cybersecurity Effectiveness and Preparedness

Table 4.2: (Staff n=45; Customers n=150)

Effectiveness of Security Measures

Response	Staff			Customer		
	ST Staff	ZA Staff	FNB Staff	ST Cust.	ZA Cust.	FNB Cust.
Very Ineffective	13%	13%	13%	8%	10%	8%
Ineffective	20%	20%	13%	16%	20%	20%
Neutral	27%	27%	27%	30%	30%	30%
Effective	27%	27%	33%	26%	24%	26%
Very Effective	13%	13%	13%	20%	16%	16%

Frequency of Cyber Incidents

	Staff			Customer		
Response	ST Staff	ZA Staff	FNB Staff	ST Cust.	ZA Cust.	FNB Cust.
Very Often	13%	13%	13%	10%	8%	10%
Often	20%	20%	13%	14%	16%	14%
Occasionally	27%	27%	27%	40%	36%	40%
Rarely	27%	27%	33%	24%	28%	24%
Never	13%	13%	13%	12%	12%	12%

Preparedness for Cyber Threats *(Staff only)*

Response	ST Staff	ZA Staff	FNB Staff
Not Prepared	13%	13%	13%
Somewhat Unprepared	20%	20%	13%
Neutral	27%	27%	27%
Prepared	27%	27%	33%
Very Well Prepared	13%	13%	13%

- Effective or very effective cybersecurity measures were reported by 46% of FNB staff, compared to 40% at STANCHART and 40% at ZANACO, showing a modest security advantage at FNB.
- Neutral cybersecurity ratings remained high across staff (27% in all banks) and customers (30% in all banks), reflecting uncertainty about security strength.
- Frequent cybersecurity incidents (very often/often) were reported by 33% of STANCHART staff, 33% of ZANACO staff, and 26% of FNB staff, indicating lower exposure at FNB.

- Among customers, cybersecurity incidents occurred often or very often for 24% at STANCHART, 24% at ZANACO, and 24% at FNB, suggesting sector-wide vulnerability.
- Preparedness for cyber threats was highest at FNB staff (46% prepared or very well prepared), compared to 40% at STANCHART and 40% at ZANACO, though neutrality remained substantial.

Objective 3: Digital Transformation Challenges and Usability

Table 4.3: (Staff n=45; Customers n=150)

Difficulty of Digital Transformation / Ease of Use

	Staff			Customer		
Response	**Stncht**	**Zanaco**	**FNB**	**Stncht**	**Zanaco**	**FNB**
Very Difficult / Very Challenging	20%	13%	13%	8%	6%	6%
Difficult / Challenging	27%	27%	20%	14%	16%	14%
Neutral	27%	33%	27%	30%	32%	30%
Easy / Manageable	20%	20%	27%	32%	30%	32%
Very Easy / Not Challenging	7%	7%	13%	16%	16%	18%

Management Support / Service Range Satisfaction

	Staff			Customer		
Response	**Stncht**	**Zanaco**	**FNB**	**Stncht**	**Zanaco**	**FNB**
Very Poor / Very Dissatisfied	13%	13%	13%	10%	12%	8%
Poor / Dissatisfied	20%	27%	20%	20%	24%	20%
Neutral	27%	27%	27%	30%	30%	30%
Good / Satisfied	27%	20%	27%	24%	24%	30%
Excellent / Very Satisfied	13%	13%	13%	16%	10%	12%

Obstacles Experienced

	Staff			Customer		
Response	**Stncht**	**Zanaco**	**FNB**	**Stncht**	**Zanaco**	**FNB**
Significant / Frequently	20%	13%	13%	10%	8%	10%
Moderate / Sometimes	27%	27%	20%	20%	24%	20%
Neutral	27%	33%	27%	30%	32%	30%
Few / Rarely	20%	20%	27%	24%	20%	24%
None / Never	7%	7%	13%	16%	16%	16%

- Digital transformation was rated as challenging or very challenging by 47% of STANCHART staff and 40% of ZANACO staff, compared to 33% at FNB, indicating smoother implementation at FNB.
- Ease of digital service use (easy or very easy) was reported by 50% of FNB customers, compared to 48% at STANCHART and 46% at ZANACO.
- Management support rated as good or excellent was highest at FNB (40%), followed by STANCHART (40%), and lowest at ZANACO (33%).
- Significant or moderate obstacles were reported by 47% of STANCHART staff, 40% of ZANACO staff, and 33% of FNB staff, confirming greater internal constraints at STANCHART.
- Customer-reported obstacles occurring frequently or sometimes were highest at ZANACO (32%), compared to 30% at STANCHART and 30% at FNB, indicating usability and service range gaps.

V. Discussion

The findings show clear differences in how digital transformation affects operational efficiency across the three banks. FNB recorded fewer system downtimes and higher reliability, which suggests that stronger investment in digital infrastructure improves operational stability. This supports earlier studies that link infrastructure maturity and redundancy mechanisms to better system uptime and customer trust (Barnes, 2003, Mwiya et al., 2017). In contrast, more frequent disruptions at STANCHART and ZANACO point to gaps in maintenance capacity and infrastructure resilience.

Cybersecurity emerged as a major operational concern across all banks. Although FNB showed slightly stronger cybersecurity performance, staff uncertainty and reports of ineffective controls indicate that current measures are not fully adequate. These results align with prior studies showing that weak or uneven cybersecurity readiness increases operational risk and customer dissatisfaction (Boufounou et al., 2022, Rahmalia et al., 2024). The findings also support the Resource-Based View, which suggests that banks with stronger internal capabilities, such as skilled IT teams and advanced security systems, achieve better operational outcomes.

The study further reveals that digital transformation remains difficult to implement, especially where leadership support, infrastructure quality, and digital skills are limited. Higher usability challenges and lower service satisfaction at ZANACO reflect the role of digital literacy and system design in shaping customer

experience, as noted in earlier research on emerging markets (Siasulingana & Haabazoka, 2024). FNB's stronger performance suggests that coordinated investment in technology, staff capacity, and customer-focused design improves both efficiency and satisfaction.

Therefore, the study shows that digital transformation alone does not guarantee operational efficiency. Its impact depends on infrastructure reliability, cybersecurity readiness, and organisational support. For managers, the findings point to the need for sustained investment in resilient systems, staff training, and customer education. For policymakers, they highlight the importance of supportive regulatory environments that encourage infrastructure upgrades without delaying innovation.

VI. Conclusion

This study examined how digital transformation affects operational efficiency in selected Zambian commercial banks, with specific attention to system downtime, cybersecurity, and implementation challenges. The findings show that banks with stronger digital infrastructure and redundancy mechanisms experience fewer service disruptions and better operational stability. Cybersecurity remains a major constraint across all banks, with uneven preparedness affecting both efficiency and customer trust. The study also shows that digital transformation is slowed by infrastructure gaps, low digital literacy, usability challenges, and uneven management support, particularly in locally owned banks.

The study contributes to knowledge by providing empirical evidence from a Zambian banking context, which is underrepresented in existing literature. It extends prior work by showing how internal capabilities, infrastructure reliability, and cybersecurity readiness jointly shape operational efficiency in developing economies. The findings support the Resource-Based View by demonstrating that banks with stronger internal digital resources achieve better performance outcomes.

From a practical perspective, the study suggests that banks should prioritise investment in resilient infrastructure, strengthen cybersecurity frameworks, improve staff and customer digital skills, and design simpler, user-friendly platforms. Policymakers can support these efforts through flexible regulations that encourage innovation while safeguarding customers.

The study is limited by its focus on urban branches, reliance on self-reported data, and cross- sectional design, which restricts long-term analysis. Future research could adopt longitudinal approaches, include rural banking contexts, and examine the impact of emerging technologies such as AI and blockchain on operational efficiency and financial inclusion.

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