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The Influence of Digital Transformation on the Financial Performance of Telecommunications Firms: A Case of Airtel Zambia

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Abstract

Zambia's telecommunications industry has in the recent past witnessed notable growth, which has been driven by digital transformation initiatives. Despite this progress, the influence of digital transformation on financial outcomes in Zambia's telecommunications sector remains under researched. This study sought to examine the influence that digital literacy, organizational digital capability, and digital investment have on financial performance, focusing on Airtel Zambia as a case study. Utilizing the Resource-Based View, Dynamic Capabilities Theory, and Disruptive Innovation Theory, the study employed a descriptive research design, with data being collected from a sample of 97 employees using a structured questionnaire. Quantitative analysis, including descriptive and inferential statistics was applied. The data was analyzed using regression and correlation analyses to determine the relationship between the independent variables (Digital Literacy, Digital Capability and Digital Investments) and the dependent variable (Financial Performance). The results showed that Digital Literacy had a Pearson correlation coefficient of 0.442 at (sig. 2-tailed) < 0.01 while Digital Capability and Digital Investments had Pearson correlation coefficients of -0.171 at (sig. 2-tailed) < 0.01 and 0.425 at (sig. 2-tailed) < 0.01 respectively. The interpretation of the regression analysis revealed that the independent variables collectively explained 25.3% of the variability in financial performance. Regression results demonstrated that digital capability and digital investments significantly and positively influenced financial performance with Beta coefficients β = 0.341 and β = 0.34 ($p < 0.05$), while digital capability exhibited a weaker and insignificant impact with a Beta coefficient β = 0.066 ($p > 0.05$). The research findings underscore the need for telecommunications companies to prioritize employee digital literacy and to align organizational digital capabilities with their strategic goals. The study concludes that Airtel Zambia and similar telecommunications firms that are undergoing digital transformation should pay attention to which digital technologies they invest in and to cultivate digital capabilities if they are to sustain growth, competitiveness and maximization of profits.

Keywords: Digital transformation, Digitalization, Financial Performance, Digital Literacy, Digital Capability, Digital Investment, Telecommunications

1. Introduction

The telecommunications sector plays an important role in the social-economic development of countries like Zambia. With rapidly advancing digital technology in the wake of industry 4.0 and an increase in demand for data services and connectivity, the Zambian telecommunications sector has undergone substantial growth in the recent years (Deka-Zulu, 2022).Leading telecommunication companies have access to large amounts of data and an extensive customer base, which makes them aspiring digital lifestyle service providers as they can utilize their vast networks for market insights. In this dynamic landscape, the concept

of digital transformation has come up as a central theme, reshaping the strategies and competitive landscapes of telecommunication companies (UNDP, 2020).

Over the past 2-3 decades, the Zambian telecommunications industry has evolved. It has transitioned from a predominantly voice-centric model to a data-centric one, driven by the increase of mobile devices, internet connectivity, and the demand for digital services (TechTrends, 2023). These changes have not only altered consumer behavior but have also forced telecommunication companies to continuously innovate and adapt (Hapompwe, et al., 2021).

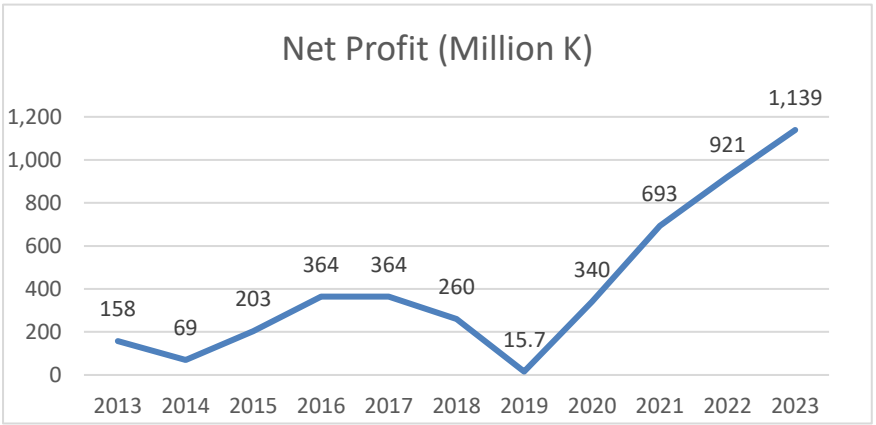
Digital transformation, a term that encompasses the integration of digital technologies into all aspects of business operations, has become a strategic imperative for telecommunication companies in Zambia (Modise, 2023). Companies like Airtel, Zamtel and MTN are leveraging digital technologies, including high-speed networks, big data analytics, cloud computing, and automation, to enhance their service offerings, improve operational efficiency, and explore new revenue streams (Alsafadi, 2018). The networks Airtel, MTN and Zamtel have around 7.6 million, 8.3 million and 3.7 million subscribers respectively (Deka-Zulu, 2022). This study aims to investigate the influence of digital transformation on financial performance within the Zambian telecommunications industry. Airtel Zambia has been picked as the subject of the research because of its leadership in the telecommunications industry and also for its advanced level of digitalization (Tembo, 2021). The company has implemented various digital transformation initiatives, including the introduction of e-SIM technology, process automation, big data analytics, service automation, and the use of social networking platforms for customer engagement (TechTrends, 2023). Additionally, Airtel has made significant strides in digital mobile banking with its Airtel Money platform, positioning itself as a pioneer in driving digital innovation within Zambia's telco sector. This makes Airtel an ideal case study for exploring the link between digital transformation and financial performance.

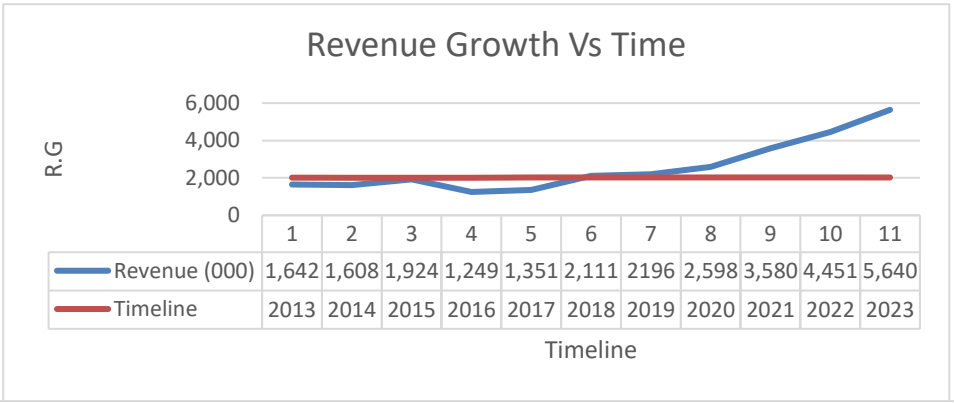
In 2000, Airtel first joined the Zambian market as Zamcell Communications Limited. To expand its network coverage throughout Africa, Celtel International purchased Zamcell in 2004. Celtel used this tactic to join the Zambian market in an attempt to gain the same level of dominance as it does in the other African nations in which it conducts business. This Celtel acquisition was short-lived, because in 2007 the mobile phone company MTC Group, based in Kuwait, acquired Celtel's businesses in Africa and rebranded them as Zain International and Zain Zambia (Central Statistical Office, 2007). Due to this costly acquisition, Zain was the biggest provider of mobile phone service in Africa, but it was still unable to overtake CellZ which is now Zamtel and Telecel, which is now MTN. Later, in 2010, the massive Indian mobile provider Bharti Airtel acquired Zain, which is now known as Airtel Zambia (Chihana, 2018).

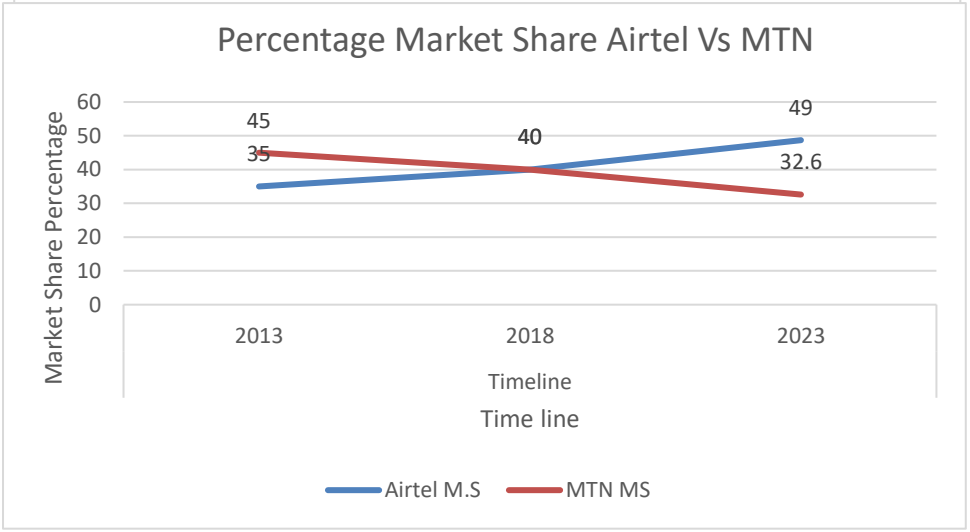
Due to irregular user acquisition, Airtel Zambia's market share lagged behind rivals prior to digital transformation, especially MTN Zambia (Chihana, 2018). Due to investments in digital platforms like Airtel Money and the deployment of a 100% 4G and developing 5G network, which improved user experience and retention, Airtel was able to secure a 48.6% market share by 2023 (Airtel Zm, 2023)

With a net profit of about ZMW 158 million in 2013, profitability was low in the years after its 2013 listing on the Lusaka Stock Exchange (Airtel Zm, 2015). However, attempts for digital transformation spurred substantial development, with earnings rising by approximately 620% to ZMW 1,139 million in 2023 (Airtel Zm, 2023). Despite inflationary pressures, cost-cutting initiatives like the "War on Waste" strategy helped to sustain this profitability (Airtel Zm, 2022).

Investments in digital infrastructure and process automation led to a significant improvement in cost efficiency. As a result of cost efficiency, network improvements and digitalization, Airtel's operating profit margin grew from an expected 7% in 2013 to 26.9% in 2023 (Airtel Zm, 2023). The early 2010s saw a halt in revenue growth, with an annual increase of less than 10%. Revenue increased after the digital transition, rising by 28.4% in 2023 alone to ZMW 5,716 million (Airtel Zm, 2023). The adoption of digital services like high-speed internet and mobile money, which led to higher consumer spending, was the main driver of this development (Mudenda, 2017). Below are some trends in Financial Performance metrics according to Airtel Zambia's Annual reports and financial statements.







Despite these achievements, Airtel Zambia and other telecom companies still struggle to decide how best to distribute their resources (ZICTA, 2023). For instance, because of market preparedness, large expenditures in cutting-edge technology like 5G frequently have delayed returns on investment (Airtel Zm, 2023). According to studies, mismatched goals, underutilized digital technologies, and external economic constraints have all contributed to businesses' inability to maximize revenues (Airtel Zm, 2022).

Airtel Zambia's market share, profitability, cost effectiveness, and revenue growth have all increased dramatically as a result of its digital transformation. But maintaining this development will require improving investment strategies and bringing them into line with consumer and market demands (Deka-Zulu, 2022).This emphasizes how important strategic planning is to optimizing the benefits of digital transformation in the telecommunications industry.

Lack of sufficient literature on the influence of digital transformation on financial performance in the telecommunications industry in Zambia is the backdrop against which this research will be conducted. The purpose of this research therefore, is to provide actionable insights that can inform strategic decision-making and resource allocation. This research therefore, is of significant importance to various stakeholders, such as telecommunication companies, consumers and industry regulators.

1.2 Problem Statement

In 2023 there was a 22% increase in mobile telecommunications revenue from K7.8 billion in 2022 to K9.5 billion. Despite the significant growth in the telecommunications sector, operational inefficiencies remain a concern (ZICTA, 2023).For example, Airtel Zambia invested K1.3 billion in infrastructure in 2023, yet the return on investment does not explicitly correlate with corresponding increases in profit margins as inflation and currency devaluation offset gains (Airtel Zm, 2023). While companies like Airtel Zambia have reported strong revenue growth (income growth of 28.4% from K4,451 million as of 31st December 2022 to K5,716 million as of 31st December 2023) and market share dominance, resource allocation remains suboptimal. Challenges include balancing investments between new technologies (e.g., 5G) and legacy systems (e.g., 2G, which still accounts for 36.8% of operational sites), which complicates prioritization (TechTrends, 2023). Another reason could be attributed to a limited understanding among Zambian telecommunications firms on how factors like employee digital literacy, organizational digital capabilities, and digital investments directly affect financial performance (Cenamor, et al., 2019).

Zambian telecommunications firms have invested significantly in digital transformation, yet the direct impact of these efforts

on financial performance remains unclear, leading to inefficient resource allocation and suboptimal decision-making (Minister of Technology and Science, 2023). This raises the critical issue of whether these firms are investing in the right areas such as employee digital literacy, organizational capabilities, and targeted digital tools to maximize returns and achieve sustainable growth.

The influence of digital transformation on financial outcomes in Zambia's telecommunications sector remains under researched, this study therefore seeks to address this knowledge gap.

1.3 Aim of the study

The aim of this study was to examine the influence of digital transformation on the financial performance of telecommunications firms in Zambia (using Airtel Zambia as the case study). The specific objectives of the study were;

i. To establish the effect digital literacy has on the financial performance of Airtel Zambia.
ii. To establish the effect of organizational digital capabilities on the financial performance of Airtel Zambia.
iii. To find out the effect that digital investments have on the financial performance of Airtel Zambia.

2. Literature Review

2.1. Introduction

Zambian telecommunications firms need to better position themselves to compete in an increasingly digital market place. This requires a holistic approach that includes not only technological investments but also leadership commitment, employee training, and a supportive organizational culture (ZICTA, 2023). Despite how important it is to understand the link between digital transformation and financial performance, very few academic literatures exist on the topic (Bughin, et al., 2018). This literature review evaluates recent studies on digital literacy, digital capability and digital investments, critiques the existing literature and explores their implication on the financial performance of telecommunications firms within the African context.

2.2. Digital Literacy

When analyzing the effects of digital transformation on the business efficiency of the New York times, (Cenamor, et al., 2019) focused on how the Covid-19 pandemic accelerated the adoption of digital transformation processes by organizations. The results of this research suggested that there is significant net positive impact on business efficiency for organization being researched. In their paper on digital literacy (Chanias, et al., 2019) details that digital skills acquired by employees help them leverage advanced digital platforms and tools which results in improved service delivery and optimal resource allocation.

According to the (Khin & Ho, 2018) digital literacy plays a very important role in improving customer engagement. The paper asserted that firms with digitally literate employees are able to better utilize social media and digital marketing strategies, which in turn results in better client engagement. Client engagement is critical for retaining clients in any competitive industry. Digitally literate employees tend to embrace new technologies, giving firms a competitive advantage. In the telecommunications industry, the rate at which technological advancements occur is rapid, which makes the capability of digital literacy essential for sustaining financial performance (Ahmada & Mustafa, 2022).

Despite all these positive impacts, (Davenport & Westerman, 2018) notes that there exists a disparity in digital literacy levels across different demographic groups and regions in sub-Saharan Africa. This was attributed to a limited access to educational resources and digital infrastructure. Telecommunications firms operating in these areas struggle to fully leverage digital opportunities and this can affect their overall financial performance (Manita, et al., 2020).

Communication and Social Connection

Social connectedness is promoted and communication modes are drastically changed when digital literacy is included into telecoms. Real-time interactions are made possible by digital platforms, which also allow for smooth information sharing across geographic boundaries. (Nambisan, 2016) highlights that training programs for digital literacy are essential for fostering the development of digital skills, which in turn fosters a more inclusive and participatory environment. These initiatives foster social inclusion and connectedness by improving people's capacity for digital communication. Similar to this, the DIGCOMP Project of the European Commission emphasises that digital competence includes the use of digital technology for efficient communication and teamwork, both of which are necessary for active engagement in contemporary society (Lin & Lv, 2019). Additionally, studies show that digital literacy helps people use a variety of digital communication tools, which improves their ability to stay in touch with others and take part in community events (Tembo, 2021).

Storage and Retrieval of Data

The effectiveness of data storage and retrieval in telecommunications is directly impacted by digital literacy proficiency. Digital information system management skills are essential for decision-making and organizational operations. According to the European Commission's DIGCOMP Project, digital competence encompasses the capacity to efficiently handle data and information, which is crucial for both personal and professional endeavors (Eurydice, 2019). Furthermore,

(Wright, et al., 2023) point out that training programs for digital literacy frequently concentrate on fostering information-seeking skills, which empower people to find, assess, and use digital information effectively. The significance of efficiently obtaining, evaluating, and determining the applicability of digital information, identifying information processing and management is a fundamental component of digital competency (Timotheou, et al., 2022).

Training

Employee empowerment in the telecom sector requires the implementation of strong digital literacy training initiatives. These kinds of training promote digital abilities, which boosts career advancement and work performance. According to (Ahmada & Mustafa, 2022), training programs in digital literacy are essential for maintaining people's knowledge and abilities current, which promotes their digital empowerment and general well-being. The DIGCOMP Project of the European Commission also highlights the significance of digital competency for lifelong learning, which is necessary for adjusting to the rapidly changing digital environment (Empirical Economics, 2022). Additionally, learning about and using digital technologies is a crucial component of digital competence, according to the Open Universiteit Nederland, highlighting the necessity of ongoing education and adaptation in the digital era (Hess, et al., 2016).

2.3. Digital Capability

Digital capability is the ability of organizations to leverage digital technologies to drive innovation, improve processes and enhance customer experiences. According to (Zhang, et al., 2019) digital capability has a significant impact on organizational performance because it fosters digital innovation, while also playing a mediating relationship between digital orientation and both financial and non-financial performance. (Chesula & Kiriinya, 2018) further emphasize the role played by digital platforms in driving performance. Their study shows that digital capabilities enable firms to leverage digital platforms which improve connectivity and operational efficiency. Nonetheless, the study focuses on SMEs in Malasia which may limit the generalizability of its findings to larger telco firms in Africa.

(Cenamor, et al., 2019) argue that the failure of most digital strategies is due to a lack of alignment between digital capabilities and long-term business objectives. The study suggests that successful digital transformation requires more than just an investment in digital technologies but also the development of capabilities to effectively leverage these technologies. The implication of this is that firms need to invest in both digital infrastructure and the skills required to harness its potential.

A critical perspective is given by (Adeniran & Johnston, 2012)highlighting major challenges faced by pre-digital organizations when adopting digital transformation strategies. The study details the importance of having a strategic approach towards building digital capability, this includes leadership commitment, and organizational culture change. While the existing literature gives valuable insights into the significance of digital capability, the research emphasized the positive impacts without addressing the drawbacks and potential risks such as cyber security concerns and the digital divide (Ahmada & Mustafa, 2022). There is need for more empirical studies that examine the impact of digital capability on financial profitability, revenue growth and market share in African telecommunications firms.

Digital Devices

The cornerstone for developing digital capabilities in telecommunications organizations is the adoption and efficient usage of digital equipment. These gadgets, which include tablets, smartphones, and cutting-edge networking gear, are the main means of data processing and transmission (GSMA, 2023). In a meta-analysis of how mobile portable digital devices affect learning outcomes, (Tembo, 2021) found that these gadgets greatly improve user engagement and information accessibility. Similar to this (Berman, 2012) highlights that having access to digital devices is essential to digital inclusion. In the telecom industry, this access results in increased customer satisfaction and operational efficiency.

Digitalization

The process of digitalization entails incorporating digital technology into every facet of corporate operations, radically altering the way businesses provide value to their clients (Chihana, 2018). Digitalization in telecommunications is a strategy change that affects internal procedures, client contacts, and service offerings in addition to being a technical advancement (Berman, 2012). Digitalization greatly improves internal processes by facilitating data-driven decision-making, promoting innovation, and increasing communication, according to a thorough literature analysis by (Higgins, et al., 2019). These enhancements result in a more customer-centric strategy and more operational efficiency, both of which are critical in the fiercely competitive telecom industry. In a similar vein, (Jewitt, et al., 2011)suggest that in order to attain sustainable growth and competitive advantage, digital transformation initiatives in the telecom industry should concentrate on matching technical developments with corporate goals.

Level of Awareness

A key factor in the successful execution of digital projects is the degree of awareness that both consumers and workers have about digital technology. Being aware includes being aware of the advantages, difficulties, and uses of digital tools and procedures. (Nguyen, 2024) investigates the elements that affect students' knowledge of the digital revolution and discovers that family surroundings, teachers, and educational institutions have a big influence on people's attitudes and level of preparedness to use digital technology. Even though this study focusses on an educational context, the lessons

learnt may be applied to the telecom sector, where encouraging a digitally conscious culture can improve consumer acceptance of new services and staff engagement (Nguyen & Watanabe, 2017). In order to develop a workforce that is aware of digital issues, telecommunications companies should invest in training programs and leadership development, according to the World Bank's Global Study on Digital Capabilities (World Bank, 2023), which highlights the importance of leadership, skills development, and cultural factors. Furthermore, the DESI framework evaluates digital proficiency and usage in all EU nations, offering standards that telecom companies may utilise to evaluate and enhance their digital awareness campaigns (Al-Mamary, et al., 2015).

2.4. Digital Investment

Digital Investments are strategic technological investments aimed at differentiating business operations by enhancing service delivery and ultimately improving financial outcomes (Ifeoma, et al., 2021). The importance of digital investments is underscored by the rapid digitalization occurring in Africa, which is driven by an increased mobile penetration, expanding internet digital infrastructure and a growing demand for digital services (Berman, 2012). These digital technologies include robotics, IoT, big data analytics, AI and social media applications.

Research into digital investments suggests that they can enhance a telecommunications firm's operational efficiency and market competitiveness. A study by (World Bank, 2023) explains how digital investments have improved broad band access and affordability in sub-Saharan Africa. This has resulted in an increased broadband speed and reduction of costs which has had second order effects as it increases customer acquisition and retention (Boateng A; Ameyaw C; Mensah S, 2020). Such improvements contribute to revenue growth and market share expansion, critical components of financial performance.

For telecommunications companies in Africa, digital investments are important because of unique challenges and opportunities. The transformative potential of digital investments is underscored by the rapid growth of mobile money and other digital financial services across Africa (Berman, 2012). However, the success of these investments is often contingent on market readiness, customer's digital literacy and a firm's ability to manage and integrate new technologies effectively.

While the positive impacts of digital investment on operational efficiency have been both documented and supported by anecdotal evidence, critiques suggest that these benefits are not uniformly realized in all the African markets. For example, during the Covid-19 pandemic, investment decisions were influenced by uncertainties and risk aversion, leading to varied financial performance for different firms (Empirical Economics, 2022). A report by (GSMA, 2023) suggested that while digital investments have the potential to enhance financial outcomes, their success heavily depends on the regulatory environment and firm's ability to innovate and adapt to rapidly changing market conditions. Another argument presented by (Chanias, et al., 2019) is that even though digital investments cause the emergence of new digital models, they do not always translate into immediate financial gains due to high initial costs and long pay pack periods associated with such technologies.

Digital Strategy

In order to successfully manage the challenges of digital transformation, telecoms firms must have a strong digital strategy. A thorough digital strategy makes sure that digital investments generate value creation and competitive advantage by coordinating technology developments with corporate goals. According to a meta-review by (Hanelt, et al., 2021), digital transformation requires an integrated strategic approach that transcends organisational borders, involving both business and technical challenges. In a similar vein, (Oliveira, et al., 2023) bibliometric study from 2023 emphasises the development of digital strategy research and its importance in helping businesses navigate digital transformations. Furthermore, (Gorjian & Peter, 2022) contend that a well-thought-out digital strategy acts as a road map for putting digital initiatives into action, making it easier to allocate resources efficiently and accomplish strategic objectives.

Organizational Culture

The successful deployment of digital initiatives is highly impacted by the current company culture. An atmosphere that is favourable to digital transformation is produced by a culture that values creativity, adaptability, and ongoing education. A supportive culture is essential for a successful digital transformation, according to (Gorjian & Peter, 2022) exploration of the importance of corporate culture for digital strategy. In a similar vein, (Deep, 2023) explores the significant impact of digital transformation on organisational culture, arguing that technological advancements need cultural change and alter corporate environments. Additionally, research by (Helfat & Winter, 2011) shows that digital technologies affect performance results, organisational behaviour, and decision-making, emphasising the necessity of cultural adaptation to accept digital transformation.

Business Intelligence

In order to optimize the return on digital investments in telecoms, business intelligence (BI) technologies are essential (Hotlan, et al., 2021). In order to improve customer experiences, optimize operations, and inform decision-making, business intelligence (BI) uses data analytics tools and procedures. (Khin & Ho, 2018) highlight that big data analytics capabilities greatly affect business performance, suggesting that the efficient use of data analytics tools may lead to increased decision-making and operational efficiency. According to (Nambisan, 2016), BI tools are crucial for operational

optimization since they explore how big data and predictive analytics improve supply chain and organizational performance. Additionally, (Berman, 2012) investigate how consumer goods businesses create in the digital era, proposing that BI tool support product invention and testing before launching on the market.

2.5. Financial Performance

In the telecom industry, financial performance is a complex concept that includes cost effectiveness, market share, profitability, and revenue growth (Wandeto, 2023). These aspects are important markers of a business's competitiveness and overall health. This review of literature aims to clarify the factors impacting these performance measures by synthesizing industry reports and contemporary literature.

Revenue growth

One of the main markers of a telecom company's success is revenue growth. In this industry, revenue enhancement is influenced by a number of things. It has been demonstrated that broadening service offerings—like combining fiber-optic and fixed wireless access—attracts a larger clientele. For example, T-Mobile's aggressive 5G expansion and smart merger with Sprint have greatly increased its income stream (Hough, 2025).

Investments in state-of-the-art technology, such as 5G networks, improve customer satisfaction and service quality, which raises income (Christensen, et al., 2015). This strategy is demonstrated by Telstra's $800 million investment in modernizing its network infrastructure, which aims to satisfy the rising demand for cutting-edge services. Revenue growth may be fueled by entering new markets, especially underdeveloped rural areas (Hough, 2025). T-Mobile's remarkable financial performance, surpassing that of conventional tech companies, as a result of its growth into rural communities.

Profitability

The capacity of a business to turn a profit in relation to its expenses and other charges is reflected in its profitability. Reducing labour redundancies and streamlining procedures may result in considerable cost reductions, which is one of the key factors of telecom profitability (Hess, et al., 2016). Profitability may be impacted by changing service pricing in response to cost structures and market circumstances. It is essential to handle operational expenses (opex) effectively (Airtel Zm, 2015). To reduce expenses and increase profitability, tactics including network sharing contracts and infrastructure optimization have been used.

Market Share

A company's competitive position in the industry is indicated by its market share. Customers from competitors might be drawn in by providing reasonable price without sacrificing service quality (Mudenda, 2017). Gaining a competitive edge might come from early adoption of new technologies like 5G (Zhai, et al., 2021). Businesses that make investments in cutting-edge network capabilities frequently see an improvement in both client acquisition and retention. A company's market footprint can be increased through partnerships and mergers (Alwan & Alshurideh, 2021).

Cost Efficiency

Reducing costs without sacrificing service quality is known as cost efficiency. Utilising network infrastructure cooperatively can save operating and capital costs. (Chihana, 2018) Agreements for network sharing have been used to save expenses and maximise resources. Long-term financial savings can result from investing in contemporary, energy-efficient technologies (Mithas, et al., 2013). Streamlining processes through automation and process enhancements can lower costs. Businesses that prioritise operational effectiveness frequently see improvements in their financial results (Davenport & Westerman, 2018).

3. Theoretical models and Conceptual frameworks

3.1. Introductions

To study the influence of digital transformation on financial performance, the research will use the Resource Based View, Dynamic Capabilities Theory and the Disruptive Innovation Theory

3.2. Resource-Based View (RBV)

The Resource-Based View theory, was first proposed by (Barney, 1991), and states that a firm's sustainable competitive advantage is attained through the use of its unique resources that are valuable, rare, inimitable, and non-substitutable (VRIN criteria). RBV emphasizes that internal resources, such as technological infrastructure, skills, and knowledge, are essential to maintaining a competitive advantage. Firms in the telecommunications industry can leverage their technological capabilities to enhance operational efficiency and financial performance. A study by (Wandeto, 2023) shows that for telecommunication firms, digital investments align with the RBV by transforming technological resources into significant financial gains through increased efficiency and customer satisfaction. However, critics argue that the RBV can be too inward-looking, ignoring external market dynamics that can significantly influence performance (Coff, 1999). The

RBV also assumes that resources are not mobile across firms, an idea challenged by the dynamic and rapidly changing nature of technology markets (Barney & Wright, 2001). The RBV framework remains relevant for exploring how digital transformation initiatives, when seen and managed as strategic resources, can drive financial performance improvements in firms like Airtel Zambia.

3.3. Dynamic Capabilities Theory

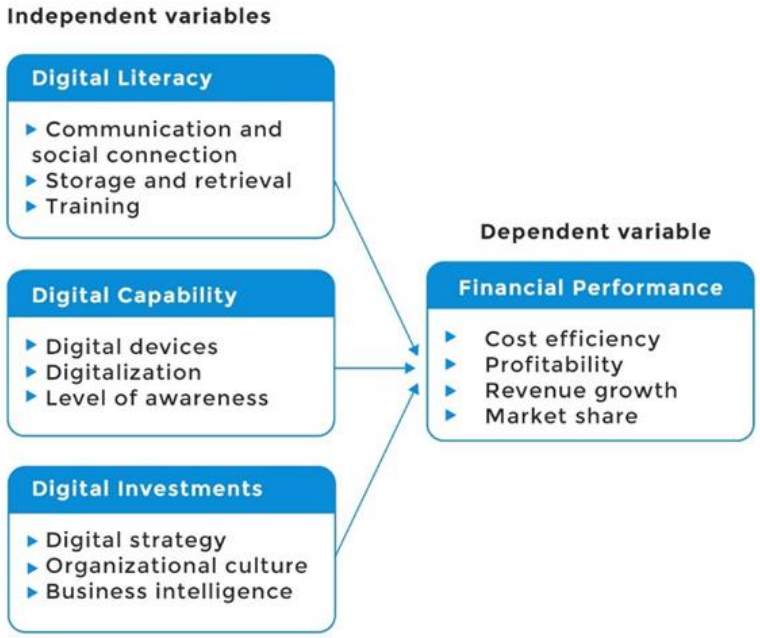
The Dynamic Capabilities Theory was developed by (Teece, et al., 1997), and extends the RBV by emphasizing a firm's ability to renew and recreate its strategic capabilities in order to adapt to changing business environments. The theory suggests that firms have to constantly reconfigure both their internal and external competencies, to sustain a competitive advantage in rapidly changing markets (Cenamor, et al., 2019). In the case of telecommunications firms in Africa, technology adoption is rapidly evolving, dynamic capabilities therefore allow companies to respond to market changes and help incorporate new digital technologies (Adeniran & Johnston, 2012). Recent research by (Porter, 1979) emphasizes that dynamic capabilities such as integrating big data analytics and cloud computing, are important for enhancing financial performance. However, the theory has been criticized for having broad and vague definitions, which makes empirical testing difficult (Helfat & Winter, 2011). The theory also assumes that firms have unlimited access to resources needed to build these capabilities, which is usually not the case in the often resource-constrained environments of African markets (Adeniran & Johnston, 2012). Despite these criticisms, the Dynamic Capabilities Theory remains a powerful tool for understanding how firms like Airtel Zambia can strategically manage digital transformation to improve financial outcomes.

3.4. Disruptive Innovation Theory

The Disruptive Innovation Theory was put forwards by (Christensen, 1997), and describes how smaller companies can not only challenge but also overtake established firms by offering simpler, more affordable products and/or services that initially only cater to underserved markets. Disruptive innovations are new digital technologies that lower costs and/or provide unique services (Berman, 2012). An example is the rise of mobile money in Africa, which has disrupted traditional banking systems by offering accessible financial services through telecommunications networks (Christensen, et al., 2015). A study by (Ahmada & Mustafa, 2022) demonstrated that telecommunications firms which embrace disruptive digital technologies can significantly enhance their financial performance and market share by meeting the needs of previously untapped customer segments. Critics often argue that the theory oversimplifies the dynamics of market competition and underestimates the ability of established firms to respond to disruptive threats (Bughin, et al., 2018). Critics also add that the theory may not fully capture the hybrid nature of innovations which tends to combine disruptive and sustaining elements (Hotlan, et al., 2021). The Disruptive Innovation Theory still remains relevant for understanding how Airtel Zambia can use digital transformation to navigate competitive forces and drive growth financially.

3.5. Conceptual Framework

This study's conceptual framework seeks to establish a cause-effect relationship by highlighting the interplay between digital transformation and financial performance. It hypothesizes that the independent variables – digital literacy, digital capability, and digital investments are crucial drivers of financial performance, which can be measured by revenue growth, profitability, cost efficiency and market share.



4. Research Methodology

4.1. Research design

This study used positivism which is associated with quantitative research and is considered a form of empiricism as first labelled by Augustine Comte in 19th Century (Wa-Mbaleka, 2018). Quantitative methods were be used to measure and quantify the influence of digital transformation on key performance indicators such as revenue growth, market share, and profitability.

4.2. Study area

The study area will be limited to one telecommunications company, Airtel Zambia

4.3. Study Population

(Creswell & Poth, 2018) asserted that the target population of a study must be explicitly defined. This is done in order to increase the trust worthiness of the analyzed data. The target population of this research will be employees working for Airtel Zambia ltd. The sample size has to meet the level of precision, confidence level, and extent of predictability of the elements that are quantified in the population as this will represent the whole population. Due to the nature of the study, a sample of 110 respondents will be drawn from employees in different departments, sections and work areas. The sample size for the study was calculated using the Yamane Formula; using the Yamane Formula;

n= N/(1+Ne^2) = 150/(1+150* 〖0.05〗 ^2) = 110
Where:
n = Sample size
N= Population size
e = Level of precision = 0.05

4.4. Study Sample

The main source of the data that was collected, was from individuals working in lower/middle/upper management. The study sample constitutes 110 employees aged 18 years and above working in different departments at Airtel Zm.

Job category	No of people to be sampled	Population
Technical/IT	20	20
HR	5	5
Consumer operations	60	60
Corporate affairs/legal	5	5
Strategy and innovation	10	10
Customer business unit	10	50
	Total	**150**

4.5. Sampling Techniques

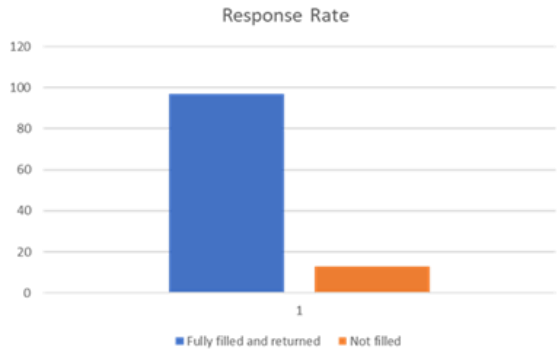
Purposive sampling was used to select the main departments from which respondents were selected. This technique was chosen based on the assumption that, given the study's aims and objectives, specific individuals within the selected organization hold distinct and valuable information on the topics under investigation (Dudovskiy, 2018). The next step involved identifying employees for participation in the study through convenience judgmental sampling (Merriam & Tisdell, 2016).

4.6. Instruments for Data Collection

The primary data used in this study was gathered using structured questionnaires that used a 5-point Likert scale to record variables and constructs. The questionnaire was divided into two parts: structured statements on the research variables and background information about the respondents (Creswell & Poth, 2018). Questionnaires are often chosen due to their cost-effectiveness and potential to minimize bias during the data collection process. Google Forms was added to the drop-and-pick approach to increase productivity and make it easier for responders to finish the survey. Secondary data was collected from financial statements and reports.

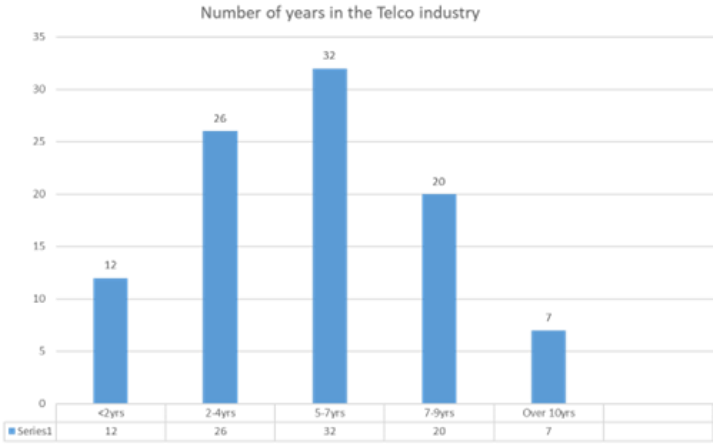
5. Results and Data Presentation

5.1. Descriptive Statistics



110 questionnaires were administered using google forms. only 97 questionnaires were returned. The study's overall response rate was 88%.

Gender distribution shows a balanced split, with females representing 53.6% and males 46.4% of the total sample, suggesting near parity.



Level of education	Frequency	Percentage
School Certificate	2	2.1
College Certificate	8	8.2
Diploma	11	11.3
Degree	49	50.5
Master's Degree	19	19.6
PhD	8	8.2
Total	**97**	**100**

A significance population of the respondents had worked in the telecommunication firm for long enough and hence they were in a position to share experience with regards to digital transformation and its impact on financial performance. Educational attainment reveals a high level of formal education, with 50.5% holding a degree and an additional 19.2% holding a master's degree

5.2. Inferential statistics

As part of the inferential analysis, the study used two primary tests. Regression analysis was used to ascertain the extent of the effect between the independent and dependent variables, and Pearson correlation was used to establish the relationship between the research variables.

Correlation analysis

In order to ascertain the relationship between the independent variables and financial performance, a correlation analysis

was carried out in this phase of the study. The results are shown in Table y. A correlation value of zero denotes the absence of a linear link between two continuous variables, while a correlation coefficient of -1 or +1 denotes a perfect linear relationship, according to (Pallant, 2011). The relationship's strength might range from -1 to +1.

Effect of Digital Literacy on Financial Performance

		Financial Performance
Digital Literacy	Pearson Correlation	.442**
	Sig. (2-tailed)	0.000
	N	97
Financial Performance	Pearson Correlation	1
	Sig. (2-tailed)	
	N	97

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

Digital literacy and improved financial performance at Airtel Zambia are moderately correlated, according to a positive correlation of 0.442. This probably suggests that workers or other stakeholders in the organization contribute more successfully to productivity and operational efficiencies as they gain greater digital literacy. These findings are in line with the conclusion made by (Wandeto, 2023)who asserted that digital literacy positively impacts firm performance citing that employees with lower levels of digital literacy are less willing to experiment with new technologies and embrace digital learning which reduces the organization's adaptability in the age of industry 4.0.

Effect of Digital Capability on Financial Performance

As indicated by the negative correlation of -0.171, there seems to be an inverse relationship between organizational digital capability and financial performance. This is surprising as most of the existing literature indicate a positive relationship (Helfat & Winter, 2011). The study findings could suggest difficulties like ineffective digital capability implementation (Airtel Zm, 2022) or that, perhaps as a result of a learning curve or operational misalignment, the resources spent on improving digital capabilities have not yet resulted in financial gains (Adeniran & Johnston, 2012).

2.4. Effect of Digital Investment on Financial Performance As indicated by the negative correlation of -0.171, there seems to be an inverse relationship between organizational digital capability and financial performance. This is surprising as most of the existing literature indicate a positive relationship (Helfat & Winter, 2011). The study findings could suggest difficulties like ineffective digital capability implementation (Airtel Zm, 2022) or that, perhaps as a result of a learning curve or operational misalignment, the resources spent on improving digital capabilities have not yet resulted in financial gains (Adeniran & Johnston, 2012).

2.4. Effect of Digital Investment on Financial Performance

		Financial Performance
Digital Capabity	Pearson Correlation	-0.171
	Sig. (2-tailed)	0.094
	N	97
Financial Performance	Pearson Correlation	1
	Sig. (2-tailed)	
	N	97

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

As indicated by the negative correlation of -0.171, there seems to be an inverse relationship between organizational digital capability and financial performance. This is surprising as most of the existing literature indicate a positive relationship (Helfat & Winter, 2011). The study findings could suggest difficulties like ineffective digital capability implementation (Airtel Zm, 2022) or that, perhaps as a result of a learning curve or operational misalignment, the resources spent on improving digital capabilities have not yet resulted in financial gains (Adeniran & Johnston, 2012).

5.3. Effect of Digital Investment on Financial Performance

The main source of the data that was collected, was from individuals working in lower/middle/upper management. The study sample constitutes 110 employees aged 18 years and above working in different departments at Airtel Zm.

Investments in digital transformation seem to be linked to better financial performance, with a positive correlation of 0.425. This suggests that spending money on digital tools and infrastructure usually pays off, most often as a result of increased consumer involvement, operational effectiveness, and adaptability (Hess, et al., 2016). The returns, however, could not be immediate or significant enough to demonstrate a high impact because this link is moderate rather than strong (Schwertner, 2017).

5.4. E Regression Analysis

Regression analysis was employed to describe the relationship between a dependent variable and the three independent variables. As per the research objectives digital literacy, organizational digital capabilities, and digital investment were the independent variables, and financial performance was the dependent variable.

The findings are detailed in the tables below.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Watson Durbin
1	.503[a]	.253	.229	.54352	2.027

Model		SS	df	MS	F	Sig.
1	Regression	9.298	3	3.099	10.491	.000[b]
	Residual	27.473	93	.295		
	Total	36.771	96			

The analysis sought to find out the magnitude of the effect of digital transformation elements (Digital literacy, Digital capability and Digital Investment) on Financial Performance. The regression results indicate that R^2 = 0.253 which implies that holding other factors constant, 25.3% of the changes in financial performance can be determined by digital capability, digital literacy and digital investment. The results also indicate that the F-test in the ANOVA tests in the regression model is a good fit for the given data. Since F= 10.491; P=0.000 and is less than 0.05, the model is statistically significant in predicting how digital transformation can influence financial performance of Airtel.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.283	.654		1.961	.043
	Digital Literacy	.341	.115	.328	2.976	.004
	Digital Capability	.066	.060	.116	1.106	.271
	Digital Investment	.340	.128	.300	2.654	.009

$$Y = 1.283 + 0.341X1 + 0.0661X2 + 0.34X3 + 0.654$$

The constant $\alpha = 1.283$ is statistically significant because the P-value; Sig = .043<.05. The results show that digital literacy has a coefficient (.341), which is said to be statistically significant (Sig = .004<.05), this implies that a unit change in digital literacy can result in a 34.1% change in the level of financial performance. The findings show that the coefficient of Digital capability (.066) is not statistically significant (with Sig = .271 >.05), which shows digital capability does not influence financial performance. The study results also indicate that the coefficient for digital investment is (.34) which is significant (Sig = 0.09 <.05), which shows that a unit change in digital investments will result in a 34% change in the level of financial performance.

5.5. E Regression Analysis

The effect of digital literacy on financial performance

The first objective of the study was to examine the effect of digital literacy on the financial performance of telecommunications firms (with a focus on Airtel Zambia). The first objective hinged on the Resource based view theory as the foundation upon which digital literacy would be analyzed because employees qualify as valuable, rare, inimitable, and non-substitutable (VRIN criteria) resources that drive competitive advantage. The study findings reveal that there is a moderately strong correlation of 0.442 and ($\beta = 0.459$; Sig = .000<.05), between digital literacy and financial performance, and that there exists a significant proportion of employees at Airtel that effectively engage with digital platforms, enabling them to perform tasks more efficiently. These digital platforms enable employees to develop their own competencies with

respect to computing functionalities. This further facilitates seamless communication and information sharing. Firms that invest in training their employees on emerging technologies report substantial benefits which include enhanced service delivery and efficiency. These findings align with (Cenamor, et al., 2019) and (Davenport & Westerman, 2018) who highlighted how leveraging digital platforms for customer engagement improves financial outcomes. In many telecommunications firms, the use of digital platforms has notably increased customer satisfaction and retention (Khin & Ho, 2018)

Digital literacy has been identified as a critical factor in influencing financial performance, because employees who are more proficient at using digital tools demonstrate higher productivity. Studies by (Alwan & Alshurideh, 2021)support this, emphasizing that employees with limited digital literacy skills are less likely to adopt new technologies, which ultimately hinders innovation and efficiency. With digital literacy, employees can easily analyse and interpret data much more effectively, enabling overall data-driven decision-making. For Airtel Zambia, this could mean the optimization of customer service strategies, the identification of market trends, and the tailoring of products and offerings to customer needs based on insights derived from data like customer usage patterns and other trends.

The effect of digital capability on financial performance

The second objective of the study was to examine the effect of digital capacity on the financial performance of telecommunications firms (with a focus on Airtel Zambia). The second objective aligned more closely with the dynamic capabilities' theory (Teece, et al., 1997) which emphasize the importance of reconfiguring and adapting resources to meet the needs of a constantly changing environment. The study findings on digital capability indicate important insights about its role in influencing financial performance (at Airtel Zambia). The descriptive statistics reveal a moderate mean score of 2.88 for digital capability, and a high standard deviation of 1.36, implying varied perceptions among the respondents. Some airtel employees perceive the firm's digital systems as robust, others highlight gaps in the integration and utilization of these digital systems.

The reviewed literature demonstrated that digital skills in organizational contexts have beneficial effects, including the utilization of IT infrastructure which has been demonstrated to facilitate innovation, expansion, and new business development, and collaborative technology is becoming more prevalent in organizations (Wandeto, 2023).

The research study findings revealed a negative correlation coefficient of -0.171 also indicate a weak inverse relationship, implying surprisingly, that higher digital capability slightly correlates with lower financial performance. This could imply challenges such as inefficiencies in implementing digital capabilities or perhaps that the resources invested in enhancing digital capabilities have not yet translated into financial gains, possibly due to a learning curve or operational misalignment (Cenamor, et al., 2019)

The inferential statistics applied further demonstrate a very weak and statistically non-significant influence of digital capability on financial performance ($\beta = 0.066$, $p = 0.271$). Another explanation for this could be that Airtel's digital capabilities may not yet be dynamic enough to address market needs or they are not able to fully leverage technological advancements. This misalignment underscores the need for strategic reorientation to ensure that digital systems are not only present but also effectively integrated into core operations (Helfat & Winter, 2011).

The effect of digital investment on financial performance

The study findings emphasize that there exists a significant influence of digital investment on financial performance. Descriptive statistics revealed a high mean score from respondents (4.21) with a low standard deviation (0.64), showing a strong agreement among the respondents about the positive influence of digital investments. Inferential statistics further validated these perceptions, where digital investment showed a strong and statistically significant effect on financial performance ($\beta = 0.34$; $p < 0.01$). These results indicate that Airtel Zambia's investments in newer technologies such as Airtel Money and 5G infrastructure are yielding not only profitability but also enhanced operational cost efficiency, revenue growth, and market competitiveness.

The Disruptive Innovation Theory (Christensen, et al., 2015) underscores how targeted investments in digital innovative technologies enable companies to capture underserved markets. As an example, Airtel Money has contributed significantly to financial inclusion in Zambia, aligning with this theory by addressing gaps in traditional banking services (Kinyanjui, 2021).

The study further addressed the problem of whether telecommunications firms are prioritizing the right areas for investment to maximize ROI. The strong positive relationship between digital investment and financial performance provides evidence that Airtel Zambia's focus on digital transformation is yielding tangible returns, demonstrating that prioritizing digital infrastructure and customer-centric innovations is a productive strategy (ZICTA, 2023).

The findings of this study are consistent with those of (Mai & Hoan, 2022), who reported that digital platforms improve customer engagement and operational efficiency. Similarly, studies in Kenya's telecommunications sector found that investments in mobile money platforms and 4G technology enhanced profitability and customer retention (Wandeto, 2023). These parallels highlight the universality of digital investment as a driver of financial performance, reinforcing the need for Airtel Zambia to sustain and expand its digital transformation initiatives.

6. Conclusion and Recommendations

The study concludes that digital transformation, through digital literacy, digital capability and digital investment significantly enhances financial performance of telecommunications firms by improving operational efficiency, increasing adaptability and innovation adoption. Digital literacy enables employees to be able to utilize digital tools effectively, improving productivity, while digital capabilities theoretically enable firms to adapt dynamically to environmental changes and market demands. Digital investments in digital strategies and advanced technologies and infrastructure positions firms for competitive advantage. These findings validate theories like Resource-Based View, Disruption Innovation Theory, and Dynamic Capabilities theory, underscoring the need of aligning digital initiatives with strategic goals to achieve sustainable growth and maximize ROI in Zambia's telecommunications sector.

Furthermore, it is easy to understand how digital transformation and financial performance are related. Organizations aiming to reach carbon neutrality, increase the effectiveness of regional carbon emissions, and actively stimulate the potential of IT capital may find this study useful. Operations managers are becoming more concerned about the requirement for organizations to be both innovative and efficient and investing in Digital literacy, capability and investments is a good way to do so. The study's overall findings indicate that financial performance is impacted by digital literacy, organizational digital capability, and digital investment, particularly for telecommunications companies.

Recommendations

Based on the findings, the study recommends that telecommunications firms must invest in training employees. This capacity building exercise will help the employees better leverage digital tools, helping them communicate better and making it easier for them to adopt other emerging digital technologies. A moderately positive correlation between digital literacy and financial performance underscores the need for skilled personnel in maximization of profits and decision-making. Digital literacy findings can inform the development of performance evaluation metrics that are linked to digital tool usage. By tracking the effectiveness of a digital tool adoption, Airtel Zambia can assess ROI on training programs and identify areas for further improvement. Decision-makers at Airtel Zambia should therefore allocate resources to comprehensive digital literacy programs if they plan to maximize the utility of their technological investments.

The telecommunications industry has witnessed an increase in operational costs over the last 10years due to increased regulation and cyber security risks. Firms are therefore turning to digital transformation to maintain a competitive edge. This study also recommends that Airtel and in extension telecommunications firms should focus on enhancing existing technologies and also to increase the usage and information handling which will help reduce costs further and also keep employees cyber-security-aware.

Airtel Zambia should ensure that its digital capabilities directly support its core business objectives, such as customer acquisition, customer retention and cost reduction. It is therefore recommended that regular evaluations of digital investments should be done to help identify underperforming systems and reallocation of resources to high-impact areas. Additionally, collaborative platforms and cross-functional teams can help improve the utilization of digital capabilities, ensuring they contribute meaningfully to financial performance.

Suggestions for future research

Given that this study focused on Airtel Zambia only, future research can do a comparative study between all three network providers namely, Airtel Zambia, MTN Zambia and Zamtel. Since this study looked at how digital transformation affects the telecommunication industry's financial performance, future research might look at the effect of digital transformation on other sectors like the banking sector.

Given that the government controls the telecommunications industry, it is crucial that future scholars look at how government regulation impacts the digitalization process. Furthermore, more research on the impact of digital transformation on operational efficiency in other industrial sectors is required.

Conflict of Interest

The authors declare that they have no conflicting interests

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Data Availability statement

The data used to support the findings of this study are available from the corresponding author upon request.

Ethical considerations

The article followed all ethical standards appropriate for this kind of research.

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