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THE IMPACT OF SHARED FIBRE INFRASTRUCTURE IN THE CASE OF INTERNET SERVICE PROVISION SECTOR IN ZIMBABWE

BY

SIMON CHIMUTSOTSO

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Abstract

This study explored the ramifications of shared fiber infrastructure models on the Information, Communications and Technology (ICT) sector in Zimbabwe with a specific focus on aspects such as cost effectiveness, market competitiveness, service excellence and regulatory complexities. Grounded in a pragmatic research philosophy, the study employed a mixed-methods approach, blending qualitative and quantitative data collection methodologies offering a comprehensive insight into the subject matter. The targeted demographic was comprised of low, middle and top management employees from both Internet Service Providers (ISPs) and Internet Access Providers (IAPs) operating in Zimbabwe under the umbrella of the Zimbabwe Internet and Access Providers Association (ZIAPA). The study, in particular, delved into three prominent Internet Services Providers namely Liquid Intelligent Technologies (Private) Limited, TelOne Zimbabwe (Private) Limited, and DFA Zimbabwe (Private) Limited. The total population under scrutiny amounted to one hundred and twenty-nine (129) individuals who are in management positions, with a breakdown as follows: Liquid Intelligent Technologies (52), TelOne (45), and DFA Zimbabwe (32). A sample size of 98 was chosen through a combination of non-probability and probability sampling techniques, with the distribution being Liquid (40), TelOne (34), and DFA Zimbabwe (24). Data collection was facilitated through structured questionnaires and semi-structured in-depth interview guides, allowing for a triangulated analysis of the results. Quantitative data was scrutinized using descriptive and inferential statistical methodologies, while qualitative data was subjected to thematic scrutiny. The study concluded that shared fibre infrastructure is an essential and viable strategy for improving quality, availability and cost efficiencies for internet service provision in Zimbabwe, provided that regulatory and operational challenges are addressed. These findings provide actionable insights for policymakers and industry sector stakeholders to lower cost of doing business, enhance Zimbabwe's competitiveness in the SADC region and facilitate efficient communications and trade in the Sub Sahara Africa region in alignment with the African Continental Free Trade Area (AfCFTA) agenda.

Key words: Fibre, Sharing, Cost

Declaration

I hereby affirm that this dissertation submitted to Africa University Zimbabwe as part of the Executive Master in Business Administration program is a product of my own professional and independent effort under the guidance of Dr. Kandiero, my supervisor. I declare that it is my original work except where sources have been cited and acknowledged. The work has never been submitted, nor will it be submitted to another university for the award of a degree.

Simon Chimutsotso

14/4/25

Student's Full Name Student's Signature (Date)

Dr. Agripah Kandiero

14/04/25

Main Supervisor's Full Name Main Supervisor's Signature (Date)

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Dedication

To my beloved wife, Chana, and my cherished offspring, Maita, Leeroy, and Roynne.

List of Acronyms and Abbreviations

ISPs Internet Service Providers

IAPsInternet Access Providers

ZIAPAZimbabwe Internet and Access Provision Association

POTRAZPostal and Telecommunications Regulatory Authority of Zimbabwe.

RBV Resource-Based View

ICT Information and Communication Technology

CapExCapital Expenditure

OpExOperational Expenditure

ZISPAZimbabwe Internet Services Provision Association

AfCFTAAfrican Continental Free Trade Area

Table of Contents

List of Tables

List of Figures

List of Appendices

CHAPTER 1 INTRODUCTION

1.1 Introduction

Despite the increase in digital transformation in Zimbabwe, many users have expressed frustrations over the poor quality of internet services and frequent disruptions caused by Internet Service Providers (ISPs) (Piason & Peter, 2025). The government's telecommunications regulatory authority, POTRAZ, has encouraged ISPs to share fibre infrastructure to address these challenges, especially in underserved areas. This initiative aims to enhance service quality and expand coverage, ensuring that all Zimbabweans can access reliable and affordable internet connectivity. However, there is a notable lack of research examining the effects of such infrastructure sharing on the cost, quality and coverage of internet service provision in Zimbabwe.

This study sought to fill that gap by investigating how shared fibre infrastructure can influence the cost, quality and accessibility of internet services in Zimbabwe. By exploring the effectiveness of infrastructure sharing, identifying the factors that affect its implementation among ISPs, and proposing strategies to promote collaboration, this research aimed to provide insights that could save as a catalyst for enhanced digital transformation. This would in turn lead to improved and affordable internet services to position Zimbabwe competitively in the global economy.

1.2 Background of the Study

The telecommunications landscape in Zimbabwe has undergone significant transformations in recent years, driven by the rapid growth of digital technology and the increasing demand for high-quality internet services. However, despite the rising user demand, the country's Internet service provision has faced challenges, including inadequate infrastructure, high costs, and frequent service disruptions. The introduction of shared fibre infrastructure has emerged as a potential solution to these challenges, aiming to enhance connectivity and improve service delivery nationwide. This approach addresses the inefficiencies inherent in individual ISP operations and promises to create a more equitable framework for Internet access among diverse populations, particularly in underserved regions.

Shared fibre infrastructure enables multiple ISPs to utilize the same physical network, reducing the need for parallel investments in infrastructure that can strain financial resources and lead to redundancy. This model has been explored in various contexts to accelerate digital connectivity, particularly in regions where the cost of building new infrastructure is prohibitive (Strusani & Houngbonon, 2020). In Zimbabwe, where many areas suffer from poor internet coverage and quality, the potential benefits of such collaboration are significant. Mthwazi (2022) highlights that infrastructure sharing can improve the delivery of public services and foster more sustainable and environmentally friendly practices by minimizing the physical footprint of telecommunications infrastructure. As ISPs collaborate to share resources, they can streamline operations, reduce costs, and enhance consumer service reliability.

Regulatory challenges and a history of state control over internet access further complicate Zimbabwe's telecommunications sector context. Recent liberalization efforts have aimed to create a more competitive environment, but the realities of implementation remain fraught with obstacles. For instance, Robb and Paelo (2020) emphasize that while competition can drive

innovation and improve services, the competitive dynamics within the market can also lead to inefficiencies if not appropriately managed. Moreover, the recent internet shutdowns in Zimbabwe reflect a broader trend of digital authoritarianism that can stifle service provision and user trust (Mare, 2020). These complexities underscore the importance of establishing a robust regulatory framework supporting infrastructure sharing while prioritizing user interests.

In the broader regional context, the experiences of neighbouring countries such as Zambia offer valuable insights into the potential and pitfalls of shared infrastructure. The liberalization of the international gateway in Zambia has led to opportunities and challenges in internet development, illustrating the importance of strategic policy frameworks that encourage collaboration among ISPs (Zimba et al., 2021).

As Zimbabwe seeks to enhance its telecommunications sector, lessons from such experiences can inform the development of strategies that leverage shared fibre infrastructure to create a more inclusive and resilient internet ecosystem. The study of shared fibre infrastructure in Zimbabwe, therefore, not only contributes to understanding local dynamics but also positions the country within the larger narrative of digital transformation across Africa. By exploring these interconnections, this research highlights pathways for improving internet service provision, ultimately contributing to Zimbabwe's economic growth and social equity.

1.3 Statement of the problem

The demand for reliable and high-speed internet connectivity has grown exponentially in recent years. The demand for international bandwidth has been almost doubling every two years, prompting extensive investments in both upgrades to existing networks and the development of

new infrastructure. (Carks, 2024). Zimbabwe has not been spared by this surge, with reports from POTRAZ indicating that mobile internet and data usage grew by 31% increased by 8.60% from 389,051 Mbps recorded in the second quarter of 2024 to 422,518 Mbps in the quarter under review, whereas used outgoing international bandwidth capacity grew by 2.19% from 123,926 Mbps recorded in second quarter to reach 126,635 Mbps in third quarter of 2024. (POTRAZ, 2024).

However, in Zimbabwe, customers have complained about poor quality Internet services as well as massive disruptions of internet connectivity by ISPs (Virima et al., 2019; ZISPA, 2024). Techzim reported that on the 9th of May, around 12 pm, Econet faced nationwide service outages. (Sengere, 2023). Poor internet services quality resulted in the the government of Zimbabwe implementing stringent penalties for network service providers through Statutory Instrument 154 of 2024, imposing fines of up to US$5,000 for poor-quality services. (Kadzere, 2024).

The major challenge faced by customers is the high cost of data and Internet connectivity speed in comparison to developed markets (Piason & Peter, 2025). According to, Galal, 2023, Zimbabwe had the most expensive mobile internet in Africa as of 2023, one gigabyte was costing on average 43.75 U.S. dollars in the African country, the highest worldwide. Furthermore, Oluwole, 2023 submitted that Zimbabwe leads as the most expensive country globally and within the region at USD 43.75 for 1GB of mobile data.

The need to solve cost, quality and availability of efficient internet services led to the introduction of shared fibre infrastructure to ensure consistent service provision across the country. In fibre deployment 80-90% of the cost is in the civil works for the ducting – if this

can be shared, the savings are very substantial. (Jensen, 2024). The government's telecommunications regulatory authority, POTRAZ, has urged ISPs to share infrastructure, especially where network coverage is poor or non-existent. POTRAZ is also advocating for the shared use of infrastructure among operators, a move designed to optimize energy usage and cut down on carbon emissions. (Robin Phiri, 2025).

However, no study has been undertaken to determine if this initiative can improve internet service provision cost, quality and coverage. Hence, the study aimed to determine whether shared fibre infrastructure influences cost, quality and availability of internet service provision in Zimbabwe.

1.4 Research Objectives

The main objective of the research was to determine the effectiveness of fibre infrastructure sharing models in enhancing quality, availability and cost effectiveness of internet service provision by ISPs in Zimbabwe. Sub objectives of the research were to:

(a) Explore the factors affecting the adoption and implementation of fibre infrastructure sharing among ISPs and IAPs in Zimbabwe.
(b) Identify strategies for promoting and optimizing fibre infrastructure sharing among ISPs and IAPs in Zimbabwe.
(c) Assess how much fibre infrastructure sharing reduces operational and capital expenditures for ISPs and IAPs in Zimbabwe.

1.5 Research Questions

Research questions for the study were developed as below:

(a) How effective is fibre infrastructure sharing in promoting quality internet service provision by ISPs and IAPs in Zimbabwe?

(b) What are the factors affecting fibre infrastructure sharing among ISPs and IAPs in Zimbabwe?

(c) What strategies should be implemented to promote fibre infrastructure sharing among ISPs in Zimbabwe?

1.6 Hypothesis

The hypothesis of this research was that shared infrastructure will result in increased network coverage at lower costs to end customers.

1.7 Delimitation

The study focused on determining Zimbabwe's optic fibre infrastructure coverage and the requirements to meet minimal coverages and investment thresholds using the current models of individual builds by telecommunication companies. Also, the study looked at network coverage requirements and investment thresholds using the shared infrastructure model and expected benefits to the telecoms industry and end customers regarding costs, quality, and dependability of network services, as well as the impact on positioning Zimbabwe to the global world. The study covered the impact of shared fibre infrastructure in Africa from a global perspective, focusing on acceptance by telecom companies and government support, as well as a review of policies and legislation developed to support the shared infrastructure model. Equally, the study looked at infrastructure-sharing models that Telecommunication can use without losing control of their infrastructure and in promoting information and intellectual property security. Similarly, the study focused on the correlation between the sharing of infrastructure and revenue/profitability statistics.

CHAPTER 2 REVIEW OF RELATED LITERATURE

2.1 Introduction

The rapid advancement of Information and Communication Technologies (ICTs) has established internet connectivity as a pivotal catalyst of socio-economic progress, particularly in developing nations such as Zimbabwe. The pervasive impact of digitalization has revolutionized numerous facets of daily life, including government services, education, online commerce, and diverse business transactions (Magoutas, Chaideftou, & Skandali, 2024). Nevertheless, the exorbitant expenses associated with deploying fibre optic infrastructure pose as a formidable obstacle to achieving widespread internet accessibility. (Jorgensen, 2024). Consequently, shared fibre infrastructure model has emerged as a cost-efficient remedy, enabling Internet Service Providers (ISPs) to consolidate resources and diminish both capital expenditure (CapEx) and operational expenditure (OpEx) (Chavula & Calandro, 2017). This comprehensive review delves into the repercussions of shared fibre infrastructure on the internet service provision sector in Zimbabwe, with a keen focus on its efficacy, the determinants influencing its adoption, and strategies for its enhancement.

Globally, the practice of infrastructure sharing has been widely embraced as a strategic approach to bolster broadband penetration, especially in environments with limited resources. Research conducted in nations like South Africa has illustrated that collaborative fibre optic networks can substantially reduce expenses and enhance internet accessibility (Kodua-Ntim & Fombad, 2024). In Zimbabwe, the government's National Broadband Plan (2023) and the Ministry of ICT’s Smart Zimbabwe 2030 Master Plan underscores the significance of infrastructure sharing as a pathway to achieving ubiquitous access. Nonetheless, the introduction of shared fibre optic

infrastructure in Zimbabwe has presented a mix of prospects and obstacles, underscoring the necessity for a comprehensive evaluation of its efficacy and the factors influencing its adoption.

The effectiveness of shared fibre infrastructure in enhancing internet service provision can be measured through its impact on cost efficiency, service quality, and market competition. Empirical evidence from Zimbabwe suggests that ISPs utilizing shared fibre networks have reported a 30% reduction in costs, leading to lower tariffs for consumers (Ndlovu, 2021). Furthermore, shared infrastructure has been shown to improve service reliability by reducing network congestion and downtime (Dube, 2021). However, challenges such as inadequate maintenance and over-subscription of shared networks have been identified as barriers to consistent service delivery (Moyo, 2022).

Several factors influence the adoption and implementation of shared fibre infrastructure among ISPs in Zimbabwe. Regulatory frameworks play a critical role in facilitating or hindering infrastructure sharing. The Postal and Telecommunications Regulatory Authority of Zimbabwe (POTRAZ) has been instrumental in promoting infrastructure sharing through policies such as the National Broadband Plan (2023). However, delays in licensing and disputes over access fees have hindered the full realization of the benefits of shared infrastructure (Mazango, 2021). Technical challenges, including the lack of skilled personnel and inadequate infrastructure, also pose significant barriers to the effective implementation of shared fibre networks (Chikomo, 2022).

Market-related factors, such as the dominance of a few players in the telecommunications sector, further complicate the adoption of shared fibre infrastructure. While infrastructure sharing has the potential to foster competition by lowering barriers to entry for smaller ISPs,

there is a risk of collusion among dominant players, which could stifle competition and innovation (Makoni, 2020). Addressing these challenges requires a collaborative approach involving government, regulators, and private sector stakeholders.

Strategies to promote and optimize fibre infrastructure sharing among ISPs in Zimbabwe must address both regulatory and operational challenges. Clear guidelines on infrastructure sharing, as highlighted by Gillwald and Stork (2018), are essential to prevent conflicts among stakeholders. Additionally, investment in technical capacity building and infrastructure maintenance is critical to ensuring the sustainability of shared fibre networks (Gumbo, 2020). The socio-economic benefits of shared fibre infrastructure, including increased economic activity and improved access to education and healthcare, further underscore the importance of optimizing its implementation (Ndlovu, 2021). Briglauer, Krämer, & Palan, 2024, Briglauer, Krämer, & Palan, 2024, argued that socioeconomic benefits of shared fibre infrastructure include economic growth, productivity, house prices, and education, as well as economic resilience but are also subject to diminishing returns beyond a certain broadband quality level.

This review draws on empirical studies and theoretical frameworks to provide a comprehensive understanding of the impact of shared fibre infrastructure on the internet service provision sector in Zimbabwe. By examining the effectiveness of shared infrastructure, the factors affecting its adoption, and strategies for its optimization, this review aims to inform policymakers and industry stakeholders in their efforts to enhance internet access and drive socio-economic development in Zimbabwe.

2.2 Empirical Evidence

2.2.1 Cost Efficiency and Financial Benefits

Empirical evidence from Zimbabwe and other African countries underscores the substantial cost efficiencies linked with shared fibre infrastructure. A research study conducted by Chavula and Calandro (2017) on infrastructure sharing in Africa revealed that collaborative networks lead to reductions in both capital expenditure (CapEx) and operational expenditure (OpEx) for Internet Service Providers (ISPs).

In Zimbabwe, ISPs and ISPs such as Liquid Intelligent Technologies, TelOne, and DFA Zimbabwe have documented cost savings of up to 30% through infrastructure sharing (Ndlovu, 2021). These economic benefits have been cascaded to consumers through reduced tariffs, thereby enhancing the accessibility of internet services. For example, Liquid Intelligent Technologies, a prominent ISP in Zimbabwe, disclosed that the sharing of fibre infrastructure with other providers decreased its deployment expenses by 25%, enabling the organization to extend its network coverage to underserved regions (Dube, 2021). Similarly, TelOne Zimbabwe observed that shared infrastructure facilitated the reallocation of resources towards enhancing service quality rather than investing in redundant infrastructure (Mazango, 2021). These observations are in alignment with global patterns, where collaborative infrastructure has exhibited a propensity to decrease costs and enhance affordability in nations such as Kenya and South Africa (Mureithi & Omino, 2015).

Nevertheless, obstacles such as substantial initial investment outlays and imbalanced cost sharing agreements have been highlighted. Certain smaller ISPs in Zimbabwe, like DFA Zimbabwe, have encountered difficulties in meeting their financial commitments within shared infrastructure initiatives, resulting in delays in network expansion (Chikomo, 2022). These

challenges underscore the necessity for equitable cost-sharing frameworks and governmental subsidies to bolster smaller entities.

2.2.2 Market Competition and Innovation

Shared fibre infrastructure has the potential to stimulate competition and innovation in the internet service provision sector. In Zimbabwe, the telecommunications market has historically been monopolized by a few major players, constraining competition and innovation (Mudzimu, 2018). However, the advent of shared fibre networks has diminished entry barriers, enabling smaller ISPs to compete more vigorously.

A research conducted by Makoni (2020) revealed that infrastructure sharing in Zimbabwe has resulted in a 20% surge in the number of ISPs operating in urban areas. For instance, DFA Zimbabwe Private Limited, a lesser-known ISP, managed to extend its services to Harare and Bulawayo by capitalizing on shared fibre infrastructure (Chikomo, 2022). This escalated competition has spurred innovation, prompting ISPs to introduce novel services such as bundled internet packages and value-added features like cloud storage and VoIP (Ndlovu, 2021).

Despite these advantages, concerns regarding collusion among dominant players have surfaced. In certain instances, larger ISPs have been accused of monopolizing shared infrastructure, thereby restricting access for smaller providers (Mazango, 2021). Therefore, regulatory supervision is imperative to ensure that shared infrastructure benefits all market participants and fosters robust competition.

2.2.3. Service Quality and Reliability

The quality and reliability of internet services are directly influenced by the underlying infrastructure. Shared fibre networks, when properly managed, can enhance service quality by providing a robust and scalable platform for data transmission. In Zimbabwe, ISPs utilizing shared fibre infrastructure have reported significant improvements in service reliability.

A survey of ISPs in Zimbabwe found that 72% of respondents experienced a 25% improvement in network uptime after adopting shared fibre infrastructure (Dube, 2021). For example, TelOne Zimbabwe reported a 30% reduction in network downtime, attributing this improvement to the redundancy and resilience of shared fibre networks (Mazango, 2021). Similarly, Liquid Intelligent Technologies noted that shared infrastructure allowed it to upgrade its network capacity, reducing congestion during peak usage periods (Ndlovu, 2021).

However, challenges such as inadequate maintenance and over-subscription of shared networks have been reported. In some cases, ISPs have failed to meet their maintenance obligations, leading to network degradation and service disruptions (Moyo, 2022). Additionally, over-subscription of shared networks, particularly in urban areas, has resulted in congestion and reduced service quality (Chikomo, 2022). Addressing these challenges requires coordinated efforts among ISPs and regulatory bodies to establish clear maintenance protocols and usage limits.

2.2.4. Regulatory and Policy Challenges

The establishment of shared fibre infrastructure necessitates a conducive regulatory framework. In Zimbabwe, the Postal and Telecommunications Regulatory Authority of Zimbabwe

(POTRAZ) has been pivotal in advocating for infrastructure sharing through initiatives like the National Broadband Plan (2023). Nonetheless, regulatory impediments, such as licensing delays and disagreements regarding access charges, have impeded the complete realization of the advantages of shared infrastructure.

A research conducted by Gillwald and Stork (2018) on regulatory structures in Africa underscored the significance of explicit guidelines on infrastructure sharing to avert conflicts among involved parties. In Zimbabwe, the absence of a comprehensive legal structure for infrastructure sharing has resulted in disputes between Internet Service Providers (ISPs) and infrastructure providers, thereby stalling the implementation of shared networks (Mazango, 2021). For instance, a disagreement between Liquid Intelligent Technologies and a smaller ISP over access fees postponed the deployment of a shared fibre network in Bulawayo by half a year (Chikomo, 2022).

To tackle these obstacles, stakeholders have advocated for the formulation of a standardized regulatory framework delineating the rights and responsibilities of all stakeholders engaged in infrastructure sharing (Gumbo, 2020). This framework should encompass provisions for conflict resolution, cost-sharing models, and maintenance protocols to ensure the sustainable establishment of shared fibre infrastructure.

2.2.5. Socio-Economic Impact

The socio-economic impact of shared fibre infrastructure extends beyond the internet service provision sector. Improved internet access can drive economic growth, enhance education, and improve healthcare services. In Zimbabwe, the deployment of shared fibre networks has been

linked to increased economic activity in urban areas, particularly in the ICT and financial services sectors (Ndlovu, 2021).

A study by Qiang et al. (2009) on the impact of broadband infrastructure in developing countries found that a 10% increase in broadband penetration can lead to a 1.3% increase in GDP growth. In Zimbabwe, the expansion of shared fibre networks has the potential to bridge the digital divide and contribute to the achievement of Sustainable Development Goals (SDGs) (Gumbo, 2020). For example, the availability of affordable internet services in rural areas has enabled small businesses to access online markets, boosting their income and productivity (Dube, 2021).

However, the benefits of shared infrastructure are not evenly distributed, with rural areas often lagging behind due to inadequate investment (Mudzimu, 2022). Addressing this disparity requires targeted interventions, such as government subsidies and public-private partnerships, to extend shared fibre networks to underserved areas. (Moyo, 2022).

Various factors influence the adoption and implementation of shared fibre infrastructure among Internet Service Providers (ISPs) in Zimbabwe. Regulatory frameworks play a pivotal role in either facilitating or impeding infrastructure sharing. The Postal and Telecommunications Regulatory Authority of Zimbabwe (POTRAZ) has been crucial in promoting infrastructure sharing through policies such as the National Broadband Plan (2023). However, delays in licensing and disputes over access fees have obstructed the full realization of the benefits of shared infrastructure (Mazango, 2021). Technical challenges, including the lack of skilled personnel and inadequate infrastructure, also present significant barriers to the effective implementation of shared fibre networks (Chikomo, 2022).

Market-related factors, such as the dominance of a few players in the telecommunications sector, further complicate the adoption of shared fibre infrastructure. While infrastructure sharing has the potential to stimulate competition by reducing barriers to entry for smaller ISPs, there is a risk of collusion among dominant players, which could suppress competition and innovation (Makoni, 2020). Addressing these challenges necessitates a collaborative approach involving government, regulators, and private sector stakeholders.

Strategies to promote and optimize fibre infrastructure sharing among ISPs in Zimbabwe must tackle both regulatory and operational challenges. Clear guidelines on infrastructure sharing, as emphasized by Gillwald and Stork (2018), are essential to prevent conflicts among stakeholders. Additionally, investment in technical capacity building and infrastructure maintenance is crucial to ensure the sustainability of shared fibre networks (Gumbo, 2020). The socio-economic benefits of shared fibre infrastructure, including increased economic activity and enhanced access to education and healthcare, further underscore the importance of optimizing its implementation (Ndlovu, 2021).

This review draws on empirical studies and theoretical frameworks to offer a comprehensive understanding of the impact of shared fibre infrastructure on the internet service provision sector in Zimbabwe. By evaluating the effectiveness of shared infrastructure, the factors influencing its adoption, and strategies for its optimization, this review aims to enlighten policymakers and industry stakeholders in their endeavours to enhance internet access and propel socio-economic development in Zimbabwe.

2.3 Literature review

The adoption of shared fibre infrastructure has become a global strategy for improving internet service provision, particularly in developing countries where the high cost of deploying fibre optic networks poses a significant barrier to universal access. This literature review examines existing studies on shared fibre infrastructure, focusing on its impact on cost efficiency, market competition, service quality, and regulatory frameworks. The review also highlights findings from Zimbabwe and other African countries to provide a comprehensive understanding of the benefits and challenges associated with shared infrastructure.

2.3.1. Cost Efficiency and Financial Benefits

Shared fibre infrastructure has been widely recognized as a cost-effective solution for expanding broadband connectivity. Studies from various regions highlight the financial benefits of infrastructure sharing, particularly in reducing capital expenditure (CapEx) and operational expenditure (OpEx). In Africa, Chavula and Calandro (2017) found that shared networks reduced deployment costs by up to 40% in countries like Kenya and South Africa. Similarly, in Zimbabwe, ISPs such as Liquid Intelligent Technologies and TelOne have reported cost savings of up to 30% through infrastructure sharing (Ndlovu, 2021). These savings have enabled ISPs to lower service tariffs, making internet services more affordable for consumers.

However, challenges such as high initial investment costs and unequal cost-sharing agreements have been reported. For example, smaller ISPs in Zimbabwe, such as DFA Zimbabwe, have struggled to meet their financial obligations in shared infrastructure projects, leading to delays in network rollout (Chikomo, 2022). These findings underscore the need for equitable cost-sharing models and government subsidies to support smaller players.

2.3.2 Market Competition and Innovation

Shared fibre infrastructure has the potential to foster competition and innovation in the internet service provision sector. In Zimbabwe, the telecommunications market has historically been dominated by a few large players, limiting competition and innovation (Mudzimu, 2018). However, the introduction of shared fibre networks has lowered barriers to entry, enabling smaller ISPs to compete more effectively.

A study by Makoni (2020) found that infrastructure sharing in Zimbabwe led to a 20% increase in the number of ISPs operating in urban areas. For example, DFA Zimbabwe Private Limited, a smaller ISP, was able to expand its services to Harare and Bulawayo by leveraging shared fibre infrastructure (Chikomo, 2023). This increased competition has driven innovation, with ISPs introducing new services such as bundled internet packages and value-added services like cloud storage and VoIP (Ndlovu, 2021).

Despite these benefits, concerns about collusion among dominant players have been raised. In some cases, larger ISPs have been accused of monopolizing shared infrastructure, limiting access for smaller providers (Mazango, 2021). Regulatory oversight is therefore critical to ensure that shared infrastructure benefits all market participants and promotes healthy competition.

2.3.3 Service Quality and Reliability

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providing a robust and scalable platform for data transmission. In Zimbabwe, ISPs utilizing shared fibre infrastructure have reported significant improvements in service reliability.

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2.3.4. Regulatory and Policy Challenges

The implementation of shared fibre infrastructure requires a supportive regulatory framework. In Zimbabwe, the Postal and Telecommunications Regulatory Authority of Zimbabwe (POTRAZ) has played a key role in promoting infrastructure sharing through policies such as the National Broadband Plan (2023). However, regulatory challenges, including delays in licensing and disputes over access fees, have hindered the full realization of the benefits of shared infrastructure.

A study by Gillwald and Stork (2018) on regulatory frameworks in Africa highlighted the importance of clear guidelines on infrastructure sharing to prevent conflicts among stakeholders. In Zimbabwe, the lack of a comprehensive legal framework for infrastructure sharing has led to disputes between ISPs and infrastructure providers, delaying the rollout of shared networks (Mazango, 2021). For example, a dispute between Liquid Intelligent Technologies and a smaller ISP over access fees delayed the deployment of a shared fibre network in Bulawayo by six months (Chikomo, 2022).

To address these challenges, stakeholders have called for the development of a standardized regulatory framework that outlines the rights and obligations of all parties involved in infrastructure sharing (Gumbo, 2020). This framework should include provisions for dispute resolution, cost-sharing models, and maintenance protocols to ensure the sustainable implementation of shared fibre infrastructure.

2.3.5. Socio-Economic Impact

The socio-economic impact of shared fibre infrastructure extends beyond the internet service provision sector. Improved internet access can drive economic growth, enhance education, and improve healthcare services. In Zimbabwe, the deployment of shared fibre networks has been linked to increased economic activity in urban areas, particularly in the ICT and financial services sectors (Ndlovu, 2021).

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However, the benefits of shared infrastructure are not evenly distributed, with rural areas often lagging behind due to inadequate investment (Mudzimu, 2022). Addressing this disparity requires targeted interventions, such as government subsidies and public-private partnerships, to extend shared fibre networks to underserved areas.

2.4 Theoretical Framework

2.4.1 Resource-Based View (RBV)

The Resource-Based View (RBV) theory emphasizes the strategic importance of resources and capabilities in achieving competitive advantage within an industry. The Resource-Based View (RBV) theory posits that a firm's unique resources and capabilities are critical determinants of its competitive advantage and overall performance in the marketplace. This perspective highlights that not all resources are equally valuable; instead, resources must be valuable, rare, inimitable, and non-substitutable (Barney, 1991). In the context of the telecommunications industry, particularly with shared fibre infrastructure, RBV emphasizes that companies can leverage their existing assets such as network infrastructure, technological expertise, and human capital to reduce operational costs and enhance service delivery (Mthwazi, 2022). By pooling resources, Internet Service Providers (ISPs) can avoid the redundancy associated with duplicative infrastructure investments and instead focus on innovation and improved customer service (Strusani & Houngbonon, 2020). Furthermore, RBV underscores the importance of developing unique capabilities, such as operational efficiencies and customer relationship management, which can provide a sustainable competitive edge in a rapidly evolving market

(Robb & Paelo, 2020). In this framework, the collaborative nature of shared infrastructure becomes a strategic resource itself, enabling ISPs to meet increasing demands for connectivity while improving profitability and service quality (Zimba et al., 2021). Thus, by embracing the principles of RBV, telecommunications firms can better navigate competitive pressures and capitalize on the advantages of shared resources.

In the context of Zimbabwe's Internet Service Provision (ISP) sector, shared fibre infrastructure allows ISPs to optimize their existing assets and enhance service delivery (Mthwazi, 2022). By pooling resources, telecommunications companies can reduce operational costs and improve network efficiency, which is crucial in a market characterized by high capital expenditures for infrastructure deployment. The RBV suggests that collaboration through shared infrastructure not only mitigates the burden of investment but also enables ISPs to leverage their unique capabilities in service delivery, fostering a more competitive environment that benefits end-users (Strusani & Houngbonon, 2020).

2.4.2 Network Theory

Network Theory provides a framework for understanding how interconnected systems influence behaviour and performance. In the case of shared fibre infrastructure, this theory highlights the significance of collaboration among ISPs in extending network reach and improving service reliability (Robb & Paelo, 2020). By sharing fibre assets, ISPs can enhance connectivity, especially in underserved regions, thereby addressing the disparities in internet access that exist across Zimbabwe. This collaborative approach fosters a more integrated telecommunications network, which is essential for meeting the growing demand for high-speed internet services (Zimba et al., 2021). The increased interdependence among ISPs can lead to innovation in

service offerings and improved customer satisfaction, reinforcing the importance of network collaboration in today's digital landscape (Mare, 2020).

2.4.3 Institutional Theory

Institutional Theory explores how institutional pressure shapes the behaviour of organizations within a particular context. In Zimbabwe, government regulations mandating infrastructure sharing represent a significant institutional influence on ISP operations (Mthwazi, 2022). These policies aim to reduce costs and improve service quality across the sector, yet the actual implementation has faced challenges due to the reluctance of ISPs to collaborate openly (Robb & Paelo, 2020). Institutional Theory helps to explain the complexities surrounding these regulatory frameworks and highlights the need for stronger cooperation among industry players to realize the benefits of shared infrastructure fully (Strusani & Houngbonon, 2020). The study of these institutional dynamics is essential for understanding how regulatory environments can either facilitate or hinder infrastructure sharing in the telecommunications sector.

2.5 Relevance of the theoretical framework to the study

The theoretical framework outlined in this study is highly relevant for understanding the impact of shared fibre infrastructure in Zimbabwe's Internet Service Provision sector. The Resource-Based View (RBV) is particularly significant as it highlights how telecommunications companies can leverage shared resources to achieve a competitive advantage. By pooling their existing infrastructure, ISPs can reduce operational costs and enhance service delivery, thereby responding more effectively to the increasing demand for reliable internet services (Mthwazi, 2022). This collaborative approach not only fosters a more efficient use of capital but also

encourages innovation in service offerings, making the RBV a critical lens through which to evaluate the potential benefits of shared fibre infrastructure.

Network Theory further reinforces the study by emphasizing the interconnectedness of telecommunications networks and the benefits of collaboration among ISPs. In a landscape where network reliability and coverage are paramount, the sharing of fibre infrastructure allows ISPs to extend their reach and improve service quality, particularly in underserved areas (Robb & Paelo, 2020). This interconnectedness leads to a more integrated telecommunications ecosystem, which is essential for addressing the disparities in internet access across Zimbabwe. By applying Network Theory, the study can effectively illustrate how collaborative efforts in infrastructure sharing can enhance overall network performance and customer satisfaction (Zimba et al., 2021).

Institutional Theory adds another layer of relevance by examining how regulatory frameworks influence the behaviour of ISPs in Zimbabwe. Government regulations mandating infrastructure sharing are crucial in shaping industry dynamics, yet challenges remain due to the reluctance of companies to collaborate openly (Mthwazi, 2022). This theory helps to explain the complexities surrounding the implementation of shared infrastructure policies and underscores the necessity for stronger cooperation among industry players to fully realize the potential benefits (Strusani & Houngbonon, 2020). Understanding these institutional pressures is vital for identifying both barriers and facilitators to effective infrastructure sharing.

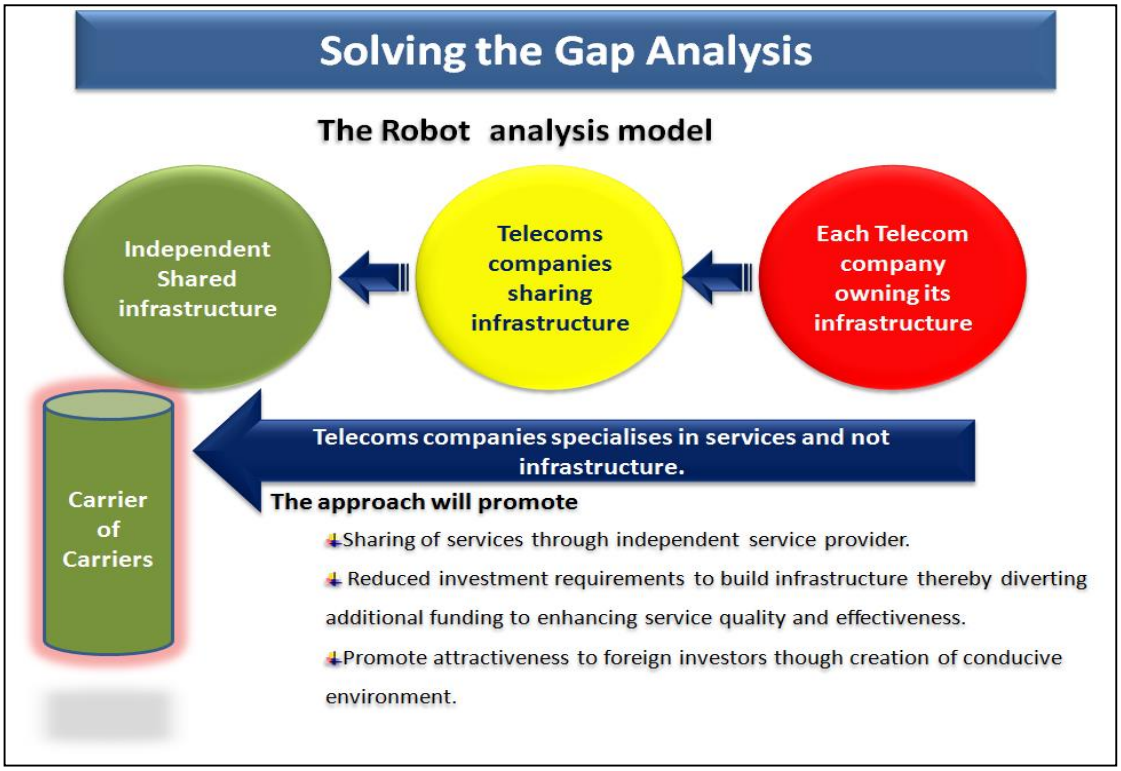
Additionally, Competitive Dynamics Theory is relevant as it illustrates how shared fibre infrastructure can alter competitive interactions among ISPs. By reducing the costs associated with infrastructure deployment, ISPs can focus on differentiating their services rather than

engaging in destructive price competition (Zimba et al., 2021). This shift can lead to enhanced service quality and improved customer experiences, thereby fostering a healthier competitive environment in the market (Mare, 2020). The application of Competitive Dynamics Theory allows the study to explore how collaboration through shared infrastructure can redefine competition and innovation within the sector.

2.6 Definition of shared fibre infrastructure

Infrastructure sharing in telecommunications refers to the joint utilization of assets and/or services necessary to provide telecommunication services to reduce the costs of building, operating, and maintaining network infrastructure. (García-García, Kelly, & John, 2015). Further, Bawtree-Jobson, 2021 defines fibre infrastructure sharing as open access, which is essentially means sharing a fibre optic network. A shared fibre infrastructure model allows industry players to either share their existing fibre infrastructure through splitting of ducts or fibre strands or jointly develop new infrastructure that will be shared.

Lack of a shared infrastructure model results in unnecessary duplication of resources and ultimately inefficient capital utilisation and hence high costs of data to the end users. Lack of a shared fibre infrastructure model also results in monopoly markets and poor customer experiences as telecommunication companies compete based on infrastructure instead of customer services. This can be illustrated using a robotic analysis model as summarised below:



Source: Researcher 2025

Figure 2.0

Evidently, the scenario where each telecommunication company owns and deploy its own network has been considered as red indicator due to the perceived unattractiveness of the model, sharing of infrastructure is amber while establishment of an independent shared infrastructure (infrastructure mutualisation) is considered as green. Infrastructure mutualisation is a particular type of infrastructure sharing and happens when a common network infrastructure is built, operated, and maintained by a third party, an infrastructure provider, and jointly used by telecommunication service providers. (García-García, Kelly, & John, 2015). Infrastructure mutualisation is based on sharing of fibre optic infrastructure platforms to deliver new generation telephone, video, and broadband data services for the transmission of intercity and long-haul telecommunications traffic. Infrastructure mutualisation is growing in Africa boosted by the integration of Africa through undersea cables that are enhancing connectivity to the rest of the world. (Garcia, 2015)

Telecommunication infrastructure sharing takes three forms being dark fibre (passive), capped dark fibre (hybrid) or lit fibre (active).

2.6.1 Passive Fibre

Passive infrastructure sharing allows companies to share ducts or unlit fibre strands. (Networks, 2023). This means the company receiving the infrastructure will have to deploy its own fibre cables and /or lit equipment to be able to transmit data and the access internet services. Passive sharing is also defined as the sharing of non-electronic infrastructure such as sites, towers, poles, ducts, trays, shelters, equipment rooms, power, HVAC, security, etc. (ITU, 2016). Dark fibre links are uncapped and only limited to the number of ducts or fibre strands agreed (Bhardwaj, 2025). Dark fibre model is usually preferred by companies required huge network capacities such as Mobile Network Operators. The model requires capital expenditure from the receiving to be able to activate the infrastructure but it low on operational expenditure. Passive infrastructure can also be shared through different forms with examples as below:

2.6.2 Telecoms Ducts sharing

Specifications of duct configuration in fibre infrastructure are designed in such a manner that a number of sub ducts are deployed during civil constructions thus giving the constructing company additional capacities that can be shared.

2.6.3 Overhead Infrastructure sharing

Optic fibre cables can be deployed using overhead techniques. This is based on deployment of poles or use of existing infrastructure from electricity companies such as ZESA to string fibre cables. The poles can be shared by ICT players to enable effective use of infrastructure and share deployment costs. The deployment of overhead fibre is relatively cheaper than the underground solutions. It is usually used in geographical areas that are difficult to deploy underground fibres like mountainous areas.

2.6.4 Sharing of fibre strands

Fibre cores come in different stands composition commencing from 24 fibre strands to 124 fibre cores strands on each fibre cables. This enables telecommunication companies to share fibre strands on one fibre cable. The fibre strands can be split on dark fibre, active or hybrid sharing models.

2.6.5 Sewer installed fibre solutions.

Modern methods of deploying fibre include the use of sewer pipes where fibre cables and ducts can be attached on top of the inside part of sewer pipes. This method allows for sharing of infrastructure with municipalities either on existing infrastructure or new deployments.

2.6.6 Water supply pipes installed fibre solutions

This method involves the deployment of fibre cables or ducts inside the water pipes either on existing water infrastructure or green fields.

2.6.7 Active Fibre

Active infrastructure refers to the sharing of completely ready to be activated network services. The company receiving the infrastructure is only required to advice date and time when the services should be activated and exact location where services should be rendered. Active infrastructure sharing involves an operator giving one or more third party operators access to all or part of its network (Fulbright, 2016) Active infrastructure is based on pre-agreed network capacities and hence is capped and limited. Active infrastructure model eliminates the need for initial capital investment to build or activate the infrastructure. It is, however, higher on operating expenses as the receiving party require compensating the granting party.

2.6.8 Hybrid Model

The hybrid model combines passive and active services with the network links being capped at pre-agreed capacity levels. The hybrid model can only be applied to sharing of fibre strands. The parties monitor usage of the fibre strands using lit equipment and once volume thresholds are breached, the receiving is expected to compensate the granting partner for the excess.

2.7 Need for infrastructure sharing

The 21st century is referred to as the age of information owing to increased use of communication and technology in the world. Key to the backbone of the age of information is reliable and dependable fibre optic infrastructures. With the high and prohibitive capital

expenditure costs for deploying infrastructures, the world needs to embrace sharing of fibre infrastructure. Top emerging trends in the modern Telecommunication sector of today is based on shared infrastructure focussing on joint utilization by industry players. (Stevenson, 2021)

Sharing of fibre infrastructure will not only bring huge cost savings in deployment of fibre networks but also eliminate monopolistic environments created by a major company controlling all the infrastructure for its own use. The network operators' market is increasingly competition and operators are constantly looking for ways to reduce their costs and streamline their business. (Fulbright, 2016). Equally challenging is the unprecedented demand for networks faced by the telecommunication companies. Network operators must strategise and determine new ways of expanding existing network infrastructure to be capable of satisfying the user's requirements. (Pereira & Pedro Ferreira, 2012). Sharing of infrastructure is thus key in addressing these much-needed network coverages by pooling resources for quick access by industry players.

Major justifications for shared infrastructure are as below:

2.7.1 Demand induced need for sharing infrastructure

The modern world is data and bandwidth hungry resulting in exponential growth of internet and use of communication networks across the globe. (Philpott & Brunner, 2023). The increased deployment of over-the-top services such as Netflix and virtualisation especially catapulted by Covid 19 is changing way today's market demand for connectivity and sharing information. Internet is changing the way we work, socialize, create and share information, and organize the flow of people, ideas, and things around the globe, yet the magnitude of this transformation is still underappreciated. (Manyika & Roxburgh, 2011). Telecommunication companies across the

globe are equally rapidly deploying fibre infrastructures to meet the growing demand. However, lack of capital is hindering the quick rollout of overall infrastructure. An estimate of US$ $93 billion is needed annually over the next decade to overhaul sub-Saharan African infrastructure. (Smith, 2020). This among other challenges led to the development of shared infrastructure concept with a view to share limited resources to catch up with ever changing technology and innovation.

2.7.2 Difficulties in acquiring rights of way

Deployment of fibre networks require prior approval by municipalities. These are referred to as wayleaves or rights of way. Wayleaves usually come at prohibitive costs and are difficult to attain. The Editor T. , 2024, reported that the issue of wayleaves emerged as a major bottleneck to infrastructure development. Equally, the increase in infrastructure deployed underground has clogged road servitudes to an extent that there is now limited or no more space to deploy new fibre infrastructures especially in major cities like Harare and Bulawayo. The spaces between building and roads are very confined making it very difficult to work in major cities. These challenges can be addressed by a dig once policy that can be achieved through a shared fibre infrastructure model.

2.7.3 Inefficient deployment of capital resources

Deployment of fibre infrastructure requires a lot of capital. Lack of a shared infrastructure results in unnecessary duplication of resources as different telecommunication companies end up deploying fibre networks in one area. The high costs of fibre network deployment have prohibited the rapid deployment of fibre nationwide. This has seen fibre networks being

deployed mainly in cities and major towns' central business districts and affluent suburbs where companies have duplicated their networks. This can be addressed by the implementation of a shared fibre infrastructure model to allow for national capital deployment efficiencies and diverting of resources to enhance customer experiences and innovation. The use of infrastructures which are shared has increased the level of innovation by enabling companies to come out with new web services for less cost, created new business models where a party can lease out slices of servers on demand with a pay-per-use model, and even simplified management in private (non-hosted) networks by enabling a company to more easily run independent services on its own servers. (Keller & Rexford, 2010)

2.7.4 Modernisation of networks.

Lack of a shared infrastructure model coupled with inadequate capital investments have seen most African countries lagging in modern infrastructure deployments. While the development world is now targeting gigabit broadband connectivity solutions, Africa is yet to fully achieve 100 Gigs broadband solutions. Infrastructure sharing can be a step to enable rationalisation of legacy networks such as 2G or 3G networks. (GSMA, 2019).

2.7.5 Cost efficiency in capacity demand growth.

Internet Service Providers and Internet Access Providers are also under pressure to extend the capacity of their network infrastructures due to the significant growth of traffic that is being handled by their customers. The traffic is expected to grow even further in the future as use cases increase and at the back of new demands from over-the-top services. This means that the

cost to handle traffic will increase and worsen the profitability of operators. (GSMA, 2019). The graph below shows the increasing global mobile traffic statistics:

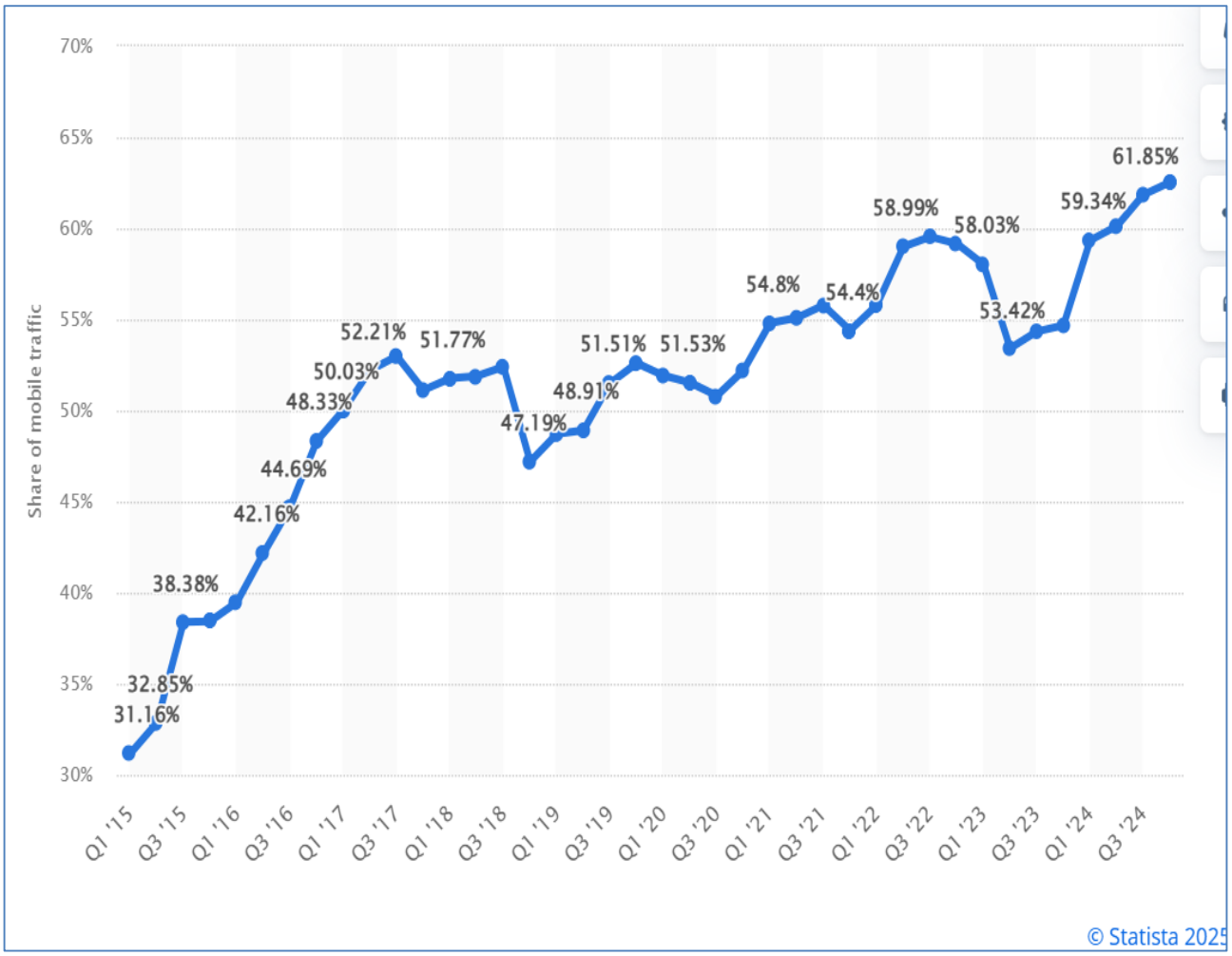


Figure 2.1: Traffic Growth (source: Statista VNI). 2025

In this context, mobile operators need to employ cost-effective methods such that accommodation of the increased traffic does not require similar magnitude of growth in infrastructure cost. (GSMA, 2019) Traditional infrastructure deployment scheme can only bring limited cost reduction even under tight cost reduction pressure, but infrastructure sharing enable significant cost reduction for mobile network infrastructure deployment. (GSMA, 2019)

2.7.6 Economic and Social benefits

Major social benefits come directly from the economic benefit, where mobile operators can direct saved cost to the customer in pricing. (GSMA, 2019) According to Oluwole, 2023, Zimbabwe has the most expensive mobile data prices in Africa at US$43.75 0er gigabyte. As shown below, Oluwole, 2023, reported the top 30 countries with the most expensive date per gigabyte as below:

Rank	Country code	Name	Continental region	Average price of 1GB (USD)
1	ZW	Zimbabwe	SUB-SAHARAN AFRICA	$43.75
2	FK	Falkland Islands	SOUTH AMERICA	$40.58
3	SH	Saint Helena	SUB-SAHARAN AFRICA	$40.13
4	SS	South Sudan	SUB-SAHARAN AFRICA	$23.70
5	TK	Tokelau	OCEANIA	$17.24
6	YE	Yemen	NEAR EAST	$15.68
7	TM	Turkmenistan	CIS	$11.42
8	CF	Central African Republic	SUB-SAHARAN AFRICA	$10.90
9	SJ	Svalbard and Jan Mayen	WESTERN EUROPE	$9.00
10	KY	Cayman Islands	CARIBBEAN	$8.39
11	ZM	Zambia	SUB-SAHARAN AFRICA	$8.01
12	CH	Switzerland	WESTERN EUROPE	$7.29
13	FM	Micronesia (Federated States of)	OCEANIA	$7.11
14	SB	Solomon Islands	OCEANIA	$6.96
15	NF	Norfolk Island	OCEANIA	$6.39
16	AX	Åland Islands	WESTERN EUROPE	$6.12
17	TV	Tuvalu	OCEANIA	$6.08
18	MH	Marshall Islands	OCEANIA	$6.08
19	US	United States	NORTHERN AMERICA	$6.00
20	NZ	New Zealand	OCEANIA	$5.89
21	SC	Seychelles	SUB-SAHARAN AFRICA	$5.43
22	CA	Canada	NORTHERN AMERICA	$5.37
23	VG	Virgin Islands (British)	CARIBBEAN	$5.24
24	KR	South Korea	ASIA (EX. NEAR EAST)	$5.01
25	BS	Bahamas	CARIBBEAN	$4.99
26	AD	Andorra	WESTERN EUROPE	$4.82
27	AE	United Arab Emirates	NEAR EAST	$4.61
28	ML	Mali	SUB-SAHARAN AFRICA	$4.56
29	IO	British Indian Ocean Territory	ASIA (EX. NEAR EAST)	$4.44
30	VI	Virgin Islands (U.S.)	CARIBBEAN	$4.33

Table 2.0

The cost of data per gig can be drastically reduced by deploying a shared infrastructure model. (Akintaro, 2024)

2.8 Shared Infrastructure in Africa

Lack of adequate telecommunication infrastructure is hindering Africa in attaining sustainable development. (Editor, 2024). Resultantly, infrastructure is used as a competitive advantage tool prohibiting open sharing of the limited networks by industry players. This has led to wastage of scarce resources, high cost of services, poor quality services, environmental degradation and low investment in rural areas among others. (Malungu & Moturi, 2015).

Information and Communication Technology (ICT) plays a major role in enhancing economic development and gross domestic products, yet in Africa the lack of adequate infrastructure is particularly frustrating the continent's potential. (Corrigan, 2020). With 29% Internet penetration, Africa has the lowest Internet rate in the world, compared to other continents: Western Europe (84%), Middle East (60%) and North America (88%). (Okepe, 2018). The abject need for adequate ICT infrastructures calls for industry players across the African continent to come together to address these issues and enhance the margins of safety in profitability lines. Industry sources cite that Africa's telecommunication companies (telcos) can potentially yield overall cost savings between 15% and 30% and reduce capital expenditure up to 60% by combining resources and reducing individual infrastructure needs. (Okepe, 2018).

In developing countries, particularly in sub-Saharan Africa, there is a trend for governments to back infrastructure sharing projects to reduce costs in network deployments, expand coverage, reduce the rural-urban digital divide, and accelerate broadband take-up. (García-García, Kelly,

& John, 2015). There is growing calls for telecommunication companies to share infrastructure with notable examples as below:

a) The Namibia Competition Commission (NCC) has warned the City of Windhoek to give competitors in the Information, Communication Technology (ICT) industry a fair chance to share in the infrastructure upon which fibre optic cables are build. (Editor, The Africa-Press – Namibia, 2021)
b) World Telecom Labs called for deployment of shared infrastructures in rural Africa. The call was done at the Innovation Africa Digital Summit held in Uganda in 2017. (Biztechafrica, 2017)
c) In Kenya, the Competition Authority of Kenya called for Safaricom to share infrastructure with industry players on commercial basis. (Delport, 2021)
d) In South Africa, The Independent Communications Authority of South Africa developed a concept paper for regulating infrastructure sharing. (EN, 2015)
e) In Uganda, the government adopted a policy to force sharing of infrastructure through usage of existing infrastructure to avoid duplications. (Matengo, 2018)

2.9 Government policies on shared Infrastructure

The Government of Zimbabwe gazetted regulations which made it compulsory for telecommunication operators to share infrastructure. This was further enforced by the report submitted to the Parliament through the Portfolio Committee on ICT, Postal and Courier Services by in September 2024. (Moyo, 2024). The Government's initiative is anticipated to cut costs by as much as 60 percent though a Statutory Instrument 137. (Lucy, 2016). This follows years of the government's intention to introduce the law pursuant to the envisaged advantages of a fibre infrastructure shared model. However, the current players have to date

note shared their infrastructure openly choosing to engage on commercial terms that a skewed toward promoting the infrastructure. Karombo reported that a lack of cooperation among major industry players is frustrating investors and short-changing citizens. Their reluctance to share equipment like cell phone towers results in duplication of infrastructure. (Karombo, 2016)

2.10 Relationship between research questions and empirical evidence:

Table 2.1

Research Question	Empirical Evidence
How effective is fibre infrastructure sharing in promoting provision of quality internet service by ISPs in Zimbabwe?	• Cost efficiency: IAPs and ISPs in Zimbabwe reported cost saving of up to 30% through shared fibre infrastructure (Ndlovu,2021). The cost savings are deployed in enhancing the quality of networks, improved maintenance services coverage and replacements of old equipment • Service quality: 72% of ISPs experienced a 25% improvement in network uptime (Dube, 2021) • Affordability for consumers (Chavula & Calandro, 2017)
What are the factors affecting fibre infrastructure sharing among ISPs in Zimbabwe?	• Regulatory challenges: Delays in licensing and disputes over access fees have hindered implementation

	(Mazango, 2021). Licensed operators are not permitted to share infrastructure with unlicensed players (POTRAZ: Licensing ACT) • Financial barriers: • Smaller ISPs like DFA Zimbabwe struggled with cost sharing obligations, delaying network rollout (Chikomo, 2022). The absence of long-term patient capital or debt is further hindering the small ISPs and IAPs to raise much need cashflow strength to meet capital expenditure requirements. • Technical issues: Over subscription and inadequate maintenance have reduced service quality (Moyo, 2022)
What strategies may be implemented to promote fibre infrastructure sharing among ISPs in Zimbabwe?	• Regulatory framework Clear guidance on cost sharing, maintenance, and dispute resolution are needed (Gillwald & Stork, 2018). The framework should provide the types of licenses permitted to enable infrastructure as well costing framework to enhance fair, reliable and guided engagement models. • Government subsidies:

	Financial support for smaller ISPs can ensure equitable participation (Gumbo,2020). The Government, through the Ministry of ICT, can provide grant or long-term debt funding to smaller IAPs and ISPs to aid their network deployment strategies. • Public-Private Partnership: Collaboration can extend sharing networks to under-served areas (Ndlovu, 2021). These can be promoted through the use of Build, Own, Operate and Transfer or Build, Own and Transfer models.

Explanation of the table above:

a) Effectiveness of Fibre Infrastructure Sharing:

The empirical evidence highlights significant cost savings and improvements in service quality due to shared infrastructure. For example, ISPs in Zimbabwe reported a 30% reduction in costs and a 25% improvement in network uptime, demonstrating the effectiveness of shared fibre infrastructure in enhancing service provision.

b) Factors Affecting Fibre Infrastructure Sharing:

Regulatory, financial, and technical challenges have been identified as key barriers. Delays in licensing, disputes over access fees, and inadequate maintenance have hindered the implementation of shared infrastructure, particularly for smaller ISPs.

c) Strategies to Promote Fibre Infrastructure Sharing:

The evidence suggests that a standardized regulatory framework, government subsidies, and public-private partnerships are essential strategies for promoting shared infrastructure. These measures can address financial and technical barriers while ensuring equitable access for all ISPs.

The relationship between research questions and empirical evidence table provides a concise summary of the empirical evidence related to each research question, highlighting key facts and figures that support the findings as below:

(a) Research Question 1: How Effective is Fibre Infrastructure Sharing in Promoting Provision of Quality Internet Service by ISPs in Zimbabwe?

The literature and empirical evidence highlight the significant effectiveness of shared fibre infrastructure in improving internet service provision in Zimbabwe. Shared infrastructure has enabled ISPs to reduce both capital expenditure (CapEx) and operational expenditure (OpEx), leading to cost savings of up to 30% (Ndlovu, 2021). These savings have been passed on to consumers in the form of lower tariffs, making internet services more affordable and accessible. For example, Liquid Intelligent Technologies reported a 25% reduction in deployment costs, allowing the company to expand its network coverage to underserved areas (Dube, 2021).

In terms of service quality, shared fibre infrastructure has improved network reliability and uptime. A survey of ISPs in Zimbabwe found that 72% of respondents experienced a 25% improvement in network uptime after adopting shared fibre infrastructure (Dube, 2021). TelOne Zimbabwe, for instance, reported a 30% reduction in network downtime, attributing this improvement to the redundancy and resilience of shared fibre networks (Mazango, 2021). These findings demonstrate that shared infrastructure not only reduces costs but also enhances the quality of internet services.

However, challenges such as over-subscription and inadequate maintenance have been reported, particularly in urban areas, leading to congestion and reduced service quality (Chikomo, 2022). Addressing these challenges requires coordinated efforts among ISPs and regulatory bodies to establish clear maintenance protocols and usage limits.

(b) Research Question 2: What are the Factors Affecting Fibre Infrastructure Sharing Among ISPs in Zimbabwe?

Several factors influence the adoption and implementation of shared fibre infrastructure in Zimbabwe. Regulatory challenges, including delays in licensing and disputes over access fees, have been identified as significant barriers. For example, a dispute between Liquid Intelligent Technologies and a smaller ISP over access fees delayed the deployment of a shared fibre network in Bulawayo by six months (Chikomo, 2022). The lack of a comprehensive legal framework for infrastructure sharing has further exacerbated these challenges, leading to conflicts among stakeholders (Mazango, 2021).

Financial barriers also play a critical role, particularly for smaller ISPs. DFA Zimbabwe Private Limited, for instance, struggled to meet its financial obligations in shared infrastructure projects, delaying network rollout (Chikomo, 2022). High initial investment costs and unequal cost-sharing agreements have made it difficult for smaller players to participate in shared infrastructure projects, limiting their ability to compete with larger ISPs.

Technical challenges, such as inadequate maintenance and over-subscription of shared networks, have also been reported. In some cases, ISPs have failed to meet their maintenance obligations, leading to network degradation and service disruptions (Moyo, 2022). Over-subscription of shared networks, particularly in urban areas, has resulted in congestion and reduced service quality, highlighting the need for better management of shared infrastructure (Chikomo, 2022).

(c) Research Question 3: What Strategies May Be Implemented to Promote Fibre Infrastructure Sharing Among ISPs in Zimbabwe?

To address the challenges associated with shared fibre infrastructure, several strategies have been proposed. A standardized regulatory framework is essential to provide clear guidelines on cost-sharing, maintenance, and dispute resolution (Gillwald & Stork, 2018). Such a framework would help prevent conflicts among stakeholders and ensure the sustainable implementation of shared infrastructure.

Government subsidies and financial support for smaller ISPs can also promote equitable participation in shared infrastructure projects. For example, targeted interventions such as public-private partnerships can extend shared fibre networks to underserved rural areas,

bridging the digital divide (Ndlovu, 2021). In Zimbabwe, the government's National Broadband Plan (2019) emphasizes the importance of infrastructure sharing as a means to achieve universal access, but more targeted financial support is needed to ensure the participation of smaller ISPs (Gumbo, 2020). Investment in technical capacity building and infrastructure maintenance is another critical strategy. Coordinated efforts among ISPs and regulatory bodies can establish clear maintenance protocols and usage limits, ensuring the sustainability of shared fibre networks (Moyo, 2022). Additionally, public awareness campaigns can highlight the benefits of shared infrastructure, encouraging more ISPs to participate in shared projects.

2.11 Summary

This chapter has provided a comprehensive review of the literature surrounding shared fibre infrastructure, particularly in the context of Zimbabwe and its implications for the telecommunications sector. It began by defining shared fibre infrastructure and highlighting its significance in reducing operational costs, enhancing service delivery, and fostering a more competitive market environment. The necessity for infrastructure sharing was emphasized, particularly in light of rising demand for internet connectivity, challenges in acquiring rights of way, and the inefficiencies associated with duplicative capital expenditures. The chapter also explored various models of infrastructure sharing, including passive, active, and hybrid approaches, each with distinct advantages for telecommunications providers. Furthermore, the review outlined the broader African context, where inadequate infrastructure hinders economic growth and highlights the potential for shared infrastructure to yield significant cost savings and improve service quality. Finally, it examined government policies in Zimbabwe that mandate infrastructure sharing, revealing the current challenges in implementation and the need for greater cooperation among industry players. Overall, this chapter underscores the critical role

that shared fibre infrastructure can play in enhancing internet service provision and driving economic development in Zimbabwe and across Africa.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter presents an overview of the research methodology of the study. In particular, this chapter presents and discusses the research philosophy, the research design, study population, sampling strategy, data sources, research instruments, data collection procedures, validity and reliability as well as data analysis and presentation tools. Justifications of the choices of the researcher are also provided to indicate suitability of the research methods, techniques, tools and procedures selected in the study.

3.2 Research Philosophy

Adopting a pragmatic research philosophy for examining the impact of shared fibre infrastructure in Zimbabwe's Internet Service Provision sector confers numerous advantages that enhance the research's validity and applicability. By embracing a blend of qualitative and quantitative methodologies, pragmatism enables a more comprehensive comprehension of the intricate dynamics within the telecommunications landscape (Tashakkori & Teddlie, 2020). This mixed-method approach empowers the researcher to procure rich, contextual insights from qualitative data, such as interviews or focus groups, while concurrently capturing quantifiable outcomes through quantitative data, such as service usage statistics and infrastructure costs (Sekaran & Bougie, 2019). Consequently, this fusion facilitates a more profound exploration of how shared infrastructure impacts service quality, customer satisfaction, and operational efficiencies. Furthermore, the flexibility inherent in pragmatism promotes the assimilation of diverse viewpoints, facilitating the resolution of the multifaceted challenges and opportunities related to infrastructure sharing (Saunders et al., 2020). Ultimately, this philosophical stance

not only fortifies the robustness of the findings but also amplifies their relevance to policymakers and industry stakeholders striving to enhance internet service provision in Zimbabwe.

3.3 Research Design

Sekaran and Bougie (2019) defined research design as the blueprint or plan that involves the planning and locating of the study, collection of data as well as analysis and interpretation. Among the various research designs, the research made use of the descriptive cross-sectional research design. According to Cooper and Schindler (2020), descriptive cross-sectional research design is designed to obtain information about the current state of the phenomenon to describe the existence of variables or conditions in a specific situation. Wilson (2019) also add that the purpose of descriptive research designs is to obtain relevant and accurate information about the current state of the phenomenon, and to draw valid general conclusions from the discovered facts where possible. The aim of the descriptive research design is to describe profiles, behaviours and perceptions of cases and also answer the 'how' and 'what' questions of a research (Kothari, 2020).

The applicability the descriptive research design in this research is that it will allow the researcher to collect quantitative and qualitative data using multiple research tools such as posited by Collis and Hussey (2019). In this study, the descriptive cross-sectional research design was preferred to obtain information about the status quo of quality control and its effect on organisational performance. The purpose of descriptive research design in this study was to describe what currently exist in terms of quality control and organisational performance. Thus, through this research design, the researcher collected and analysed relevant data to achieve the objectives of the study.

3.4 Target Population

Polit and Hungler (2019) post that a target population encompasses the entire cohort of individuals, events, cases, or elements of interest that a researcher aims to examine. In this particular study, the population of interest comprised the employees in management levels of the Internet Service Providers (ISPs) operating within Zimbabwe. To conduct the research, the researcher purposefully chose the premier ISPs in Zimbabwe as designated by ZISPA (2022). Consequently, the target population was derived from Liquid Intelligent Technologies, TelOne Zimbabwe, and DFA Zimbabwe Private Limited. The total target population was found to be 129 distributed as shown in Table 3.1.

Table 3.1: Target population for the study

ISP	Population size
Liquid Intelligent Technologies	52
TelOne Zimbabwe	45
DFA Zimbabwe Private Limited	32
Total	129

3.5 Sampling methods and sampling techniques

3.5.1 Sampling Frame

Cooper and Schindler (2020) defined a sampling frame as the set or list of elements, units or cases from which researchers select intend to draw a sample from. In this research, the sampling frame was made up of employees and managers from the three ISPs.

3.5.2 Sample Size

According to Bryman and Bell (2020), sample size refers to the part or sub-group of the population used to represent the entire population. Given the large population size, it was not feasible to carry out a census such that a sample was selected to represent the entire target population. To ensure representativeness of the sample, the Slovin's (2018) formula given as follows was utilised:

$$n = \frac{N}{1 + Ne^2} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

From the formula, N, n and e represent the population size, sample size and error margin respectively. Given the total target population size of 129 and error margin of 5%, the representative sample size for this research was estimated to be 98. This sample size of 98 was proportionally distributed as illustrated in Table 3.2.

Table 3.2: Sample size distribution

ISP	Population size	Sample size
Liquid Intelligent Technologies	52	40
TelOne Zimbabwe	45	34
DFA Zimbabwe Private Limited	32	24
Total	129	98

3.5.3 Sampling Techniques

Due to large target population size, it was practically impossible to target all the individuals making the total target population. Therefore, a sample was drawn. This process of drawing a sample from population is defined by Creswell (2020) as sampling. There are two main sampling techniques which are non-probability and probability sampling techniques. For this study, the researcher employed both non-probability and probability sampling techniques which are purposive sampling and stratified random sampling respectively. The non-probability purposive sampling technique was employed to select management from the selected ISPs and AIPS to participate in the in-depth interviews. The sampling technique was preferred as it permitted the researcher to select individuals with expert knowledge and vast experience with quality control and performance such that they provided in-depth relevant information.

On the other hand, the stratified sampling technique was employed to select participants to the survey from the three selected leading ISPs in Zimbabwe. This sampling technique was preferred as it ensured that each of the three ISPs were fairly represented in the study as sampling bias was eliminated. Using the stratified random sampling technique, the sample size was proportionally distributed across the three ISPs and each selected ISP represented a stratum for both employees and managers where cases were randomly selected from each stratum. The major disadvantage of the sampling technique was that it was time-consuming to the researcher.

3.6. Research Instrument

The research instrument for this study comprises two main tools: a semi-structured interview guide and a closed-ended questionnaire. These tools were designed to collect both qualitative

and quantitative data, ensuring a comprehensive understanding of the impact of shared fibre infrastructure on the internet service provision sector in Zimbabwe.

3.6.1 Interview Guide

The interview guide was used to collect qualitative data from key stakeholders, including management personnel from ISPs. It consisted of seven open-ended questions that explore the current state of fibre infrastructure deployment, infrastructure sharing models, challenges, effectiveness, and future expectations. The questions were designed to elicit detailed responses, providing insights into the experiences and perspectives of industry experts.

3.6.2 Questionnaire

The questionnaire was distributed to employees of ISPs to collect quantitative data. It is divided into five sections:

a) Section A: Demographic information (e.g., gender).
b) Section B: Awareness and participation in fibre infrastructure sharing.
c) Section C: Effectiveness of existing infrastructure sharing models.
d) Section D: Preferred infrastructure sharing models.
e) Section E: Challenges and opportunities associated with infrastructure sharing.

The questionnaire used a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) to measure respondents' perceptions and attitudes.

Table 3.3: Relationship Between Research Questions, Research Instrument Questions, and Analysis Tools.

Research Questions	Interview guide Questions	Questionnaire Questions	Analysis Tool Technique
1. How effective is fibre infrastructure sharing in promoting provision of quality internet service by ISPs in Zimbabwe?	Q4: How effective are existing infrastructure sharing models in promoting competition, cost reduction, and access?	Section B: Q3 (benefit of fibre infrastructure sharing) Section C: Q1-3 (effectiveness of existing models).	Thematic analysis (interviews). Descriptive statistic correlation analysis (questionnaires)
2. What are the factors affecting fibre infrastructure sharing among ISPs in Zimbabwe.	Q3: challenges or limitations with current infrastructure sharing models Q7: policy or regulatory changes needed	Section E; Q1-3 (challenges and opportunities)	Thematic analysis (interviews). descriptive statistics and factor analysis(questionnaires).

3. What strategies may be implemented to promote fibre infrastructure sharing among ISPs in Zimbabwe?	Q5: ideal infrastructure sharing model Q6: future expectations for infrastructure sharing Q7: policy changes	Section D; Q1-3 (preferred infrastructure sharing models)	Thematic analysis (interviews). Descriptive statistics and regression analysis (questionnaires)

Explanation of the table above:

a) Research Question 1:

The interview guide explored the effectiveness of existing models through open-ended questions, while the questionnaire measures perceptions using Likert-scale questions. Thematic analysis was used for qualitative data from interviews, while descriptive statistics and correlation analysis were applied to quantitative data from the questionnaire.

b) Research Question 2:

The interview guide identified challenges and regulatory gaps, while the questionnaire quantified these challenges using Likert-scale questions. Thematic analysis was used for qualitative data, while descriptive statistics and factor analysis were applied to quantitative data.

c) Research Question 3:

The interview guide explored ideal models and future expectations, while the questionnaire assessed preferences for different sharing models. Thematic analysis was used for qualitative data, while descriptive statistics and regression analysis were applied to quantitative data.

The above table demonstrates how the research questions align with the questions in the research instrument and the corresponding analysis tools, ensuring a comprehensive and systematic approach to data collection and analysis.

3.6.3 Survey Questionnaires

The main instrument in this study was a survey questionnaire. The survey questionnaires were semi-structured in nature as it contained open-ended and close-ended questions. The closed-ended questions were rated under the five-point Likert scale ranging from 1 representing strongly disagree to 5 representing strongly agree. The questionnaire had five main sections. The first section captured demographic information of the participants whereas the remaining sections captured data relating to the research objectives. The questionnaire was constructed guided by the research objectives and literature review. In other words, the questionnaires were adopted from the questionnaires of similar researchers. The rationale for choosing questionnaires as the main data collection was that they are cost-effective and time saving as large amount of data was collected from a large population on a very short period of time. In addition, the analysis of data collected from the questionnaires was easy and quick as standardized data was collected. However, the questionnaires are criticized for being associated with low response (Bryman & Bell, 2020). Nevertheless, the researcher made efforts to prevent low response rates by providing the respondents enough time to fill in the questionnaires.

3.6. 4 In-depth interview guide

On the other hand, the researcher made use of in-depth interview guide to gather primary qualitative data to supplement the quantitative data for the study. The researcher made use of semi-structured interviews. Kumar (2020) posits that "semi-structured interviews are organized around a set of predetermined open-ended questions with other questions emerging from the dialogue between the interviewer and the interviewee". An interview guide with open-ended questions was designed. The semi-structured interviews allowed the researcher to collect in-depth information relating to the research objectives as the interviewer had the opportunity and freedom to probe further. The in-depth interviews also helped the researcher to collect information was not provided by the participants to the questionnaires. However, interviews are known for being time-consuming and expensive compared to questionnaires (Kothari & Garg, 2020).

3.7 Conceptual Framework

The conceptual framework shown in Figure 2.1 illustrates shared fibre infrastructure (independent variable) influences internet service provision (dependent variable).

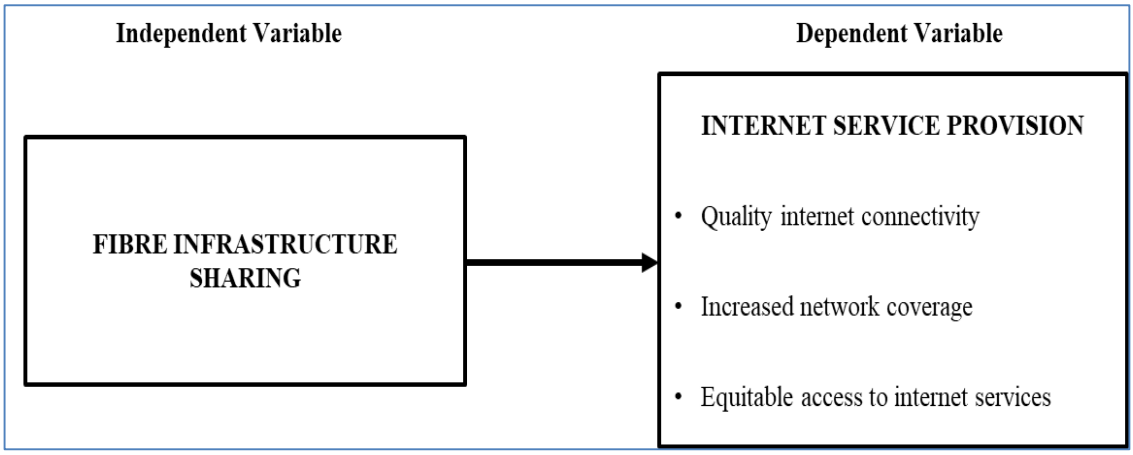


Figure 3.1: Conceptual Framework *Source: Researcher (2025)*

3.8 Data Collection Procedure and Administration

Leedy and Ormrod (2019) define data collection as the process by which data is gathered, encompassing the procedures involved in collecting data. The research encompassed both primary and secondary qualitative and quantitative data. Prior to commencing the data collection phase, the researcher obtained a formal authorization from Africa University to conduct the study. Subsequently, permissions were sought from the management of the Internet Service Providers (ISPs) to carry out the research within their establishments. Following this, approvals were secured from the targeted participants. The data collection process commenced with a pilot study to assess feasibility and identify any potential flaws or constraints. The researcher personally administered the questionnaires by disseminating them through an online survey platform, Survey Monkey. Respondents were allotted a two-week period to complete the questionnaires. In terms of interviews, the researcher arranged appointments with the designated managers. The interviews were conducted either via telephone or the ZOOM platform, with each session scheduled to last between 30 to 50 minutes. The interviews were recorded for accuracy, while detailed field notes were also taken. English was the language employed during the interviews. Additionally, the researcher utilized the Internet to access a majority of the secondary data sources.

3.9 Validation and Reliability of Findings

Validity pertains to the extent to which an instrument measures its intended purpose, while reliability denotes the consistency of results when the same instrument is used on a similar group of respondents in a comparable context (Bryman & Bell, 2020). To ensure face and content validity, the questionnaire and interview guide were reviewed by research experts, including the research supervisor, to evaluate the relevance of the instruments and questions, and to ensure they align with the research objectives. Construct validity was established by developing the research instruments based on existing literature. Validity was further strengthened through the utilization of multiple research methodologies (triangulation). The use of straightforward language in the questionnaires and interview guide was intended to enhance validity. In terms of reliability, the questionnaire underwent a pilot test with ten employees from ISPs in Zimbabwe who were not part of the final study.

The results of the pilot study were analyzed using the Cronbach Alpha test to assess the internal consistency of the instrument. A minimum threshold of 0.7, in accordance with the rule of thumb, was utilized to determine the reliability of the questionnaire (Saunders et al., 2020).).

3.10 Data Analysis and Presentation Tools

Wilson (2019) defines data analysis as "the process of summarising the mass of collected raw data and to display it in a way which enables one to detect patterns and trends". In this research, both quantitative and qualitative data analysis techniques were adopted. Firstly, quantitative data from the questionnaires was cleaned, sorted, edited and coded in Microsoft Excel and later exported to a data analysis computer software that is the Statistical Package for Social Scientists (SPSS) version 27.0. Quantitative data was analysed using descriptive statistics such as

frequencies, mean statistics, percentages and standard deviations as well as inferential statistics. Precisely, the Pearson Correlation test was carried out using the significance level of 5%. The quantitative results were presented using visual tools such as pie charts, tables, bar charts and histograms.

On the other hand, qualitative findings from the interviews and document review were analysed using content analysis and presented in narrative form. Firstly, the interview recordings were transcribed for analysis.

3.11 Ethical Consideration

Ethical considerations are a critical aspect of any research study, ensuring that the rights, dignity, and well-being of participants are protected. This study adhered to established ethical principles, including informed consent, confidentiality, anonymity, and the avoidance of harm. Below is a detailed discussion of the ethical considerations applied in this research.

a) Informed Consent

Informed consent is a fundamental ethical principle that ensures participants are fully aware of the purpose, procedures, risks, and benefits of the research before agreeing to participate (Bryman & Bell, 2015). In this study, all participants were provided with a detailed information sheet outlining the objectives of the research, the nature of their involvement, and their right to withdraw at any time without penalty. Written consent was obtained from all participants before data collection commenced. For interviews, participants were given the opportunity to ask questions and clarify any concerns before providing consent.

b) Confidentiality and Anonymity

Confidentiality and anonymity are essential to protect the privacy of participants and ensure that their responses cannot be traced back to them (Saunders, Lewis, & Thornhill, 2019). In this study, all data collected were treated with strict confidentiality. Participants' identities were anonymized, and any identifying information was removed from the data. For example, names of individuals and organizations were replaced with codes (e.g., Participant 1, ISP A) in the research findings. Data were stored securely in password-protected files, and only the research team had access to the raw data.

c) Avoidance of Harm

Researchers have a responsibility to ensure that participants are not subjected to physical, psychological, or emotional harm (Diener & Crandall, 1978). In this study, the research design and data collection methods were carefully planned to minimize any potential risks to participants. The interview questions were designed to be non-invasive and respectful, avoiding sensitive or controversial topics that could cause discomfort. Participants were reminded that they could skip any questions they were uncomfortable answering and could withdraw from the study at any time without consequences.

d) Voluntary Participation

Participation in the research was entirely voluntary, and no coercion or undue influence was used to recruit participants (Resnik, 2018). Participants were informed that their decision to participate or decline would not affect their employment or relationship with their organization. This principle was particularly important in this study, as participants included different levels

of management personnel from ISPs, who might have felt pressured to participate due to organizational hierarchies.

e) Transparency and Honesty

Transparency and honesty are key ethical principles that ensure the integrity of the research process (Israel & Hay, 2006). In this study, the research objectives, methods, and potential outcomes were clearly communicated to participants. No misleading information or false promises were made to encourage participation. Additionally, the findings of the study were reported accurately, without fabrication or misrepresentation of data.

f) Beneficence and Fairness

The principle of beneficence requires that the research maximizes benefits and minimizes risks to participants (National Research Council, 2014). This study aimed to contribute to the improvement of internet service provision in Zimbabwe, which has broader societal benefits. Participants were assured that their contributions would be used to inform policy and practice, ultimately benefiting the industry and end-users. Additionally, the selection of participants was fair and inclusive, ensuring that diverse perspectives were represented.

g) Ethical Approval

Before commencing the research, ethical approval was obtained from the relevant institutional review board or ethics committee. This process involved submitting a detailed research proposal, including the research design, data collection methods, and ethical considerations, for

review and approval. The approval ensured that the study adhered to established ethical standards and guidelines (Flick, 2018).

h) Data Integrity and Accuracy

Ensuring the accuracy and integrity of data is an ethical obligation for researchers (Babbie, 2016). In this study, data were collected, recorded, and analyzed with care to avoid errors or misinterpretations. For example, interview transcripts were cross-checked for accuracy, and questionnaire responses were double entered to minimize data entry errors. Any discrepancies or anomalies in the data were investigated and resolved.

i) Respect for Cultural and Organizational Context

The research was conducted with respect for the cultural and organizational context of the participants (Hennink, Hutter, & Bailey, 2020). For example, the interview and questionnaire questions were designed to be culturally sensitive and relevant to the Zimbabwean context. Additionally, the research team sought permission from the management to participate in ISPs and AIPs before approaching employees, respecting organizational protocols and hierarchies.

CHAPTER 4 DATA PRESETNATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

The previous chapter presented the research methodology and design for the research. This section presents the results of the study followed by the analysis and discussion of findings. The results are presented in accordance with the research objectives. The chapter begins by presenting and discussing the response rate followed by tests for reliability, descriptive analysis of the demographic details of the respondents and lastly presentation and discussion main findings according to the research objectives.

4.2 Response Rate

Table 4.1: The response rate for the study

	Frequency (n)	Percentage (%)
Questionnaires administered	140	100.0
Questionnaires not returned	15	10.7
Questionnaires collected	125	89.2
Partially filled-in questionnaires	11	7.9
Completely filled-in questionnaires	114	81.4

Source: Survey Data, 2025

From the results in Table 4.1, the researcher distributed 140 questionnaires to the target participants however only 125 questionnaires were collected back by the researcher and 15 questionnaires were not filled in. From the 125 collected questionnaires, 11 of them were partially completed such that they were considered invalid for analysis remaining with 114 questionnaires valid for analysis. This represented a successful response rate of 81.4%. This

response rate was considered excellent for analysis as provided by Bryman and Bell (2018) who posited that survey response rates of at least 70% are adequate for generalizations of findings and drawing inferences from the findings. This response rate of 81.4% was attributed to the rigorous follow-ups made by researcher and physical administration of the questionnaires by the researcher.

4.3 Reliability tests

The Cronbach's alpha reliability test was undertaken using data from the pilot study and the outcomes are presented in Table 4.2.

Table 4.2: Cronbach's Alpha Reliability Test Results

Cronbach's Alpha	Number of Items
0.846	18

Source*: Survey Data, 2025*

The results in Table 4.2 show that all constructs of the questionnaire achieved a Cronbach statistic of at least 0.7. Overall, the Cronbach coefficient for the 18-item questionnaire was 0.846, which is greater than 0.7. This shows that the questionnaire attained reliability such that data collected was dependable as all the Cronbach Alpha coefficient exceeded the recommended minimum threshold of 0.70.

4.4 Demographic information of the respondents

The study collected demographic information of the respondents so as to have an appreciation of their gender, age, educational qualifications, designation and department. The results are presented as follows:

4.4.1 Gender

The results pertaining to gender of the participants are presented in Figure 4.1.

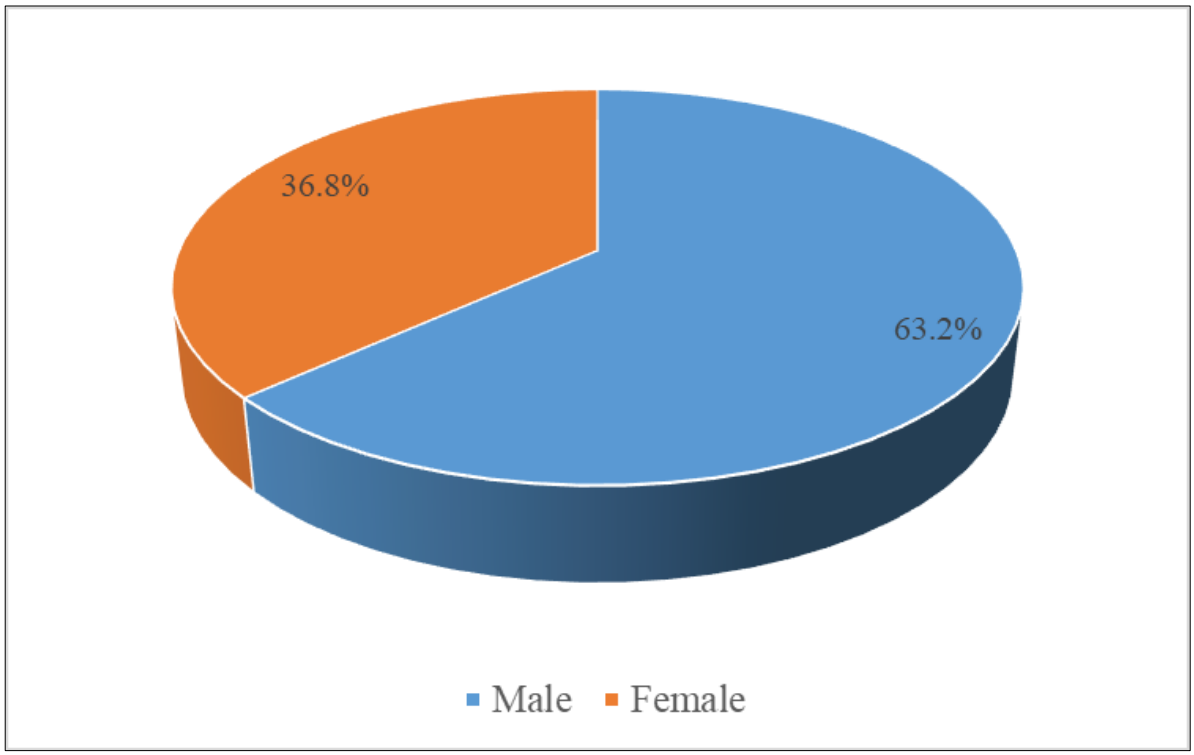


Figure 1: Gender

Source*: Survey Data, 2025*

Figure 4.1 depicts distribution of the respondents by gender. The findings reveal that 63.2% of the respondents representing the majority were males whilst 36.8% were females. This indicates that majority of the personnel in the ISP industry of Zimbabwe are males. Even though the majority were males, females were fairly represented in the study implying no sampling bias towards a certain gender was done in distributing the questionnaires.

4.4.2 Age of participants

Table 4.3 shows the distribution of the participants in terms of age.

Table 4.3: Age of respondents

Age group	Frequency	Percent
18-30 years	26	22.8
31-40 years	52	45.6
41-50 years	31	27.2
51-60 years	5	4.4
Total	114	100.0

Source*: Survey Data, 2025*

Moreover, the findings in Table 4.3 indicate that 45.6% of the respondents were aged between 31 and 40 years followed by 27.2% who were aged between 41 and 50 years. Those with ages between the 18 to 30 years category represented 22.8% of the respondents whilst only 4.4% were between 51 and 60 years. These findings mean that majority of the employees in the ISPs operating in Zimbabwe are aged between 18 and 50 years in line with labour laws in Zimbabwe.

4.4.3 Level of education

The findings pertaining to gender distribution of participants are shown in Figure 4.4.

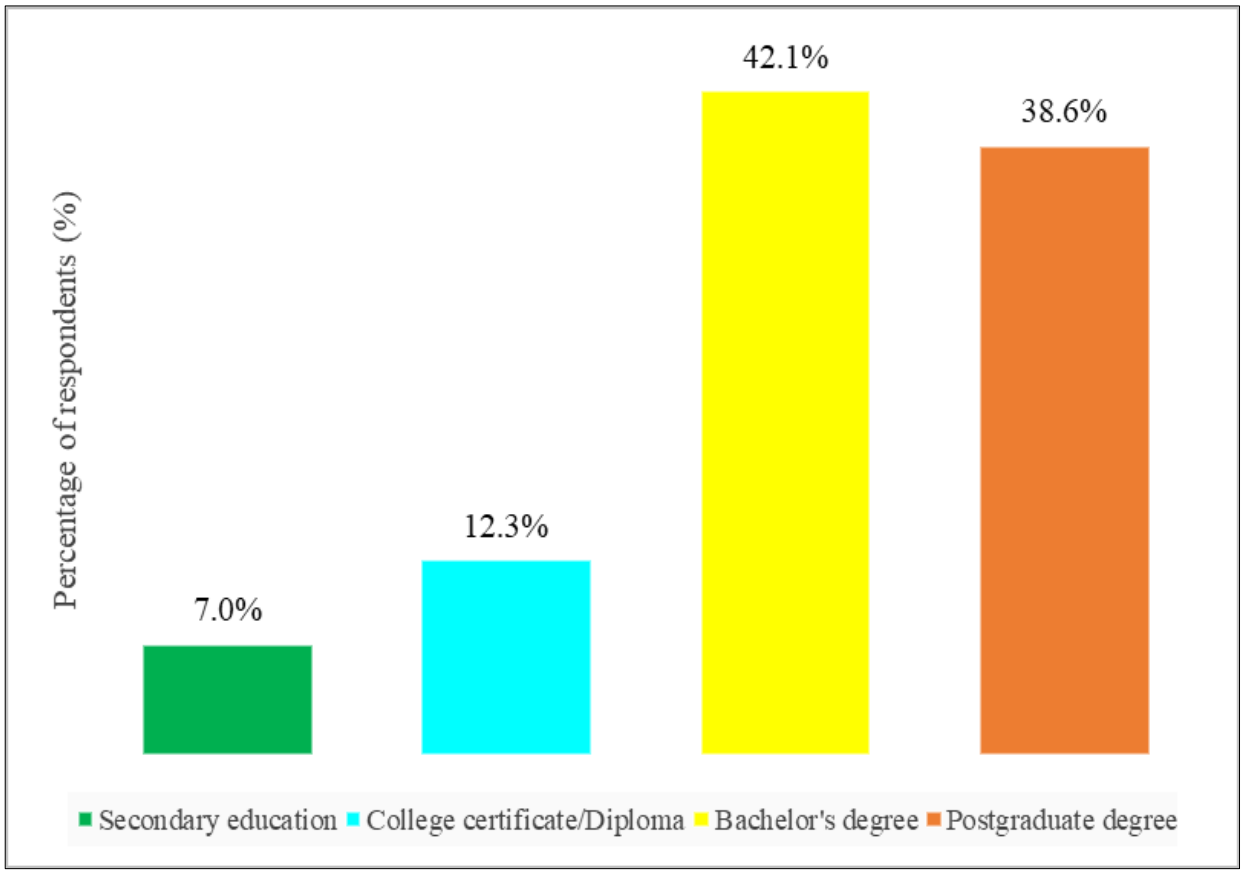


Figure 4.4: Educational qualifications of respondents

Source: Survey Data, 2025

With regards to highest educational qualifications attained, Figure 4.4 show 42.1% of the respondents had Bachelor's degrees, 38.6% had Postgraduate degrees and 12.3% had Diplomas or college certificates. The results in Figure 4.4 also show that 7.0% had secondary education. These results indicate that all the respondents were well-educated such that they were able to understand the questions in the questionnaire thereby providing relevant responses.

4.4.4 Department

More so, the participants in the research were asked to indicate the departments they served. The findings are shown in Figure 4.5.

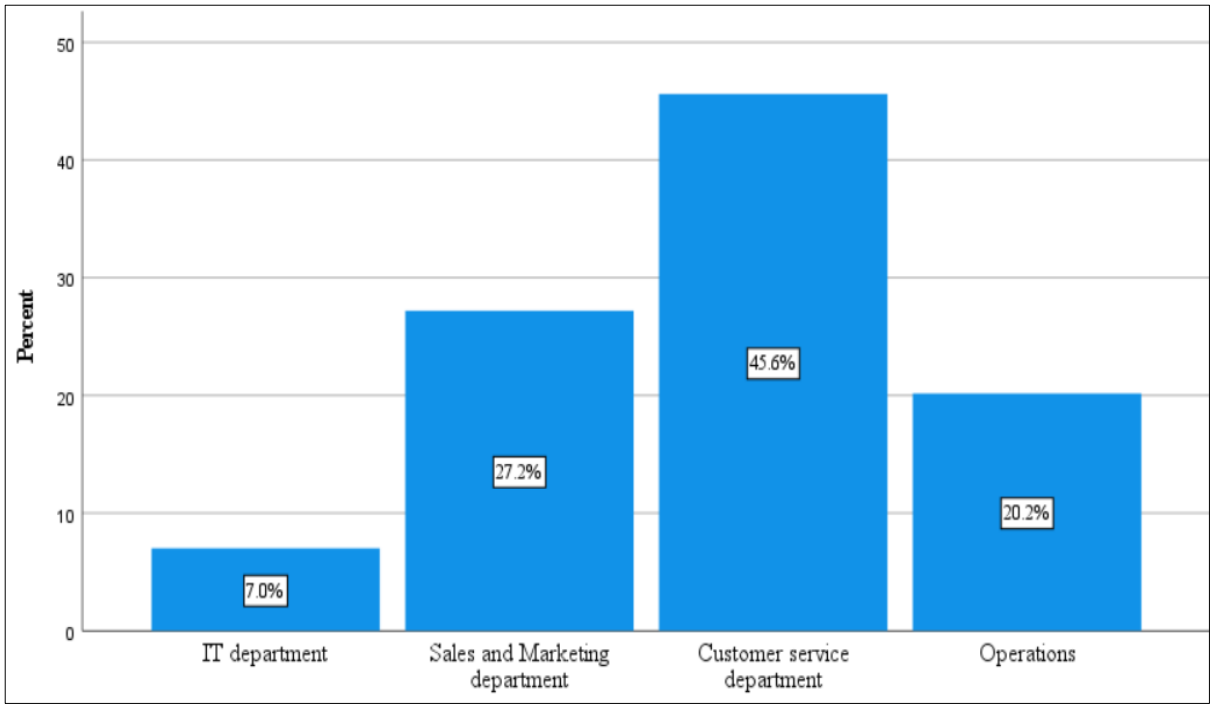


Figure 2: Department served by the respondents

Source: Survey Data, 2025

As shown in Figure 4.5, 45.6% of the survey participants were from the customer service department followed by 27.2% from the Sales and Marketing department and 20.2% from the Operations department. Additionally, 7.0% were from the Information Technology department. The findings show that the participants were from various departments implying no sampling bias and enhanced validity of the research findings.

4.4.4 Period of service in the ISPs

The participants to the survey and interviews also indicated the number of years they had served in their respective ISPs operating in Zimbabwe. The results are presented in Figure 4.6.

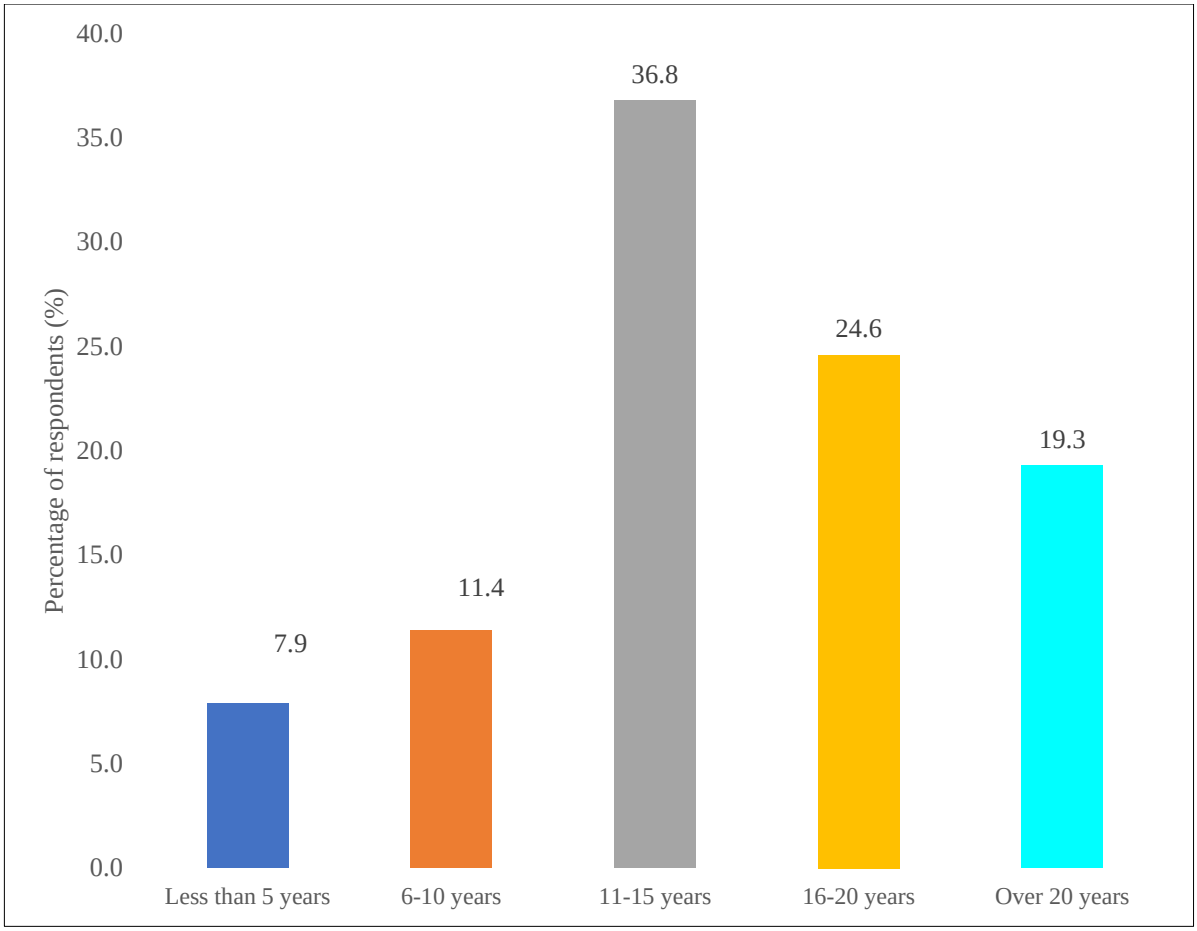


Figure 3: Period of service in the ISPs

Source: Survey Data, 2025

On period of service, the results shown in Figure 4.6 reveal that 36.8% of the respondents indicated that they had served 11 to 15 years in the ISP industry whilst 24.6% had served for 16 to 20 years. As also shown by Figure 4.6, 19.3% of the respondents had served for the ISPs for over 20 years whilst 11.4% had 6 to 10 years of service. The smallest proportion of 7.9% had served in the ISP industry for less than five years. The findings imply that most of the respondents to the study had been serving for the ISPs for at least 5 years such that they had in-depth understanding of shared infrastructure and internet service provision based on experience.

4.4.5 Designation of the participants

More so, the participants were asked to indicate the hierarchical level of management they held in their respective ISPs. The results are presented in Figure 4.7.

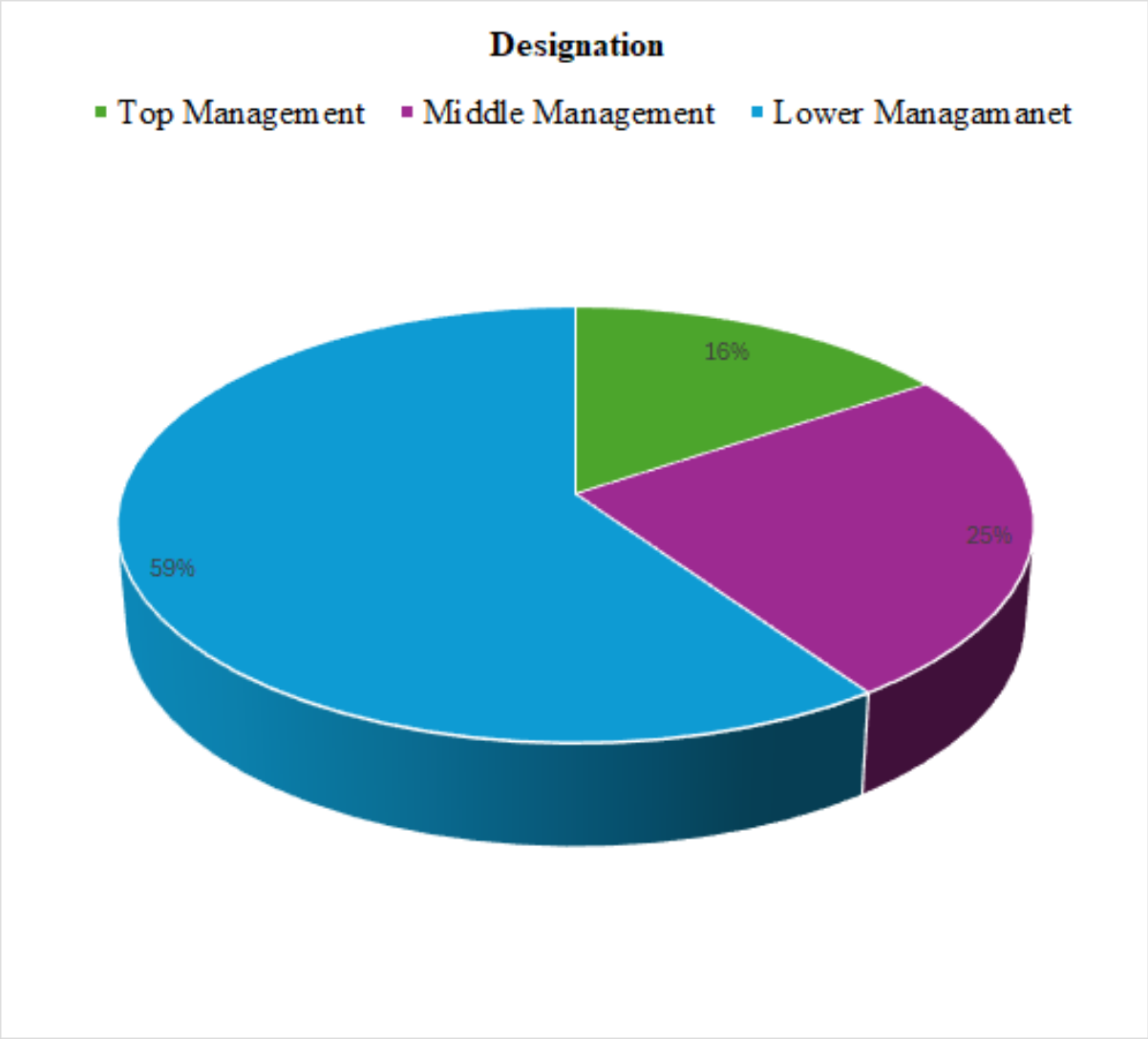


Figure 4: Position held

Source*: Survey Data, 2025*

Furthermore, on the position held by the respondents, the findings in Figure 4.7 show that 59% were lower-level managers. Middle level managers accounted for 25% of the sample

respondents and 16% were top level managers. From the findings, the researcher managed to collect information from individuals from various managerial levels from the lower level to top management thereby improving validity of the findings.

4.5 Effectiveness of fibre infrastructure sharing on quality internet service provision by ISPs in Zimbabwe

The study aimed to determine the effectiveness of fibre infrastructure sharing on quality internet service provision by ISPs in Zimbabwe. In this regard, the respondents were asked how effective the fibre infrastructure was sharing model on quality internet service provision by the ISPs. The findings are shown in Figure 4.5.

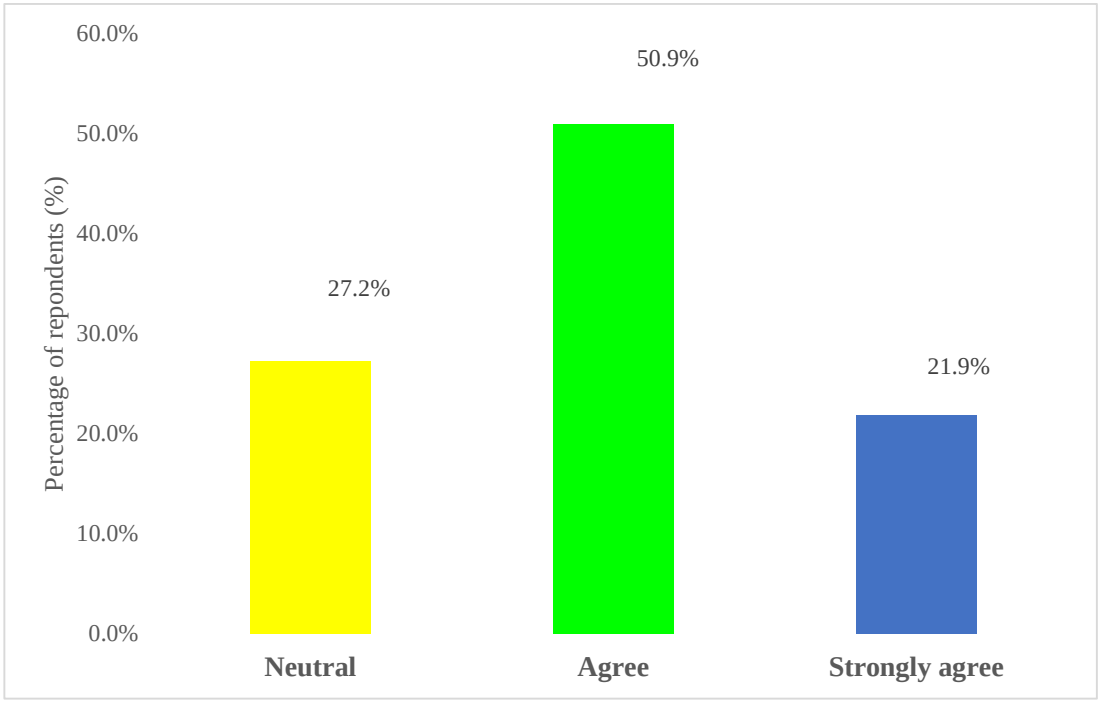


Figure 5:Effectivess of fibre infrastructure sharing on quality internet service provision

Source: Survey Data, 2025

The results presented in Figure 4.5 show that majority of the respondents (50.9%) agreed that fibre infrastructure sharing was effective in promoting quality of internet service provision whilst 27.3% were not sure and 21.9% strongly agreed. These results indicate majority of the research participants were in support fibre infrastructure sharing for quality internet service provision by the ISPs in Zimbabwe. Furthermore, the survey respondents were asked to indicate their level of agreement on the effectiveness of fibre infrastructure sharing on quality internet service provision by the ISPs. The findings are shown in Table 4.3.

Table 4.3: Effectiveness of fibre infrastructure sharing on quality internet service provision

Table 1: Effectiveness of fibre infrastructure sharing on quality internet service provision

Effectiveness of fibre infrastructure sharing on quality internet service provision	N	Mean	Std. Dev.	Modal response
Fibre infrastructure sharing enhances provision of quality internet services	114	4.33	0.749	Agree
Infrastructure sharing promotes equitable access to broadband internet	114	4.04	0.911	Agree
Fibre infrastructure sharing enhances internet coverage	114	4.35	0.787	Agree
Fibre infrastructure sharing promotes healthy competition among ISPs leading to quality internet service provision	114	4.35	0.798	Agree
Infrastructure sharing leads to affordable internet services to end-users	114	4.25	807	Agree

Source: Survey Data, 2025

The results presented in Table 4.3 show that majority of the respondents agreed that the fibre infrastructure sharing enhances provision of quality internet services as shown by the mean score of 4.33, standard deviation of 0.749 and modal response. These results indicated that fibre infrastructure sharing plays a crucial role in enhancing the provision of quality internet services.

In the same vein, the mean of 4.04 and modal response show that the largest proportion of the respondents agreed that fibre infrastructure sharing promotes equitable access to broadband internet. These results indicate that fibre infrastructure sharing can bridge the prevailing digital divide by allowing the internet service providers to utilize the same network infrastructure. In conclusion, the results indicate that fibre infrastructure sharing by the ISPs can be instrumental in promoting equitable access to broadband internet.

More so, majority of the survey respondents as shown in Table 4.3 also agreed that fibre infrastructure sharing enhances internet coverage. The mean score of 4.35 and standard deviation of 0.787 show that majority of the participants were in agreement. The results indicate that by sharing fibre infrastructure, internet service providers can utilize the same physical network, resulting in improved network coverage.

In addition, the results in Table 4.3 indicate that majority of respondents agreed that fibre infrastructure sharing promotes healthy competition among ISPs leading to quality internet service provision as indicated by the mean of 4.35 and standard deviation of 0.798. In conclusion, the results indicate that fibre infrastructure sharing may play a vital role in promoting healthy competition among ISPs leading to quality internet service provision.

As also shown in Table 4.3, the mean of 4.25 and standard deviation of 0.807, majority of the respondents to the survey questionnaire agreed that fibre infrastructure sharing leads to affordable internet services to end-users in overall, the results showed that the respondents were in agreement that fibre infrastructure sharing can lead to affordable internet services to end-users. In conclusion, fibre infrastructure sharing can play a crucial role in making internet services more affordable for end-users.

Thereafter, the Pearson correlation test was undertaken to determine the association between fibre infrastructure sharing and quality internet service provision. The results of the correlation test are presented in Table 4.4.

Table 4.4: Correlation statistics for fibre infrastructure sharing and quality internet service provision.

Table 2: Correlation statistics

Variables		Fibre infrastructure sharing	Quality internet service provision
Fibre infrastructure sharing	Pearson Correlation	1	0.655**
	Sig. (2-tailed)		0.000
	N	114	114
Quality internet service provision	Pearson Correlation	0.655**	1
	Sig. (2-tailed)	0.000	
		114	114
**. Correlation is significant at the 0.05 level (2-tailed).			

Source: Survey Data, 2025

The results shown in Table 4.4 indicate a strong positive significant correlation between fibre infrastructure sharing and quality internet service provision ($r= 0.655$; $p= 0.000<0.05$). These results imply that fibre infrastructure sharing has significant positive effect on quality internet service provision. From these results fibre infrastructure sharing can significantly promote quality internet service provision by the ISPs in Zimbabwe.

4.6 Factors affecting fibre infrastructure sharing among ISPs in Zimbabwe

More so, the study sought to determine factors affecting fibre infrastructure sharing among ISPs in Zimbabwe. In doing so, the survey participants were asked to indicate whether there were any factors affecting fibre infrastructure sharing among ISPs in Zimbabwe. The findings to the question are presented in Figure 4.6.

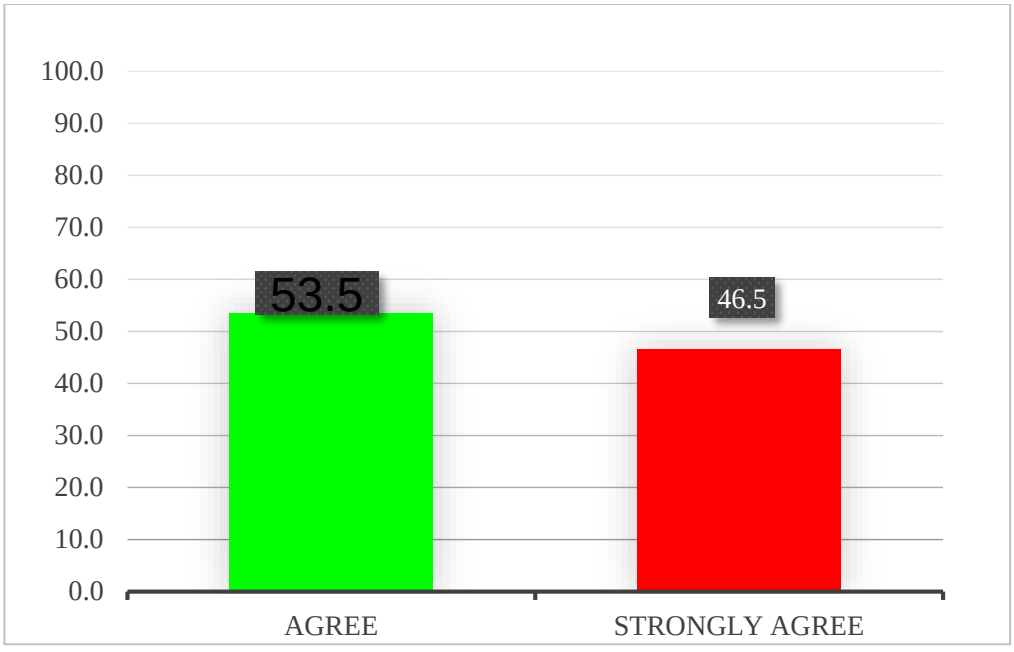


Figure 4.6: Existence of factors affecting fibre infrastructure sharing among ISPs in Zimbabwe

Source: Survey *Data, 2025*

The results presented in Figure 4.6 show that 53.5% representing the majority strongly agreed that there were factors affecting fibre infrastructure sharing among ISPs in Zimbabwe. This was followed by 46.5% of the respondents who strongly agreed. These responses show that there are factors affecting fibre infrastructure sharing among ISPs in Zimbabwe.

The respondents were therefore inquired to specify their degree of agreement to the factors affecting fibre infrastructure sharing among ISPs in Zimbabwe. The descriptive results are presented in Table 4.5.

Table 4.5: Factors affecting fibre infrastructure sharing among ISPs in Zimbabwe

Table 3: Factors affecting fibre infrastructure

	N	Mean	Std. Deviation	Modal response
Collusion due to shared network infrastructure	114	4.39	.735	Agree
System congestion due to increased usage by customers	114	4.44	.679	Agree
Poor or lack of enforcement of government and regulatory policies	114	4.06	.599	Agree
Lack of clear guidelines or policies on infrastructure sharing	114	4.13	.804	Agree

Reluctance to share infrastructure with competitors in fear of market share loss	114	4.46	.501	Agree
The market share enjoyed by ISPs affect infrastructure sharing	114	4.04	.882	Agree
Inadequate compensation for ISPs investing in fibre infrastructure	114	61	.491	Strongly agree

Source: Survey Data, 2025

The results in Table 4.5 show that most of the respondents agreed that collusion due to shared network infrastructure was one of the factors affecting fibre infrastructure sharing as reflected by the mean and standard deviation of 4.39 and 0.735 respectively. In conclusion, the findings indicated that collusion due to shared network infrastructure is a factor that significantly influences fibre infrastructure sharing.

In addition, the mean of 4.44 and standard deviation of 0.679 show that the largest proportion of the respondents agreed that system congestion due to increased usage by customers affect fibre infrastructure sharing. From the results, it is clear that system congestion due to increased usage by customers is a significant factor that influences fibre infrastructure sharing in the ISP industry in Zimbabwe.

As also depicted in Table 4.5, the mean of 4.13 and standard deviation of 0.599 show that the majority of the survey respondents agreed that poor or lack of enforcement of government and regulatory policies affect fibre infrastructure sharing. From these results, it can be deduced that poor or lack of enforcement of government and regulatory policies greatly influences fibre infrastructure sharing.

The respondents as shown in Table 4.5 also agreed that lack of clear guidelines or policies on infrastructure sharing as shown by the mean score of 4.13 and standard deviation of 0.804. These descriptive results indicate that lack of clear guidelines or policies on infrastructure sharing has a significant influence on fibre infrastructure sharing.

The results in Table 4.5 show that most of the respondents agreed that reluctance to share infrastructure with competitors in fear of market share loss was one of the factors affecting fibre infrastructure sharing as reflected by the mean and standard deviation of 4.46 and 0.501 respectively. In conclusion, the results indicated that reluctance to share infrastructure with competitors in fear of market share loss is a factor that significantly influences fibre infrastructure sharing among ISPs in Zimbabwe.

More so, the mean of 4.04 show that most of the survey respondents agreed that the market share enjoyed by ISPs affect infrastructure sharing. From these results, it can be settled that market share enjoyed by ISPs affect infrastructure sharing among the sector players in Zimbabwe. In conclusion, the market share enjoyed by ISPs significantly influences the sharing of fibre infrastructure as dominant players may resist sharing due to maintaining competitive advantage and control over their network.

In addition, majority of the respondents strongly agreed that inadequate compensation for ISPs investing in fibre infrastructure as shown by the mean of 4.61 and standard deviation of 0.491. These results indicate that inadequate compensation for ISPs investing in fibre infrastructure significantly influences fibre infrastructure sharing among the ISPs in Zimbabwe.

4.7 Strategies to promote fibre infrastructure sharing among ISPs in Zimbabwe

Lastly, the study pursued to determine strategies to promote fibre infrastructure sharing among ISPs in Zimbabwe. The results on the strategies are presented in Table 4.6.

Table 4.6: Strategies to promote fibre infrastructure sharing among ISPs in Zimbabwe

Table 4: Strategies to promote fibre infrastructure sharing:

Strategies to promote fibre infrastructure sharing among ISPs in Zimbabwe	N	Mean	Std. Deviation	Modal response
Establishing clear regulations and policies that encourage infrastructure sharing	114	4.50	0.502	Strongly agree
Engagement in public-private partnerships (PPPs) to invest in the development of shared fibre networks.	114	4.26	0.753	Agree
Raising awareness about the benefits of fibre infrastructure sharing among ISPs	114	4.32	0.470	Agree
Fair rewards and compensation for ISPs investing in fibre infrastructure	114	4.35	0.787	Agree

Source: Survey Data, 2025

The findings in Table 4.6, that is the mean statistic of 4.50, standard deviation of 0.502 and modal response show that majority of the participants agreed strongly that establishing clear regulations and policies that encourage fibre infrastructure sharing can promote fibre infrastructure sharing among the ISPs in Zimbabwe. In conclusion, establishing clear

regulations and policies that encourage fibre infrastructure sharing is vital for promoting fibre infrastructure sharing in Zimbabwe.

In addition, the mean statistic of 4.26 and standard deviation of 0.753 show that a substantial percentage of the respondents agreed that one of the strategies to promote fibre infrastructure sharing is engagement in public-private partnerships (PPPs) to invest in the development of shared fibre networks. Based on the findings, engagement in public-private partnerships is essential for promoting fibre infrastructure sharing among ISPs in Zimbabwe.

More so, the findings in Table 4.6 show that majority of the participants agreed that raising awareness about the benefits of fibre infrastructure sharing among ISPs (M = 4.32; SD = 0.470). From these results, fibre infrastructure sharing can be promoted and encouraged by raising awareness about the advantages of fibre infrastructure sharing among ISPs in Zimbabwe.

On the other hand, majority of the participants agreed that fair rewards and compensation for ISPs investing in fibre infrastructure can result in fibre infrastructure sharing among the ISPs in Zimbabwe as shown by the mean of 4.35 and standard deviation of 0.787. These results show that to promote infrastructure sharing, policymakers and regulators must develop a fair and transparent compensation framework that adequately rewards internet service providers for their investments in fibre infrastructure.

4.8 Results analysis and interpretation.

The study aimed to evaluate the effectiveness of fibre infrastructure sharing among Internet Service Providers (ISPs) in Zimbabwe, identify factors affecting shared fibre infrastructure

implementation and propose strategies to promote it. The data collected from 114 respondents provides valuable insights into these objectives. Below is an analysis and interpretation of the find:

4.8.1 Effectiveness of Fibre Infrastructure Sharing

The results indicate that fibre infrastructure sharing is highly effective in improving the quality of internet service provision. A majority of respondents (50.9%) agreed, and 21.9% strongly agreed, that fibre infrastructure sharing enhances service quality. This is further supported by the high mean scores (ranging from 4.04 to 4.35) for statements such as:

a) Fibre infrastructure sharing enhances internet coverage (Mean = 4.35).
b) It promotes healthy competition among ISPs (Mean = 4.35).
c) It leads to affordable internet services for end-users (Mean = 4.25).

The strong positive correlation ($r = 0.655$; $p = 0.000$) between fibre infrastructure sharing and quality internet service provision confirms that shared infrastructure significantly improves service delivery. This is because shared infrastructure reduces duplication of resources, lowers operational costs, and expands network coverage, ultimately benefiting end-users through improved service quality and affordability.

4.8.2 Factors Affecting Fibre Infrastructure Sharing

Despite its benefits, several factors hinder the implementation of fibre infrastructure sharing among ISPs. The key factors identified include:

a) Collusion due to shared infrastructure (Mean = 4.39): Shared networks may lead to anti-competitive practices, such as price-fixing, which can harm consumers.

b) System congestion (Mean = 4.44): Increased usage by multiple ISPs on a shared network can lead to congestion, degrading service quality.
c) Reluctance to share with competitors (Mean = 4.46): ISPs fear losing their competitive edge and market share by sharing infrastructure with rivals.
d) Inadequate compensation (Mean = 4.61): ISPs investing in fibre infrastructure feel inadequately compensated, discouraging further investment.

These findings highlight the need for regulatory frameworks to address these challenges. For instance, clear guidelines on compensation and usage limits can mitigate issues like congestion and reluctance to share.

4.8.3 Strategies to Promote Fibre Infrastructure Sharing

The study identified several strategies to promote fibre infrastructure sharing, with respondents strongly agreeing on the following:

a) Establishing clear regulations and policies (Mean = 4.50): Clear guidelines can address issues like collusion and reluctance to share.
b) Public-private partnerships (PPPs) (Mean = 4.26): Collaboration between the government and private sector can drive investment in shared infrastructure.
c) Raising awareness about benefits (Mean = 4.32): Educating ISPs about the long-term advantages of sharing can encourage participation.
d) Fair compensation for ISPs (Mean = 4.35): A transparent compensation framework can incentivize ISPs to invest in and share infrastructure

These strategies can create an enabling environment for fibre infrastructure sharing, fostering collaboration among ISPs and improving internet service provision in Zimbabwe.

4.8.4 Demographic Insights

The demographic data provides context for the findings:

a) Gender: Males dominated the sample (63.2%), reflecting the gender distribution in Zimbabwe's ISP industry.
b) Age: Most respondents were aged 31-40 years (45.6%), indicating a workforce in its prime, with significant experience in the industry.
c) Education: A majority held Bachelor's (42.1%) or Postgraduate degrees (38.6%), ensuring the reliability of responses.
d) Experience: Over 80% of respondents had served in the ISP industry for more than 5 years, indicating their in-depth understanding of the sector.

These demographics suggest that the respondents were well-qualified and experienced, lending credibility to the findings.

4.9 Conclusion

The study demonstrates that fibre infrastructure sharing is a viable strategy for improving internet service provision in Zimbabwe. It enhances service quality, promotes competition and makes internet services more affordable. However, challenges such as collusion, system

congestion, and inadequate compensation hinder its implementation. To address these issues, policymakers and regulators must establish clear guidelines, promote public-private partnerships, and ensure fair compensation for Internet Service Providers and Internet Access Providers. By adopting these strategies, Zimbabwe can harness the full potential of fibre infrastructure sharing to bridge the digital divide and improve internet access for all. Furthermore, efficient deployment of fibre infrastructure shared models can help Zimbabwe to compete and facilitate trade not only in the SADC region but across the Sub Sahara Africa region.

CHAPTER 5: RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

This section provides a summary of the key findings, conclusions, implications, recommendations, and suggestions for further research based on the study's investigation into fibre infrastructure sharing in Internet Service Provision Sector. The findings indicate a growing awareness and acceptance of sharing models, the effectiveness of existing models, and the preference for open access and cost-sharing approaches. The conclusions highlight the potential of fibre infrastructure sharing for the sector. The implications underscore the need for clear regulations, prioritization of open access principles, and collaborative approaches. The recommendations suggest developing clear regulatory frameworks, promoting collaboration, and conducting further research. Additionally, potential areas for future research include exploring the long-term impact, conducting comparative analysis, examining socioeconomic influences, optimizing regulatory frameworks, and understanding consumer perspectives related to fibre infrastructure sharing in Zimbabwe.

5.2 Discussion

5.2.1 Current State of Fiber Infrastructure Sharing.

The findings from the study, combining the questionnaire and interview data, suggest a growing understanding of different fibre sharing models and the overall impact on the industry Information, Communication and Telecommunication Sector. This positive and commendable trend bodes well to develop and encourage future collaborations and implementation. While awareness is rising, emphasizing the need to encourage more companies in the ICT sector to participate in fibre sharing is key. This broader adoption is crucial to unlock the shared

infrastructure model's full potential and benefit not only the ISP sector but also the country as whole through efficient allocation of financial resources, cost savings and hence enhancing the Zimbabwe's competitiveness in the Sub Sahara Africa region. Although the questionnaire highlights low personal belief in the economic benefits of the model, both interviews highlighted the potentially positive impact of fibre sharing models. Increased competition resulting in improved customer experiences, wider infrastructure coverages, efficiency, and ultimately improved services for consumers are seen as potential outcomes of the shared infrastructure model. The questionnaire's slightly lower score suggests some potential reservations regarding sharing models or the need to educate sector players more. The interviews acknowledge the need to address these concerns, such as security of data, operational control of key network links and fair service level agreements to encourage wider participation.

5.2.2 Effectiveness of Existing Models

The effectiveness of existing fibre infrastructure sharing models in Zimbabwe has been demonstrated through their ability to reduce costs, improve service quality, and foster competition. Empirical evidence shows that shared infrastructure significantly lowers capital and operational expenditures for ISPs, with cost savings of up to 30% reported by ISPs such as Liquid Intelligent Technologies and TelOne (Ndlovu, 2021). These savings have enabled ISPs to offer more affordable services, improving internet access for end-users. Additionally, shared infrastructure has enhanced service reliability, with 72% of ISPs reporting a 25% improvement in network uptime (Dube, 2021). However, challenges such as over-subscription and inadequate maintenance have been reported, particularly in urban areas, leading to congestion and reduced service quality (Chikomo, 2022). Despite these challenges, the existing models have proven effective in promoting competition, with a 20% increase in the number of ISPs operating in

urban areas (Makoni, 2020). Overall, while the existing models have been effective, addressing regulatory and operational challenges is critical to maximizing their potential.

5.2.3 Preferred Infrastructure Sharing Models.

The study identified the consortium model as the most preferred infrastructure sharing model among ISPs in Zimbabwe. In this model, ISPs jointly own and manage the shared infrastructure, ensuring equitable access and cost-sharing. Respondents agreed that this model promotes transparency and collaboration, reducing the risk of collusion and monopolistic practices (Mazango, 2021). The wholesale model, where a single entity owns and manages the infrastructure while ISPs lease access, was also considered effective but less preferred due to concerns about fair pricing and access (Chikomo, 2022). A hybrid model, combining elements of both consortium and wholesale models, was also supported by respondents, as it offers flexibility and addresses the unique needs of the Zimbabwean market (Ndlovu, 2021). The findings suggest that a consortium or hybrid model, supported by clear regulations and fair compensation mechanisms, would be most effective in promoting infrastructure sharing in Zimbabwe.

5.2.4 Challenges and Opportunities.

The study identified several challenges affecting fibre infrastructure sharing in Zimbabwe, including collusion, system congestion, regulatory gaps, and inadequate compensation. Collusion among dominant players and reluctance to share infrastructure due to fear of market share loss were significant barriers (Makoni, 2020). System congestion, caused by over-subscription of shared networks, was also a major challenge, particularly in urban areas (Chikomo, 2022). Regulatory challenges, such as delays in licensing and disputes over access

fees, further hindered the implementation of shared infrastructure (Mazango, 2021). Despite these challenges, the study identified opportunities for promoting infrastructure sharing, including public-private partnerships (PPPs), awareness campaigns, and fair compensation mechanisms (Gumbo, 2020). By addressing these challenges and leveraging the identified opportunities, Zimbabwe can optimize the benefits of shared fibre infrastructure and achieve universal internet access.

5.3 Conclusions

a) Effectiveness of Fibre Infrastructure Sharing in Promoting Quality Internet Service Provision:

The study confirmed that fibre infrastructure sharing is highly effective in promoting quality internet service provision in Zimbabwe. Empirical evidence shows that shared infrastructure reduces costs, improves service reliability, and fosters competition. ISPs such as Liquid Intelligent Technologies and TelOne reported cost savings of up to 30%, enabling them to offer more affordable services to end-users (Ndlovu, 2021). Additionally, shared infrastructure has enhanced service quality, with 72% of ISPs reporting a 25% improvement in network uptime (Dube, 2021). These findings align with global trends, where shared infrastructure has been shown to lower costs and improve service quality in countries like Kenya and South Africa (Mureithi & Omino, 2015). However, challenges such as over-subscription and inadequate maintenance have been reported, particularly in urban areas, highlighting the need for better management of shared networks (Chikomo, 2022).

Overall, the findings demonstrate that fibre infrastructure sharing is a viable strategy for improving internet service provision in Zimbabwe, provided that operational and regulatory challenges are addressed.

b) Factors Affecting Fibre Infrastructure Sharing Among ISPs in Zimbabwe:

The study identified several factors affecting fibre infrastructure sharing, including collusion, system congestion, regulatory gaps, and inadequate compensation. Collusion among dominant players and reluctance to share infrastructure due to fear of market share loss were significant barriers (Makoni, 2020). System congestion, caused by over-subscription of shared networks, was also a major challenge, particularly in urban areas (Chikomo, 2022). Regulatory challenges, such as delays in licensing and disputes over access fees, further hindered the implementation of shared infrastructure (Mazango, 2021). These findings are consistent with studies in other African countries, where regulatory and operational challenges have been identified as key barriers to infrastructure sharing (Gillwald & Stork, 2018). Addressing these challenges requires a collaborative approach involving government, regulators, and private sector stakeholders. By establishing clear regulations, improving enforcement, and providing fair compensation, Zimbabwe can overcome these barriers and optimize the benefits of shared fibre infrastructure.

c) Strategies to Promote Fibre Infrastructure Sharing Among ISPs in Zimbabwe:

The study identified several strategies to promote fibre infrastructure sharing, including establishing clear regulations, engaging in public-private partnerships (PPPs), raising awareness, and providing fair compensation. Respondents strongly agreed that clear regulations and policies are essential for promoting infrastructure sharing, as they provide transparency and

reduce conflicts among stakeholders (Gillwald & Stork, 2018). Public-private partnerships were also recommended, as they can mobilize resources and expertise for the development of shared fibre networks (Ndlovu, 2021). Raising awareness about the benefits of infrastructure sharing was another key strategy, as it can encourage ISPs to participate in shared projects (Chikomo, 2022). Additionally, fair rewards and compensation for ISPs investing in fibre infrastructure were considered essential for promoting equitable participation (Mazango, 2021). These strategies, if implemented effectively, can address the challenges associated with infrastructure sharing and promote sustainable growth in the internet service provision sector.

5.4 Overall Conclusion

The study demonstrates that fibre infrastructure sharing is a viable strategy for improving internet service provision in Zimbabwe. By reducing costs, improving service quality, and fostering competition, shared infrastructure has the potential to bridge the digital divide and contribute to socio-economic development. However, addressing regulatory and operational challenges is critical to maximizing its potential. The findings provide actionable insights for policymakers and industry stakeholders, emphasizing the need for clear regulations, public-private partnerships, and fair compensation mechanisms. By adopting these strategies, Zimbabwe can optimize the benefits of shared fibre infrastructure and achieve universal internet access, ultimately driving economic growth and improving the quality of life for its citizens.

5.5 Implications

a) Policymakers:

There is a critical need for clear and comprehensive regulatory frameworks to guide fibre sharing practices. Transparent and fair guidelines will encourage broader participation and facilitate collaboration among stakeholders.

b) Regulators:

Regulatory frameworks should prioritize open access, non-discrimination, and efficient dispute resolution mechanisms to ensure fair and sustainable sharing practices.

c) Industry Players:

Embracing collaborative models like hybrid or consortium approaches can optimize infrastructure investment, reduce operational costs, and ultimately benefit consumers.

5.6 Recommendations

Based on the findings, the following recommendations are offered:

a) Develop clear and comprehensive regulatory frameworks for fiber infrastructure sharing.
b) Prioritize open access, non-discrimination, and transparency in regulatory frameworks.
c) Establish efficient dispute resolution mechanisms for potential conflicts arising from infrastructure sharing.
d) Promote collaboration and knowledge sharing among stakeholders to enhance the effectiveness of sharing models.

e) Conduct further research to assess the long-term impact of fiber infrastructure sharing on the Internet Service Provision Sector and address any emerging challenges.

5.7 Suggestions for Further Research

a) Long-Term Impact Assessment: Conduct longitudinal studies to assess the long-term impact of fibre infrastructure sharing on various aspects of the telecommunications sector.
b) Comparative Analysis: Conduct comparative studies to analyse the effectiveness of different fibre infrastructure sharing models in other countries with similar contexts. This can provide valuable insights for refining Zimbabwe's own approach. Explore the potential benefits and drawbacks of adopting a hybrid or consortium model tailored to the specific needs of the Zimbabwean market.
c) Socioeconomic Impact: Investigate the broader socioeconomic impact of fibre infrastructure sharing.
d) Regulatory Framework Optimization: Conduct research to explore the optimal design of regulatory frameworks for fibre infrastructure sharing.
e) Consumer Perspectives: Include studies that gather data directly from consumers to understand their experiences with internet services before and after the implementation of fibre infrastructure sharing models. This can provide valuable insights into the impact on affordability, service quality, and access.

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APPENDICES

Appendix 1 Questionnaire

My name is Simon Chimutsotso a student at Africa University. In partial fulfillment to my studies, I am conducting a research on "The impact of shared fibre infrastructure in the case of Internet Service Provision Sector in Zimbabwe." Please note that your participation is highly esteemed and all specific answers will be used for academic purposes.

GENERAL INSTRUCTION

Kindly attempt all questions.

SECTION A: DEMOGRAPHIC INFORMATION

Research questionnaire for employees

1. Kindly indicate your gender

Male	
Female	

SECTION B

2. Current State of Fiber Infrastructure Sharing

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

I am aware of existing fiber infrastructure sharing models in Zimbabwe.	1	2	3	4	5
My company currently participates in any form of fiber infrastructure sharing.	1	2	3	4	5
I believe fiber infrastructure sharing is beneficial for the overall growth of the Zimbabwean ISP sector.	1	2	3	4	5

3. Effectiveness of Existing Models

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Existing infrastructure sharing models in Zimbabwe are transparent and well-defined.	1	2	3	4	5
The current models ensure fair and equitable access to shared infrastructure for all participating ISPs.	1	2	3	4	5
The existing models effectively address potential competition concerns related to infrastructure sharing.	1	2	3	4	5

4. Preferred Infrastructure Sharing Models

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I believe a consortium model, where ISPs jointly own and manage the shared infrastructure, would be most effective in Zimbabwe.	1	2	3	4	5
I prefer a wholesale model, where a single entity owns and manages the infrastructure, and ISPs lease access.	1	2	3	4	5
A hybrid model, combining elements of both consortium and wholesale models, would be the most suitable option for Zimbabwe.	1	2	3	4	5

5. Challenges and Opportunities

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The lack of clear regulatory guidelines for fiber infrastructure sharing poses a	1	2	3	4	5

significant challenge in Zimbabwe.					
Sharing infrastructure can lead to reduced innovation and investment in the ISP sector.	1	2	3	4	5
Effective infrastructure sharing holds the potential to lower operational costs and improve service affordability for end-users.	1	2	3	4	5

Thank you for your participation!

Appendix 2: Interview Guide

1. Can you describe the current state of fibre infrastructure deployment in Zimbabwe, particularly focusing on the reach and capacity of existing networks?
2. In your experience, what are the different infrastructure sharing models currently used by ISPs in Zimbabwe?
3. Have you encountered any challenges or limitations with the current infrastructure sharing models in Zimbabwe? If so, can you elaborate on specific examples?
4. In your opinion, how effective are the existing infrastructure sharing models in promoting competition, cost reduction, and broader internet access in Zimbabwe?
5. If you could design an ideal infrastructure sharing model for the Zimbabwean ISP sector, what key features would it encompass?
6. What are your expectations for the future of fibre infrastructure sharing in the Zimbabwean ISP sector?
7. Are there any specific policy or regulatory changes that you believe would be beneficial for promoting effective and sustainable infrastructure sharing in Zimbabwe?

Appendix: 3 AUREC Approval Letter

AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

P.O. Box 1320 Mutare, Zimbabwe, Off Nyanga Road, Old Mutare-Tel (+263-20) 60075/60026/61611 Fax: (+263 20) 61785 Website: www.africau.edu

Ref: AU 3933/25

2 April, 2025

Simon Chimutsotso
C/O Africa University
Box 1320
MUTARE

RE: **The impact of shared fibre infrastructure in the case of Internet Service Provision Sector in Zimbabwe**

Thank you for the above-titled proposal you submitted to the Africa University Research Ethics Committee for review. Please be advised that AUREC has reviewed and approved your application to conduct the above research.

The approval is based on the following.

a) Research proposal

- **APPROVAL NUMBER** AUREC 3933/25
  This number should be used on all correspondence, consent forms, and appropriate documents
- **AUREC MEETING DATE** NA
- **APPROVAL DATE** April 2, 2025
- **EXPIRATION DATE** April 2, 2026
- **TYPE OF MEETING**: Expedited
  After the expiration date, this research may only continue upon renewal. A progress report on a standard AUREC form should be submitted a month before the expiration date for renewal purposes.
- **SERIOUS ADVERSE EVENTS** All serious problems concerning subject safety must be reported to AUREC within 3 working days on the standard AUREC form.
- **MODIFICATIONS** Prior AUREC approval is required before implementing any changes in the proposal (including changes in the consent documents)
- **TERMINATION OF STUDY** Upon termination of the study a report has to be submitted to AUREC.

Yours Faithfully

MARY CHINZOU
FOR CHAIRPERSON
AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE

Appendix 4: Letter from company authorising study

DFA Zimbabwe (Private) Limited, Block 2, Emerald Hill Office Park, 20 The Chase, Harare, Zimbabwe
info@dfafrica.co.zw www.dfafrica.co.zw +263 242 336886

D F A

01 August 2023

Attention: Simon Chimutsotso

Africa University EMBA Student number 211 007
House number 783 Adylin
Westgate
Harare

Ref: Permission to conduct Research on the impact of shared infrastructure.

Dear Simon Chimutsotso,

This letter serves to formally grant you permission to conduct research on the impact of shared infrastructure as outlined in your proposal titled "**THE IMPACT OF SHARED FIBRE INFRASTRUCTURE IN THE CASE OF INTERNET SERVICE PROVISION SECTOR IN ZIMBABWE**".

We understand that you will be conducting interviews and collecting data within our organization. We authorize you access to the Operations, Commercial and Finance departments to access data, under the following conditions:

1. **Confidentiality:**
   All data collected will be treated with the utmost confidentiality and handled in accordance with our organization's policies and ethical guidelines.
2. **Data Usage:**
   The data collected may be used for the purposes outlined in your research proposal, but not for any other purpose without our prior written consent.

3. **Contact:**
   Please contact Jacqueline Gandidzanwa on:
   jacqueline.gandidzanwa@dfafrica.co.zw / +263772349838 for any questions or clarifications.
4. **Timeline:**
   Your research activities are permitted for a period of nine months ending 31 March 2025.
5. **Feedback**
   We appreciate a copy of your final report or findings for our review and consideration.

We wish you success in your research project. Please do not hesitate to contact us if you have any questions or require further assistance.

Yours Sincerely.

Jacqueline Gandidzanwa
Chief Human Capital Officer
DFA Zimbabwe (Private) Limited

DFA
1 AUG 2023
EMERALDHILL OFFICE PARK, BLOCK 3
No. 30 THF CHASE, EMERALDHILL
0242 [illegible] 338279