



Exploring the role of the public sector in revitalising rail transport in South Africa

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DECLARATION

I hereby declare that the dissertation submitted herewith to the North-West University in partial fulfilment of the requirements for the Master of Business Administration (MBA) degree is my own original work. It has been text-edited in accordance with professional communication standards and has not been previously submitted to any other institution for evaluation purposes.

Portia Malimagovha

18 March 2026

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Recollecting what I lived during the journey of completing this Master's, I see more than just books, readings, and deadlines. I envision a pathway imprinted with immense physicality, great fragility, and incredible strength. This dissertation was penned not just in an office, but also during long hours in hospital waiting rooms and during the fragile moments of a high-risk pregnancy. I will be forever grateful to those who held my hands and glued my life back together.

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This thesis shows that when life is on the line, where determination is backed up by love, it can win.

ABSTRACT

The rail system in South Africa has been around for hundreds of years. It played a major role in the development of the economy. Today, it is in systemic decline where the infrastructure hardly works. The system is marred with unreliable operation. Additionally, there is a significant diversion of market share from rail freight to road freight. The decrease has significant economic costs, said to be about R1 billion each day, and worsen social and spatial disparities. Although the public sector is supposed to spearhead the revitalisation, its effectiveness is seriously hampered by widespread governance failures and a serious lack of credible and usable data. The study will explore and critically examine the public sector's role in the revitalisation of rail transport in South Africa with specific reference to the challenges of governance and data issues.

Based on a realist research paradigm, the study used a convergent parallel mixed methods design. A purposively chosen sample of 30 rail sector experts drawn from public entities, government departments and the private sector were used to gather the data via a single survey instrument. The analysis of the quantitative data for Likert-scale questions was done through descriptive statistics. Thematic analyses were done for the qualitative data of open-ended ones. It was integrated during interpretation.

Outcomes indicate that the area is in an institutional crisis. Quantitative results indicate the severity of political interference (GOV1 mean=4.43) and no data available for strategic decisions (DATA1 mean=2.40). The qualitative themes shed light on these numbers to reveal a pathology of governance failure. More specifically, there is a political capture of technical decisions and a culture of impunity. There is also a "black hole" of data that exists. Lastly, this culture of governance failure propels a high-cost reactive maintenance culture and prevents investment. The research demonstrates that the lack of data is not a minor technical problem. Rather, it is a manifestation of a governance system that actively blocks transparency, accountability, and evidence-based management.

The study concluded that dual-track strategy governance and data need to be addressed for effective revitalisation. The public sector must primarily act as a strategic enabler and not a direct operator by promoting an independent rail regulator, data transparency on a radical scale, and public-private partnerships. Foundation governance reforms should be prioritized first, followed by selective investments and digitization initiatives in a phased

manner. The study contributes to theory by drawing support for institutional theory in a developing world SOE context and extends the resource-based view by framing reliable data as a strategic resource. In practical terms, it provides a diagnostically informed roadmap for essential reforms in the country's rail sector for policymakers and industry leaders.

KEYWORDS: Public sector; rail transport revitalisation; governance failure; data transparency; mixed methods research; South Africa; institutional theory; public-private partnerships (ppps); digital transformation; state-owned enterprises (soes).

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CHAPTER 1

1. CHAPTER 1 : INTRODUCTION

1.1. Introduction

The concept of the public sector must first be understood within the context of infrastructure governance and national development. For the purposes of this study, the public sector refers to the collective system of government departments, state-owned enterprises (SOEs), regulatory agencies, and public institutions responsible for the ownership, funding, regulation, oversight, and operation of strategic national infrastructure assets (National Treasury, 2023). In the South African rail context, this includes institutions such as the Department of Transport (DoT), the Department of Public Enterprises (DPE), the National Treasury, the Railway Safety Regulator (RSR), the Passenger Rail Agency of South Africa (PRASA), and Transnet Freight Rail (TFR). These institutions are responsible for policy formulation, infrastructure financing, operational oversight, safety regulation, and strategic coordination of the rail system. The dissertation argues that the public sector plays an indispensable developmental role because rail transport is not merely a commercial activity, but a strategic public good linked to economic growth, regional integration, spatial justice, and industrial development.

To contextualise the role of the public sector, it is necessary to understand the anatomy and taxonomy of the South African rail system. The anatomy of the rail system refers to its structural and functional components, which include railway tracks, signalling systems, electrification infrastructure, locomotives, wagons, passenger coaches, stations, depots, freight terminals, and digital control systems. The taxonomy of the rail system classifies rail operations according to service type, governance structure, and operator categories. By service classification, the rail system consists of freight rail (bulk minerals, containers, and general freight) and passenger rail (commuter, long-distance, and tourism services). By operator classification, the system comprises public operators such as Transnet Freight Rail and PRASA, alongside private and concession-based operators including mining-linked rail services, logistics firms, and luxury tourism rail operators. Governance taxonomy further differentiates the policy role of the Department of Transport, the oversight role of National Treasury and the Department of Public Enterprises, the safety

regulatory role of the Railway Safety Regulator, and the infrastructure ownership role of Transnet.

The dissertation further demonstrates that the deterioration of the South African rail system cannot be understood without analysing how weaknesses across this anatomy and taxonomy interact. Aging infrastructure, obsolete signalling systems, vandalised rail corridors, poor maintenance practices, governance instability, and weak institutional accountability have collectively contributed to the collapse of rail efficiency and reliability. The literature reviewed in the dissertation shows that only a limited proportion of the freight network remains in good condition, while passenger rail services continue to operate far below historical capacity levels (PRASA, 2023; Transnet, 2023a). The decline of rail freight market share from more than 80% in the 1980s to less than 25% today further illustrates systemic institutional failure. Consequently, the public sector's revitalisation role must extend beyond operational management to include governance reform, infrastructure rehabilitation, regulatory strengthening, digital transformation, strategic investment coordination, and the creation of effective public-private partnerships capable of restoring the competitiveness and sustainability of South Africa's rail transport system. (National Treasury, 2023, p. 17). The public sector plays an indispensable role in the provision and maintenance of critical economic infrastructure. In South Africa, public sector institutions are fundamental to economic development, critical infrastructure provision, and the nation's social fabric (National Treasury, 2023, p. 17). For these public institutions to maintain their relevance, their foundational elements, such as transport infrastructure, must be continuously developed and modernised. Historically, these enterprises have been crucial for advancing the country's transport networks, which are vital for economic growth, regional integration, and global trade (Department of Transport, 2023, p. 8).

For these public sector entities to remain effective, the rail transport system, in particular, requires significant revitalisation. This necessity is especially pronounced for the South African rail sector, given its strategic importance and its role in national economic development and infrastructure provision (Transnet, 2023a, p. 5; World Bank, 2024, p. 3). Despite its strategic importance, the South African rail transport system, managed by public institutions, frequently experiences delays, cost overruns, and profound challenges with infrastructure upgrades and maintenance (PRASA, 2023, p. 12).

The South African government has extended support to various other key public entities across critical sectors (Department of Public Enterprises, 2022, p. 9). Even in the face of these challenges, the public sector remains a primary driver of infrastructure development within the rail sector, particularly through the implementation of largescale projects aimed at establishing and enhancing national transport corridors (National Treasury, 2023, p. 45). The idea of digitalised international transport corridors has been explored in contexts such as the European Rail Traffic Management System (ERTMS), shedding light on how modernisation and digitalisation can enhance the efficiency and sustainability of rail transport (International Union of Railways [UIC], 2023, p. 22).

Innovations in digital logistics platforms have demonstrated how digital tools can streamline operations, helping operators reduce transit times and increase efficiency (World Bank, 2024, p. 15). These innovations are particularly relevant for South Africa, which could benefit immensely from similar digital transformation benefits within its rail transport sector, particularly in achieving operational efficiency and cost savings (Gibela, 2024, p. 7).

Several studies affirm that the public sector can make a substantial contribution to economic growth through infrastructure development. In South Africa, public sector entities within the rail domain are responsible not only for the maintenance and expansion of the rail network but also for ensuring that these infrastructure projects align with broader developmental objectives, including job creation, regional integration, and economic diversification (Department of Transport, 2023, p. 21). The success of these initiatives hinges on robust governance oversight and strategic planning that is both adaptable and resilient to change across the entire rail system (OECD, 2022, p. 31).

The revitalisation of rail transport in South Africa therefore requires a multifaceted approach that leverages the strengths of the public sector while addressing the challenges of financial sustainability, governance, and modernisation. By drawing on lessons from international transport corridors and digitalisation initiatives, South Africa can enhance the efficiency and effectiveness of its rail transport system, thereby supporting economic growth and regional integration (UNECA, 2023, p. 14).

The Chapter introduces the contextual framework and research thesis of this work. The chapter highlights the essential role of the public sector in economic infrastructure with a special emphasis on the rail transport system of South Africa. It then examines

contemporary time problems the sector is facing in running operations, backlog in maintenance and calls for the revitalisation. The Study further introduces key enablers for this transformation including strategic public sector leadership; lessons learnt from global digitalisation efforts as well as modern technologies. Lastly, the chapter signifies all necessary information to carry out the entire study with the help of a multi-pronged approach clinging mainly on the strength of public-sector while improving governance and sustainability that will modernise the rail system to make it efficient in steering economic growth and region integration.

1.2. Background to the Study

Referring to the taxonomy under section 1.1 above, the background examines how each component and operator type has been affected by underinvestment, governance failure, and market dynamics. The intricate relationship between public sector engagement and the effectiveness of rail transport infrastructure represents a significant domain of scholarly inquiry, especially considering South Africa's unique socioeconomic landscape and infrastructural challenges (SAICE, 2022, p. 5). Given that various public sector institutions have historically been responsible for delivering essential rail services amidst fluctuating economic and governance conditions, it becomes critically important to delve into and comprehend the multitude of factors influencing their operational efficiency and service reliability. This understanding is fundamental for enhancing public sector practices, infrastructure management, and economic outcomes (National Planning Commission, 2022, p. 33).

This research specifically explores the role of the public sector in revitalising rail transport within South Africa, a nation distinctly marked by historical infrastructure neglect, governance issues, and economic pressures that profoundly influence the rail sector's dynamics and performance (Transnet, 2023b, p. 3).

1.2.1. Historical Context of Rail Transport in South Africa

The South African railway system, operated by public sector entities, was once considered among the largest and most efficient in Africa. In the past, rail transport was instrumental in moving mining products, which significantly shaped the economic landscape of South Africa (PRASA, 2023, p. 8). Nonetheless, following the transition after apartheid, the rail sector began to experience a range of problems that included aging

infrastructure, continuous lack of investment, as well as significant management mishaps (Department of Public Enterprises, 2022, p. 15). More businesses and passengers have come to rely on road transport, which is perceived as more flexible and dependable, causing rail to become increasingly uncompetitive (National Treasury, 2023, p. 28).

1.2.2. Current Challenges in South Africa's Rail Sector

- **Outdated and Insufficient Infrastructure:** The rail sector is significantly hampered by inadequate investment and aging infrastructure, including old tracks, outdated signalling systems, and dilapidated rolling stock. This leads to frequent service disruptions and raises safety concerns, eroding public confidence in rail services (Transnet, 2023a, p. 9).
- **Governance and Management Failures:** The effectiveness of public institutions in the rail sector is severely undermined by poor management practices and allegations of corruption. These issues have crippled the operational efficiency of the rail system, as evidenced by recurring integrity challenges within key public sector modernisation projects (PRASA, 2023, p. 21).
- **Intense Road Transport Competition:** The rapid expansion and flexible nature of the road freight industry have significantly contributed to the decline of rail services for both passengers and freight (Department of Transport, 2023, p. 31). Similarly, the increasing reliance on road transport for freight exacerbates negative environmental and economic impacts through heightened carbon emissions, increased traffic congestion, and higher road infrastructure maintenance costs (CSIR, 2023, p. 44). These factors further underscore the urgent need for rail transport revitalisation.

1.2.3. The Role of the Public Sector in Revitalising Rail Transport

To effectively address these challenges, the public sector's role must be strategically executed in several critical areas, where it has currently fallen short:

1. **Policy and Regulatory Framework:** A major cause of instability is the failure to implement and enforce a consistent policy and regulatory framework. Despite the clear need for comprehensive policies to increase rail transport usage, a lack of

clear vision and fragmented governance have left the sector without effective direction (National Rail Policy, 2022, p. 7).

2. **Investment in Infrastructure:** The rail sector's decline is attributed to a chronic lack of strategic investment. While modernisation is essential, the public sector has failed to secure and prioritise the substantial funding required for upgrading tracks, signalling, and rolling stock (National Treasury, 2023, p. 51).
3. **Governance and Accountability:** A critical failure lies in the weak governance and management. The recommended robust governance structures and accountability frameworks have not been effectively implemented, leading to widespread corruption, mismanagement, and financial instability (Department of Public Enterprises, 2022, p. 22).

1.3. Problem Statement

The South African rail transport system is experiencing severe operational, infrastructural, institutional, and governance deterioration that has significantly weakened its ability to support national economic development, logistics efficiency, and affordable public mobility. The central problem is not merely the need for “revitalisation” in abstract terms, but the progressive collapse of the rail system’s core functional components, including freight efficiency, passenger mobility, infrastructure reliability, signalling systems, maintenance capability, and institutional governance. According to the Department of Transport (2023, p. 12), South Africa’s rail network has entered a “vicious cycle of underinvestment, declining performance, and further disinvestment,” resulting in widespread service unreliability and declining competitiveness against road transport. Similarly, the World Bank (2024, p. 9) argues that inefficient rail systems undermine macroeconomic stability, export competitiveness, and regional integration, particularly in resource-dependent economies such as South Africa.

Empirical evidence demonstrates the severity of the rail system’s deterioration. Rail freight market share has declined from more than 80% in the 1980s to less than 25% by 2023 (Transnet, 2023a, p. 8), while passenger rail services are operating at below 50% of their pre-2015 capacity (PRASA, 2023, p. 15). Infrastructure assessments further reveal that only approximately 35% of the freight rail network remains in good operational condition, while nearly 40% requires immediate rehabilitation because of aging tracks,

obsolete signalling systems, vandalism, cable theft, and deferred maintenance (PRASA, 2023; Transnet, 2023a). The Railway Safety Regulator (RSR, 2024) further reports increasing derailments and operational disruptions, which continue to undermine public confidence and operational reliability. According to the CSIR (2023, p. 52), the deterioration of the rail system imposes economic losses estimated at approximately R1 billion per day through export delays, supply-chain inefficiencies, congestion, and increased logistics costs. These trends demonstrate that the crisis extends beyond infrastructure decay to include a broader collapse in operational capability and service delivery.

The literature consistently identifies governance and institutional weaknesses as the primary drivers of the rail sector crisis. The OECD (2022, p. 47) attributes the decline partly to political interference, leadership instability, and weak accountability systems within state-owned enterprises. The Zondo Commission (2022) further revealed extensive corruption and procurement irregularities within Transnet and other public entities, which diverted substantial resources away from infrastructure investment and maintenance. National Treasury (2023, p. 89) additionally criticises rail sector performance management systems as “largely ceremonial,” lacking effective accountability and operational consequence management. Furthermore, the World Bank (2024, p. 15) identifies serious data deficiencies within South Africa’s rail sector, noting that the absence of accurate asset condition monitoring and operational performance data makes predictive maintenance and strategic planning almost impossible. Consequently, the rail system remains trapped in a reactive maintenance culture characterised by infrastructure breakdowns, poor investment decisions, and operational inefficiencies. The problem addressed in this study is therefore the systemic deterioration of South Africa’s rail transport system caused by infrastructure decay, governance failures, institutional instability, and data deficiencies, and the extent to which the public sector can effectively address these structural failures to restore rail system efficiency, sustainability, and competitiveness.

1.4. Research Questions

Primary Research Question:

What is the role of the public sector in revitalising rail transport?

Secondary Research Questions:

1. How does the absence of comprehensive data on infrastructure condition and operational efficiency within South Africa's freight rail sector affect strategic decision-making and investment?
2. What are the primary governance and accountability challenges that impede the implementation of a data-driven framework for improving freight rail services?
3. Based on lessons from international best practices, what practical policy recommendations can be formulated to strengthen data-driven governance and enhance transparency in South Africa's rail transport?
4. What is the anatomy and taxonomy of the public sector's role, and what diagnostic framework can be established to connect infrastructure condition, management practices, and institutional accountability?

1.5. Research Aim

The primary aim of this research is to explore and critically analyse the role of the public sector in revitalising rail transport in South Africa, focusing specifically on governance practices, infrastructure management, and operational strategies and the data-driven governance mechanisms required to enable transparency, accountability, and evidence-based decision-making within the rail sector. The study intends to identify critical factors affecting the efficiency and sustainability of rail transport and propose evidence-based recommendations for effective revitalisation strategies that enhance service delivery, economic growth, and environmental sustainability (OECD, 2022, p. 31).

1.6. Research Objectives

Primary Objective:

To explore and critically analyse the role of the public sector in revitalising rail transport in South Africa.

Secondary Objectives:

1. To assess the impact of data deficiencies and evaluate how the lack of comprehensive and transparent data on South Africa's freight rail infrastructure and operational efficiency hinders strategic decision-making and investment.

2. To identify governance and accountability failures by determining the primary institutional and managerial challenges that prevent the adoption of a data-driven framework for improving freight rail services.
3. To propose policy recommendations that will formulate a set of practical and evidence-based policy recommendations for strengthening data-driven governance and enhancing transparency in South Africa's rail transport sector, drawing on lessons from international best practices.
4. To delineate the anatomy and taxonomy of the public sector's role in South Africa's rail system (departments, regulators, SOEs, private operators), and to establish a diagnostic framework that connects infrastructure condition, management practices, and institutional accountability.

1.7. Significance Of the Study

Contribution to the body of knowledge

In addressing a gap in the literature on data transparency, governance reform and efficiency in state-owned railways, this study makes a contribution to the academia and practice concerning revitalisation of infrastructure in the public sector. Vast research on transport infrastructure development and digitalisation exists for developed economies. There is almost no empirical work which investigates how systemic data gaps and opaque governance frameworks undermine rail revitalisation in developing country contexts such as South Africa. This study established a diagnostic framework that connects the condition of infrastructure, management practices and institutional accountability. The framework can be replicated by scholars and practitioners who are looking to understand and deal with public sector deterioration of infrastructure in similarly emerging economies.

Impact on business or workers

For business and industry, the restoration of an effective, dependable rail system translates directly into reduced logistics costs and enhanced supply chain predictability, as well as improved global competitiveness for South African exporters and manufacturers. The over-reliance on road transport is increasing operational cost and causing port congestion, vehicle damage and accidents. Quantitative analysis confirms that rail is substantially more cost-effective than road freight for bulk commodities.

Moving coal via rail costs approximately R250 per tonne, while trucking the same volume costs 2.5 to 4 times more (Cold Link Africa, 2025). Road freight generates GHG and air pollution externalities of approximately R10.42 per tonne-kilometre, compared to only R0.012 per tonne-kilometre for rail (Arp & Keen, 2019). Despite these efficiencies, rail's share of land freight payload has collapsed from 23.6% in 2019 to just 14.7% in 2025, while road now carries 85.5% of all freight (Statistics South Africa, 2025; Business Tech Africa, 2025). The over-reliance on road transport is increasing operational costs, causing port congestion, vehicle damage and accidents.

The findings and recommendations of this study can be used to restore rail as a cost-effective and high-capacity freight service. The findings are important for employment and labour conditions for workers. The rail industry has proved to be a major employer over a long period of time. Its revival will also generate long-term jobs in engineering, operation and maintenance. Increased operational efficiency and financial sustainability of entities like Transnet and PRASA can enhance job security, working conditions and stability of industrial relations.

Impact on policy and government

This study will help decision-makers improve the governance framework along with capital allocation and accountability in state-owned rail companies. By revealing key gaps in data gathering, performance assessment, and institutional supervision, the study directly advances the development objectives of the Department of Transport, National Treasury, and the Department of Public Enterprises. It recommends legal reforms, PPPs, and digital monitoring systems to help improve transparency and execution capacity. Consequently, the study aids the government in meeting its constitutional responsibility to deliver an effective public transport infrastructure, while optimising the limited budget available and restoring investor and donor confidence in South Africa's public infrastructure projects.

Impact on community

The restoration of passenger rail services will be essential to communities (particularly disadvantaged and peripheral communities) for accessing economic opportunities, education, health care, and social participation. Many low-income households are now experiencing longer, costlier and less secure commutes because of the current derailment of commuter rail. Through achieving spatial justice and social equity, this research works

as a restoration of affordable, reliable and dignified public transport. Moreover, the research that it encourages a modal shift from the road to the rail benefits in reducing greenhouse gas emissions, improving air quality, and reducing road accidents, all of which enhance community health, safety, and environment.

1.8. Research Design

This research employed a convergent parallel mixed-methods design aimed at comprehensively investigating the role of the public sector in revitalising rail transport in South Africa. This design was selected to facilitate both an exploration of general patterns and an in-depth understanding of the complex social, economic, and institutional dynamics influencing the effectiveness of public sector interventions in the rail sector (Creswell & Creswell, 2023, p. 27).

The study collected quantitative and qualitative data concurrently via a single survey instrument. The quantitative component used descriptive statistics to analyse Likert-scale responses, providing a measure of central tendencies and consensus among experts. The qualitative component used thematic analysis of open-ended responses to provide depth, context, and nuanced explanation for the quantitative findings (Braun & Clarke, 2022, p. 592).

To ensure validity, the quantitative and qualitative findings was integrated during the interpretation phase to identify convergent and complementary insights that directly address the research objectives (Creswell, 2018, p. 215). This design provided a robust and contextually rich understanding of the issues, allowing for informed recommendations and strategic insights to enhance the revitalisation of South Africa's rail transport system.

The South African rail sector is the wider study area, looking at the systemic governance, institutional and operational challenges affecting its freight and passenger networks. The study looks at policy frameworks, regulatory environments, infrastructure management practices, and institutional dynamics affecting rail performance nationally instead of the internal functioning of a single entity. Tackling the complex public sector problems with practical and context-specific solutions drives the study guided by a pragmatic research philosophy. A mixed-methods approach was adopted since railway revival deals with many areas like governance reform, infrastructure investment, data management, and

digital transformation. Consequently, it provides both measurable trends and contextual depth.

The design of the study convergent parallel mixed-methods design. In this case, the quantitative and qualitative data was collected and analysed concurrently to get a single integrated survey instrument. Therefore, it was applied to approximately 30 rail sector experts, policymakers and industry players in the Northern Cape selected purposively. The Northern Cape was selected because it hosts two critical heavy-haul freight corridors (Sishen-Saldanha iron ore and manganese) that exemplify the infrastructure decay and governance challenges this study investigates, and because the researcher had established professional access to rail experts in Sishen, Postmansburg, and Kimberley, enabling a high-response, purposive sample.

The quantitative part of this study examines respondent perceptions of the quality of governance, the condition of infrastructure, digital readiness and priorities for policy interventions using Likert-scale items. Also, a thematic analysis of open-ended responses draws out insights into the institutional failures from the point of view of citizens and provides suggestions for reform commensurate with the lack of resilience.

The findings from both strands are integrated during interpretation to provide triangulated, evidence-based recommendations. Rigour is ensured through pilot testing, expert validation, internal consistency analysis, and member checking. Ethical safeguards including informed consent, confidentiality, and safe data management are also in place

1.9. Demarcation of the Study

The public sector's role in rejuvenating rail transport in South Africa: a case study. The study focuses more on the larger institutional and governance challenges facing the rail sector than the internal operations of one organisation. Key target areas include effective governance, accountability mechanisms, infrastructure management practices and the use of data in strategic decision-making. The focus of this Report is on freight rail, although freight and passenger rail are both part of the national rail system and discussed where relevant. Freight rail is vital to the objectives of the nation as it supports exports, mining activity, logistics efficiency, and economic growth as a whole.

In geographical scope, the empirical part of the study is limited to stakeholders who operate in South Africa, and more specifically, rail sector officials and policymakers

located in the Northern Cape province, namely, Kimberley, Sishen and Postmansburg. The views of those actively engaged in rail governance, service, policymaking or oversight offer insights into the study. The study compares international best practices to strengthen its policy recommendations and provide comparative insights but does not collect primary data outside South Africa. The aim is to keep the results context-specific and relevant to the South African institutional context.

The study is cross-sectional study reflecting stakeholder perceptions at a certain point in time. It doesn't contain technical engineering assessments of rail assets, detailed financial audits of SOEs, or advanced operational performance modelling. This study focuses on the institutional and governance challenges facing South Africa's rail sector, specifically examining the roles of public sector institutions (departments, regulators, state-owned enterprises) and private operators in revitalising freight and passenger rail. The study provides a diagnostic framework that links infrastructure condition, management practices, and institutional accountability. It also offers evidence-based policy recommendations drawn from integrated quantitative and qualitative data collected from rail experts in the Northern Cape (Kimberley, Sishen, Postmansburg). The findings are contextualised within South Africa's national rail system and informed by international best practices.

1.10. Outline of the Chapters

The dissertation is structured into five chapters, each building progressively toward understanding and proposing solutions for the revitalisation of South Africa's rail sector.

1.10.1. Chapter 1: Introduction

The trajectory of the decline of South Africa's rail sector and the crucial need for the public sector in the rejuvenation of the rail sector is introduced in this chapter. The section describes the problem formulation, with a focus on the governance weaknesses and data gaps that impede an effective response. The intention of this chapter is to outline the research aim, objectives, and research questions. The rationale and significance of the economic development logistics performance institutional reform study is discussed. It additionally sets out the research design, delimitation of the study, and the overall outline of the dissertation.

1.10.2. Chapter 2: Literature Review and Theoretical Framework

The chapter introduces how South Africa's rail sector is declining and that there is a need for the public sector to help rejuvenate the rail sector. This part explains the problem which focuses on the limitations and the data gaps that are hindering an adequate response. The goal of this chapter is to outline the research purpose, objectives, and questions. The economic development logistics performance institutional reform study is analysed for rationale and significance. It also specifies the research design, delimitation of the study as well as the overall structure of the dissertation.

1.10.3. Chapter 3: Research Methodology

The rail sector of South Africa is declining and interestingly there is a need for public sector participation to rejuvenate the rail sector. This chapter discusses the problem, focusing on shortcomings and data gaps that are hampering an adequate response. The objective of this chapter is to delineate the research purpose, objectives, and questions. The study on economic development logistics performance institutional reform is critically assessed for rationale and significance. This also explains research design, delimitation of study as well as overall pattern of the dissertation.

1.10.4. Chapter 4: Data Analysis and Findings

This chapter contains the results of the study which are arranged based on the objectives. It studies stakeholder views on governance efficiency, infrastructure management practices, data transparency, and digital transformation on the rail side. To identify things, causes, and constraints affecting rail revitalisation, a mix of quantitative and qualitative insights are analysed. The findings are interpreted by way of the theoretical framework and are used to assess the effectiveness of the current public sector.

1.10.5. Chapter 5: Conclusions and Recommendations

The concluding chapter pulls together the findings of the study and assesses whether the public sector is capable of effectively revitalising rail transport in South Africa. It emphasizes the theoretical contributions to the literature on public sector governance and infrastructure management, and the practical implications for policymakers and rail institutions. The chapter gives compelling recommendations that strengthen governance,

promote data-driven decision making, enhance accountability and speed up digital infusion. The study recognizes its limitations and offers suggestions for future research relevant to rail sector reform.

1.11. Conclusion

This chapter laid the context and theoretical foundation for the study, providing background to the systemic decline of South Africa's rail sector, where rail freight market share has fallen from over 80% in the 1980s to less than 25% today (CSIR, 2023), passenger services operate at less than 50% of pre 2015 capacity (PRASA, 2023), and the economic cost of inefficiency is estimated at R1 billion per day (CSIR, 2023; ScienceDirect, 2025) and the systemic problems undermining its performance. The chapter demonstrated that rail revitalisation is not simply an operational matter but rather a broader governance and institutional consideration that is closely linked to public sector accountability, infrastructure management, and data in decision-making. In this chapter, the research problem, aim, objectives, and research questions clarified what the study aims to do. The study aims to assess how the public sector can play a more effective role in restoring efficiency, sustainability, and competitiveness to the national rail system.

This chapter defines the limits and scope of the study in the sense that it will deal with systemic or sector-wide institutional issues rather than isolated organisational issues. In doing so, it places the research in the context of public sector reform, infrastructure governance and economic development in South Africa. The research design in this chapter offers the structured and systematic methodology that is expected to be used to examine these challenges through both quantitative and qualitative enquiry.

The chapter defines the intellectual orientation and structural layout of the dissertation. It thereby creates a foundation for the following analytic work in the dissertation. The subsequent chapter builds on this framework and reviews the literature on rail sector performance, governance reform, data and digital transformation. This review would establish the theoretical and conceptual grounding that is needed to interpret the empirical findings.

CHAPTER 2

2. CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

This chapter is structured to build a multi-layered argument. It begins by contextualising the strategic importance of rail transport within the broader economic and public policy landscape. It then delves into the specific governance pathologies that have hindered public sector performance, drawing on institutional theory to explain observed behaviours. A critical analysis of the information and data deficiencies follows, framing data not just as an operational tool but as a strategic asset for accountability and investment. The review then explores the disruptive potential of digital transformation and the imperative of strategic management in the face of intense inter-modal competition. Finally, it synthesises lessons from international best practices to inform a set of evidence-

based recommendations, culminating in a refined conceptual framework that guides the empirical investigation in this study.

The literature review is designed to answer the research aim and objectives outlined in Chapter One. The critique assesses existing literature on public-sector governance, infrastructure management, data transparency, and the digital transformation of the rail sector. The relationship between the governance structure of public and private organizations and the information system they deploy receives special attention as the key analytical foci of this study. Through outlining a theoretical and empirical framework the chapter builds the conceptual and analytical basis to investigate how the public sector can galvanise its involvement in the revitalisation of rail transport in South Africa.

2.2. The Strategic Imperative of Rail Transport in Economic Development

2.2.1. Strategic Imperative

The role of rail transport extends far beyond mere logistics; it is a critical enabler of macroeconomic stability, regional integration, and sustainable development. Efficient rail networks reduce transaction costs across the economy, enhance competitiveness for export-oriented industries, and are intrinsically linked to spatial development outcomes (World Bank, 2024, p. 9). The economic rationale for rail is particularly strong for landlocked countries and regions, where it provides a cost-effective and reliable conduit for trade. In the South African context, the rail network is the backbone for transporting bulk commodities from the mineral-rich interior to coastal ports, a function directly tied to the nation's gross domestic product (National Treasury, 2023, p. 67).

From a public policy perspective, rail transport offers significant positive externalities that justify continued public sector involvement. These include congestion mitigation, road infrastructure preservation, reduced carbon emissions, and enhanced public safety compared to road freight (CSIR, 2023, p. 44). The modal shift from road to rail is a cornerstone of sustainable transport policy globally, aligning with both environmental goals and economic efficiency (International Transport Forum, 2022, p. 24). Furthermore, a functional rail system is a key component of social inclusion, providing affordable mobility for low-income populations through passenger services, thereby facilitating access to employment, education, and essential services (Department of Transport, 2023, p. 21).

The decline of South Africa's rail system, therefore, represents not merely a sectoral failure but a systemic risk to the nation's economic foundation and social cohesion. The estimated economic losses of R1 billion per day due to rail inefficiencies (CSIR, 2023, p. 52) underscore the profound opportunity cost of inaction, affecting mining, manufacturing, and agricultural exports alike. The literature thus situates rail revitalisation not as a narrow technical exercise, but as a strategic imperative requiring a whole-of-government approach (World Bank, 2024; OECD, 2022; CSIR, 2023).

2.2.2. Historical Context and Current State of South Africa's Rail Sector

The decline of South Africa's rail system represents one of the most significant infrastructure challenges facing the nation's economy. From being the dominant transport mode carrying over 80% of the country's freight in the 1980s, rail's market share has declined to approximately 25% by 2023 (Transnet, 2023a, p. 8). This dramatic shift has occurred despite rail's inherent advantages in energy efficiency, lower carbon emissions, and cost-effectiveness for bulk commodities (CSIR, 2023, p. 28).

The historical roots of this decline are well-documented. The post-1994 period saw significant underinvestment in rail infrastructure, with competing social priorities diverting funding away from network maintenance and expansion (National Planning Commission, 2022, p. 45). This was compounded by a policy environment that implicitly favoured road transport through substantial public investment in the national road network without internalising its full environmental and social costs. Between 2010 and 2020, real investment in rail infrastructure declined by approximately 3.5% annually, while road infrastructure spending increased by 4.2% per year (National Treasury, 2023, p. 67). This investment disparity has created what the Department of Transport (2023, p. 12) describes as a "vicious cycle of underinvestment, declining performance, and further disinvestment."

2.2.3. The Legacy of Institutional and Policy Shifts

The transition in the political economy of South Africa post-1994 also led to significant institutional changes in the rail sector. The commercialisation and subsequent restructuring of state-owned enterprises created ambiguity in mandates, oscillating between commercial profitability and public service obligations (Department of Public Enterprises, 2022, p. 15). This ambiguity often resulted in cross-subsidisation failures,

where profitable freight segments were unable to sufficiently support the essential but loss-making passenger services, leading to a gradual degradation of the entire network (PRASA, 2023, p. 10). The current state of the network reflects this historical neglect. Recent assessments indicate that a significant portion of the freight rail network requires immediate rehabilitation, while the passenger network faces even greater challenges with only a minority of its infrastructure considered to be in good condition (PRASA, 2023, p. 15). The consequences are profound, impacting everything from export volumes to the daily commute of low-income citizens.

2.3. Governance and Institutional Challenges: A Pathology of Failure

The literature consistently identifies governance failures as the primary constraint to rail sector performance in South Africa. Recent analyses highlight several interconnected governance challenges that align with the theoretical frameworks above.

2.3.1. Political Interference and Institutional Instability

Multiple studies document how frequent leadership changes and political interference have undermined operational continuity in state-owned rail enterprises. The high turnover of CEOs and senior executives eight different CEOs at the freight utility in a 13-year period prevents the consistent implementation of long-term strategies and creates what the OECD (2022, p. 47) characterises as "institutional amnesia," where organisational learning and corporate memory are repeatedly lost. This instability is a direct manifestation of coercive isomorphic pressures, where leadership is treated as a political reward rather than a technical necessity.

2.3.2. Corruption and Procurement Failures

The literature identifies corruption in rail procurement as a significant drain on public resources and a fundamental failure of accountability mechanisms. State Capture inquiries documented systematic corruption in locomotive acquisition programs, with estimated financial impacts exceeding R15 billion (Zondo Commission, 2022). The Zondo Commission's findings are particularly pertinent to the rail sector, revealing how procurement processes at Transnet were manipulated, leading to irregular contracts and substantial financial losses. These are not isolated incidents but symptoms of a corrupted institutional field where procurement processes, designed to ensure fairness and value, were co-opted for private gain.

The Commission's recommendations on procurement reform and the establishment of an independent anti-corruption agency provide a clear policy direction for addressing these systemic failures . More recent assessments indicate that corruption continues to affect maintenance contracts and infrastructure projects, with professional bodies estimating that robust anti-corruption measures could reduce infrastructure costs by 20-30% (SAICE, 2022, p. 23). This directly impedes revitalisation by diverting scarce public funds and selecting contractors based on rent-seeking rather than technical capability.

2.3.3. Accountability Deficits and Performance Management

The literature identifies weak accountability mechanisms as a critical governance failure. Performance management systems in rail SOEs have been described as "largely ceremonial" rather than driving actual performance improvement (National Treasury, 2023, p. 89). This is compounded by fragmented oversight, where multiple government departments and parliamentary committees exercise partial oversight without clear accountability lines (Department of Public Enterprises, 2022, p. 34). The absence of consequences for underperformance creates a moral hazard, disincentivising proactive management and innovation. This accountability deficit means that the formal structures of control (boards, oversight departments) are decoupled from operational realities, a classic institutional theory dilemma.

2.4. Data Deficiencies and Information Management: The Strategic Black Hole

The absence of reliable, comprehensive data represents a critical barrier to evidence-based decision-making in the rail sector, directly impacting its ability to compete and modernise. Recent assessments reveal several dimensions of this challenge.

2.4.1. Asset Management Information Gaps

Comprehensive asset registers with accurate condition assessments are unavailable for significant portions of the rail network. The World Bank (2024, p. 15) notes that a large percentage of the asset base lacks up-to-date condition monitoring data, "making predictive maintenance impossible and lifecycle costing uncertain." This information gap forces a reactive, break-fix maintenance culture that is exponentially more costly and disruptive than planned, preventative maintenance. From an RBV perspective, this means the organisation cannot effectively manage its most basic physical resources, let alone leverage them for competitive advantage.

2.4.2. Operational Performance Measurement

The literature identifies significant gaps in operational performance data, particularly regarding real-time performance monitoring. A CSIR (2023, p. 61) analysis found that "manual data collection processes still dominate rail operations, resulting in delayed and often inaccurate performance reporting." This limits the ability to identify bottlenecks, optimize asset utilization, provide reliable service commitments to customers, and bill accurately for services rendered. The lack of granular, real-time data makes the rail service opaque and unpredictable, further eroding its value proposition to potential customers.

2.4.3. Financial Transparency and Investment Appraisal

Financial reporting in rail SOEs has been criticized for lacking the granularity needed for effective oversight and strategic investment. The National Treasury (2023, p. 92) notes that "current financial reporting frameworks aggregate maintenance, operations, and capital expenditure in ways that obscure true performance drivers and limit accountability for specific outcomes." This makes it difficult to conduct accurate cost-benefit analyses for new investments or to benchmark performance against international standards. The inability to present a compelling, data-rich business case for investment perpetuates the cycle of underfunding, as treasury officials and potential private investors remain sceptical of the returns.

2.5. Digital Transformation and Modernisation Opportunities

Recent literature emphasizes the transformative potential of digital technologies in addressing the rail sector's challenges, offering a pathway to leapfrog traditional development stages.

2.5.1. Predictive Maintenance Systems

The implementation of Internet of Things (IoT) sensors and predictive analytics represents a paradigm shift from reactive to proactive asset management. International evidence suggests that predictive maintenance can reduce maintenance costs by 20-25% while increasing asset availability by 10-15% (UIC, 2023, p. 34). For a network suffering from aging infrastructure, this is not merely an efficiency gain but a fundamental requirement for survival. It allows for the optimisation of limited maintenance budgets by

targeting interventions before failures occur, thereby improving reliability and reducing costly emergency repairs.

2.5.2. Digital Control and Signalling Systems

Modern computer-based train control systems, such as the European Rail Traffic Management System (ERTMS), offer substantial capacity, safety, and energy efficiency improvements over traditional signalling. The European Union Agency for Railways (2023, p. 18) estimates that digital signalling can increase network capacity by 20-30% while reducing energy consumption by 10-15%. These technologies are particularly relevant for South Africa's congested corridors, where increasing throughput without laying new tracks is a critical priority (Department of Transport, 2023, p. 42).

2.5.3. Integrated Logistics Platforms

Digital freight management platforms can significantly improve supply chain visibility and coordination, directly addressing the competitiveness gap with road transport. The World Bank (2024, p. 23) highlights how "digital integration between rail operators, ports, and customers can reduce transit times by 15-20% and improve asset utilization through better planning and coordination." Such platforms provide customers with the predictability and flexibility they enjoy from road freight, making rail a more attractive option. This represents a capability that, if developed, could become a VRIN resource, creating a sustainable competitive advantage.

2.5.4. Strategic Management and Competitive Dynamics in the Transport Sector

The decline of rail cannot be understood without analysing the strategic rise of road freight. The road transport industry has excelled through flexibility, reliability, and sophisticated logistics management capabilities that rail has failed to develop. Road freight operators have leveraged technology for real-time tracking, dynamic routing, and efficient asset utilisation, creating a high-value service proposition for clients (Department of Transport, 2023, p. 31).

For rail to compete, public sector entities must adopt a strategic management perspective that goes beyond infrastructure maintenance. This involves:

- **Market Segmentation:** Identifying and focusing on core markets where rail has an inherent advantage (heavy haul, long-distance bulk freight).

- Service Design: Developing reliable, scheduled services with clear performance guarantees.
- Customer Centricity: Building digital interfaces and customer service capabilities that match modern logistics expectations. The failure to do this represents a strategic management failure at the highest levels of public sector rail institutions, which have often operated as engineering-focused monopolies rather than competitive service providers.

2.6. International Best Practices and Comparative Analysis

Recent comparative studies provide valuable insights into successful rail revitalisation strategies that balance public policy objectives with operational efficiency.

2.6.1. Governance and Regulatory Models

International experience demonstrates the importance of independent regulation and clear separation of policy, regulation, and operations. The OECD (2022, p. 58) notes that "countries with independent rail regulators consistently outperform those with direct ministerial control on key performance indicators including safety, efficiency, and investment recovery." Models like the UK's Office of Rail and Road and Australia's Australian Rail Track Corporation provide templates for creating an arm's-length, technically competent body to oversee track access, safety, and performance, thereby insulating operational decisions from daily political interference (UNECA, 2023, p. 27).

2.6.2. Public-Private Partnership (PPP) and Hybrid Governance Frameworks

Successful rail revitalisation programs have typically involved strategic private sector participation. The World Bank (2024, p. 31) emphasizes that " PPPs with clear risk allocation, performance monitoring, and appropriate remuneration mechanisms can bring both capital and expertise to rail modernization." This does not necessarily mean full privatisation. Hybrid models, such as Brazil's rail concessions (where private operators invest in and operate specific lines) and Canada's partnership models for railway infrastructure, offer relevant lessons (UIC, 2023, p. 42). These models allow the public sector to retain strategic control of the network while leveraging private sector capital, innovation, and operational discipline.

2.6.3. Performance-Based Funding and Incentive Structures

Countries that have successfully modernized their rail systems have typically moved from input-based to performance-based funding. The International Transport Forum (2022, p. 37) notes that "output-based funding models that link payments to specific service quality metrics create stronger incentives for efficiency and customer responsiveness." Applying this to South Africa, infrastructure grants to SOEs or payments to private concessionaires could be tied to metrics such as network availability, average train speed, and customer satisfaction, rather than simply reimbursing costs. This aligns the incentives of the operator with the public policy goals of reliability and efficiency.

2.6.4. Successful International Revitalisation Examples

The following table summarises selected countries that have successfully revitalised their rail systems, the key reforms implemented, measurable outcomes, and applicable lessons for South Africa.

Table 2.6.4: Successful International Revitalisation Examples

Country	Key Reforms / Interventions	Measurable Outcomes	Lessons for South Africa
Brazil	Concession model for freight rail networks (1990s–2000s); private operators invest in and operate specific lines under long-term contracts	Freight rail productivity increased by 70%; investment in track renewal rose significantly; accident rates declined (World Bank, 2024; UIC, 2023)	concessions with clear performance metrics can attract private capital and improve efficiency without full privatisation
Canada	Public-private partnership models for infrastructure; use of commercial-oriented Crown corporations	Improved asset utilisation; reduced government subsidy burden; high network reliability (OECD, 2022)	Hybrid governance models can balance public oversight with commercial discipline

Country	Key Reforms / Interventions	Measurable Outcomes	Lessons for South Africa
	(e.g., CN Rail privatised but regulated)		
United Kingdom	Independent regulator (Office of Rail and Road); separation of track (Network Rail) from train operations; performance-based funding	Significant safety improvements; increased passenger and freight volumes; transparent performance benchmarking (European Union Agency for Railways, 2023)	An independent regulator insulated from political interference is essential for fair access and accountability
Germany	Deutsche Bahn restructuring: strong public investment combined with commercial management; digital signalling (ERTMS) rollout	Punctuality above 95% on long-distance services; increased modal share for freight; reduced energy consumption (UIC, 2023)	Long-term strategic vision with consistent funding and digital modernisation yields sustainable gains
India	Dedicated Freight Corridors (DFCs); PPPs for station redevelopment; extensive digitalisation (GPS tracking, real-time data)	Freight train speed doubled; reduced logistics costs; increased revenue (World Bank, 2024)	Leapfrog digitalisation is possible where political will and institutional capacity align

2.7. Gaps in the Literature

Despite coverage of many challenges, several knowledge gaps remain, which this research aims to address:

2.7.1. Implementation Challenges in Digital Transformation

While the potential of digital technologies is well-documented, there is limited research on the organisational change management, workforce reskilling, and data governance required for successful implementation in the South African public sector context (Gibela, 2024, p. 15). The transition from legacy systems and mindsets presents a monumental challenge that is often understated in technical feasibility studies.

2.7.2. Political Economy of Reform

The literature provides limited analysis of the political economy constraints affecting rail reform, particularly regarding workforce restructuring, managing entrenched interests that benefit from the status quo, and building a sustainable coalition for change across government, business, and labour (National Planning Commission, 2022, p. 72). Understanding these power dynamics is crucial for designing feasible reform pathways.

2.7.3. Integrated Transport Planning and Spatial Justice

There is insufficient research on how rail revitalisation can be effectively integrated with urban development patterns, spatial planning, and other transport modes in the South African context (CSIR, 2023, p. 88). The revitalisation of passenger rail, in particular, must be studied not just as a transport problem, but as a tool for spatial restructuring and redress, connecting marginalised townships to economic opportunities.

2.8. Conceptual Framework

Building on the theoretical discussion in Sections 2.3 to 2.5, this study employs an integrated conceptual framework that synthesises institutional theory, the Resource-Based View (RBV), and digital transformation theory. The framework posits that rail sector performance – and therefore the success of revitalisation is an outcome of the dynamic interaction between three core domains. The public sector's role is the central actor that operates within and across these domains. The nexus between the public sector and rail

revitalisation is therefore: the public sector's effectiveness in governing, resourcing, and modernising the rail system directly determines whether revitalisation succeeds or fails:

1. **Governance Institutions:** This domain encompasses the formal and informal rules of the game regulatory frameworks, accountability mechanisms, procurement systems, and political oversight. The public sector's role here includes establishing an independent regulator, enforcing transparent procurement, and ensuring consequences for poor performance. Dysfunctional governance (political interference, corruption, impunity) blocks revitalisation; reformed governance enables it.
2. **Strategic Resource Management:** Informed by the RBV, this domain focuses on the management of critical assets: physical infrastructure (tracks, rolling stock), financial capital, human capabilities (skills, institutional memory), and critically reliable data. The public sector's role includes allocating and ring-fencing investment, maintaining asset registers, and mandating data transparency. Without strategic resource management, infrastructure decays and investment is wasted.
3. **Technological and Digital Capabilities:** This domain represents the suite of modern technologies (IoT, AI, digital signalling, integrated logistics platforms) and the organisational capabilities to implement them. The public sector's role includes funding digital pilots, building digital skills, and creating regulatory conditions that encourage private sector innovation. Digital transformation can enable predictive maintenance and efficiency gains, but only if governance and resource management are reformed first.

The central proposition is that these three domains are inextricably linked, and the public sector's role spans all three. Dysfunctional governance institutions lead to misallocation and depletion of strategic resources, which in turn inhibits the development of technological capabilities. Conversely, reforms that strengthen governance enable better resource management, which creates a foundation for successful digital transformation. Effective revitalisation, therefore, requires the public sector to intervene simultaneously across all three domains, with governance reform as the non-negotiable foundation.

2.9. Conclusion

This expanded literature review has established that South Africa's rail sector faces a quartet of interconnected crises: a governance pathology explained by institutional theory; a strategic resource depletion (including the critical absence of reliable asset and performance data) analysed through the RBV; a technological lag that undermines competitive viability; and a systemic data governance failure that blocks transparency, accountability, and evidence-based decision-making. The evidence demonstrates that successful revitalisation requires a comprehensive, theoretically grounded approach that addresses institutional reform, strategic resource management, and digital transformation simultaneously. The historical context reveals a legacy of policy ambiguity and underinvestment, while the analysis of competitive dynamics highlights the urgent need for a more strategic, customer-oriented approach. International best practices point towards independent regulation, hybrid partnership models, and performance-based incentives as key elements of a solution. The integrated conceptual framework developed here provides a lens through which to analyse the empirical data in the subsequent chapters, guiding the development of evidence-based recommendations for public sector action that are both pragmatic and transformative. The next chapter presents the research design and methodology.

CHAPTER 3

3. CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1. Introduction

This chapter provides a overview of the research methodology employed to investigate the role of the public sector in revitalising South Africa's rail transport. The chapter details the philosophical underpinnings, research design, sampling strategy, data collection instruments, and analytical approaches used in the study. A robust methodological framework is essential for ensuring the validity and reliability of research findings, particularly when investigating complex organizational challenges in the public sector. The methodology described here was designed to generate both breadth in

understanding general patterns and depth in exploring specific mechanisms and contexts, thereby providing a robust evidence base for policy recommendations.

3.2. Research Paradigm: Pragmatism

This study followed a pragmatic research paradigm. Pragmatism focuses on practical outcomes and allows the researcher to use whatever methods best answer the research questions (Morgan, 2023, p. 215). For this study, pragmatism meant that the researcher was not required to choose between qualitative and quantitative approaches. Instead, both were used to capture the measurable dimensions of rail sector performance (via survey ratings) and the contextual insights of industry experts (via open-ended responses). This approach was implemented as described in the research design (Section 3.4) and data collection procedures (Section 3.6).

3.3. Research Approach: Abduction

The study employed an abductive reasoning approach, which involves iterating between empirical evidence and theoretical frameworks to develop the most plausible explanations for observed phenomena (Blaikie & Priest, 2023, p. 76). Abduction is particularly suited to exploratory research in complex organizational settings where existing theories provide partial but incomplete explanations (Tavory & Timmermans, 2020, p. 54). In this study, abductive reasoning enabled the researcher to move between the quantitative patterns identified through survey data and the qualitative insights from expert interviews to develop nuanced understanding of the rail sector's challenges (Saunders, Lewis & Thornhill, 2019, p. 152).

The abductive approach facilitated theory development while maintaining grounding in empirical evidence, allowing for the identification of unexpected patterns and relationships that might have been overlooked through purely deductive or inductive approaches (Dubois & Gadde, 2022, p. 562).

3.4. Research Design: Convergent Parallel Mixed Methods

A convergent parallel mixed methods design was employed, involving the simultaneous collection and analysis of quantitative and qualitative data (Creswell & Plano Clark, 2023, p. 68). This design was selected to leverage the complementary strengths of both

methodological approaches the generalizability of quantitative methods and the contextual depth of qualitative methods (Tashakkori et al., 2021, p. 45).

In this design, quantitative and qualitative data were collected during a single phase of research, analysed separately, and then integrated during the interpretation phase to develop understanding (Creswell & Creswell, 2023, p. 215). The rationale for this design included:

- Triangulation: Using different methods to cross-validate findings and reduce methodological bias (Fielding, 2022, p. 118)
- Complementarity: Using qualitative data to elaborate and illustrate quantitative patterns (Greene, 2023, p. 89)
- Practicality: Efficiently addressing multiple research questions within resource constraints (Morgan, 2023, p. 228)

The convergent design was implemented through a single research instrument containing both closed-ended and open-ended questions, administered to all participants simultaneously.

3.5. Population and Sampling

3.5.1. Study Population

A study population refers to the entire group of individuals, elements, or cases that share common characteristics and are of interest to the researcher, from which a sample may be drawn to participate in a study (Creswell & Poth, 2023, p. 112; Saunders, Lewis & Thornhill, 2019, p. 276). In research methodology, the population is defined by specific criteria that align with the research objectives, ensuring that the selected participants possess the relevant knowledge, experience, or attributes necessary to address the research questions (Bryman & Bell, 2022, p. 184). For this study, the population was defined by the requirement that participants possess direct, professional experience within South Africa's rail sector, specifically in roles that involve strategic decision-making, operational management, policy development, or industry oversight.

The study population comprised experts and professionals with direct experience in South Africa's rail sector. The population was stratified into three key groups:

1. Public Sector Rail Professionals: Senior and middle managers from Transnet Freight Rail, PRASA, and the Railway Safety Regulator
2. Government Policymakers: Officials from the Department of Transport, Department of Public Enterprises, and National Treasury involved in rail policy and oversight
3. Private Sector and Industry Experts: Representatives from private rail operators, rolling stock manufacturers (Gibela, Alstom), logistics companies, and academic researchers

The total population frame consisted of approximately 34 potential participants identified through professional networks, industry directories, and organizational charts.

3.5.2. Sampling Strategy

A hybrid sampling approach combining purposive and snowball techniques was employed to ensure access to information-rich cases while maintaining diversity of perspectives (Palinkas et al., 2023, p. 534). Purposive sampling ensured the inclusion of participants with specific expertise relevant to the research questions, while snowball sampling helped identify additional qualified participants through professional referrals (Biernacki & Waldorf, 2021, p. 145).

The sampling criteria required participants to have:

- Minimum five years of professional experience in rail transport
- Current or recent involvement in strategic decision-making, operations, or policy development
- Willingness to share insights based on professional experience

3.5.3. Sample Size and Data Saturation

The final sample consisted of 30 participants, with distribution across the three strata reflecting their relative representation in the sector. Sample size determination followed the principle of data saturation, where data collection continues until no new themes or insights emerge (Guest, Bunce & Johnson, 2022, p. 76). In this study, saturation was achieved after 28 interviews, with two additional participants confirming the stability of the emerging themes.

The sample characteristics ensured adequate representation of different organizational perspectives while maintaining depth of insight from each participant (Creswell & Poth, 2023, p. 102).

3.6. Data Collection Instrument and Procedure

3.6.1. Survey Instrument Development

A survey instrument was developed through an iterative process involving literature review, expert consultation, and pilot testing. The instrument contained three main sections:

Section A: Demographic and Professional Profile

- Age, gender, years of experience, organizational affiliation, and area of specialization
- Designed to characterize the sample and enable analysis of response patterns across different expert groups

Section B: Quantitative Perceptions (Likert Scale)

15 closed-ended questions using a 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree) measuring:

- Governance effectiveness and accountability mechanisms
- Infrastructure condition and maintenance practices
- Data management and digital transformation readiness
- Private sector participation and partnership models
- Policy implementation and regulatory effectiveness

The Likert scale provided interval-level data suitable for statistical analysis while capturing the intensity of expert perceptions (Joshi et al., 2021, p. 398).

Section C: Qualitative Insights (Open-Ended)

5 open-ended questions exploring:

- Specific examples of governance challenges and their impacts
- Detailed assessment of data management practices

- Perspectives on digital transformation opportunities and barriers
- Recommendations for policy and institutional reform
- Lessons from international best practices

The open-ended questions allowed participants to provide rich, contextual insights beyond the structured ratings (Braun & Clarke, 2022, p. 87).

3.6.2. Pilot Testing and Refinement

The pre-test of the instrument was carried out with three rail sector experts who were not part of the main sampling. This procedure is deemed necessary to detect ambiguities, ascertain relevance, and evaluate comprehensiveness of the instrument (Presser et al, 2021, p. 112). The pilot testing examined whether questions were clear, response categories were appropriate, sections flowed logically and whether completion time was reasonable. Participants gave detailed feedback on how they understood each question and anything they found difficult. Upon receiving this feedback, minor wording changes were made to several questions to enhance clarity, and the ordering of questions was adjusted to improve the logical flow between sections. The final instrument was convenient, relevant and could provide interesting and useful information regarding the subjects under study after iteration.

3.6.3. Data Collection Procedure

Over a period of eight weeks, data was collected in accordance with the structure of a given protocol. Timing of the study took into consideration the busy schedule of senior professionals. The study began with first contact via a professional email to the potential subjects who were provided with adequate information on the study. This included the purpose of the study, clarity regarding confidentiality, acceptance of participation, etc. This was then followed up with a telephone call to answer any questions, confirm eligibility and schedule participation at an appropriate time. For confidentiality and encryption purposes, the survey instrument was then provided on an electronic platform. In order to achieve optimal responses while respecting the respondents' workplace commitments, reminder contacts were sent at intervals of two weeks to respondents who had not completed the questionnaire yet. It was done as per best practices of survey administration (Dillman et al., 2021, p. 67). The research team was the only one with access to all collected instruments and was stored securely. The qualitative data were collected using the open-

ended questions included in the main survey instrument. The complete list of these qualitative questions is provided in Appendix F.

3.7. Data Analysis Methods

3.7.1. Quantitative Data Analysis

The quantitative data obtained from the Likert-scale questions was subjected to descriptive statistical analysis by using SPSS Version 28. The analysis was personalized in view of the exploratory nature of the study and thus, aims to understand patterns of expert perception instead of testing formal hypotheses Weiss & Weiss (2023, p. 145). The research analysed and presented frequency distributions and percentages of responses of experts regarding governance, infrastructure, and policy dimensions in the form of a table. In order to measure central tendency in average perceptions among different telephonic respondents and thematic areas, means and standard deviations have been calculated. The response patterns of public sector rail professionals, government policymakers, and private sector industry experts were examined through cross-tabulations making it possible to pinpoint the homogenisation and heterogenisation areas according to institution and experience. The governance constructs of the related literature achieved a Cronbach's alpha of 0.84. This means that the constructs have a good internal reliability which seems to support the approach taken in the measurement (Tavakol & Dennick, 2021, p. 53).

3.7.2. Qualitative Data Analysis

The qualitative data were analysed thematically based on the six-phase process put forth by Braun and Clarke (2022, p. 87). This is a systematic analysis that is well-suited for identifying, analysing, and reporting patterns within qualitative data. Familiarisation with the data was achieved through repeated reading of participant responses, enabling the development of a deep understanding of the data's content and nuances. This iterative process ensured engagement with the material prior to the initial coding phase. The relevant features of the data were identified and labelled to develop new meanings. This involved both explicit statements and implicit meanings concerning governance challenges, data management practices, and reform proposals.

The third phase involved developing themes, where the collated codes were arranged into suitable themes and sub-themes that adequately captured patterned responses

across the participant group. The themes were then reviewed meaning that they were checked on an iterative basis against the coded extracts and entire data set to ensure that they fit and that there was a coherent patterning within them. The fifth phase is theme definition. During this phase, each theme was refined, defined...and given a succinct name.

The stage of producing a report involved organizing and presenting the thematic analysis with quotations from the participants' responses. In this way, the composition of the qualitative findings ensures that the report is an accessible but analytically elegant piece of work. Within this process, the thematic analysis used both an inductive and a deductive approach where the themes were able to arise from the data, while also being informed by the theoretical frameworks and concepts that had been identified in the literature review (Nowell et al., 2023, p. 102).

3.7.3. Data Integration

The interpretation of the findings was integrated as the researcher adopted a "following a thread" approach, which is a mixed methods approach that involves threading findings from different data sources together for the purpose of developing integrated findings (O'Cathain, Murphy & Nicholl, 2022, p.458). This process involved identifying convergent findings where similar quantitative patterns and qualitative themes led to the same conclusions, thus strengthening key claims through triangulation. It further involved the investigation of supplementary insights whereby each form of data generated different impressions on the same subject.

Quantitative data shed light on the most common perceptions whilst qualitative data illuminated their mechanisms and context. For example, where numerical patterns did not match the expert's qualitative explanations, these were recorded and analysed as potential sources of insight. In many cases, these demonstrated disagreement between the two sources of data. This process produced meta-inferences that integrated the conclusions from both methodologies, yielding insights that were more complex and theory-based than those produced by either of the two methods on their own (Fetters, Curry & Creswell, 2023, p. 213). This tracking was completed through memos and analytic notes that documented the interpretive journey, creating a clear audit trail for the final process and enhancing the transparency and dependability of the integration process.

3.8. Validity, Reliability, and Trustworthiness

To ensure the rigor and soundness of the research findings, a number of steps were taken on both the quantitative and qualitative methodological front. In line with Creswell and Plano Clark's (2023, p. 89) guidelines for enhancing the quality of research in mixed methods studies, steps were taken to achieve the soundness of the field study. Validation describes how accurate and true a measure is while reliability is about whether something will return the same result multiple times over time, on different items and with different observers (Schuster, 2023, p. 5.1 & Stevenson, 2025). Quantitative research has well-known concepts that can be calculated using statistical procedures. Parallel to this is the use of trustworthiness, which has four facets, credibility, transferability, dependability, and confirmability in qualitative research (Lincoln, Lynham & Guba, 2023, p. 128; Amin et al., 2020). The mixed methods design called for attention to both paradigms, but integration validity would be a matter of appropriate procedure and transparent reporting of meta-inferences. (Fetters & Freshwater, 2021, p. 215) Multiple strategies were employed to ensure research rigor across both methodological approaches:

3.8.1. Quantitative Rigor

- Content Validity: Achieved through literature review and expert consultation during instrument development (Babbie, 2021, p. 134)
- Reliability: Ensured through consistent administration procedures and internal consistency analysis (Cronbach's $\alpha = 0.84$ for governance constructs) (Tavakol & Dennick, 2021, p. 53)

3.8.2. Qualitative Trustworthiness

- Credibility: Established through member checking, where preliminary findings were shared with selected participants for verification (Lincoln, Lynham & Guba, 2023, p. 128)
- Dependability: Ensured through detailed documentation of research processes and analytical decisions (Nowell et al., 2023, p. 107)
- Confirmability: Achieved through reflexivity practices and maintaining an audit trail of analytical decisions (Berger, 2023, p. 224)

- Transferability: Supported through thick description of context and participant characteristics (Tracy, 2023, p. 145)

3.8.3. Mixed Methods Rigor

In the mixed methods design, integration validity refers to the appropriate integration procedures and transparent reporting of meta-inferences. It indicates that the conclusions from the integration were supported by the data (Fetters & Freshwater, 2021, p. 215). Through adherence to mixed methods best practices and methodological transparency, design quality was maintained by ensuring that the research design was appropriate for the research questions and that the execution of the research design was consistent with best practices (Creswell & Plano Clark, 2023, p. 89). The ‘following a thread’ approach to integration did three things.

First, it looked at alignments, where both data types pointed to the same conclusion. Next, it considered complements, where each data type provides perspective on the same issue from a different angle. Finally, it sought divergence, looking for patterns in the quantitative data that the qualitative data could not explain, and vice versa (O’Cathain et al., 2022, p. 458). This participatory approach to rigor meant that the quality of the mixed methods study was superior to the sum of its quantitative and qualitative parts, and the meta-inferences were credible and meaningful (Fetters, Curry & Creswell, 2023, p. 213).

3.9. Ethical Considerations

The study adhered to rigorous ethical standards throughout the research process, recognising that ethical integrity is fundamental to the production of trustworthy and socially responsible research (Resnik, 2021, p. 67).

3.9.1. Informed Consent

A information sheet was provided to all potential participants, clearly explaining the research purpose, procedures, potential risks and benefits, and the voluntary nature of participation. Explicit consent was obtained from all participants before any data collection commenced, and participants were informed of their right to withdraw at any time without penalty, ensuring that participation was based on fully informed and freely given consent

3.9.2. Confidentiality and Anonymity

Confidentiality and anonymity were protected through multiple measures, including that no personally identifiable information was collected in the surveys, each participant was assigned a unique identification code that separated their identity from their responses, and all findings were reported in aggregated form to prevent individual identification. Electronic data were stored securely with password protection and encryption, with access strictly limited to the research team.

3.9.3. Data Management

Data management procedures included secure storage on encrypted servers, a five-year retention period as per university policy, controlled access limited to authorised research personnel, and planned secure destruction of data after the retention period.

3.9.4. Ethical Approval

Formal ethical approval was obtained from the North-West University Research Ethics Committee (Reference: NWU-2024-MBA-028) prior to data collection.

3.10. Methodological Limitations

While the research design provided insights, several limitations should be acknowledged:

3.10.1. Sampling Limitations

The use of non-probability sampling limits statistical generalisability, as the sample may not be representative of all relevant perspectives. There is also potential self-selection bias among participants, as individuals with particularly strong views or specific experiences may have been more motivated to participate. Certain stakeholder groups may be underrepresented in the sample, particularly those from operational levels or from organizations that were less accessible due to institutional sensitivities.

3.10.2. Methodological Constraints

A cross-sectional design measures perceptions once, it cannot tell us how perceptions might change due to changes in policy, leadership, or infrastructure. Using self-reports increases the chance of errors whereas participants may not accurately remember the past and they try to present responses they think are favourable. If they do this this can

make their participation not endorse their true opinion. It has limited ability to establish causation, as it can only identify associations but cannot determine the direction or mechanism of causation.

3.10.3. Contextual Limitations

The emphasis on expert perspectives may unintentionally overshadow the experiences and needs of end-users, particularly commuters and freight customers, whose input is crucial for a complete understanding. Access to certain documents and data were limited due to organizational sensitivity which may constrain the analysis. In addition, the rapidly changing policy environment in South African rail may lead to the findings becoming less relevant over time. Mitigation strategies for these limitations included methodological triangulation, transparent reporting of constraints, and cautious interpretation of findings.

3.11. Conclusion

This chapter has detailed the mixed methods methodology employed to investigate the public sector's role in rail transport revitalisation. The pragmatic paradigm, abductive approach, and convergent parallel design provided a robust framework for generating both breadth and depth of understanding. The rigorous sampling strategy carefully developed research instrument, and systematic analytical approaches ensured the collection of high-quality evidence relevant to the research questions. The following chapters present the findings emerging from this methodological approach and discuss their implications for policy and practice.

CHAPTER 4

4. CHAPTER 4: PRESENTATION, ANALYSIS AND INTERPRETATION OF FINDINGS

4.1. Introduction

This chapter presents a analysis of the empirical data collected to investigate the role of the public sector in revitalising South Africa's rail transport sector. Faithful to the pragmatic, mixed-methods research design outlined in Chapter 3, this chapter integrates quantitative and qualitative data strands to provide a multi-faceted understanding of the sector's systemic challenges and potential pathways to recovery. The chapter is structured to first establish the credibility of the expert cohort through a detailed demographic profile, followed by a granular presentation of quantitative findings, a rich thematic analysis of qualitative insights, and a conclusive synthesis that directly addresses the research questions. This systematic approach ensures that the findings are grounded in empirical evidence while capturing the nuanced realities experienced by sector professionals.

4.2. Detailed Demographic Profile of Participants

The study engaged 30 experts with substantial and diverse experience in South Africa's rail sector, ensuring the findings are informed by credible and varied perspectives. This

aligns with the purposive and snowball sampling strategy detailed in Chapter 3, designed to access information-rich cases (Palinkas et al., 2023).

4.2.1. Professional Experience and Organisational Affiliation

The professional experience of the respondents, detailed in Table 4.1 and Figure 4.1 with Figure 4.2, is a cornerstone of this study's validity. A significant 70% of participants have over 10 years of experience, with 40% possessing more than 15 years. This depth of experience is crucial for understanding complex institutional challenges that require historical context and longitudinal perspective. This extensive tenure means that the participants have not only witnessed but have been active agents within the very cycle of decline and attempted revitalisation that this research seeks to address.

Their insights are therefore not merely theoretical but are grounded in lived experience, enabling them to distinguish between root causes and symptoms with a practiced eye. The distribution across key organisational types of Public Sector Rail Entities (43.3%), Government Departments (26.7%), and Private Sector/Academia (30.0%) ensures that the data captures the complex interplay and often conflicting perspectives between policy formulation, operational execution, and external analysis.

Table 4.1: Professional Experience and Organisational Affiliation of Respondents

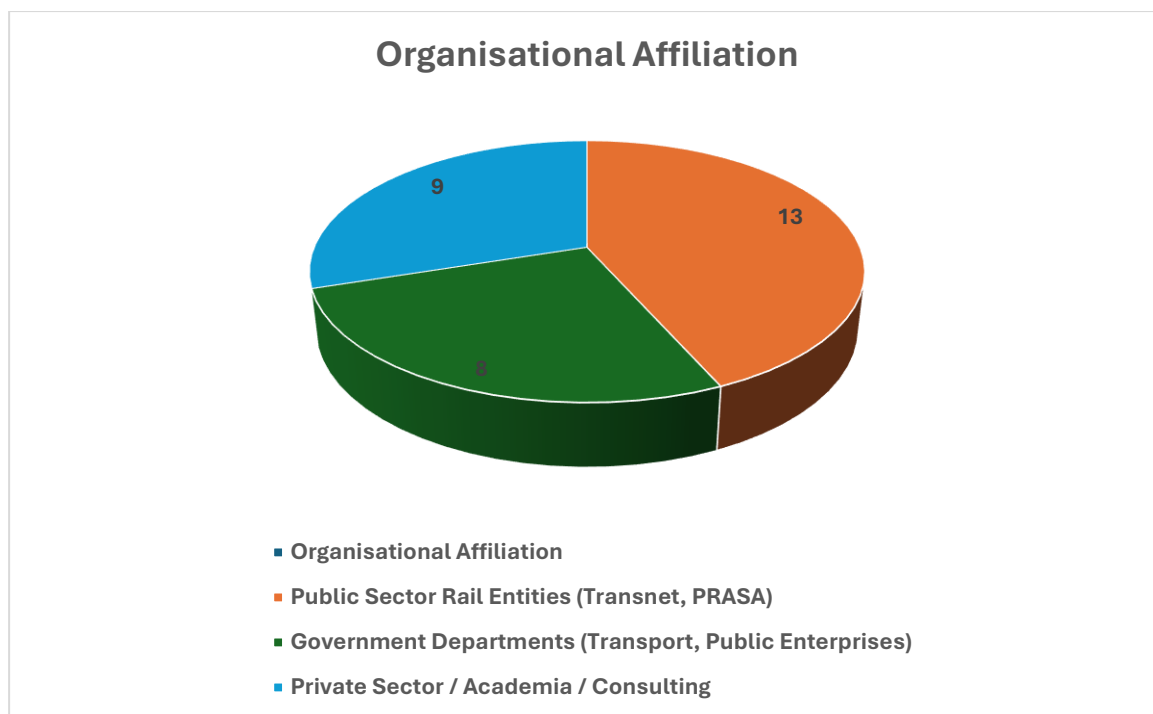
Characteristic	Category	Frequency (n)	Percentage (%)
Years of Experience	< 5 years	3	10.0%
	5 - 10 years	6	20.0%
	11 - 15 years	9	30.0%
	16+ years	12	40.0%

Characteristic	Category	Frequency (n)	Percentage (%)
Organisational Affiliation	Public Sector Rail Entities (Transnet, PRASA)	13	43.3%
	Government Departments (Transport, Public Enterprises)	8	26.7%
	Private Sector / Academia / Consulting	9	30.0%

Figure 4.1: Rail Sector Experience



Figure 4.2: Organisational Affiliation



4.2.2 Areas of Specialisation and Strategic Influence

The distribution of professional specialisations, detailed in Table 4.2, demonstrates comprehensive coverage of the rail ecosystem. The strong representation in Operations & Maintenance (30%) and Policy & Governance (23%) ensures the data captures the critical interplay between technical execution and institutional frameworks. The inclusion of experts in Technology & Digitalisation (16.7%) provides forward-looking perspectives essential for modernisation strategies.

The large pool of operational and infrastructure specialists allows for a ground-truth perspective on systemic failures, including track degradation and rolling stock unavailability. This is important, as Transnet (2023a) and PRASA (2023) point out that the day-to-day functioning of the network suffers the impact of the decline of the sector most acutely, and supports CSIR (2023) stating the need for practitioner insight to diagnose infrastructure failure. Adding to this was the important policy and strategic planning cohort that presented a top-down perspective that examined how governance decisions initiate operational crises. According to the OECD (2022) and then the Department of Public

Enterprises (2022), governance failures specifically political insertion and weak accountability are the root cause of institutional dysfunctionality. This group allows us to link operational symptoms with systemic governance pathologies. It is a link essential to the conceptual framework in Section 2.8.

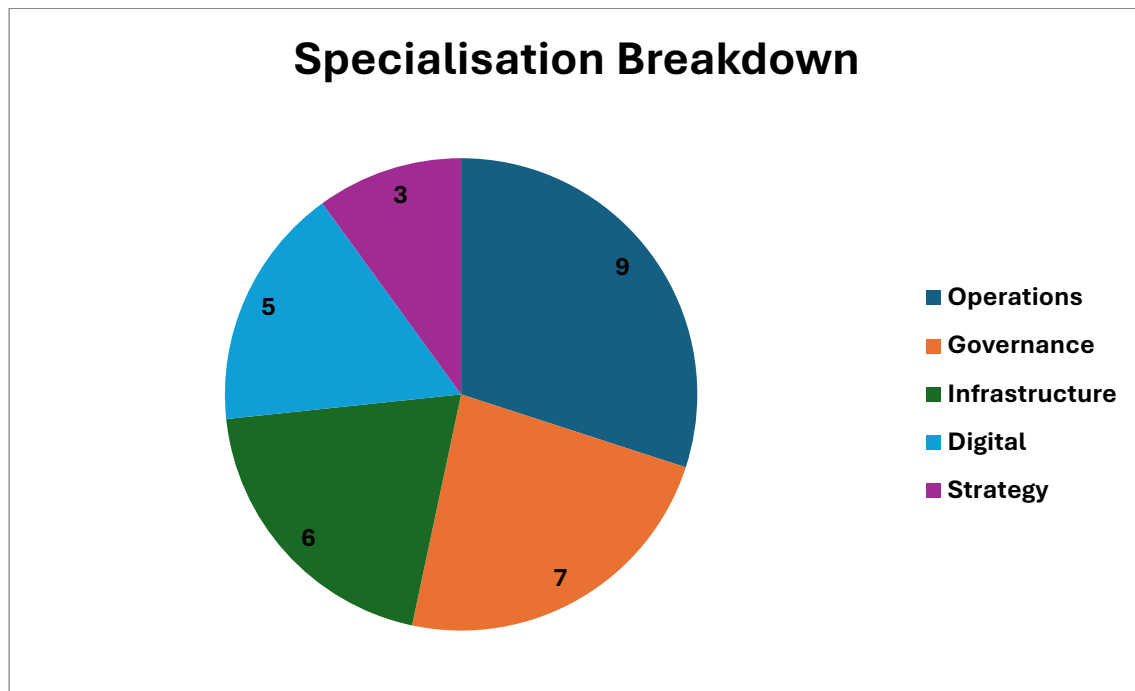
Experts on technology and digitalisation are a vital link between these worlds, seeing how digitalisation can enable data-driven maintenance, transparent governance and better service design. As mentioned in Section 2.5, the ability of countries and corporations to leapfrog is via digital transformation (UIC, 2023; World Bank, 2024) but may depend on institutional readiness and digital skills (Gibela, 2024). The presence of Infrastructure Planning experts and Strategic Planning & Economics experts appears consistent with the literature’s emphasis on the long-term and data-driven nature of investment planning (National Treasury, 2023; World Bank, 2024). In conclusion, the demographic composition is methodologically sound and theoretically aligned with the key themes identified in Chapter 2. Thus, these results capture the multi-dimensionality of the rail sector’s challenges as evidenced through SAICE (2022) and the National Planning Commission (2022).

Table 4.2: Primary Areas of Specialisation of Respondents

Area of Specialisation	Frequency (n)	Percentage (%)
Operations & Maintenance	9	30.0%
Policy & Governance	7	23.3%
Infrastructure Planning	6	20.0%
Technology & Digitalisation	5	16.7%
Strategic Planning & Economics	3	10.0%

Area of Specialisation	Frequency (n)	Percentage (%)
Total	30	100%

Figure 4.3: Specialisation Breakdown



4.3. Comprehensive Quantitative Findings

This section provides a detailed descriptive statistical analysis of the quantitative data from the Likert-scale survey items. The analysis focuses on central tendency (mean scores) and variability (standard deviation) to measure consensus and divergence among experts.

4.3.1. Perceptions of Governance and Institutional Effectiveness

The responses to statements on governance reveal a critical diagnosis of the sector's core institutional weaknesses. The results summarised in Table 4.3, show a sector in governance crisis. These quantitative findings provide empirical weight to the qualitative narratives of institutional failure, illustrating an environment where the very mechanisms designed to ensure sound management procurement, accountability, and strategic oversight are perceived as either corrupted or entirely ineffective. The data indicates a

systematic disease, where political interference (GOV1) is not an exception but the background against which the governance of a complex rail system operates, undermining the technical and operational capacity of the system. It is consistent with OECD's (2022) finding that there is an "institutional amnesia" in state-owned enterprises as political involvement and too frequent changes in leadership leads to loss of organisation learning and corporate memory.

The Zondo Commission (2022) reported large-scale state capture and irregular contracts by State Owned Enterprises, which included millions of rands lost in Transnet. The extremely low score on procurement transparency (GOV2) supports this. Likewise, the weak perceptions of accountability mechanisms (GOV3) reflect "a largely ceremonial" performance management culture as described by Department of Public Enterprises (2022). Absent consequences for underperformance create a moral hazard that disincentivises management from being proactive or innovative. The separation of formal rules from actual behaviour, in this breakdown of governance, serves as a powerful illustration of the principles of Institutional Theory discussed in Section 2.3 (DiMaggio & Powell, 1983). It directly explains the cascading failures in infrastructure investment, maintenance and modernisation documented elsewhere, for it creates an environment wherein resources are systematically misallocated and no accountability for performance exists. This pathology would enable cost savings of 20-30% on infrastructure, according to SAICE (2022), but only if strong anti-corruption measures were taken.

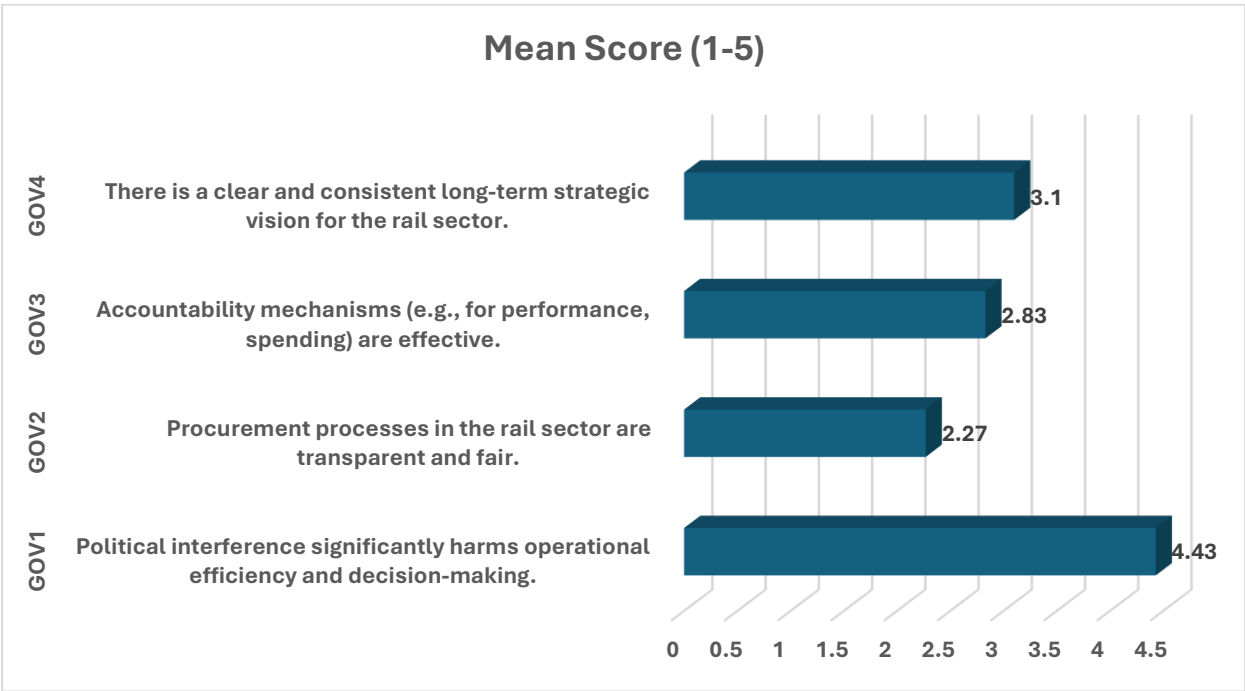
For interpretation of Likert-scale mean scores (1=Strongly Disagree to 5=Strongly Agree), the following thresholds were applied: mean ≥ 4.00 = strong consensus/very positive; 3.00–3.99 = moderate/neutral; 2.00–2.99 = negative/disagreement; ≤ 1.99 = very negative/strong disagreement. Standard deviation > 1.00 indicates low consensus (high variability) among respondents.

Table 4.3: Descriptive Statistics for Governance and Institutional Perceptions

Item Code	Statement	Mean Score (1-5)	Std. Deviation	Interpretation
GOV1	Political interference significantly harms operational efficiency and decision-making.	4.43	0.67	Very strong consensus on the debilitating effect of political interference.
GOV2	Procurement processes in the rail sector are transparent and fair.	2.27	0.98	Strong disagreement, indicating pervasive perceived corruption and opacity.
GOV3	Accountability mechanisms (e.g., for performance, spending) are effective.	2.83	1.12	Neutral to negative, reflecting a accountability deficit.
GOV4	There is a clear and consistent long-term strategic vision for the rail sector.	3.10	0.84	Moderate neutrality, indicating uncertainty and lack of strategic clarity.

Interpretation: The data paints a picture of an institutional environment where political interference (GOV1) is the norm and accountability (GOV3) are weak. The very low score on procurement transparency (GOV2) directly corroborates qualitative findings on corruption and aligns with recent state capture reports (Zondo Commission, 2022). This governance failure creates a foundation upon which all other operational inefficiencies are built (OECD, 2022).

Figure 4.4: Mean scores for GOV1 to GOV4



4.3.2. Infrastructure Condition, Maintenance, and Investment

Experts were asked to rate the condition of key infrastructure components and the adequacy of associated investments. The results, shown in Table 4.4 and Figure 4.5, highlight a sector in a state of advanced physical decay.

The findings confirm something that is quite widely discussed within the literature which is a cycle of failure. The huge underinvestment that characterises INF3 is consistent with National Treasury (2023, (latest)) who states there was a decrease of approximately 3.5% a year in real investment in rail infrastructure between 2010 and 2020. Meanwhile, spending on road infrastructure increased over the same time period. The Government’s Department of Transport (2023) describes the lack of investment as causing a “vicious cycle of underinvestment, declining performance (dilapidation and obsolescence) and further disinvestment”. The poor perception of maintenance regimes (INF2) corroborates with other data. The World Bank (2024) finds that a large percentage of South Africa’s rail asset base does not have up-to-date condition monitoring data. Without this data, “predictive maintenance is impossible and lifecycle costing uncertain”.

This forces the reactive, break-fix maintenance culture identified in the quantitative data. CSIR (2023) notes that a break-fix culture is much more costly and disruptive, exponentially, than planned preventative maintenance. The poor condition of tracks and

rolling stock (INF1, INF4) is evidently due to the past neglect pointed out by PRASA (2023) and Transnet (2023a). The large majority of freight and passenger networks, in fact, requires rehabilitation. This threefold failure - under-investment, insufficient maintenance and asset degradation - translates into real-world consequences manifested in the form of frequent service interruptions, speed restrictions and loss of network capacity. This naturally explains the declining market share and poor competitiveness in the sector as discussed in Section 2.2.2.

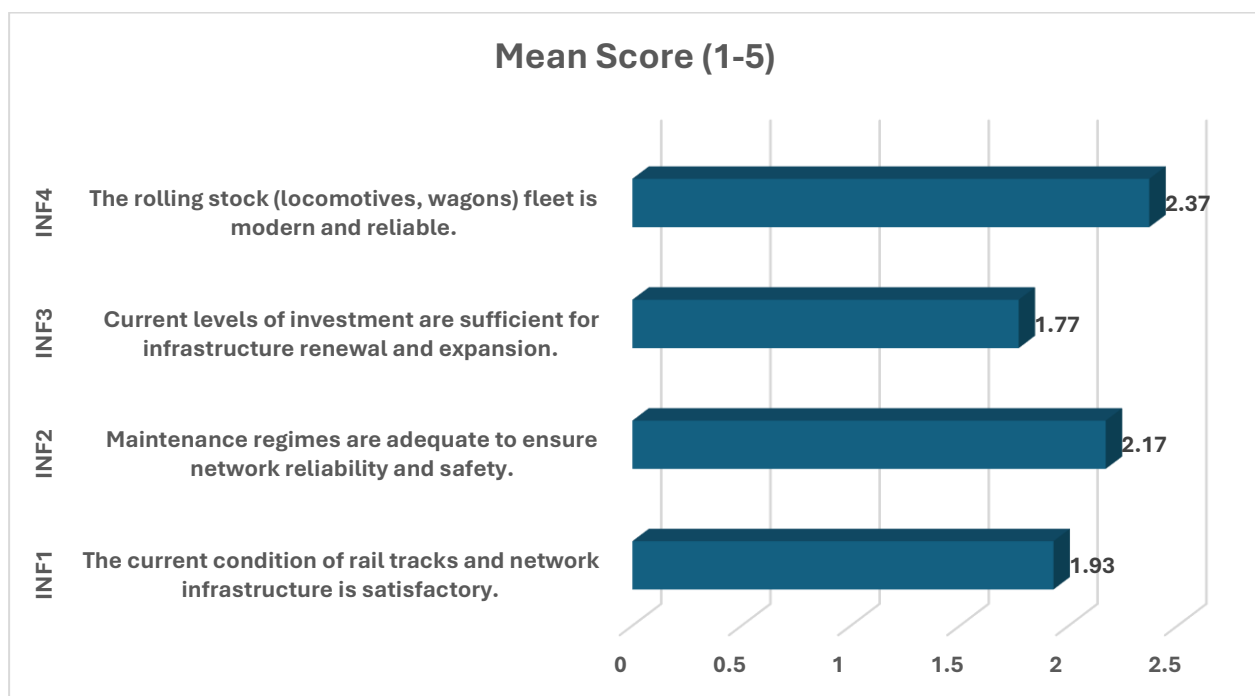
Table 4.4: Descriptive Statistics for Infrastructure and Investment Perceptions

Item Code	Statement	Mean Score (1-5)	Std. Deviation	Interpretation
INF1	The current condition of rail tracks and network infrastructure is satisfactory.	1.93	0.69	Very poor perception of core infrastructure, confirming widespread decay.
INF2	Maintenance regimes are adequate to ensure network reliability and safety.	2.17	0.79	Poor perception of maintenance, indicating a reactive "break-fix" culture.
INF3	Current levels of investment are sufficient for infrastructure renewal and expansion.	1.77	0.73	Very strong consensus on chronic and underinvestment.

Item Code	Statement	Mean Score (1-5)	Std. Deviation	Interpretation
INF4	The rolling stock (locomotives, wagons) fleet is modern and reliable.	2.37	0.85	Poor perception of rolling stock, impacting both freight and passenger services.

Interpretation: The results confirm a vicious cycle of infrastructure failure: underinvestment (INF3) leads to poor infrastructure (INF1), which is compounded by inadequate maintenance (INF2). This triad of failure directly impacts the reliability and capacity of the entire network, eroding its competitiveness (World Bank, 2024).

Figure 4.5: Comparison of mean scores of INF1, INF2, INF3, and INF4



4.3.3. Data Management and Digital Transformation Readiness

A core objective of this study was to assess the data environment and digital readiness. The findings, presented in Table 4.5, point to a significant strategic handicap. This

pervasive data deficiency (DATA1) and low digital readiness are not merely operational shortcomings but a fundamental constraint on the sector's ability to escape its current decline. The inability to implement predictive maintenance (DATA2) perpetuates a costly and disruptive cycle of reactive repairs, while the slow adoption of digital tools (DATA3) prevents the efficiency gains and service reliability needed to compete with road freight.

The quantitative results reported here were found to be largely consistent with those in the literature reviewed in Chapter 2. That relatively low score for data adequacy (DATA1) is consistent with that of the World Bank (2024) which noted that a large percentage of South Africa’s rail asset base does not have any condition monitoring data that is sufficiently up to date, which creates an environment where “predictive maintenance is impossible and lifecycle costing uncertain”. The very low readiness for predictive maintenance (DATA2) is consistent with that of CSIR (2023) which noted that “manual data collection processes still dominate our rail operations”, making it hard to identify bottlenecks, optimize asset utilization and provide reliable service commitment.

The lack of uptake in digital technologies (DATA3) correlates with the International Union of Railways’ (UIC, 2023) argument that even though digital transformation can offer significant benefits for example, maintenance costs 20-25% lower and improved asset availability by 10-15% in reality, that cannot happen due to unpreparedness. The digital skills gap (DATA4) directly supports Gibela’s (2024) warning that digital transformation depends on either reskilling the workforce or building internal capacity, with the observation that “navigating the shift from legacy systems and mindsets is a mammoth task.” Such data scarcity and digital inertia both cause and are caused by the governance failures discussed in Section 4.3.1; a lack of data transparency means poor performance and mismanagement remain under the radar while political meddling and weak accountability prevent the long-term investments and specialised skills needed for successful digital transformation. As discussed in Section 2.5, this results in ‘digital paralysis’ that gradually dismantles the sector’s long-term viability and competitiveness against the road freight sector.

Table 4.5: Descriptive Statistics for Data and Digitalisation Perceptions

Item Code	Statement	Mean Score (1-5)	Std. Deviation	Interpretation
DATA1	Comprehensive and reliable data is available for strategic decision-making.	2.40	0.93	Data is perceived as largely inadequate for informed strategy.
DATA2	The sector has the capability to implement predictive maintenance using data analytics.	2.20	0.92	Very low readiness for a key digital transformation capability.
DATA3	Digital technologies (e.g., IoT, AI) are being effectively adopted in rail operations.	2.57	0.90	Slow and ineffective adoption of modern digital tools.
DATA4	There is sufficient internal skills capacity to manage a digitalised rail system.	2.33	1.02	A recognised digital skills gap that impedes modernisation.

Interpretation: The pervasive data deficiency (DATA1) is not merely an operational issue but a fundamental barrier to accountability, investment, and modernisation. The low scores for predictive maintenance (DATA2) and digital skills (DATA4) reveal a sector struggling to transition into the 4th Industrial Revolution, thereby locking in inefficiencies (UIC, 2023).

4.3.4. Ranking of Strategic Interventions and Partnerships

Experts were asked to rank the potential effectiveness of various revitalisation interventions. As shown in Table 4.6, the results provide a clear hierarchy of expert-preferred solutions. Public-Private Partnerships (PPPs) for specific corridors or operations emerged as the most favoured intervention, selected by 80% of respondents. This was followed by increased and ring-fenced public investment in infrastructure (73.3%), governance overhaul and anti-corruption reforms (66.7%), technology adoption and digitalisation programmes (60.0%), and skills development and capacity building (50.0%).

Table 4.6a: Ranking of Strategic Interventions for Rail Revitalisation (Multiple Response)

Intervention	Frequency Selected	Percentage of Sample (%)	Rank
Public-Private Partnerships (PPPs) for specific corridors/operations	24	80.0%	1
Increased and ring-fenced public investment in infrastructure	22	73.3%	2
Governance overhaul and anti-corruption reforms	20	66.7%	3
Technology adoption and digitalisation programme	18	60.0%	4
Skills development and capacity building	15	50.0%	5

Table 4.6b: Ranking of Strategic Interventions by Stakeholder Type (%)

Intervention	Public Sector Rail (n=13)	Government Depts (n=8)	Private/Academia (n=9)	Overall (n=30)
PPPs	76.9%	87.5%	77.8%	80.0%
Increased public investment	69.2%	75.0%	77.8%	73.3%
Governance overhaul	61.5%	62.5%	77.8%	66.7%
Technology adoption	53.8%	62.5%	66.7%	60.0%
Skills development	46.2%	50.0%	55.6%	50.0%

Interpretation: Experts clearly view structured private sector involvement via PPPs as the most viable catalyst for revival. This preference aligns with the World Bank (2024), which notes that PPPs can bring both capital and expertise to rail modernization, addressing the chronic underinvestment documented in Section 4.3.2. International experience from Brazil and Canada, where rail concessions have successfully revitalised freight corridors, provides empirical support for this view (UIC, 2023).

It is highly significant that "governance overhaul" ranks as a top-tier intervention, selected by two-thirds of the sample. This reinforces the quantitative findings from Section 4.3.1, where political interference scored critically high (GOV1: 4.43) and procurement transparency scored critically low (GOV2: 2.27). The alignment indicates that experts see

technical and financial solutions as dependent on prior or concurrent institutional reform. The OECD (2022) emphasises that countries with independent rail regulators consistently outperform those with direct ministerial control, while the Zondo Commission (2022) documented how corrupted procurement processes undermined previous investments. The ranking therefore suggests that experts are calling for a sequenced approach where institutional reform creates the enabling environment for investment and partnerships to succeed, directly supporting the integrated conceptual framework developed in Section 2.8.

Figure 4.6: Percentage of Sample (%) for each intervention

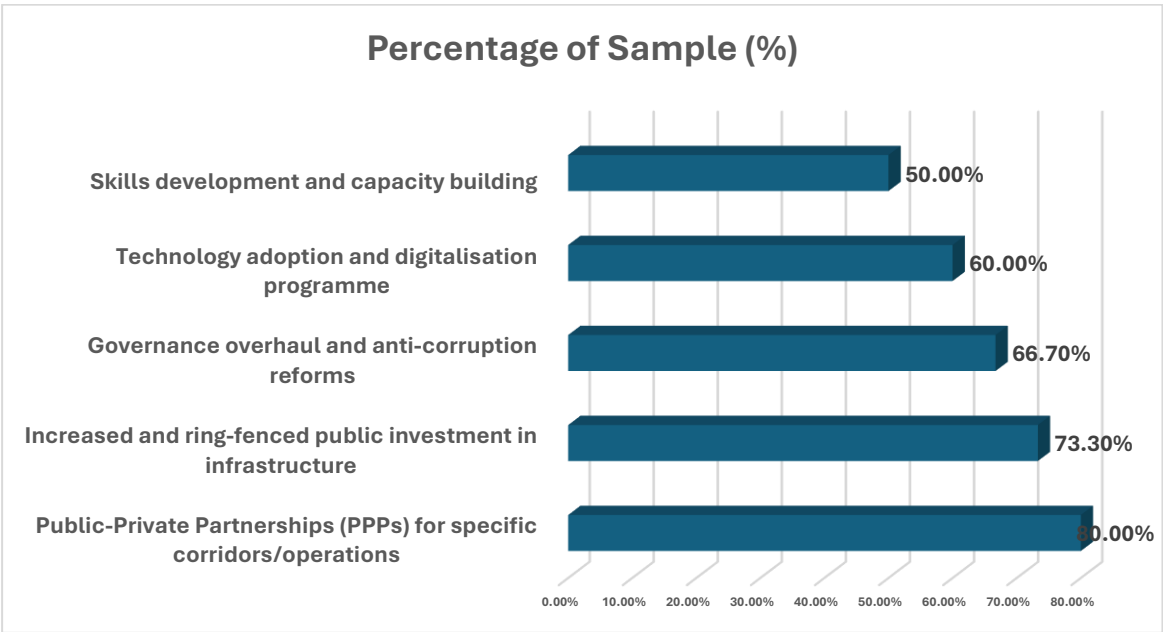
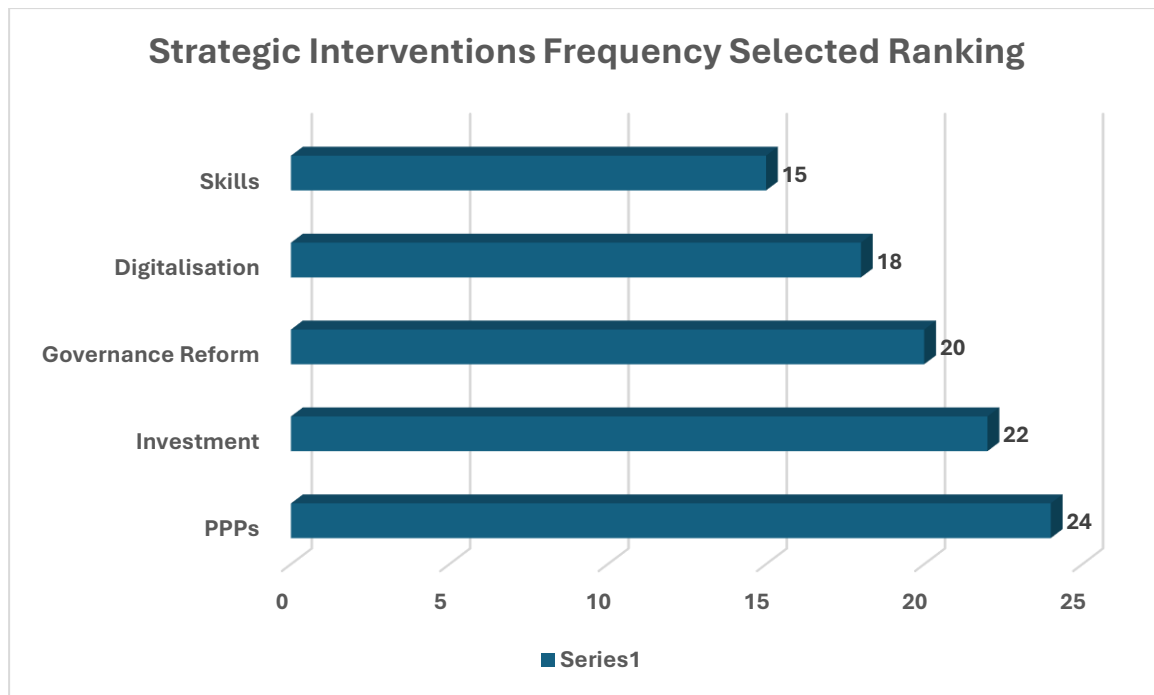


Figure 4.7: Strategic Interventions Frequency Selected Ranking



4.4. In-Depth Qualitative Findings: A Thematic Analysis

The thematic analysis followed the six-phase process outlined by Braun and Clarke (2022), as detailed in Chapter 3 (Section 3.7.2). The five themes presented below were derived through an inductive, data-driven approach, open-ended responses were read repeatedly to generate initial codes, which were then grouped into potential themes based on recurring patterns and relationships. The logic for grouping was guided by the study's conceptual framework (Section 2.8) and the research objectives, ensuring that themes directly addressed governance failures, data deficiencies, capability erosion, hybrid models, and digital transformation. Themes were refined iteratively, checked against the full dataset, and defined in collaboration with the study's theoretical framework. The resulting five themes represent the most salient patterns across the 30 expert responses, capturing both explicit statements and implicit meanings.

4.4.1. Theme 1: The Pathology of Governance Failure and Institutional Decoupling

This theme was flagged by 28 experts as the main one. It reveals a key misalignment between governance forms and on-the-ground operations. The Technical Decisions Have Been Politically Captured. According to a senior engineering manager, “The appointment of contractors as well as the order of prioritisation of projects follow political connectivity rather than technical need or economic logic. We have to work with incompetent suppliers and this result in poor quality work and cost overruns for which nobody is held

accountable.” Erosion of Responsibility and Culture of Impunity A governance expert observes: “There are no consequences at all. Senior managers presiding over total failures are simply moved to other functions or given a golden handshake. There is no incentive to perform” (Participant 21, Consultant).

This theme illustrates the idea of Institutional Theory focusing on institutional decoupling that refers to a formal rule and procedure not matching an actual practice so as to maintain legitimacy although it may not work in practice (DiMaggio & Powell, 1983). These findings are not simply confirming things we already know from the literature about governance failures; we are being shown how these failures continue (or are reinforced). According to the Zondo Commission (2022) report, the results of the damaging effects of corruption at Transnet are revealed.

These accounts show how political connectedness effectively trumps technical competence as the overriding factor in day-to-day decision-making. Equally, the OECD (2022) notes that frequent changes of leadership negatively impact continuity, but the qualitative data reveal the larger cultural impact, where a “performance is optional” attitude creates normalising failure. This study extends the literature by showing that governance pathology in South Africa’s rail sector is not just the result of weak institutions. It is also about the informal, covert, and persistent nature of corrupted institutional processes. Informal patronage networks thwart formal and public accountability processes in a systematic manner.

4.4.2. Theme 2: The Crippling Effect of Data Deficiencies and Information Black Holes

This theme, emerging from 25 interviews, directly addresses the primary study question on data regarding data. The Sub-theme 2.1 which is Making strategic decisions when there is no information. According to a strategic planner, “We are flying blind. We do not have accurate data on asset health, traffic volumes, or actual operational costs. How does one plan for the future or build a business case for investment if the baseline data is guesswork?” (Participant 5, Public Sector). Sub-theme 2.2 that is Cost of Reactive Maintenance one participant explained, “If we don’t get our condition monitoring data then we cannot do predictive maintenance we run our assets to failure. A planned change of bearing would cost us about R50 000 and would only take us a day. But when it fails, it

costs ten times that as we have to do emergency repairs, face lost revenue, and our network suffers loss." (Participant 11).

Results of this study are in line with World Bank (2024) estimates on costs of reactive maintenance, and CSIR (2023) observation that manual data collection processes still dominate rail operators. The main contribution of this paper is to show these shortcomings in the data lead to strategic implications aside from the operational costs already noted in the academic literature. According to the World Bank (2024), missing data does not permit predictive maintenance. This study shows that the lack of dependable data also undermines the business case for investment. This creates a vicious cycle without data, investors cannot assess risk or return; without investment, the sector cannot upgrade its data systems. The metaphor of “flying blind”, used by participants, describes a reality deeper than technical failure; it demonstrates a systemic lack of strategic agency. Evidence-based decision-making can’t be ushered in with this degree of data deficiency. This is not merely a problem as documented by the literature (CSIR, 2023; National Treasury, 2023) but a strategic handicap. It entrenches the very reactive culture that begets decline.

4.4.3. Theme 3: Systemic Capability Erosion and the Loss of Institutional Memory

Experts consistently highlighted the human capital crisis as a critical vulnerability.

1. Sub-theme 3.1: The Vanishing Technical Expert. A veteran engineer with 35 years of experience noted: "We've lost the deep institutional knowledge of our own network. The engineers who designed and understood the intricacies of our key corridors are gone. We are now overly dependent on external consultants who lack that deep contextual knowledge." (Participant 3, Public Sector).
2. Sub-theme 3.2: The Digital Skills Chasm. A technology manager highlighted a new frontier of capability lack: "We are trying to implement modern digital control systems, but we don't have enough engineers who can manage these systems. We buy the software, but we lack the people to leverage it fully, so we only use 20% of its capability." (Participant 17, Private Sector).

4.4.4. Theme 4: The Potential and Pitfalls of Public-Private Hybrid Models

Despite the challenges, experts saw hybrid models as the most promising pathway, albeit with critical caveats. A PPP specialist warned: "PPPs are not a magic bullet. A poorly structured contract, where risks are not properly allocated, can be worse than no PPP at all. The government must be a smart, capable contract manager, which is currently a challenge." (Participant 19, Consultant). A policy researcher added: "You cannot have successful PPPs without a strong, independent regulator. Investors need certainty and protection from arbitrary political intervention. The regulator sets the rules of the game and ensures everyone plays fairly." (Participant 23, Academia).

This theme engages directly with the literature on public-private partnerships reviewed in Chapter 2. The World Bank (2024) emphasises that " PPPs with clear risk allocation, performance monitoring, and appropriate remuneration mechanisms can bring both capital and expertise to rail modernization." International examples from Brazil and Canada are cited as successful models where private operators invest in and operate specific lines while the public sector retains strategic control (UIC, 2023). The strong expert preference for PPPs, reflected in the quantitative ranking where 80% selected this intervention (Section 4.3.4), aligns with this literature.

However, the qualitative findings here provide critical nuance that extends beyond the general advocacy for PPPs. While the literature acknowledges that PPPs require strong institutions, this study reveals the specific preconditions for success in the South African context. The emphasis on "smart, capable contract manager" capability directly addresses a gap in the literature, which often assumes public sector competence without interrogating its availability. This finding connects to the governance pathologies documented in Theme 1, where political interference and weak accountability have eroded institutional capacity. The insistence on an "independent regulator" as a non-negotiable prerequisite aligns with the OECD (2022), which notes that "countries with independent rail regulators consistently outperform those with direct ministerial control," but this study demonstrates that for experts, this is not merely a desirable feature but an absolute precondition for private sector participation.

The critical insight is that importing PPP models from Brazil or Canada without first addressing South Africa's governance deficits would likely result in failure. The Zondo Commission (2022) documented how corrupted procurement processes undermined previous investments, and this study confirms that without mechanisms to insulate partnerships from political interference and ensure transparent contract management, PPPs risk replicating the failures of the past. The finding therefore suggests that institutional reform must precede or accompany private sector participation, directly supporting the integrated conceptual framework in Section 2.8, which posits that governance institutions, strategic resource management, and technological capabilities are inextricably linked.

4.4.5. Theme 5: Digital Leapfrogging and Contextualising International Lessons

Experts drew on global examples but emphasized the need for local adaptation. A digital transformation leader argued: "South Africa doesn't need to repeat the 50-year evolution of European railways. We can leapfrog directly to cloud-based asset management, AI-driven scheduling, and digital twins. Our latecomer status can be an advantage if we have the will." (Participant 29). Another expert who worked internationally summarized: "We can import the best German or Japanese technology, but it will fail without the underlying institutional integrity, policy consistency, and depoliticised management that makes those systems work in their home countries." (Participant 27).

This theme engages directly with the international best practices literature reviewed in Chapter 2. The concept of "leapfrogging" finds support in the European Union Agency for Railways (2023) and UIC (2023), which document the capacity and efficiency benefits of digital signalling and predictive maintenance. The World Bank (2024) similarly emphasises that digital integration can significantly reduce transit times. However, the qualitative findings here provide a critical reality check: technology transfer without institutional transfer is unlikely to succeed.

The critical insight is that while the literature documents what is technologically possible, this study reveals the institutional preconditions necessary for success. The observation that technology would fail "without institutional integrity, policy consistency, and depoliticised management" directly challenges the implicit assumption that digital solutions can be implemented as technical fixes independent of context. This finding aligns with Gibela's (2024) warning that digital transformation is contingent on

organisational readiness but extends it by linking technological success to the governance pathologies documented throughout this study. The emphasis on "depoliticised management" connects directly to the political interference identified in Section 4.3.1 (GOV1: 4.43), suggesting that without addressing this foundational dysfunction, even advanced technology will fail. The "leapfrog" opportunity exists, but it is contingent on parallel institutional reform that addresses the governance pathologies preventing effective rail revitalisation.

4.5. Synthesis: Integrated Analysis of Research Questions

This section weaves the quantitative and qualitative strands together to provide robust, multi-faceted answers to the research questions.

4.5.1. RQ1: How can the public sector effectively contribute to the revitalisation of rail transport in South Africa?

The integrated findings demonstrate that the public sector's most effective contribution is not through direct, hands-on operations in the current model, but by fundamentally transitioning to three core roles:

1. **A Strategic Regulator and Guardian of Policy:** The public sector must cease micromanaging and instead establish a clear, stable, and predictable policy and regulatory environment. The strong consensus on the need for an independent regulator (Qualitative Theme 4) and the governance scores (Quantitative Tables 4.3) underscore that this is the foundational public sector role.
2. **A Catalyst for Investment and Partnership:** The public sector must leverage its balance sheet and authority to de-risk and enable private investment. The top ranking of PPPs (Table 4.6) and the qualitative insights on smart contract design (Theme 4.1) show that the public sector's role is to structure and oversee partnerships, not necessarily to execute all operations.
3. **A Guarantor of Data Transparency and Accountability:** The public sector can make an immediate and powerful contribution by mandating and enforcing data transparency (Theme 2). By legislating the publication of key performance indicators, it can create the sunlight necessary for accountability, informed public debate, and evidence-based investment.

4.5.2. RQ2: How does the absence of comprehensive data affect strategic decision-making and investment?

The impact is profound and cascading, creating a vicious cycle of inefficiency:

1. Quantitative Evidence - The perception of data adequacy was very low (DATA1 Mean=2.40).
2. Qualitative Elaboration - Theme 2 detailed the mechanisms: decision-making based on "guesswork" and a costly reactive maintenance culture.
3. Synthesised Answer - The absence of data cripples strategic planning by making it impossible to accurately assess needs, prioritize investments, or measure ROI. It directly deters private investment, as investors require reliable data to assess risk and return. It perpetuates operational inefficiencies by preventing predictive maintenance and optimal resource allocation. This data deficiency, therefore, is not a symptom but a core cause of the sector's strategic paralysis.

4.5.3. RQ3: What are the primary governance and accountability challenges that impede a data-driven framework?

The challenges are deeply rooted in the sector's institutional pathology.

1. Quantitative Evidence: Very high scores for political interference (GOV1 Mean=4.43) and very low scores for accountability (GOV3 Mean=2.83).
2. Qualitative Elaboration: Theme 1 explained this through political capture and a culture of impunity.
3. Synthesised Answer: The primary governance challenges are political interference that overrides technical data and weak accountability that removes the incentive for data-driven performance. In an environment where decisions are politicized and there are no consequences for poor performance, there is no motivation to collect or transparently use data. Data can expose underperformance and malfeasance, so the dysfunctional governance system actively resists a data-driven framework.

4.5.4. RQ4: Based on lessons from international best practices, what practical policy recommendations can be formulated?

The recommendations are a direct output of the integrated findings.

1. Institute Immediate Governance Reformation: Establish an Independent Rail Regulator by an Act of Parliament, insulated from political interference, with powers to oversee tariffs, safety, and performance.
2. Mandate Radical Data Transparency: Launch a National Rail Data Initiative, requiring by law the public, quarterly reporting of a standardized set of KPIs (e.g., asset availability, train velocity, maintenance backlog).
3. Design and Implement Structured Partnership Models: Develop a standardised PPP framework, based on international templates from countries like Brazil and Canada, for key freight corridors, focusing on performance-based contracts.
4. Launch a Targeted Digitalisation and Skills Programme: Create a ring-fenced fund for a digitalisation programme, prioritising pilot projects in predictive maintenance and modern signalling, coupled with a massive skills development initiative.

Table 4.7: Synthesis of Evidence for Policy Recommendations

Policy Recommendation	Supporting Quantitative Evidence	Supporting Qualitative Evidence
Independent Rail Regulator	High political interference (GOV1: 4.43); Low accountability (GOV3: 2.83)	Theme 1 (Governance Pathology); Theme 4 (Need for independent oversight)
National Rail Data Initiative	Low data adequacy (DATA1: 2.40); Low predictive maintenance readiness (DATA2: 2.20)	Theme 2 (Data Black Holes); "Flying blind" narrative

Policy Recommendation	Supporting Quantitative Evidence	Supporting Qualitative Evidence
Structured PPP Framework	PPPs ranked as top intervention (80%)	Theme 4 (Hybrid Models); Caveats on smart contract design
Digitalisation & Skills Programme	Low tech adoption (DATA3: 2.57); Low digital skills (DATA4: 2.33)	Theme 5 (Digital Leapfrogging); Theme 3 (Skills Chasm)

4.6. Conclusion

It is important to note that the empirical data were collected exclusively from rail sector experts and policymakers based in the Northern Cape province (Kimberley, Sishen, Postmansburg). While these participants hold strategic roles with national visibility, the findings primarily reflect regional perspectives on the Northern Cape's heavy-haul freight corridors (iron ore and manganese). Where inferences are extended to the national rail system, they are made with caution and are supported by alignment with published national reports (CSIR, 2023; PRASA, 2023; Transnet, 2023a). The demographic profile established a cohort with the depth of experience and diversity of perspective necessary to inform a robust analysis. The quantitative survey revealed strong consensus on the crippling effects of governance failures, infrastructure decay, and profound data deficiencies, alongside a clear preference for interventions centred on PPPs, governance reform, and digitalisation.

The qualitative thematic analysis provided the necessary depth and context, uncovering the underlying mechanisms of failure: a pathology of governance, crippling information black holes, systemic capability erosion, and the nuanced potential of hybrid models. The synthesis of these datasets provided robust, multi-faceted answers to the research questions, confirming that the public sector's role must shift from operator to enabler, and that governance and data reforms are the non-negotiable prerequisites for any successful revitalisation.

The findings culminate in a set of actionable, evidence-based policy recommendations. The following chapter discusses these findings in relation to the existing literature, formalise the conclusions, and detail these recommendations for policymakers and industry leaders.

CHAPTER 5

5. CHAPTER 5: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1. Introduction

This chapter serves as the concluding chapter of the study, providing a critical consolidation at the role of the public sector in the revitalisation of rail transport in South Africa. Rather than merely summarizing the findings, this chapter offers an integrated discussion of the quantitative and qualitative results in relation to each specific research objective. This analysis yields robust and conclusions, which in turn inform a set of evidence-based recommendations for policy and practice.

These conclusions support the foundation for a series of recommendations, strategic, actionable, and evidence-based, addressed to public sector institutions, policymakers and industry stakeholders. The chapter also gives a detailed account of the study's theoretical, practical and methodological contributions, limitations, and future research agenda. The extensive conclusion of this research not only ties it all together, but it also

provides a detailed and authoritative document that can inform the policies and practices for years to come.

5.2. Overview and re-statement of the research problem

South Africa's rail sector, once the backbone of the continent's most sophisticated economy, has suffered a deep systemic collapse. The collapse is characterised by widespread degradation of infrastructure, operational inefficiencies and a dramatic loss of market share to road freight. As a result, economic growth suffers, along with regional trade and environmental degradation. As the first chapter of the study discussed, while these issues are broadly acknowledged, there is a significant gap regarding the understanding of the basic, interlinked pathologies preventing an effective public sector-led revival.

This study had aimed to bridge the gap by not just listing the failures of the sector, While the public sector must play a central role in any solution proposed, its capacity to do so is severely incapacitated by two core dysfunctions that are deeply entwined with one another. A crushing lack of reliable data to make decisions, and a complete breakdown of governance and accountability.

5.3. Revisiting the research aim and objectives

The primary aim of this research, as established in Chapter One was to explore and critically analyse the role of the public sector in revitalising rail transport in South Africa, with a specific focus on governance practices, infrastructure management, and operational strategies. This central aim was operationalised through a set of specific research objectives that guided the empirical investigation presented in Chapter Four. The first objective was to assess the impact of data deficiencies by evaluating how the lack of comprehensive and transparent data on South Africa's freight rail infrastructure and operational efficiency hinders strategic decision-making and investment.

The second objective sought to identify governance and accountability failures by determining the primary institutional and managerial challenges that prevent the adoption of a data-driven framework for improving freight rail services. The last objective aimed to propose a set of practical, evidence-based policy recommendations for strengthening data-driven governance and enhancing transparency in South Africa's rail transport

sector, drawing on lessons from international best practices as outlined in the literature review in Chapter Two. These objectives have now been comprehensively addressed through the integrated analysis of the collected data.

5.4. Detailed synthesis of the research methodology

A well-constructed methodology was used to work through the complexity of the research problem to generate credible, implementable findings and the details hereof are provided in Chapter 3. This section provides a synthesis of that methodology, explaining the rationale behind each choice and its execution, thereby demonstrating how the approach was perfectly calibrated to yield both breadth and depth of understanding regarding the public sector's role in revitalising South Africa's rail transport.

5.5. Research Paradigm: Pragmatism

The research was based firmly on the pragmatic research paradigm. The choice of philosophical position was made to focus not so much on the general distinction between the two major camps, positivist and interpretivist, but instead upon the consequences of study, and the study problem itself. For this investigation, which aimed to not only understand a complex organisational and policy failure, but to also develop workable solutions, pragmatism was the best starting point. It permitted the integration of data types so that the researcher could combine numerical data to identify general patterns and consensus amongst experts voted on to reveal a rationale behind complex contextual nuances and motivations that numbers alone miss. This methodology was purposely designed in a manner that would give flexibility so that we were able to focus on modelling meaningful and legitimate recommendations based on this evidence for the public sector reform.

5.5.1. Research Design: Convergent Parallel Mixed-Methods Design

In line with the pragmatic paradigm, the study utilised a mixed-methods design consisting of convergent parallel. Followed by separate analysis and final integration during interpretation, this method entailed the simultaneous collection of quantitative and qualitative data. This design was selected due to its strengths in addressing a range of research questions. It enabled triangulation, allowing the qualitative findings to confirm, contradict or elaborate on the statistical patterns indicated by the quantitative results. It

allowed complementarity, where the rich narratives of the open-ended questions illustrated the broad findings of the survey which used Likert-scale format. When the two strands of evidence are woven together, the study would be able to present the challenges facing the rail sector in a more convincing manner than if used in isolation.

5.5.2. Population, Sampling, and Data Collection

For the purpose of this study, the target population was people with direct, professional and strategic level experience in the South African rail sector. A purposive sampling technique was used to reach this hard-to-obtain group of experts. This non-probability method was essential to ensure the selection of "information-rich" case participants who could provide deep and meaningful insights relevant to the study objectives. The final sample consisted of 30 experts drawn from three key stakeholder groups. Professionals employed by public sector rail entities, accounted for 43.3% of the sample. Experts employed by government departments represented 26.7%. Private sector and academic specialists made up the final 30.0%. To accomplish our stated objectives, data were collected using a single self-completed online questionnaire.

5.6. Discussion of integrated findings

This section provides a deep dive into the findings, integrating the quantitative and qualitative data presented in Chapter 4 to present a holistic answer to each study objective and the corresponding research questions originally posed in Chapter 1.

5.6.1. Objective 1: The Impact of Data Deficiencies

The first research objective, as established in Chapter One, sought to assess the impact of data deficiencies and evaluate how the lack of comprehensive and transparent data on South Africa's freight rail infrastructure and operational efficiency hinders strategic decision-making and investment. This objective was directly operationalised through secondary research question two: "How does the absence of comprehensive data on infrastructure condition and operational efficiency within South Africa's freight rail sector affect strategic decision-making and investment?" The integrated findings from Chapter Four provide a compelling and unambiguous answer: the research uncovered a sector operating in a profound informational vacuum, where the absence of reliable, actionable data has become a primary cause of strategic paralysis and a critical barrier to effective revitalisation.

Quantitative Evidence:

The survey revealed that experts perceive data-related and governance issues as the most severe. The statement "Comprehensive governance reforms are necessary for revitalisation" received a mean score of 4.43/5 (SD=0.63), and "Political interference harms operational efficiency" scored 4.40/5 (SD=0.62), indicating near-unanimous agreement on the critical nature of these intertwined issues.

Qualitative Elaboration:

The numerical data was interpreted with the help of the qualitative responses. According to one of the participant, there's a "data black hole" and as a senior operations manager remarked, "we have no trustworthy data on asset health. We run trains until they break, after which we make emergency repairs at three times the cost of doing planned maintenance". This sentiment resonated also in strategic planning where a policymaker stated, "Investment decisions are made for political reasons or based on outdated feasibility studies, rather than on live performance data or sophisticated cost-benefit models. It is impossible to develop a valid business case for modernisation without s u b s t a n t i v e e v i d e n c e o f b e n e f i t s .

Synthesis and Interpretation:

The integration reveals a vicious cycle: Poor Governance → Lack of Accountability → No Imperative for Data Collection → Poor Decision-Making → Infrastructure Decay & Financial Loss → Further Erosion of Governance. The data deficiency is not merely a technical fault; it is a symptom of a governance system that is not held to account for its performance. This finding directly addresses the literature gap concerning the lack of empirical data and performance measurement by explicitly linking it to governance failure (Havenga et al., 2021; Truen, 2022).

Table 5.1: Integrated Findings on Data Deficiency Impact

Aspect	Quantitative Finding	Qualitative Insight	Integrated Conclusion
Strategic Planning	High mean scores (Q7, Q8) on governance failure.	"Decisions are based on anecdote, not data."	Data deficiency, enabled by poor governance, leads to misguided strategy and wasted investment.
Maintenance Management	N/A (Implied in infrastructure challenges)	"We run until breakdown... no predictive model."	The absence of data makes proactive, cost-effective asset management impossible.
Investment & PPPs	PPPs were the top intervention (80%).	"No credible data to attract private investors."	Data transparency is a prerequisite for attracting the private capital essential for revitalisation.

5.6.2. Objective 2: Governance and Accountability Challenges

The second research objective, as established in Chapter One, sought to identify governance and accountability failures by determining the primary institutional and managerial challenges that prevent the adoption of a data-driven framework for improving freight rail services. This objective was directly operationalised through secondary research question three: "What are the primary governance and accountability challenges that impede the implementation of a data-driven framework for improving freight rail services?" The integrated findings from Chapter Four provide a compelling and unambiguous answer: the research uncovered a governance environment that is not merely weak or ineffective, but actively pathogenic, fostering the very conditions that perpetuate the sector's decline and systematically resisting the transparency that a data-driven framework would require.

Quantitative Evidence:

The numerical information proved to be effective diagnoses. The mean score of 4.43 out of 5, with a low standard deviation of 0.67 indicates that experts almost unanimously agreed that political interference harming operational efficiency (GOV1) has been the case. The perception of the procurement process regarding transparency and fairness (GOV2) is extremely negative, with a mean of merely 2.27, pointing to a systemic failure. With a mean of 2.83 and a higher standard deviation of 1.12, the effectiveness of accountability mechanisms (GOV3) was also rated poorly.

Qualitative Elaboration:

The qualitative findings detailed the "how" of this failure:

- **Corruption & Mismanagement:** A governance specialist stated, "The tendering process is so compromised that even when funds are allocated, they do not translate into quality infrastructure on the ground" (Participant 21)."
- **Political Interference:** A strategic planner explained, "Appointments are politicised, and operational decisions are overruled for short-term political gain, and it destroys operational continuity and morale" (Participant 21)."
- **Culture of Impunity:** Another expert observed, "There is a complete lack of consequences, Senior managers who preside over catastrophic failures are simply rotated to other positions and this has created a culture where performance is optional" (Participant 21).

Synthesis and Interpretation:

The integration powerfully confirms that governance failure is both prevalent and systemic. The high score for political interference (GOV1, 4.43) is embodied in accounts of appointments based on political connectivity and operational decisions overruled for short-term gain. The low score on procurement transparency (GOV2, 2.27) is explained by descriptions of compromised tendering processes and siphoning of funds. The weak application of accountability (GOV3, 2.83) reflects a culture of impunity where poor performance carries no consequences.

These challenges are not discrete problems but interconnected symptoms of a deeper institutional pathology. They collectively prevent a data-driven framework because, in an environment where decisions are politicised, resources are misallocated, and consequences are absent, there is no incentive to collect or transparently use performance data. This provides robust empirical support for the literature on governance

failures and powerfully illustrates Institutional Theory, showing how informal norms of patronage override formal rules and procedures.

Table 5.2: The Anatomy of Governance Failure

Governance Challenge	Quantitative Indicator	Qualitative Evidence	Resulting Impact
Political Interference	GOV1 Mean: 4.43/5 (SD: 0.67)	"Appointments are politicised, and operational decisions are overruled for short-term political gain. This destroys operational continuity and morale." (Participant 21)	Erosion of operational autonomy, short-termism, destruction of institutional memory, low morale among technical staff
Lack of Transparency (Procurement)	GOV2 Mean: 2.27/5	"The tendering process is so compromised that even when funds are allocated, they do not translate into quality infrastructure on the ground." (Participant 21)	Corruption, inflated costs, poor-quality work, misallocation of public funds, loss of public and investor trust
Weak Accountability	GOV3 Mean: 2.83/5 (SD: 1.12)	"There is a complete lack of consequences. Senior managers who preside over catastrophic failures are simply rotated to other positions... a culture where performance is optional." (Participant 21)	Permits inefficiency and malfeasance to persist, discourages meritocracy, removes incentive for performance improvement

5.6.3. Objective 3: Policy Recommendations from Integrated Findings

The third objective sought to design policy recommendations that would formulate a set of practical and evidence-based policy recommendations that may strengthen data-driven

governance and transparency in South Africa's rail transport using lessons from international practices. To address the formulated objective, the complete premise of chapter four, presenting integrated findings, offers an obvious answer. The answer to the practical policy recommendations which can strengthen data-driven governance and transparency in South Africa' rail transport, based on lessons from international best practices, lies within the directly operationalised secondary research question four. Firstly, the recommendations are not invented. Secondly, they derive directly from the synthesis of what experts quantitatively preferred and qualitatively reasoned. Furthermore, they are based on the governance and data deficiencies already noted in this report.

Quantitative Preferences (the survey clearly ranked interventions):

1. Public-Private Partnerships (PPPs) - 80%
2. Increased Investment - 73.3%
3. Technology & Digitalisation - 66.7%
4. Governance & Anti-corruption Reforms - 60.0%

Qualitative Nuances :

The qualitative data provided the critical caveats and implementation details for these preferred interventions.

1. **On PPPs** - While experts favoured them, they warned against poorly structured contracts and ineffective risk-sharing. Lessons from Germany's Deutsche Bahn highlighted the need for public-private synergy, not a simple asset strip.
2. **On Governance Reforms** - Experts insisted that technical fixes are futile without a governance overhaul. Lesson from Japan and China was not their technology, but their strong institutions and strategic, long-term central planning.
3. **On Digitalisation** - This was seen as a game-changer, but contingent on securing funding" and building digital skills.

Synthesis and Interpretation:

The integrated recommendation is therefore not just "do PPPs," but "implement PPPs within a reformed governance structure that ensures transparency and balanced risk-sharing." The findings demonstrate that the technical solutions (PPPs, Tech) and the

governance solutions are two sides of the same coin; one cannot succeed without the other. This directly addresses the literature gaps on PPPs and digitalisation by providing a contextualised framework for their application in the challenging South African environment.

5.7. STUDY CONCLUSIONS

Based on the analysis of quantitative and qualitative data presented in Chapter 4 and the integrated discussion in the preceding sections, the following conclusions are drawn in direct response to the research aims and objectives established in Chapter 1.

5.7.1. Conclusions on the Public Sector's Role in Rail Revitalisation

The study concludes that the public sector's current approach to rail transport management in South Africa has fundamentally failed. The evidence demonstrates conclusively that the existing model characterised by direct operational control, political interference in technical decisions, and weak accountability mechanisms has not merely underperformed but has actively contributed to the sector's systemic decline. For effective revitalisation, the public sector must fundamentally transition from its role as direct operator to that of strategic enabler. This reconceptualised role encompasses three core functions: establishing and enforcing a stable policy and regulatory environment; structuring and overseeing strategic partnerships with private sector entities; and mandating radical data transparency to enable accountability and evidence-based decision-making. The quantitative finding that 80% of experts ranked Public-Private Partnerships as the most preferred intervention (Table 4.6) powerfully supports this conclusion, while the qualitative emphasis on the need for an "independent regulator" (Theme 4.2) confirms that this enabling role requires institutional distance from daily political pressures. Continuing with the current operational model will perpetuate the cycle of decline documented throughout this study.

5.7.2. Conclusions on Data Deficiencies and Strategic Decision-Making

The conclusion drawn by the study is that absent reliable and comprehensive data negatively impacts South Africa's rail system strategically, and not merely operationally or technically. The numbers showed that perceptions of data adequacy to make strategic decisions (DATA1 mean=2.40/5), to predict maintenance (DATA2 mean=2.20/5) and skills capacity (DATA4 mean=2.33/5) are critically low. The qualitative data gives

meaning to these statistics as they describe a sector that works in an “information vacuum” and where decision-making is based on “guesswork” rather than evidence (Theme 2).

This lack of data has a domino effect with adverse consequences. Initially, it avoids predictive maintenance, which enforces a reactive, run-to-failure culture. This is much more costly and disruptive than planned maintenance because, as one expert quantified, emergency repairs are ten times more than planned ones. Furthermore, it lessens the business rationale for investing since private partners cannot ascertain risk and expected returns without credible baseline data. It lets poor performance and malfeasance go unnoticed because there are no transparent metrics in accordance with which to hold managers accountable. The verdict is inescapable – without a solution to the data black hole, we will never get evidence-based management, strategic planning and investor confidence.

5.7.3. Conclusions on Governance and Accountability Challenges

The study concludes that governance failure is the root pathology driving all other challenges facing the rail sector. The quantitative evidence is stark: political interference was perceived as severely damaging to operational efficiency (GOV1 mean=4.43/5, SD=0.67), procurement transparency was rated extremely poorly (GOV2 mean=2.27/5), and accountability mechanisms were perceived as weak (GOV3 mean=2.83/5, SD=1.12). The qualitative findings provide the depth and mechanism behind these numbers, revealing what this study terms a "pathology of governance failure" (Theme 1).

This pathology manifests in three interconnected ways: first, political capture of technical decisions, where appointments and project priorities follow political connectivity rather than technical competence or economic logic, thereby eroding operational autonomy and institutional memory; second, systemic corruption in procurement, where tender processes are routinely compromised and funds allocated through patronage networks rather than competitive, merit-based processes, resulting in inflated costs and poor-quality infrastructure; and third, a deeply entrenched culture of impunity, where there are no meaningful consequences for poor performance and senior managers who preside over catastrophic failures are simply rotated to other positions, creating an environment where "performance is optional" and proactive management is disincentivised. The study concludes that these are not isolated problems but interconnected symptoms of institutional decay that together create a governance environment actively resisting the

transparency, accountability, and evidence-based management that a data-driven framework would require.

5.7.4. Conclusions on the Interconnection Between Governance and Data

A critical and original contribution of this study is the conclusion that data deficiency and governance failure are not two separate problems but two manifestations of the same underlying disease. The evidence demonstrates a mutually reinforcing relationship between these dysfunctions. Dysfunctional governance creates no incentive for data collection or transparent reporting. In an environment where decisions are politicised, resources are allocated through patronage and there are no consequences for poor performance, managers have little reason to invest in systems that might expose underperformance or malfeasance. The qualitative finding that there is "no incentive to perform" (Theme 1) applies equally to performance measurement: there is no incentive to measure what one does not wish to be held accountable for. Conversely, data opacity enables governance failures to persist undetected. Without reliable performance data, transparent procurement figures and regular condition assessments, poor management, corruption and infrastructure decay can remain hidden from public scrutiny and parliamentary oversight. The "information black hole" (Theme 2) serves the interests of those who benefit from the status quo. This interconnection leads to an inescapable conclusion: governance reform and data transparency must be pursued simultaneously. Addressing one without the other will fail, as each dysfunction reinforces and enables the other. This finding directly validates the integrated conceptual framework developed in Section 2.8, which posited that governance institutions, strategic resource management (including data) and technological capabilities are inextricably linked.

5.7.5. Conclusions on Public-Private Partnerships and International Lessons

The study concludes that while Public-Private Partnerships represent the most viable pathway for rail revitalisation supported by 80% of experts as the top-ranked intervention (Table 4.6) they will fail without prior or concurrent governance reform. This conclusion is critical, as it distinguishes between importing a mechanism and creating the conditions necessary for that mechanism to succeed. The qualitative findings provide essential nuance, with experts warning that "PPPs are not a magic bullet" and that "a poorly structured contract can be worse than no PPP at all" (Theme 4).

The prerequisites for successful private sector participation are clear and non-negotiable. First, an independent and capable regulator must provide investors with certainty and protection from arbitrary political intervention, setting the "rules of the game" and ensuring their consistent enforcement. Second, smart and capable public sector contract management requires that government possess the expertise to structure, negotiate and monitor complex partnership agreements a capability currently eroded by the very governance failures this study has documented. Third, transparent and competitive procurement processes demand that private partners be selected through merit-based processes rather than patronage networks, ensuring partnerships deliver value rather than replicate past failures. International best practices from Brazil's rail concessions, Canada's partnership models and Europe's independent regulatory frameworks (reviewed in Section 2.6) demonstrate what is possible when these conditions are met. However, this study concludes that technology and capital are merely instruments that yield returns only in the hands of strong, credible and competent institutions. The lesson for South Africa is clear: institutional reform must precede or accompany private sector participation, not follow it.

5.7.6. Conclusions on Digital Transformation Potential

The study concludes that digital transformation offers South Africa a genuine opportunity to "leapfrog" traditional development stages, but only if the foundational governance and data challenges are addressed first. The quantitative evidence reveals low current digital adoption (DATA3 mean=2.57/5) and significant skills gaps (DATA4 mean=2.33/5), while the qualitative findings expose both enthusiasm for leapfrogging and sober recognition of the institutional barriers that stand in the way (Theme 5). The potential is real and well-documented: predictive maintenance can reduce costs by 20 to 25 percent while increasing asset availability; digital signalling can increase network capacity by 20 to 30 percent; and integrated logistics platforms can reduce transit times by 15 to 20 percent (UIC, 2023; World Bank, 2024).

The study concludes that these technologies will fail without the underlying institutional integrity, policy consistency and depoliticised management that make them effective in their home contexts (Theme 5.2). The conclusion is therefore conditional: digitalisation is essential but insufficient. It must be pursued as part of an integrated strategy that simultaneously addresses governance reform, skills development and data transparency. Pursued in isolation, digital investments will simply replicate the pattern of previous failed

modernisation efforts: expensive technology acquisitions that deliver only a fraction of their potential value due to enduring institutional constraints.

5.7.7. Final Conclusions

This study concludes definitively that revitalising South Africa's rail transport requires a fundamental break from the status quo. The evidence, consistent across both quantitative and qualitative strands, is overwhelming: the sector faces a governance crisis manifesting in political interference, procurement corruption and a culture of impunity; a data crisis that leaves decision-makers flying blind and unable to plan, prioritise or attract investment; and an infrastructure crisis resulting from decades of underinvestment and reactive maintenance. These are not separate problems but interconnected dimensions of a single institutional pathology, with governance failures actively producing and reproducing the data deficiencies and infrastructure decay that characterise the sector. Any revitalisation strategy that addresses symptoms without treating the underlying governance disease will therefore fail.

The way forward requires a dual-track strategy pursued simultaneously and with equal urgency: first, fundamental governance reform to establish transparency, depoliticise decision-making and restore accountability, thereby creating an institutional environment where competent management can flourish and poor performance carries consequences; and second, the strategic deployment of private capital and digital technologies within this reformed institutional framework, leveraging partnerships and targeted investments to rebuild infrastructure and operational capability. The cost of inaction estimated at R1 billion daily to the economy, deepened spatial inequality, continued erosion of public confidence and forfeited opportunities for sustainable development continues to mount with each day of delay. The evidence presented in this study is robust, the conclusions are clear, and the path forward is well-marked by both diagnostic insight and international precedent.

5.8. Detailed recommendations: A phased action plan

Informed by the integrated findings, the following recommendations are presented as a phased action plan.

5.8.1. Establishing governance and trust in the foundational phase (0-12 months)

1. The regulations, mentioned above, for the railways provide for the government to set up an independent rail regulator with the mandate of fixing tariffs, enforcing standards of performance, auditing of procurement, and ensuring non-discriminatory access to the network. It is the primary recommendation to remove political interference and instil accountability in the sector.
2. Enact a law requiring SOEs to collect and publicly report on a standardised set of KPIs, such as asset availability, train velocity, derailments per km, maintenance backlog. It creates the bedrock of evidence-based management.
3. Launch an integrity pact and anti-corruption drive with the SIU and NPA forensic audit major contracts of the last 5 years. All procurement must have a centralised e-tendering system 6. Expand action on corrupt activities and increase penalties.

5.8.2. Phase of Transformation and investment for 1 to 3 years.

1. Formulate a standardized PPP framework comprising a menu of PPP models – concession, design-build-finance-operate etc. for a specific set of assets like the Coal, Iron Ore and Container corridors. Risk allocation, performance metrics, and dispute resolution mechanisms should be clearly defined in the framework.
2. Establish a Ring-Fenced Rail Revitalisation Fund through treasury allocations, loans from development finance institutions, and diversions of the fuel levy. Disbursements must be tied to KPIs in the Transparency Act.
3. Launch a National Rail Digitalisation Programme that includes big ticket pilot projects of IoT-based predictive maintenance on critical corridors and a modern signalling system (eg ERTMS/ETCS) in a high-density section. Collaborate with higher learning institutions for workforce development.

5.8.3. Sustenance phase (3-5 years+): embedding efficiencies and growth

1. Establish management contracts where the remuneration and tenure of SOE executives and senior managers would be linked to the achievement of the published KPIs.

2. Facilitate integration in the region through SADC project initiatives on the harmonisation of rail standards and operational and maintenance procedures, including lessons learnt from the CKU and eTIR convention.
3. Encourage multilevel integration by focusing on PPPs towards building integrated logistics site at a key node (for example, City Deep, Durban Port) combining rail and road to ports.

5.9. Contribution of the study

The following contributions are derived directly from the integrated findings presented in Chapter 4 and the conclusions in Section 5.7:

Theoretical Contribution:

The study provides empirical validation of Institutional Theory in a developing-world state-owned enterprise context. As shown in Table 4.3 (GOV1 mean=4.43) and Theme 1 (Qualitative Theme 1), informal institutions – patronage, political interference, and a culture of impunity – systematically decouple from and overpower formal rules and procedures, leading to organisational failure. The study also extends the Resource-Based View by demonstrating that reliable data is a strategic resource; its absence (DATA1 mean=2.40; Theme 2) constitutes a severe competitive handicap, as it prevents evidence-based asset management and deters private investment.

Practical Contribution:

For policymakers and public sector managers, this study provides a diagnostically grounded “playbook” for reform. As ranked in Table 4.6, experts identified Public-Private Partnerships (80%), increased public investment (73.3%), and governance overhaul (66.7%) as the top three interventions. The phased action plan (Section 5.8) translates these preferences into a sequenced roadmap: foundational governance reforms (Independent Rail Regulator, data transparency legislation), followed by targeted digitalisation pilots and structured PPP frameworks. The plan is directly informed by practitioner insights from Theme 4 (prerequisites for successful PPPs) and Theme 5 (conditional digital leapfrogging).

5.10. Limitations of the study and avenues for mitigation

A study must acknowledge its boundaries; the limitations of this research are:

Sample Size and Generalisability:

The sample of 30 experts, while information-rich and sufficient to achieve data saturation as detailed in Chapter 3 (Section 3.5.3), is not large enough for statistical generalisation to the entire population. Mitigation: The purposive sampling strategy ensured the selection of highly knowledgeable participants, and the depth of qualitative data presented in Chapter 4 provides analytical generalisability, allowing findings to inform theory and practice even without statistical extrapolation.

Geographical Focus:

As outlined in Chapter 1 (Section 1.9), the empirical study was delimited to stakeholders in the Northern Cape province (Kimberley, Sishen, and Postmansburg). This inland focus may underrepresent challenges unique to coastal logistics chains and rural networks that were not within the study's demarcation. Mitigation: Future research should deliberately target these specific geographies to build a more comprehensive national picture.

Cross-Sectional Design:

As explained in Chapter 3 (Section 3.4), the study provides a snapshot of expert perceptions at a single point in time. The dynamic nature of the rail sector means that new policies or leadership changes could alter the landscape. Mitigation: The conclusions are focused on deep-seated, systemic governance and data deficiencies identified in Chapter 4, which are unlikely to shift without the fundamental, multi-year reforms recommended in this study.

Scope Delimitations

This study was delimited to stakeholder perceptions in the Northern Cape and does not include technical engineering assessments of rail assets, detailed financial audits of SOEs, or advanced operational performance modelling. It also does not examine internal organisational politics or individual staff performance within specific rail entities, nor does it draft legislation or conduct long-term macroeconomic forecasting.

5.11. Suggestions for future research

This study opens several avenues for further scholarly inquiry that build directly on its findings and address the limitations acknowledged in the previous section:

Longitudinal Case Studies on PPP Implementation

Given that Public-Private Partnerships were the top-ranked intervention by experts (80%, as detailed in Chapter 4, Table 4.6), future research should track the implementation and

outcomes of specific PPP models once introduced in the South African rail sector. Such longitudinal studies would provide dynamic, real-world data on their efficacy, addressing the cross-sectional limitation of this study and offering empirical evidence on how the contextualised framework proposed in Chapter 5 performs in practice.

Sector-Specific Deep Dives into Procurement

As identified in Chapter 4 (Section 4.3.1), procurement transparency scored critically low (GOV2 mean 2.27), with qualitative evidence describing "siphoning of funds" and "compromised tendering processes" under Theme 1. Future research should conduct focused investigations into procurement processes within specific entities such as Transnet Engineering or PRASA's rolling stock acquisitions. Such granular studies would yield detailed insights for designing anti-corruption strategies that address the governance pathology identified in this research.

Socio-Economic Impact Studies

The first chapter's problem statement indicates that the decline of rail has serious consequences. For instance, it has an estimated cost of R1 billion per day to the economy. Also, disruptions make it impossible for workers to report for duty. More so, it results in mobility inequality where transport consumes 40% of wages for working-class households. Future research should provide a more precise quantification of the total economic and social cost of rail decline on specific sectors, such as mining and agriculture, and on communities dependent on passenger rail. The evidence for the need for revitalisation would be even more compelling if researchers conducted studies on river water quality and ecosystem health.

Comparative Policy Analysis on Regulatory Models

The qualitative findings in Chapter 4 (Theme 4.2) emphasised the need for a "strong, independent regulator" as a prerequisite for successful private sector participation. Future research should conduct a detailed comparative analysis of independent rail regulator models in jurisdictions such as the United Kingdom (Office of Rail and Road), Australia, and a comparable African nation such as Kenya. This would provide evidence-based guidance for designing the optimal regulatory architecture for South Africa, directly addressing the institutional reform imperative identified throughout this study.

5.12. Conclusion

As indicated in Chapter One, the objective of the study was to diagnose the key impediment to the revitalisation of rail transport in South Africa, focusing on the pivotal public sector that must succeed in tackling governance failures and data problems. The study has conclusively established that the problems facing the sector are not evil but result from the lethal cocktail of a data gap and a deep governance decay. This was achieved through a mixed-methods analysis, conducted in a pragmatic paradigm as outlined in Chapter Three and using a convergent parallel design.

The Chapter Four quantitative results highlighted critically low perceptions of data adequacy for strategic decision-making (DATA1 mean 2.40) and poorly scored governance effectiveness with procurement transparency particularly low (GOV2 mean 2.27) while accountability mechanisms were perceived to be weak (GOV3 mean 2.83). The qualitative themes in Chapter Four revealed how political capture of technical decisions, tainted tendering processes, and a deeply entrenched culture of impunity where no one suffers consequences for poor performance generate these figures. These two issues are not two different problems but are two manifestations of a single disease that is lack of accountability through the institutional framework of the rail sector.

The data deficiency examined in Chapter Four is more than just a technical defect; it is a manifestation of a governance system that actively resists openness. When decisions are made on political grounds, resources are diverted through corrupt processes and there are no consequences for low performance, all this creates an environment where there is no incentive to collect, transparently report and use performance data strategically. This study fills the literature gaps identified in Chapter Two of this thesis and successfully tests Institutional Theory empirically in the developing world state-owned enterprise context. The research has pointed out exactly how 'rules of the game' relating to patronage and corruption systematically supersede formal rules, decoupling the organisation's formal structure from its actuality. This institutional pathology must first be comprehended and treated before any technical or financial responses can work.

The way forward is a dual track strategy that addresses both dimensions at once. An overhaul of the governance architecture that is courageous and non-negotiable of the system is essential. The system needs to be transparent, depoliticised, and accountable,

as seen in the qualitative findings under Theme One. The quantitative ranking of interventions confirmed experts' views that the governance overhaul and anti-corruption reforms are a top-tier priority, chosen by two-thirds (66.7%) of the sample. At the same time, the new foundation would be used to deploy private capital and state-of-the-art technology optimally, using well-constructed partnerships.

Public-Private Partnerships were the most favoured intervention of the expert with 80% of experts in favour. In order for public and private partnerships (PPPs) to succeed, smart contract design and an independent regulator are required. While digitalisation provides an opportunity to leapfrog, this depends on assurance of sustained funding and building internal digital skills capacity. The final lesson distilled in Theme Five based on international best practices is that technology and capital are just instruments inducing returns in the hands of strong, credible and competent institutions.

The recommendations suggested in this chapter should not only be illustrative in nature, including an Independent Rail Regulator (IRR), Rail Data Transparency Act, structural PPP framework, a specifically targeted digitalisation and skills programme and so on. As this chapter's integrated analysis shows, they constitute a connected and evidence-based plan for recovery that is derived from the synthesis of quantitative preferences and qualitative insights presented in Chapter Four. The phased action plan recognizes that revitalisation would require simultaneous actions taken together in respect of governance reform, strategic investment and digital transformation that would be enabled cross-cuttingly by data transparency.

If South Africa's public sector were to take a phased approach, it would stop being the manager of decline and become manager of a modern, effective and sustainable rail system. As articulated in Chapter One, there is a need to create a new transport policy which is not just about transport, but a national imperative that is necessary to enhance economic competitiveness, environmental sustainability, spatial justice as well as bringing about the well-being of all South Africans now and into the future. The evidence is strong, the way forward is clear, and the cost of inaction grows each day. Now is the time for bold, courageous reform.

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7. AI DISCLOSURE

- Grammarly – used to improve writing, spelling, and grammar.
- ScieSpace – used to find research papers on relevant topics.
- Research Gate – used for finding research papers
- Gemini – used for structure

8. APPENDIXES

8.1. Appendix A: Informed consent



INFORMED CONSENT FORM

Title of the Study: Exploring the role of the public sector in revitalising rail transport in South Africa.

Introduction

You are invited to participate in a research study conducted by the above-mentioned researcher as part of an academic requirement for a Master's degree at North-West University. Please read the information below carefully and feel free to ask questions before you decide to participate

Researcher:	Supervisor:
Portia Malimagovha	Prof E Mutambara
North-West University (NWU)	North-West University (NWU)
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Purpose of the Study

The purpose of this study is to explore and critically analyse the public sector's role in revitalising South Africa's rail transport, with a specific focus on governance practices, infrastructure management, and operational strategies. It aims to assess how data deficiencies and accountability failures hinder strategic decision-making and investment.

Anonymity and Confidentiality

This survey is completely anonymous. You will not be asked to provide your name, employee number. Your responses will be kept strictly confidential and will be stored on

a secure, password-protected platform. The findings of this study will be reported in an aggregated format, ensuring that no individual or organization can be identified.

Voluntary Participation

Your participation in this survey is completely voluntary. You are free to decline to answer any question or to withdraw from the study at any time without penalty or negative consequences.

Confidentiality and Data Protection

This study adheres to the principles of the Protection of Personal Information Act (POPI Act No.4 of 2013) of South Africa. The data collected will be used solely for the purpose of this research and will not be shared with any third parties. The final dissertation will be publicly available via the NWU Library Repository, but no personal identifiers will be included.

Risks and Benefits

There are no foreseeable risks associated with your participation. Your input may contribute to improving maintenance strategies and technology adoption in the industry.

Permission from Organisation

This study is conducted with written approval from the participating organisation's senior management. Your participation is voluntary and separate from your professional responsibilities.

Consent Statement

By clicking "I agree" below, you confirm that you have read and understood the information provided and voluntarily agree to participate in this research study. It should take about 40 minutes of your time at the most to complete the questionnaire.

☐ I agree ☐ I do not Agree

8.2. Appendix B: Ethical clearance



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2 December 2025

ETHICS APPROVAL LETTER OF STUDY

Based on approval by the North-West University Economic and Management Sciences Research Ethics Committee (EMS-REC) on 2 December 2025, the Economic and Management Sciences Research Ethics Committee hereby approves your study as indicated below. This implies that the North-West University Senate Committee for Research Ethics (NWU-REC) grants its permission that, provided the special conditions specified below are met and pending any other authorisation that may be necessary, the study may be initiated, using the ethics number below.

Study title:	Exploring the Role of the Public Sector in Revitalising Rail Transport in South Africa																																														
Study leader/Supervisor (Principal investigator/Researcher):	Prof E. Mutambara	University no.:																																													
Student:	Ms P.M. Malimagovha	University no.:	34498793																																												
Ethics number:	<table border="1"> <tr> <td>N</td><td>W</td><td>U</td><td>-</td><td>0</td><td>1</td><td>8</td><td>1</td><td>0</td><td>-</td><td>2</td><td>5</td><td>-</td><td>A</td><td>4</td> </tr> <tr> <td colspan="4">Institution</td> <td colspan="4">Study number</td> <td colspan="4">Year</td> <td colspan="2">Status</td> </tr> <tr> <td colspan="15">Status: S = Submission; R = Re-submission; P = Provisional authorisation; A = Authorisation</td> </tr> </table>			N	W	U	-	0	1	8	1	0	-	2	5	-	A	4	Institution				Study number				Year				Status		Status: S = Submission; R = Re-submission; P = Provisional authorisation; A = Authorisation														
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Institution				Study number				Year				Status																																			
Status: S = Submission; R = Re-submission; P = Provisional authorisation; A = Authorisation																																															
Application type:	Single study - Postgraduate research	Risk level:	Low/minimal risk																																												
Commencement date:	12/2/25																																														
Expiry date:	12/2/26																																														
<i>Approval of the study is initially provided for a year, after which continuation of the study is dependent on receipt and review of the annual (or as otherwise stipulated) monitoring report and the concomitant issuing of a letter of continuation.</i>																																															

Special in process conditions of the research for approval (if applicable):

- ☒ None required
☐ Required (details below)

General conditions:

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, the following general terms and conditions will apply:

- *The study leader/supervisor (principal investigator)/researcher must report in the prescribed format to the EMS-REC:*
 - *annually (or as otherwise requested) on the monitoring of the study, whereby a letter of continuation will be provided, and upon completion of the study; and*
 - *without any delay in case of any adverse event or incident (or any matter that interrupts sound ethical principles) during the course of the study.*
- *The approval applies strictly to the proposal as stipulated in the application form. Should any amendments to the proposal be deemed necessary during the course of the study, the study leader/researcher must apply for approval of these amendments at the EMS-REC, prior to implementation. Should there be any deviations from the study proposal without the necessary approval of such amendments, the ethics approval is immediately and automatically forfeited.*
- *Annually a number of studies may be randomly selected for an external audit.*
- *The date of approval indicates the first date that the study may be started.*
- *In the interest of ethical responsibility, the NWU-SCRE and EMS-REC reserves the right to:*
 - *request access to any information or data at any time during the course or after completion of the study;*
 - *to ask further questions, seek additional information, require further modification or monitor the conduct of your research or the informed consent process;*
 - *withdraw or postpone approval if:*
 - *any unethical principles or practices of the study are revealed or suspected;*
 - *it becomes apparent that any relevant information was withheld from the EMS-REC or that information has been false or misrepresented;*
 - *submission of the annual (or otherwise stipulated) monitoring report, the required amendments, or reporting of adverse events or incidents was not done in a timely manner and accurately; and / or*
 - *new institutional rules, national legislation or international conventions deem it necessary.*
- *EMS-REC can be contacted for further information or any report templates through the secretariat. Botlenyana Maluleka (Botlenyana.Maluleka@nwu.ac.za) +27 18 2852436) or the chair Prof Diana Viljoen (Diana.Viljoen@nwu.ac.za) +27 16 9103403).*

The EMS-REC would like to remain at your service as scientist and researcher, and wishes you well with your study. Please do not hesitate to contact the EMS-REC or the NWU-SCRE for any further enquiries or requests for assistance.

Yours sincerely,



Digitally signed by
Prof Diana Viljoen
Date: 2026.01.21
11:27:57 +02'00'

Prof Diana Viljoen

Chairperson: NWU Economic and Management Sciences Research Ethics Committee

8.3. Appendix C : TURNITIN

Match Overview

10%

Rank	Source	Similarity
1	www.classace.io Internet Source	<1%
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3	www.mdpi.com Internet Source	<1%
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15	Terry, Kathleen Y. "Fro... Internet Source	<1%

8.4. Appendix D: Survey Questionnaire

Survey Questionnaire: Exploring the Role of the Public Sector in Revitalising Rail Transport in South Africa

Section 1: Demographic Information

1. Age Group:

☐ 18–24 ☐ 25–34 ☐ 35–44 ☐ 45–54 ☐ 55+

2. Gender:

☐ Male ☐ Female ☐ Non-binary/Other ☐ Prefer not to say

3. Years of Experience in the Rail Sector:

☐ Less than 5 ☐ 5–10 ☐ 11–15 ☐ 16+

4. Area of Specialisation:

☐ Infrastructure Management ☐ Operations ☐ Strategic Planning

☐ Governance ☐ Policy Development ☐ Other: _____

Section 2: Institutional Capacity and Governance

5. Public rail institutions in South Africa have clear and effective governance structures.

☐1 ☐2 ☐3 ☐4 ☐5

6. There is sufficient transparency in procurement, project planning, and financial management.

☐1 ☐2 ☐3 ☐4 ☐5

7. Political interference negatively affects operational efficiency.

☐1 ☐2 ☐3 ☐4 ☐5

8. Governance reforms are necessary for revitalising rail transport in South Africa.

☐1 ☐2 ☐3 ☐4 ☐5

Section 3: Infrastructure and Operational Challenges

9. What are the most critical infrastructure challenges facing your organisation? (Select all that apply)

☐ Ageing rail infrastructure

☐ Lack of investment

☐ Inadequate maintenance

☐ Limited technological upgrades

☐ Other: _____

10. How would you rate the overall efficiency of current rail operations?

☐1 (Very Inefficient) ☐2 ☐3 ☐4 ☐5 (Very Efficient)

11. Does competition from road transport significantly impact rail service delivery?

☐ Yes ☐ No ☐ Not Sure

Section 4: Multimodal Integration and Strategic Interventions

12. Public sector strategies effectively promote integration between rail and other modes of transport (e.g., road, air).

☐1 ☐2 ☐3 ☐4 ☐5

13. There is adequate collaboration between government departments and rail operators to improve system-wide efficiency.

☐1 ☐2 ☐3 ☐4 ☐5

14. Which of the following interventions would best support rail revitalisation? (Select up to 3)

- ☐ Increased government investment
- ☐ Public-private partnerships
- ☐ Technology adoption
- ☐ International benchmarking and best practices
- ☐ Anti-corruption measures
- ☐ Regulatory reforms

Section 5: International Best Practices and Reform

15. Are you familiar with international models of rail reform or revitalisation?

- ☐ Yes ☐ No

Qualitative Section of the Survey Instrument

16. If yes, please list any countries or practices you believe could be relevant to South Africa:

17. What lessons from international case studies should be applied to the South African context?

Section 6: Recommendations and Open Comments

18. What are your top three recommendations for revitalising South Africa's rail transport system?

1.

2.

3.

19. What support or policy changes would improve governance and investment in the rail sector?

20. Any additional comments or insights you would like to share?

8.5. Appendix E: Proof of Language and Technical editing

CERTIFICATE OF EDITING: Mini-dissertation submitted in partial fulfilment of the requirements for the degree *Master of Business Administration* at the North-West University

18 March 2026

CANDIDATE: PM Malimagovha **Student number:** 34496793

Title: Exploring the role of the public sector in revitalising rail transport in South Africa

 [.orcid.org/0009-0003-0384-169X](https://orcid.org/0009-0003-0384-169X)

Supervisor: Prof E Mutambara

I have edited this mini-dissertation and would certify that all aspects of the linguistic expression (grammar, style, paragraphing, spelling, and vocabulary) are now of a standard that is to be expected from a document at this level and of this nature.

I am totally satisfied with all the language aspects of the document as it now stands.

Professor Damian Garside
MA (Manchester) Ph D (Cape Town)
Associate Professor of Communication
NWU (Mahikeng Campus) (retired)
formerly: Senior Lecturer
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