A Comparative Analysis of Road Infrastructure Accounting in South Africa

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DEDICATION

This dissertation is written as a motivation to my children, Macheba, Nhlamulo and Musa Makaringe. I hope to inspire them to believe in their uniqueness and ability to achieve whatever they put their minds to.

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ABSTRACT

The South African Government has spent R86.4 billion on transport and logistics infrastructure in the 2022/2023 financial year (Treasury, 2024). This makes up 36.18% of the country's total infrastructure spending, highlighting the significance of these assets. Reliable and publicly accessible accounting information about infrastructure assets serves as a valuable resource when evaluating the magnitude and nature of investments in such assets (Ehalaiye et al., 2021). Currently, the accounting for road infrastructure assets is regulated by the Generally Accepted Accounting Practice (GRAP) standard applicable to property, plant, and equipment. The research aims to assess the influence of the current accounting practices adopted by the three road authorities in South Africa on the uniformity of financial reporting. This research employed mixed method approach with content analysis used to analyse the current accounting practices adopted by the three road authorities in South Africa in accounting for road infrastructure assets in their annual financial statements. A self-constructed disclosure index, informed by the reviewed literature, was utilised to collect data. Information gathered was analysed by applying framework analysis, carried out manually by documenting information collected from the annual report and identifying common themes. The results revealed that the entities apply different accounting policies for road infrastructure assets. The South African National Roads Agency Limited demonstrates an application most aligned with the proposals outlined in the reviewed literature, offering an opportunity for the other two entities to adopt similar practices. The results of this research will contribute to a better understanding and knowledge of infrastructure accounting. Furthermore, the results will assist authorities in recognising the need for guidelines and in developing principles to guide the accounting for infrastructure assets, enabling stakeholders to better interpret the data presented in financial reports.

Keywords:

Road infrastructure, asset management, condition assessments, accounting policies, financial statements, valuation, disclosure

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LIST OF ACRONYMS

ASB	Accounting Standards Board
BMS	Bridge Management System
BRT	Bus Rapid Transit
COJ	City of Johannesburg
COTO	Committee of Transport Officials
CRC	Current Replacement Cost
DRC	Depreciated Replacement Cost
FAR	Fixed Asset Register
GRAP	Generally Recognised Accounting Practice
IFRS	International Financial Reporting Standards
IPSAS	International Public Sector Accounting Standards
IPSASB	International Public Sector Accounting Standards Board
ITIS	Integrated Transportation System
JRA	Johannesburg Roads Agency
LSR	Loan Supportable by Revenue
MFMA	Municipal Finance Management Act
PFMA	Public Finance Management Act
PMS	Pavement Management System
PPE	Property, Plant and Equipment
RAL	Roads Agency Limpopo
RAMS	Road Asset Management Systems
TMH	Technical Methods for Highways
VCI	Visual Condition Index
WIP	Work-in-Progress

CHAPTER 1: INTRODUCTION

1.1 Introduction

The South African road network is approximately 750,000 kilometres long, the lengthiest in Africa and the number ten lengthiest network globally (Treasury, 2023). The South African Government has spent R86.4 billion on transport and logistics infrastructure in the 2022/2023 fiscal year (Treasury, 2024). This constitutes 36.18% of the country's total infrastructure spending, highlighting the significance of these assets. Road networks facilitate development by enabling efficient movement of people, goods, and services while ensuring ease of access to land, facilities such as schools, hospitals, shopping centres, workplaces, and recreation centres (Mashwama et al., 2019) and a diverse range of trade and social activities. Furthermore, roads enhance the economic prosperity of nations and augment productivity (Matjane, 2023). The availability and performance of road assets can facilitate regional development by attracting investors and developers by fulfilling their logistical needs (Mikolaj et al., 2022). Infrastructure assets denote a significant portion of the state's assets and government spending. Given these economic resources' political, social and economic importance, it is necessary to analyse how infrastructure assets are recorded and disclosed in financial statements (Lombardi et al., 2021). Given the significant value placed on the government's asset portfolio, accurate accounting and reporting procedures related to these assets are vital for financial reports' users to confidently depend on the annual financial statements to arrive at well-informed conclusions (Ivannikov et al., 2018). Reliable and publicly accessible accounting information about infrastructure assets is valuable when evaluating the magnitude and nature of investments in such assets (Ehalaiye et al., 2021). It is critical to have accurate financial information regarding public assets to ascertain their societal worth, assess the performance of their portfolios, allocate funds for upkeep and usage expenses and quantify their capacity to generate income (Horni et al., 2020). Relevant accounting practices for infrastructure assets are a foundation for evaluating transport investment alternatives and determining suitable funding levels.

This research analysed the current accounting practices adopted by the three road authorities in South Africa in accounting for road infrastructure assets in their annual financial statements. It also identified the similarities and differences used to guide the development of uniform reporting.

This chapter details the backdrop of the research, problem description, aims of the research, assumptions, limitations and delimitations for the research.

1.2 Background to the Research

Infrastructure assets are immovable, part of a network, have a specialised characteristic with no utilisation options, and have disposal restrictions. Additionally, while various entities can own infrastructure assets, significant infrastructure assets are often found in the public sector (ASB, 2021). A road is a highway or path that connects two or more sites or areas. Road assets encompass paved and unpaved routes, geotechnical materials, including cut and fill slope materials, pavement materials utilised for load distribution on designed roads, catch pits and stormwater pipelines (Matjane, 2023). Examples of infrastructure assets include road networks, sewer systems, water and power supply systems and communication networks (ASB, 2021)), and thus, road falls under the definition of infrastructure assets.

The Constitution of the Republic of South Africa (1996) designates distinct roles and responsibilities to different levels of government in the Republic of South Africa, which include the National, Provincial, and Local spheres. These levels are interconnected and interdependent, each possessing the authority to legislate within its own area of competence, with transport serving as a shared function. Schedule 4, Parts A and B of the Constitution allocate road transport matters to be equally managed by National, Provincial, and Local Governments. Accordingly, the mandate for the erection and maintenance of the network is distributed among the South African National Roads Agency (SANRAL) and provincial and local government authorities. South African National Roads Agency Limited (SANRAL) controls national roads and has a network of 22,197 km of paved roads. Provinces are accountable for 222,951 km, and the Department of Transport reports that the local authorities' network is approximately 275,661 km of the declared network. The remainder of the network is undeclared unpaved roads that primarily serve rural communities. These undeclared roads do not belong to any of the road authorities and are therefore not maintained by them. The custodianship of roads generally falls within the National Ministry of Transport at the national level, which established SANRAL to carry out its road infrastructure custodianship mandate (Treasury, 2024). Limpopo is the only province with a similar arrangement where road custodianship is carried out by Roads Agency Limpopo (RAL) and not the provincial Department of Public Works and/or Transport. RAL, the custodian of road infrastructure in Limpopo, is responsible for all provincial roads, both paved and unpaved. The City of Johannesburg (COJ) brings in an element of the local government sector and has established

the Johannesburg Roads Agency (JRA) to carry the mandate of managing road infrastructure, including all roads within the Johannesburg Metropolitan Municipality. The JRA is mandated to plan, design, build, manage, regulate, repair and maintain road infrastructure and stormwater systems f behalf of COJ. This duty encompasses constructing and preserving bridges, culverts, traffic signals, traffic signal systems, sidewalks, road signage and road marks. Although the entity executes all these responsibilities, infrastructure assets, including roads and bridges, are accounted for in the books of the COJ and therefore the entity's annual report was reviewed for context with detailed analysis performed on the annual report of the City of Johannesburg.

The annual financial statements of the two entities (RAL and COJ) were prepared in compliance with GRAP, regulated by the Accounting Standards Board in compliance with Section 91(1) of the Public Finance Management Act (PFMA). The Accounting Standards Board (ASB) issued Directive 12, which requires SANRAL, a schedule 3A entity, to comply with GRAP as a reporting framework from 1 April 2018. SANRAL requested an exemption from compliance with GRAP. With this exemption, the National Treasury permitted SANRAL to prepare its financial statements in compliance with the International Financial Reporting Standards (IFRS). The exemption was duly published on 12 April 2019 and was applicable until the end of 2021. It was extended through a government publication on 30 April 2021 for another two years until 31 March 2023.

The key qualities of data presented in the financial statements for state-owned institutions include being relevant, accurately depicted, easy to understand, timely, comparable across different entities and capable of being verified (ASB, 2019). Reliable and publicly accessible accounting information about infrastructure assets is valuable when evaluating the magnitude and nature of investments in such assets (Ehalaiye et al., 2021). Relevant accounting practices for infrastructure assets serve as a foundation for evaluating transport investment alternatives and determining suitable funding levels. Additionally, they raise awareness regarding the value of assets and promote informed decision-making, thereby aiding the government in substantiating the ability of assets to offset liabilities and borrowings for credit rating objectives (O'Shea, 1990).

In June 2019, the International Public Sector Accounting Standards Board (IPSASB) engaged in a project to ascertain the challenges public sector accounting professionals encountered when implementing the rules of International Public Sector Accounting Standard 17 (IPSAS 17) for road assets to create a proposal to suggest updates for revision of IPSAS 17 (Ivannikov

et al., 2018). The highlighted challenges include defining and controlling infrastructure assets, recognising the difference between fixed and operational spending, measuring valuation at an asset's opening and subsequent capitalisation stages, depreciation, dividing assets into components and disclosure requirements (IPSASB, 2019a). In South Africa, the IPSAS17 equivalent is Generally Recognised Accounting Practice 17 (GRAP 17). For example, government entities' determination of the value of infrastructure assets presents challenges primarily due to the complexities of applying traditional commercial accounting methods, which are sometimes irrelevant due to the distinctive nature of these assets (Ivannikov et al., 2018). Several of these assets possess extended and occasionally unpredictable lifespans, and there is no existing market where these assets can be traded (Ivannikov et al., 2018). Although GRAP 17 has provisions for establishing the asset's estimated worth and the treatment of the listed challenges, similar challenges identified by the IPSAS project emerge from applying the standard.

This research examines the degree to which these difficulties affect the selected entities, including the effect of the challenges regarding consistency and ensuring that the financial statements are comparable. It analyses the current accounting practices adopted by the three road authorities in South Africa in accounting for road infrastructure assets in their annual financial statements, compares analysis results and recommends the most suitable guidelines derived from the literature. The recommendations aim to promote consistency in applying the standards, including adequate disclosures and comparability of the financial statements. The information may also be used to inform fiscal, investment and maintenance decisions within the various departments of the South African Government.

1.3 Problem Statement

According to Lombardi et al. (2021), road assets comprise a major proportion of infrastructure assets and represent considerable public sector expenditure. The South African spending on transport and logistics infrastructure in the 2022/2023 financial year was R86.4 billion (Treasury, 2024). However, existing accounting standards such as GRAP present application challenges for this highly specialised asset class, as reflected in scholarly discussions and standard-setting practices (Lombardi et al., 2021). Due to the absence of precise accounting principles governing the valuation of road infrastructure assets, accounting practitioners are compelled to rely on various assumptions when accounting for these assets.

These assumptions include making estimates and judgements about calculating the initial and subsequent value of roads, particularly in the absence of an active market. They also entail identifying the anticipated duration each major component of the asset will be in use, dividing the road infrastructure assets into their significant parts for depreciation purposes, evaluating whether there is a decline in the asset's capability to generate financial benefits or provide services and assessing whether repairs and maintenance will enhance the asset's ability to produce impending fiscal advantage or improve its service potential (IPSASB, 2019).

This problem impacts all road authorities and municipalities applying accrual accounting as the lack of guidelines has resulted in accounting professionals formulating their own determinations regarding the appropriate accounting methodology, which has led to a decrease in consistency and comparability in financial reporting across different periods. Given that infrastructure denotes a significant asset for public entities on their balance sheets, it stands to reason that management should prioritise the correctness in accounting for this asset portfolio (Ivannikov et al., 2018) as inaccuracies detrimentally affect the dependability and comparability of entities' financial accounts.

Limited research—such as that by Ivannikov et al. (2018), Lombardi et al. (2021), Vardiashvili (2019), and Young (2017)—has been conducted on the topic, and the studies that do exist are primarily from European countries. Consequently, a gap in the research exists on the subject in African countries, specifically in South Africa. The gap is addressed by conducting a comparative analysis of how applying varying methodologies, assumptions, and judgements affects the uniformity and comparability of financial statements of entities reporting using the same framework. The research further identified and analysed the differences and similarities in how the entities apply these assumptions, judgements and methodologies over a five-year period.

1.4 Objectives of the Research

The primary aim was to explore the current accounting practices adopted by the three road authorities in South Africa in accounting for road infrastructure assets in the annual financial statements. This was explored through the following secondary objectives:

a) To comparatively analyse the accounting treatment of road infrastructure assets.
b) To develop a set of recommendations for the uniform accounting treatment of road infrastructure assets.

1.5 Research Questions

The research intends to respond to these questions:

Question 1

Which accounting and reporting practices are adopted by the entities in accounting for infrastructure assets?

Question 2

How do the adopted accounting and reporting practices differ from one period to another within the individual entities?

Question 3

What are the distinctions and similarities between the adopted accounting and reporting practices among the selected entities?

1.6 Significance of the Research

Notwithstanding the global challenges in accounting for infrastructure assets, few studies have been conducted in South Africa. The research will enhance the existing literature on accounting for road infrastructure assets in South Africa. As the IPSASB seeks to establish guidelines to account for infrastructure assets, the research will identify the challenges that accounting professionals face in accounting for road infrastructure assets. The research outcomes will impact the empirical research that will inform the development of the guidelines project.

Moreover, the research will make a scholarly contribution to fiscal decision-making by demonstrating how including comprehensive and comparable information in financial statements can streamline the budgeting process for necessary asset maintenance expenditures (Blazey et al., 2020). Gaining insight into the state and performance of a portfolio can enhance decision-making processes and maximise the utilisation of limited government resources. (Blazey et al., 2020).

Therefore, the research will benefit the government with reliable financial information that guides the fiscal resource allocation. It will benefit the standard setters, the accounting professionals within the public sector, including the Auditor General, in developing relevant guidelines and preparing and auditing financial statements. It will further benefit the finance providers in making lending decisions when approached by these entities. The research will benefit the entities by strengthening their legitimacy through transparent financial reporting to their stakeholders, who are the residents of South Africa. The research will also contribute to

the scholarly community by identifying further research that can be conducted on the topic, such as the extension of the scope to include similar institutions in South Africa, Africa and globally.

1.7 Delimitations of the Research

The research employs quantitative and qualitative content analysis to examine the financial reporting patterns for five financial years from 2019 to 2023. The research excludes the inspection of registers and other schedules that support the information reported in the annual reports. It also excludes the detailed analysis of the annual reports of the Johannesburg Roads Agency.

1.8 Assumptions

The research assumes that the data presented in the annual reports of the chosen entities is accurate and comprehensive and reflects the application of the entities' asset management policies.

1.9 Limitations of the Research

The research utilised secondary data from published annual reports of the selected entities. Asset registers are the basis for asset reporting and disclosure in the financial statements. However, they could not be obtained and inspected due to the time limit of the research. Therefore, the research results depend on the correctness and comprehensiveness of the published information. The correctness and comprehensiveness of financial data are mitigated by the financial statements having undergone an independent audit.

1.10 Ethical Considerations

This research was exempted from ethics review by the University of KwaZulu-Natal Research Ethics Committee per application no: 00026672 dated 22 July 2023 (see attached appendix B). In terms of this exemption, the information from annual reports released on websites for public access is used to conduct the research. There are no participants or respondents, and the research data will be safely stored for a period of five years.

1.11 Summary/Organisation of the Research

This chapter details the background of this research, as well as its objectives, scope, assumptions and limitations. The literature review, which forms the foundation of the research, research methodology, analysis and results, recommendations, and conclusion, are discussed in the coming chapters.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter presents a comprehensive account, summation and assessment of the works on the topic, offering a vital theoretical and empirical basis for the research. The review of the writings is categorised into two segments: theoretical literature review, in which the foundations of the research are discussed, and empirical literature review, on which the research is based. The empirical literature examines recognition, measurement and disclosure principles for road infrastructure assets.

2.2 Theoretical Literature

A theory is a collection of guidelines employed to explain or interpret a phenomenon. The theory offers a precise depiction of the phenomenon or how it functions (Nimfa et al., 2021). A meticulously constructed literature review section offers the necessary theoretical groundwork to substantiate any argument of contribution (Nakano & Muniz Jr, 2018). The following theories that are applied in accounting as a discipline underpin this research.

2.2.1 Stakeholder Theory

Stakeholders are identified as any group or individuals who have the ability to influence others or to be influenced by an organisation (Hörisch et al., 2020). The inception of stakeholder theory was initially proposed as a framework for explaining voluntary disclosures (Harrison et al., 2019). The stakeholder theory is defined by the following principal concept: Companies comprise networks of relationships among various stakeholders that form the organisation (Hörisch et al., 2020). The theory has been applied as an explanatory framework for accounting choice and voluntary disclosures, taking into account the implicit claims of influential stakeholders (Harrison et al., 2019). Stakeholder orientation leads to greater levels of accountability, increased voluntary disclosure and the adoption of more conservative accounting policies (Miles & Miles, 2019). The engagement of stakeholders in the accounting and reporting process allows organisations to recognise and integrate their significant concerns, problems, opinions, requirements and hopes (Hörisch et al., 2020).

Lack of consideration for stakeholder expectations may be the cause of the discontent among those involved with the present accounting methods. Therefore, stakeholders determine whether or not to provide knowledge, resources and labour based on the information the firm provides to them and their participation in the accounting process (Hörisch et al., 2020).

Considering the perspectives of various stakeholders enhances the comprehensiveness, credibility and transparency of reporting (Hörisch et al., 2020).

In terms of the Road Asset Management Manual (2013), the entities shall acknowledge their stakeholders and their needs. The Road Asset Management Manual (2013), also known as the TMH 22, categorises stakeholders into government, road users and others within the South African context. Within the government stakeholders are the National Treasury, which ensures the optimal resource allocation and monitors that road infrastructure spending is at the right cost and quality; the Committee of Transport Officials (COTO), responsible for the creation of standards, procedures and systems; the Roads Coordinating Body which manages the consistency of standards, procedures and systems and the road authority staff responsible for the implementation of the roads standard, procedures and systems. The road users category includes general road users, such as pedestrians and cyclists, public transport operators, and the freight haulage industry, all of whom require the road and related facilities to be safe and in acceptable service conditions. Other key stakeholders include the road industry, which facilitates the transportation of people and freight across countries and jurisdictions while creating jobs and contributing to economic growth; landowners, who provide access to land for road construction; and taxpayers and citizens, who expect a return on their investment through reduced production and transport costs.

Table 1: Stakeholders requiring asset management information

Regulatory community	**Investment community**	**Supplier community**
i. Parliament, provincial legislatures and municipal councils ii. Elected officials iii. Auditor General iv. Sector regulatory bodies v. Standard setting bodies	i. National government/fiscus ii. Donor agencies iii. Development banks iv. Investors v. Developers vi. Fund managers vii. Credit rating agencies	i. General goods ii. Specialised goods iii. Capital equipment importers iv. General services v. Specialist services

Professional community	Broader community	Customers
i. Professional associations ii. Academic institutions iii. Research institutions iv. Statisticians v. Economists	i. Media ii. Special interest groups iii. Taxpayers iv. General public v. Other governments	i. Residential customers ii. Business customers iii. Institutional customers

Source: Asset Management Framework (Treasury, 2021)

COTO (2013) presents a compelling case for prioritising specific stakeholder requirements to optimise road asset management. Firstly, the preservation of road assets to meet required service standards through consistent maintenance is not merely a technical necessity but a fundamental responsibility to ensure public value. Secondly, the harmonisation of investment timing with long-term accountability to taxpayers, achieved through lifecycle costing, strengthens fiscal responsibility and sustainability. Furthermore, reducing the likelihood of injury, fatality, or property damage is paramount and public safety must remain non-negotiable in any transportation system. Improvement of network flexibility, particularly by minimising travel time between origin and destination, is a direct response to user experience demands. This involves considering congestion, obstructions, and link availability, thereby enhancing operational efficiency. Increased accessibility through improved landowner connectivity and traveller access to destinations demonstrates a commitment to inclusivity and equitable service provision within the transportation domain. Equally, elevating dependability by reducing travel time variability caused by traffic incidents or road closures supports both economic productivity and individual reliability, reinforcing the system's resilience. Prioritising user comfort and convenience contributes substantially to public satisfaction and system adoption rates, while also supporting broader mobility objectives. Additionally, minimising the environmental impact of the transportation network is integral to achieving sustainable development goals. Finally, reducing overall system risk—including the implementation of proactive measures to mitigate the effects of extreme events—not only protects physical assets but also safeguards communities from disruptive consequences. Overall, the dominant stakeholder requirements identified by COTO (2013) provide a robust framework for advancing the accountability, safety, efficiency, inclusivity, and sustainability of road asset management. Their systematic integration is essential for the development of resilient and responsive transportation infrastructure.

The literature demonstrates that the research is grounded in the theory, with stakeholders being at the centre of the research. Overall, the stakeholders need data about asset values, performance, physical condition and maintenance expenditure of the road infrastructure assets to make decisions regarding financing, maintenance prioritisation through lifecycle costing and financial resources allocation to keep the assets at their optimum performance levels (Lombardi et al., 2021). The condition of the assets forms the basis for impairment assessment and the useful life of the asset. These factors enhance the valuation of assets reported in the financial statements. Consequently, this information must be thoroughly updated in the yearly financial statements to aid stakeholder decision-making. Financial disclosures offer the facts on the road infrastructure assets, condition through the impairment disclosures, especially in cases where impairment resulted from the deterioration of the asset's condition beyond the normal wear and tear. The stakeholders' information needs were identified and addressed to promote accountability and transparency.

2.3 Empirical Literature

A review of literature is an assessment of scholarly articles, books and appropriate materials related to a certain subject or research area (Amin, 2014). It involves describing, summarising and evaluating these works. The purpose of reviewing the literature is to summarise relevant prior research and demonstrate how this research contributes to the broader field of research (Amin, 2014). The literature review incorporated diverse perspectives to create a comprehensive, unbiased and thorough understanding of the subject, drawing on both domestic and international research. This literature review is organised in headings aimed at addressing the identification, recognition, measurement and disclosure of road infrastructure assets in the annual financial statements of entities.

2.3.1 The Conceptual Framework for Financial Reporting

A conceptual framework is a systematic philosophy of accounting. It aims to provide foundational theories that underpin the formulation of accounting standards (Gornik-Tomaszewski & Choi, 2018). According to Gornik-Tomaszewski and Choi (2018), the framework is a systematic arrangement of interconnected ideas and core theories that delineate the characteristics, purpose and degree of financial reporting, projected to facilitate the creation of dependable direction, which may be instruction-based or opinion-based (Gornik-Tomaszewski & Choi, 2018). The goal of the conceptual framework is to support the IPSASB in formulating IFRS founded in coherent concepts, back preparers of financial statements in

creating common accounting policies when there is no guidance relevant to a specific matter or occurrence, or when a standard permits optional or alternative accounting procedures; and enhance understanding and interpretation of the standards by all stakeholders (IASB, 2018).

The utilisation of a conceptual framework promotes consistency in financial reporting which in turn enables the preparation of comparable financial statements. One significant advantage of this consistency is the research and development investment made in accounting standards, as they only need to be developed once and have no additional cost for additional users. Secondly, implementing uniform standards prevents informational externalities by ensuring that enterprises and countries can be compared to each other. This helps to avoid the costs imposed on others in an attempt to achieve comparability where it is lacking (Ball, 2006). The uniformity of reporting formats helps to minimise disparities in interpretation and application and facilitates the comparison of financial information between organisations and countries (Ball, 2006). The conceptual framework is perceived as the foundation needed for the development of superior standards in an organised and coherent approach, with the objective of achieving a greater level of authentic comparability, minimising the disputes around the advantages of certain standards (Macve, 2014).

The conceptual framework offers the grounds for guidelines that promote openness, supporting financiers and other industry stakeholders in making informed financial decisions. The Framework enhances responsibility by reducing the data disparity between capital providers and the funds' recipients. The use of a unified and reliable accounting language, grounded in standards derived from the conceptual framework, reduces capital costs and lowers international reporting expenses for businesses (IASB, 2018).

This research explores those accounting practices employed by the selected entities that promote or obscure comparability in a manner that affects decision-making and whether there are alternatives to these practices.

2.3.2 The South African Public Sector Legislative Landscape

The South African public sector financial management and reporting is regulated. The regulations vary in the different government spheres, and these are discussed in the following sub-headings.

2.3.2.1 The Public Finance Management Act (Public Finance Management Act No.1, 1999)

The the Public Finance Management Act (PFMA) regulates financial management in national and provincial governments to ensure efficient management of revenue, expenditure, assets, and liabilities. It delineates the duties of individuals responsible for managing financial resources and addresses pertinent issues related to financial management.

Section 38 of the PFMA assigns the accounting officer the responsibility for financial, risk management and ensuring the effective and efficient utilisation of its resources within the department. Additionally, this section specifically mandates the accounting officer to oversee the management, safeguarding, and maintenance of assets, and the management of liabilities. Section 40 mandates that the accounting officer maintain comprehensive and accurate accounts of the department's financial activities. It also holds the accounting officer accountable for preparing annual financial statements that accurately reflect the department's financial position and performance. Section 55 mandates the accounting officer to prepare annual financial statements according to generally accepted accounting practices, unless approved by the Accounting Standards Board to use other recognised accounting practices for that public entity. Section 27 requires the annual budget to show estimates of current and capital expenditure per vote and division and indicate how capital expenditure will affect future financial years.

Treasury Regulation 10.1 commands the accounting officer to establish measures for the optimal use of assets and implement controls to deter losses and abuse of assets.

2.3.2.2 The Municipal Finance Management Act (Municipal Finance Management Act No 56, 2003)

The Municipal Finance Management Act establishes norms, standards, and other requirements for managing the fiscal and financial affairs of municipalities and municipal entities, including their revenues, expenditures, assets, liabilities, and financial dealings.

Section 14 prohibits the transfer or disposal of capital assets necessary for basic municipal services. Transfers can occur if the council deems the asset unnecessary and considers its fair market value and economic/community benefits. This rule does not apply to transfers between municipalities, municipal entities, or state organs as approved by the National Treasury under a prescribed framework. Section 48 allows the municipality to secure debt or contractual obligations by pledging, mortgaging, ceding assets or rights, or providing collateral. Section

96 assigns the responsibility of managing and safeguarding the municipality's assets, including their maintenance, to the accounting officer. Section 62 requires the accounting officer to ensure the municipality has a system that accounts for its assets and liabilities, values them according to accepted standards, and maintains internal control, including an asset and liabilities register.

2.3.3 Identification of Road Infrastructure Asset

A fundamental characteristic of specilised infrastructure is the challenge of identifying alternatives for the services it provides (Barnes & Lord, 2017). In line with the definition of infrastructure assets, a road is specialised in nature with no utilisation options and with disposal restrictions. The government generally owns a road, and roads are built for use by the public with no other alternative use. Although a road can be disposed of, the disposal is subject to stringent regulations that must be fulfilled to effect the disposal.

The road network is regarded as the cornerstone of development since it fulfils the essential function of facilitating access and mobility for the execution of commercial and social activities (COTO, 2012). A robust infrastructure, which includes roads, is deemed a crucial prerequisite for national economic development (COTO, 2012).

The Committee of Transport Officials (COTO, 2013) offers a systematic framework for the management and classification of road assets and their associated infrastructure. According to COTO, roads and related infrastructure are considered fixed assets and must be accurately recorded within a Fixed Asset Register (FAR). Upon completion and confirmation that a newly constructed road asset can deliver the requisite levels of service, it is formally entered into the FAR. During the construction phase, such assets are designated as Work-in-Progress (WIP) and are only reclassified as fixed assets when they become operational.

The continued inclusion of roads within the fixed assets category is contingent upon verifiable physical existence, substantiated ownership declarations, and demonstrable capacity to deliver an acceptable level of service. Asset categorisation further delineates the operational and engineering characteristics of each asset, which, for the purposes of financial reporting, facilitates their allocation into specific financial classes. These classes encompass a range of infrastructure elements, including roadways (e.g., freeways, dual carriageways, paved and unpaved roads, and rails), bridges, tunnels, toll plazas, drainage systems, Bus Rapid Transit (BRT) stops, and ancillary assets.

The FAR constitutes a comprehensive, regularly updated listing of assets managed by the responsible entity. Its maintenance is critical for effective asset control and forms the basis for figures reported in annual financial statements. A standard FAR should include, at a minimum, details concerning the identification and location of assets, their prescribed and actual service levels, valuation basis, depreciation methodology, and a transactional audit trail capturing acquisitions, disposals, and transfers. This approach ensures enhanced transparency, accountability, and rigour in the stewardship of public infrastructure assets.

2.3.4 Road Infrastructure Asset Management

Asset management entails planning, oversight, and making decisions on the asset's acquisition, utilisation, protection, and disposal to optimise their probability to deliver service while minimising associated risks and costs throughout their lifecycle (Treasury, 2021).

Asset management encompasses a cohesive array of procedures and systems aimed at maximising the efficient and economical utilisation of assets throughout their lifecycle, including needs assessment, acquisition, operation and enhancement (Mikolaj et al., 2022).

In accordance with Treasury (2021), asset management entails the adoption of a comprehensive life-cycle approach, which encompasses processes from the initial assessment of needs through to the fulfilment of post-disposal responsibilities. It is essential that planning, control, and monitoring mechanisms are instituted to effectively mitigate risks and maximise opportunities over the entire asset life cycle. Furthermore, the evaluation of asset performance requires a systematic consideration of associated risks, costs, and potential opportunities, thereby facilitating evidence-based decision-making at both the individual asset and portfolio levels.

The condition of roads serves as a metric for the functionality of the asset in road asset management, and the purpose of conducting road inspections is to detect physical and practical deficiencies in the roadway (Geddes et al., 2019). Geddes et al. (2019) state that the generated data must possess suitable quality and accurately present the actual conditions on the ground to the greatest extent possible. Road assets encompass various components, with the road surface typically being the most valuable, succeeded by bridges and culverts, contingent upon topographical conditions (Bonin et al., 2017). These assets are administered via devoted systems named, according to the primary item, Pavement Management Systems (PMS) and Bridge Management Systems (BMS), referred to as Road Asset Management Systems (RAMS) (Bonin et al., 2017). The execution of asset management is a costly and resource-demanding endeavour, requiring road network administrators to employ individuals with particular

expertise in civil engineering, economics, traffic modelling and geographic information systems (Mikolaj et al., 2022).

The data on assets in accounting records is crucial for financial reporting, as it provides detailed insights into how assets were acquired and their timing of acquisition (Ahmad et al., 2023). A well-designed information system can make the integration of asset information into financial reporting more efficient (Abidin & Mansor, 2019) and evaluate asset information from the accounting records and the ownership registration documents held by government bodies. The application of an information system has produced improved asset management practices by minimising errors and enhancing operational efficiency (Sanjaya & Utama, 2020). Data-related issues are often identified as the primary obstacle to improving asset management (Blazey et al., 2020). One could argue that the lack of a sufficient information system negatively impacts the dependability and comprehensiveness of the financial statements, potentially resulting in significant inaccuracies (Blazey et al., 2020).

According to Matjane (2023), road maintenance necessitates collecting data regarding the asset's state, followed by data analysis and the formulation of maintenance plans. A delay between the inspection and the execution of repair leads to additional asset deterioration (Matjane, 2023).

Basic systems are generally employed to determine the current financial value of assets for the purpose of assessing financial position and planning for future replacement strategies. The system includes a one-time record and associated single-condition assessment values to derive a basic depreciated asset value and detect issues, but it does not offer guidance on resolving these issues. More intricate systems will incorporate a range of advanced tools to aid in predicting future conditions across various treatment alternatives, therefore identifying ideal procurement, maintenance and replacement plans and associated approaches (COTO, 2013). COTO (2013) sets the minimum requirements for a computer system to support asset management for South African road authorities, including the road network register linked to the Geographic Information System, the inventory for bridges and road furniture, and the Traffic Information System.

2.3.5 Recognition of Road Infrastructure Asset

The Conceptual Framework for General Purpose Financial Reporting defines an asset as “a resource presently controlled by the entity as a result of past events”(IASB, 2018). The Conceptual Framework stipulates that when assessing control, an entity must take into account

factors such as lawful rights, access to the resource, the capacity to restrict or deny permission, the ability to utilise the resource for achieving the objectives, and the presence of a legally enforceable right to service potential or the capability to generate economic benefits from the resource (IASB, 2018). Control can be established through laws, regulations, policies, and decisions made by authorities, including cabinets, executive committees, boards, municipal councils, and ministerial orders (Treasury, 2020). When an entity determines it possesses a resource that qualifies as an asset, it evaluates whether it can recognise the asset (Treasury, 2020). An asset is recorded when it is likely that economic advantages will flow to the entity in the future, and the item's price or fair worth can be reliably determined (ASB, 2021).
Service potential refers to the capacity to provide services that help achieve an entity's goals. It enables an organisation to achieve its goals even if it does not generate inflows in cash (Treasury, 2020). An organisation employs the recognition criteria to all expenditure related to an asset, primary purchase, construction and ensuing expenditure for adding, replacing, or servicing an asset (Treasury, 2020). Asset costs include explicitly assignable expenses such as employee costs, finance costs related to construction or acquisition, site arrangement, primary delivery and installation, testing, and expert costs (Treasury, 2020). For self-constructed assets, work-in-progress is accounted for over the construction period, and capitalisation of costs ends once the asset is available for utilisation as anticipated by an organisation (Treasury, 2020).

According to GRAP 17, financial statements must provide detailed disclosures for each category of property, plant, and equipment (PPE) reported. This includes specifying the extent of limitations on ownership, particularly where PPE is held as collateral for liabilities, as well as outlining the scope of guaranteed obligations related to the acquisition of PPE. In the notes to the financial statements, additional information is required for assets under construction or in development. Specifically, the aggregate expenditure included in the carrying amount of PPE must be disclosed by asset category. Further, where the completion of PPE takes significantly longer than initially anticipated, the carrying amount of such assets must be reported alongside explanations for any delays. For any PPE where construction or development has been suspended during the current or previous reporting periods, the carrying amount must also be disclosed, accompanied by reasons for halting progress and an indication of whether impairment losses have been recognised for these assets.

2.3.6 Measurement of assets

2.3.6.1 Cost model

According to Treasury (2021), asset valuation in the public sector serves several essential purposes. These purposes include ensuring compliance with financial disclosure requirements and providing indemnity. Asset valuation is also fundamental for evaluating the appropriateness of municipal property assessments, which determine the fees levied on properties, and for contesting municipal valuations when such valuations are considered excessive. Additionally, it underpins price-setting processes where pricing is based on the utilisation of assets, facilitates effective asset lifecycle management and strategic planning, and determines fair market value in instances where an asset is disposed of prior to the completion of its useful life. Moreover, accurate asset valuation is necessary to establish fair value when assets are transferred. Each of these considerations underscores the critical role that asset valuation plays in the responsible management and reporting of public sector resources.

Asset appraisal is the procedure of assessing the financial worth that converts infrastructure status and its effects on investors and other participants into financial terms as the accumulated prosperity of the public. Various measurement models and techniques can be utilised, with the choice dependent on the classification, conditions of acquisition, type of lifecycle interventions, and the valuation purpose (Treasury, 2021). Fundamental asset worth methodologies are grounded in cost analysis. This value effectively represents the expenditure, excluding the impact of routine preservation and essential restorations that contribute to the long-lasting asset's life (Mikolaj et al., 2022). According to Mikolaj et al. (2022), the determination of the value of an asset predicated on its technical state is an approach comparable to the Depreciated Replacement Cost (DRC) method, and the depreciation is contingent upon the precise assessment of operational functionality and the condition of structural assets. The assessment of functioning feasibility and structural asset state is conducted by pavement performance models and residual life expectancy, determined by the fatigue resistance of pavement construction and materials (Mikolaj et al., 2022). The technical condition refers to the road's capacity to endure traffic volumes. The technical state is quantified as a degree of damage arising from ordinary use relative to the asset's speculative optimal state. For roads, this difference is determined by the residual bearing capacity or residual service life of the pavement (Mikolaj et al., 2022).

The DRC method ensures an asset's carrying value accurately reflects its remaining worth, regardless of usage duration (Treasury, 2021). Assessing asset condition aids in impairment testing for non-cash-generating assets. The DRC approach is perfect for evaluating the asset's worth, risk exposure, and restoration requirements at various levels, making it appropriate for both financial reporting and life-cycle projection. Additionally, the DRC can estimate costs for forthcoming rehabilitation, refurbishment, or replacement of assets (Treasury, 2021).

The value of road assets is often based on historical costs and straight-line depreciation (Ehalaiye et al., 2021). One primary drawback associated with the historical cost is that it becomes inconsequential in decision-making during periods of substantial price fluctuations, as it correlates little with the current cost (O'Shea, 1990). Due to inflation, shortfalls will be created in reserves for asset replacement if depreciation is calculated using historical cost as the foundation, and these shortfalls will need to be recouped during the replacement process (O'Shea, 1990). Insurance and resource management decisions may be compromised if they rely solely on the asset's historical cost (O'Shea, 1990).

O'Shea (1990) proposes that the most suitable method for assessing roads is the current or replacement cost approach. It accurately represents the present minimum economic worth and is hence unaffected by non-commercial influences. This method calculates the present cost by comparing it to the cost per unit of service capacity of the most suitable contemporary replacement facility (O'Shea, 1990). The assessment of the value of the completed section of the road should be established by calculating the amount per kilometre of each lane based on the classification of the designated route. It is necessary to keep records of construction expenses in order to update assessments and accurately represent current replacement costs regularly (O'Shea, 1990).

The current or replacement cost method aligns with the process of assessing value for impairment calculations as outlined in GRAP 26. These standards recommend utilising DRC, restoration cost, or the service unit's method to determine value in use.

The assessment of property value located under highways and on road reserves is contentious, as it is believed that such land cannot be sold or used for other purposes (O'Shea, 1990). O'Shea (1990) argues that every piece of land has another potential use, and the most accurate way to determine its value is by looking at its current market price and taking into account its most valuable and suitable alternative use (O'Shea, 1990). Land should be appraised based on its current market purchase price.

It is essential for roads to be appraised periodically to ascertain their replacement value in current terms and depreciated replacement value, which is essential for financial reporting and for deciding when assets or their components require replacement or rehabilitation. Current Replacement Cost (CRC) offers an equitable and accurate assessment of the expense required to substitute the asset, grounded in contemporary building costs of equivalent assets (COTO, 2013).

The unit rates for each asset component are determined by its unit of measure and price discriminator. The values utilised must be aggregated by component type and sourced from current contracts, with annual updates conducted in an auditable way (COTO, 2013).

The methodology employed to determine unit rates involves utilising Bills of Quantities, wherein the historical rates or prices for each article are designated based on data from the latest comparable contracts. This methodology depends on historical data, necessitating consideration and documentation of sample size, base date, selection of pertinent payment items, the inclusion of preliminary and general items, updates utilising price indices, market influences and overall inflation projections to determine a unit rate for each component (COTO, 2013).

2.3.6.2 Revaluation Model

After recognising an asset, an organisation may choose a financial reporting policy that allows for the asset to be carried using a revaluation model, provided its fair value can be reliably determined. When this approach is used, regular revaluations should be performed to align the revalued amount with the fair value at the reporting date (ASB, 2021). The revaluation frequency is based on changes in the assets' fair value. For an asset with minimal fluctuations in fair value, revaluation may be required only every three to five years. Conversely, assets experiencing major and unpredictable fair value changes necessitate yearly reassessments (Treasury, 2020). Changes in the reassessed value are recorded as revaluation surplus in the statement of changes in net assets if the revalued amount exceeds the carrying amount. However, if these changes reverse previously recognised impairment losses, the reversal is recorded in surplus or deficit in the statement of financial performance (Treasury, 2020).

The annual financial statements must disclose the effective date of the revaluation, the methods and significant assumptions used in estimating fair values, the extent to which fair values were based on observable market prices or appraised utilising other methods, and the revaluation

surplus, comprising movements for the period and limitations on allocation to owners (ASB, 2021).

2.3.7 Depreciation and Useful Lives

A defining trait of road infrastructure assets is their extended and frequently indeterminate lifespan (Barnes & Lord, 2017). IPSAS 17 describes depreciation as allocating the asset's depreciable value across its determined lifespan. The aim of depreciation is to recognise the value, expressed in monetary terms, consumed in the reporting period, thereby accurately reflecting the asset's performance for the users of the financial statements (Treasury, 2020). Depreciation of an asset begins when the asset is ready for use. It continues even when the asset is not actively in use and stops when the asset is no longer recognised. An asset is considered ready for use when it is in the proper site and state to operate as envisioned by the organisation (Treasury, 2020).

Depreciation is unlikely to accurately reflect the consumption of resources for substantial infrastructure assets due to the contentious nature of valuation and the difficulty in ascertaining useful life (Barnes & Lord, 2017). In the case of road infrastructure assets, the challenge of determining depreciation is the uncertain value of utilisation determination. However, historical information and current information, such as the number of vehicles utilising the road, etc., may provide a reasonable basis for determination. The useful life of an asset refers to the period during which the entity expects to utilise that asset (Treasury, 2020). Inaccurate valuation of assets (depreciation) can result in biased decision-making regarding asset valuations and service capacity. These biases can result in higher expenses as a result of less-than-ideal asset management practices (Leviäkangas et al., 2019). Assessing value can be intricate, as there are always trade-offs between investment and maintenance expenditures. Implementing proactive maintenance and asset management strategies aimed at extending the service life can have a major impact on depreciation accounting (Leviäkangas et al., 2019). Proper maintenance will influence the useful life of the asset. Leviäkangas et al. (2019) argue that considering an asset's value from a technical perspective is crucial, as the asset's technical parameters largely determine its performance and, consequently, its value to users.

As assets deteriorate over time, their degradation affects their serviceability, operating capacity and the quality of service given to the client. These causes, along with the tangible deterioration that ultimately necessitates replacement and associated expenditures, represent the depreciation of the asset's value (Mikolaj et al., 2022). Implementing asset management in the operational procedures of the road authority also needs the formation of an assets system. The collection

of data, storage and analysis should employ contemporary technology, such as geographic information systems and spatially enabled management systems (Mikolaj et al., 2022).

On depreciation, O'Shea (1990) argues that to accurately record and report the value of the state's road assets, it is necessary to value them at their written-down current cost, which is the current cost minus the accumulated depreciation. Depreciation is employed to distribute the expense of providing benefits across the capitalised asset's useful life. By using the replacement cost method of depreciation, the financial cost of the asset is aligned with the financial benefit gained, giving a clear indication of the funds needed to replace the asset when necessary.

Since the government adopted accrual accounting in Australia in 1991, there has been a challenge in depreciating and valuing infrastructure assets (Ivannikov et al., 2018). The challenges in valuing government infrastructure assets primarily stem from the complexities of using existing commercial accounting methods, which are sometimes irrelevant because of the distinctive character of the road. For example, many of these assets have long, sometimes uncertain durations, lack an established marketplace for trading, and most assets owned by the government are not intended to generate profits (Ivannikov et al., 2018). The research's findings indicated that the accounting framework was unclear and lacked instructions for reassessing infrastructure assets within local governments in New South Wales, leading councils to adopt various methods in their practices.

The way public sector entities record and disclose the impact of a modification in the expected lifespan of infrastructure assets during a comprehensive revaluation could potentially be used to conceal significant mistakes and instances of non-compliance with accounting standards. This underscores the necessity for regulatory guidance (Ivannikov et al., 2018).

An entity must review the depreciation method employed at each reporting date and assess whether there are indications that its expectations about the asset's useful life have changed since the previous reporting date. If such signals are found, the organisation must adjust the estimated useful life accordingly. Any movements in the projected useful life or the depreciation method must be treated as changes in accounting estimates (Treasury, 2020).

A road that has been entirely depreciated should not be completely devalued unless it is incapable of being restored to a state that enables the delivery of services and no longer provides a service. In order to evaluate a road's service level, it must be re-examined according

to the arm's length value necessary to reinstate an asset of equivalent condition and residual lifespan (COTO, 2013).

2.3.8 Impairment

Impairment denotes the diminishment of prospective economic advantages or service potentials associated with the asset (Vardiashvili, 2019). An abrupt decrease in value may result from damage, obsolescence, and other unforeseen circumstances. After each reporting period, the entity must assess whether any significant events or circumstances may result in asset impairment (Vardiashvili, 2019).

GRAP 17 describes an impairment loss as the remainder when the book value of an asset exceeds its realistic service value. The realistic service value is the greater amount determined by deducting the asset's selling costs from its fair value and its value in use. Given the lack of a functioning market, estimating the fair value minus selling expenses for infrastructure assets becomes a challenging endeavour, requiring the use of various estimation or valuation techniques and judgement (Young, 2017).

Estimating the value of infrastructure assets involves determining the economic advantage that can be derived from them and assessing any potential loss in value (Young, 2017). On that basis, GRAP 17 is viewed as an issue in the accounting and valuation of public infrastructure as it is not providing clear guidance in this regard.

Assets are classified as cash-generating or non-cash-generating based on their intended use at initial recognition. Cash-generating assets aim to create a commercial return, producing cash flows significantly higher than their cost. Non-cash-generating assets are used for service delivery, where cash flows either match or slightly exceed their cost (Treasury, 2020). If the asset's purpose is unclear, it is assumed to be for service delivery (Treasury, 2020). Like all assets, roads can be classified as cash-generating or non-cash-generating.

In order to assess if an asset within property, plant and equipment categories has suffered impairment, GRAP 21, "Impairment of non-cash generating assets," or GRAP 26, "Impairment of cash-generating assets," will be implemented as deemed suitable. Therefore, GRAP 21 and 26 also apply to infrastructure assets. Infrastructure assets are primarily retained to deliver public services' objectives instead of generating commercial returns. As a result, these assets do not generate cash, and GRAP 21 applies to them. Applying the impairment rules under GRAP to infrastructure assets frequently necessitates the exercise of judgement (Young, 2017).

To assess whether there is any indication that an asset may be impaired, the following indications are considered as a minimum:

	External sources of information
Non-cash generating assets	The necessity for the services offered by the asset has stopped or is expected to stop soon.
	Major changes that adversely affect the entity have happened or are imminent in its technological, legal, or government policy landscape in which the organisation operates.
	The necessity for services provided by the asset has significantly declined over the long term.
Cash generating assets	Major changes that adversely affect the entity have happened or are imminent in its technological, legal, or government policy landscape in which the organisation operates.
	The asset's market value has experienced a considerable decline over the period, attributable to factors other than the length of time or usage.
	Rising market interest rates that will likely increase the discount rate, reducing the asset's recoverable amount.
	Internal sources of information
Cash- and non-cash-generating assets	The asset may experience physical deterioration or become obsolete.
	Major long-term amendments in the manner an asset is utilised, or presumed to be utilised, will adversely affect the entity throughout the year or in the upcoming months."
	An organisation has chosen to pause the construction of the asset prior to its completion or ready for use.

	Internal assessment has revealed the asset's function is, or is expected to be, considerably poorer than anticipated.

Source: GRAP Accounting Guideline (Treasury, 2020)

For cash-generating assets, value in use represents the present value of estimated future cash flows expected from the continued usage of the asset and its eventual disposal at the end of its useful life (ASB, 2022b). Conversely, for non-cash-generating assets, value in use is calculated based on the present value of the asset's remaining service potential, which can be calculated by employing methods such as depreciated replacement cost, restoration cost, or service units (ASB, 2022a).

The preference for a suitable method to assess an asset's value in use relies on the availability of data and the type of impairment (Treasury, 2020). The restoration cost method is suitable for tangible asset damage, while the service unit method suits situations where expected service units have decreased due to substantial alterations in technological, legal, or government policy environments, or alterations in the degree or way of use, including the ending or near ending of need. The depreciated replacement cost method is commonly applicable in all other scenarios (Treasury, 2020).

The technical condition is determined by diagnostics and the computation of residual life expectancy for infrastructure such as roads, bridges and culverts (Mikolaj et al., 2022). Regardless of the approach employed to assess the impaired asset, it is imperative that financial reporting accurately reflects the asset's worth (Vardiashvili, 2019).

When assets are recorded using the cost model, any impairment loss or its reversal is recorded in the surplus or deficit. In contrast, when assets are recorded at revalued amounts, an impairment loss is treated as a decrease in revaluation and is recorded in the revaluation reserve, but only up to the amount of any available revaluation surplus (Treasury, 2020). If there are indications that a previously impaired asset is no longer impaired, the reversal of the impairment loss is recorded in surplus or deficit. However, if the asset is carried at a revalued amount, the reversal is recorded in the revaluation reserve up to the carrying amount the asset would have had if no impairment loss had been recorded in prior periods (Treasury, 2020).

An entity must disclose management's considerations on implementing the requirements to classify assets as noncash-generating or cash-generating assets in the condensed accounting policies. The entity must disclose the occurrences and conditions that resulted in the recognition or reversal of the impairment loss, whether the asset's recoverable service amount represents either its fair value less costs to sell or its value in use and whether an impartial valuer was consulted to ascertain the recoverable service amount. The entity must further disclose the criterion employed to ascertain fair value less costs to sell, if the recoverable service amount is fair value less costs to sell, the methodology, concepts and major judgements applied, including the rate(s) of discount applied in the present and past approximation of value in use if the recoverable service amount is value in use (ASB, 2022).

2.3.9 Componentisation

The categorisation and administration of the road network are essential for the advancement and planning of road infrastructure in South Africa to enhance efficiency and effectiveness in road delivery (COTO, 2012). Componentisation is implemented to develop efficient strategies for maintaining and improving components that are essential parts of the asset system (Leviäkangas, 2019). According to GRAP 17, an organisation allocates the initially identified value of a specific asset to the asset's major categories and calculates depreciation for each category independently. When determining if an asset should be classified separately, management evaluates whether separating the component is essential for asset management planning (Treasury, 2021). In the case of road infrastructure, this means separately depreciating elements like pavements, foundations, curbs and gutters, walkways, bridges and lighting systems within the road network.

Assets are classified for a variety of purposes, including the determination of the asset's worth, assessments of the state of the assets, restoration and replacement arrangements, etc. Breaking down complex assets like infrastructure into components improves asset lifecycle planning, budgeting, safeguarding, and financial reporting (Treasury, 2020).

According to Treasury (2020), the recognition of components within the asset register is governed by several key principles. Firstly, a component must possess an autonomous physical or practical identity, distinguishing it from other elements of the broader asset. It should also have a definable and predictable useful life that extends beyond a single reporting period, thereby justifying its individual treatment for accounting purposes. Furthermore, it is essential that the value of the component can be determined and that this value is significant in relation

to the parent asset, surpassing any established capitalisation thresholds. Components are particularly noteworthy if they constitute major maintenance items or if they are subject to specific statutory tests or licensing requirements. Collectively, these criteria ensure that only those components meeting substantive and material standards are recognised separately.

An asset hierarchy is a framework used to categorise an asset base or portfolio into specific classifications. This hierarchy can be organised based on either the function of the assets, the type of assets, or a combination of both. Once the criteria for classification are determined, they should be consistently applied across the entire asset base or portfolio (Treasury, 2020).

In accordance with COTO (2013), road infrastructure assets are classified through a hierarchical framework. A facility can refer to either a designated route or a broader category of roads of a particular classification within a specific territory. The concept of an asset encompasses a continuous road connection, a bridge, or an aggregation of supplementary components, such as guardrails, road signs, and road markings. Asset parts that possess distinct expected useful lives are identified as components within this classification system. These component parts, which are typically evaluated individually to assess their condition, are collectively referred to as items when their evaluation contributes to the overall assessment of the asset's condition. In the context of structures, items comprise parts that are analogous, such as bridge piers, which are then appraised separately to determine their specific condition.

A variety of component types can be assigned to each asset classification. The type of material or equipment used in each component is subcategorised by engineering category and standards, which determine the form of inspection to be conducted, the unit cost, and the expected useful life of the component, as outlined in Table 2.1 (COTO, 2013).

Table 2.1: Assets component types

Asset	Component type
Roads	Surfacings
	Pavements
	Formations
Bridges	Structures
Tunnels	Civil
	Electrical

Asset	Component type
	Mechanical
	Control buildings
Toll plazas	Lanes
	Electrical
	Mechanical
	Control buildings
Drainage	Kerbs and inlets
	Lined drains
	Culverts and storm water pipes
BRT stations	Civil
	Structure
Ancillary assets	Road furniture
	Gantry signs
	Street lighting
	Retaining structures
	Walkways and cycle paths
	BRT stations

Source: Technical Methods for Highways 22

2.3.10 Repairs and Maintenance

Road infrastructure constitutes a significant share of state assets, and if these assets are not properly maintained, the risk of asset deterioration and loss increases. The primary distinction between construction and maintenance is that maintenance is ongoing (Matjane, 2023) and keeps the asset in a good state of repair during its useful life. Due to the susceptibility of South African roads to moisture infiltration, preventative maintenance is deemed essential to mitigate deterioration and maintain asset values (COTO, 2013).

SANRAL identifies the subsequent maintenance measures frequently employed by road agencies following construction (COTO, 2013):

a) Routine maintenance: This guarantees that maintenance actions are performed consistently to ensure the proper functioning of the road asset.

b) Periodic maintenance: Maintenance procedures are performed at multi-year periods to guarantee the road's functionality remains intact.

c) Ad hoc routine maintenance: Road maintenance activities performed as required.

Asset maintenance encompasses all actions aimed at ensuring that an asset performs its intended function at specific performance standards throughout its expected useful life. This involves keeping the asset as close to its initial state as possible, including frequent repeated activities to ensure it continues to operate effectively (Treasury, 2020). Repairs are a type of corrective maintenance that does not restore an asset to an "as new" condition, nor do they extend the asset's effective useful life (EUL) or enhance its design capacity or performance. (Treasury, 2020). Road infrastructure maintenance encompasses regular upkeep, enhancement and rehabilitation efforts (Matjane, 2023). Routine maintenance pertains to the systematic care of the roadway and its drainage systems. This includes gravel patching on minor segments of the roadway. These are tiny initiatives that enhance the functionality of roads and drainage systems (Matjane, 2023). Periodic maintenance denotes actions conducted at regular intervals, typically spanning years. The project encompasses the installation or enhancement of drainage systems, remediation of erosion and rut formation and the gravelling of specific road segments (Matjane, 2023). Postponed or neglected maintenance frequently results in the necessity for the repair or renewal of road assets. The choice to restore or renew is frequently 6–18 times more expensive than doing routine or periodic maintenance (Matjane, 2023).

As an asset ages, its condition and performance degrade, reducing its remaining useful life. With proper maintenance, it should meet required standards throughout its expected useful life, except in cases of unexpected events such as fire, floods, operator errors, or vandalism. (Treasury, 2020). As roads degrade over time, interventions must be implemented to maintain service within acceptable parameters and, if it falls outside these parameters, to restore it to an acceptable condition (Adey et al., 2019).

Asset rehabilitation refers to spending on an existing asset to restore its service potential or estimated useful life to its original state (Treasury, 2020). Renewal can involve replacing existing assets with those of equivalent functional potential (Treasury, 2020). The criterion for renewal is whether the expenditure results in extending the asset's life. An example of renewal is road resurfacing, as it increases the economic potential and service delivery benefit of the asset. Expenditure on rehabilitation and asset renewal is capitalised to the asset (Treasury, 2020). Pavement rehabilitation is seen as an enhancement of operational capacity (Mikolaj et al., 2022).

One of the difficulties highlighted from a project undertaken by IPSASB in June 2019 identifies the difficulties accounting professionals deal with when implementing the ideologies of IPSAS

17 on the road, differentiating maintenance expenditures from capital expenditures. The United Nations Corporate Guidance for Public Sector Accounting Standards has established a threshold regarding the capitalisation of major maintenance at above USD 100 000 (United Nations, 2016). Furthermore, information on road maintenance activities and related expenditures within entities is limited (Matjane, 2023) complicating the evaluation of the type of maintenance work conducted and its associated expenditure.

When expenditure relates to sub-components at any level below an established level hierarchy, such expenditure is not capitalised, even if the sub-components are expected to be used for longer than twelve months a period (Treasury, 2021), demonstrating that a specific threshold at which maintenance expenditure can be capitalised needs to be determined.

Capitalisation is warranted when the expenditure results in an improvement to the asset's service offering beyond its initial projection, enhances the asset's functionality beyond its original performance standards, or extends the asset's useful life beyond the initial estimate. In addition, capitalisation is appropriate if the expenditure results in an increase in the size of the asset or alters its appearance, or if it involves the replacement of a major part of the asset (Treasury, 2020).

GRAP 17 requires that expenditure associated with the repair and preservation of property, plant, and equipment be reported separately in the notes accompanying the financial statements.

2.3.11 Derecognition

Treasury (2021) outlines several circumstances under which assets may be disposed of. These include the expiration of the asset's estimated lifespan and situations where the asset can no longer fulfil its designated performance standards due to changes in legislation or evolving consumer expectations. Disposal may also be considered when the necessity for the asset has ceased or diminished to such an extent that its continued operation is no longer practical, regardless of any remaining useful life. Furthermore, assets may be disposed of if they are technologically outdated, prohibitively costly to maintain, or the necessary auxiliary components are no longer available. Lastly, a disposal may be through a transfer to another department or government entity through a non-exchange transaction. An asset is removed from the organisation's records upon disposal or when it no longer offers any anticipated benefits (ASB, 2021). If replaced, the carrying amount is derecognised and the replacement cost might indicate the original cost if the exact amount is unknown (Treasury, 2020). Any profits or losses on the disposal of assets are recorded in surplus or deficit (ASB, 2021). The

revaluation surplus is transferred to the accumulated surplus or deficit, if the asset was revalued (Treasury, 2020).

2.3.12 Presentation and Disclosures

The classification of assets is a categorisation of assets with comparable characteristics and functions within an organisation's activities, reported as a singular item for disclosure in the financial statements (GRAP 21.76).

Accounting disclosures aim to ensure that financial statements provide all relevant data required by users to make informed decisions. It has been determined that information on whether entities have sufficiently protected their assets is limited (Walker et al., 1999). This statement will be evaluated against the current disclosures GRAP requires in South Africa.

2.3.13 Research Theoretical Framework

The research aims to cover the areas of accounting for infrastructure, as depicted in Figure 2.1 below.

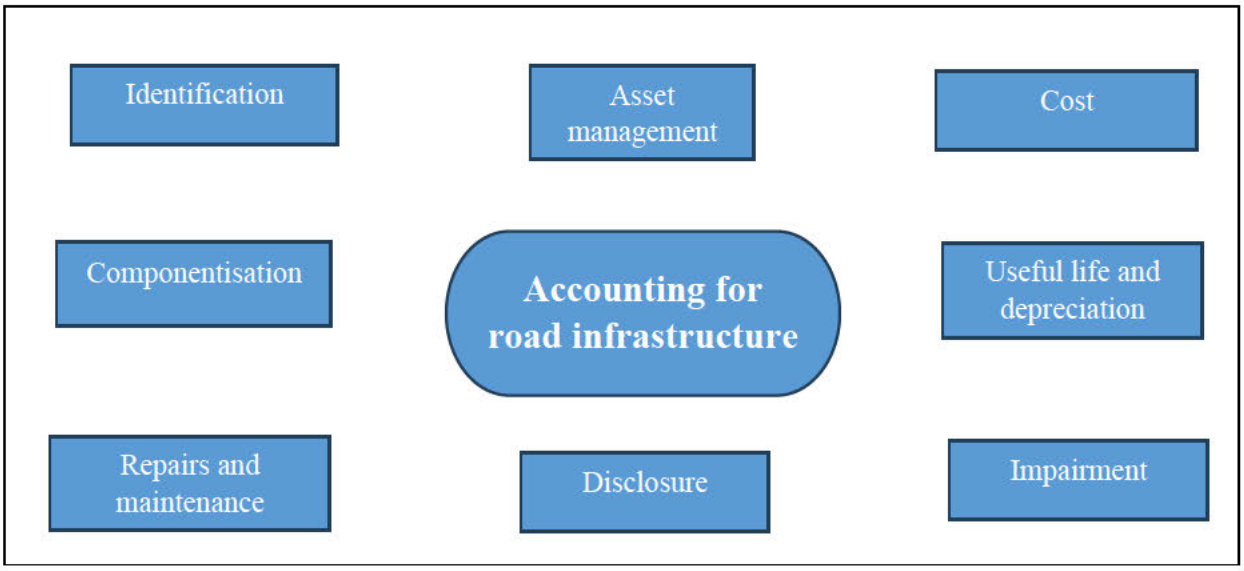


Figure 2.1: Conceptual Framework

Source: Own compilation based on reviewed literature

2.4 Summary

Research on accounting for infrastructure assets has primarily focused on European countries (Ivannikov et al., (2018), Lombardi et al., (2021), Mikolaj et al., (2022), Horni, P et al. (2020). The studies acknowledge the importance of accurate accounting and the challenges encountered in achieving this. Although South Africa faces similar challenges, the studies conducted locally, (Matjane, 2023; Von Holdt, 2009; Wall, 2023) do not address these challenges as they are more focused on asset management than accounting. This research aims

to fill this gap by highlighting the practical challenges, contributing to the body of literature, and emphasising the impact of these challenges on financial reporting for these critical resources. The National Treasury GRAP Guidelines, the National Treasury Asset Management Framework and the applicable GRAP standards complement the prior research conducted and serve as a basis or testing the application of the accounting practices with the aim of achieving fair presentation and disclosure that is comparable across the public sector.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

Creswell (2021) refers to research methodology as a sequence of steps to implement a scientific evaluation process. The preceding chapter discussed the literature relevant to the research, while this chapter discusses the methodology employed in the research. As such, this chapter provides an overview of the research philosophy, design, population, population sample, information-gathering procedures and tools, information validation and trustworthiness, details of how the research results are presented, analysed and discussed and the conclusion.

3.2 Research Design, Research Paradigm and Research Methods

3.2.1 Research Design

According to Creswell (2021), research methodology and design are a set of guidelines and instructions' that the investigator follows to accomplish the research's goal. Explanatory design involves a two-stage methodology where qualitative data serves to elucidate and expand upon preliminary quantitative findings (Almeida, 2018). An explanatory mixed-methods design involves initially collecting and prioritising quantitative data, followed by collecting qualitative data to further elaborate on the findings from the quantitative methods (Kimmons, 2022). This research began with the collection of quantitative data with qualitative data collection and analysis augmenting quantitative results.

In this research, data was primarily collected from the published annual reports with specific reference to the annual financial statements and narrative statements in the annual reports. As data was collected from historical documents, content analysis was used to gather data from the identified sources. This method entails analysing the written components and identifying patterns to determine their fundamental significances and possible connections (Stemler, 2000).

3.2.2 Research Paradigm

A research paradigm is a structure of thinking that encompasses various research traditions (Creswell, 2021). It is a shared worldview that encompasses the field's theories and values when addressing research problems and it is a conviction concerning the methodology employed for gathering and analysing facts (Lukka, 2010). This research is underpinned by the pragmatism worldview, where knowledge claims emerge from acts, circumstances and outcomes rather than prior conditions (Creswell & Creswell, 2017). The central aim of this

research is to recognise and analyse the accounting and reporting standards that the selected organisations employ and compare these practices among the entities and their application from year to year. The research intended to construct meaning from the findings acquired through a qualitative evaluation conducted.

3.2.3 Research Methods

Quantitative research is a systematic approach that utilizes statistical, logical, and mathematical tools to produce numerical data and objective facts (Ahmad et al., 2019). The qualitative research approach requires researchers to make knowledge claims that are drawn from the diverse interpretations of individual experiences to develop a theory or identify a pattern (Creswell & Creswell, 2017). Qualitative research aims to provide a detailed understanding of human actions, practice, views, purposes, and motives through reflection and analysis (Ahmad et al., 2019).

Mixed methods research integrates quantitative and qualitative methods within a single research to offer a comprehensive understanding of a problem (Almeida, 2018). The mixed-methods research design aims to offer a comprehensive understanding by providing a detailed view that improves the description and comprehension of the facts (Creswell & Creswell, 2017). Mixed-methods research has gained popularity due to its ability to integrate quantitative and qualitative data within a single research. This approach yields stronger conclusions than relying on either method independently (Creswell & Creswell, 2017). Mixed methods research offers a thorough understanding by combining the significance of observations with the prevalence of attributes in a population, thereby enhancing both the rigour and extent of the research (Wasti et al., 2022). Mixed methods play a significant role in understanding a situation by addressing both aspects within a single research question. This approach combines the strengths of two different methods, providing multiple perspectives on the research question (Wasti et al., 2022). Using mixed methods can address the limitations of both quantitative and qualitative methodologies, enabling researchers to gather comprehensive information that may not be accessible through a single method alone (Almeida, 2018).

Mixed methodologies are used when both comparative analysis and the development of research aspects need to be conducted broadly and extensively (Almeida, 2018). This research has been conducted through a mixed-methods approach, encompassing quantitative and qualitative approaches. The approach is most relevant to the research as the research involves an analysis of practices adopted, where data is collected through quantitative methods and analysed numerically to identify trends and relationships. Further data was collected by

analysing the content of the annual report to further understand the reasons why certain practices were adopted, the reasons for the changes any other observations that influence the presentation and disclosure of financial statements. This approach encompasses some level of subjectivity that relies on the researcher's experience to gather unrestricted evolving data with the primary objective of formulating themes from the data that is restricted by what the entities choose to disclose. The disclosure index serves as a guide for the research, enabling the transferability of the research results.

3.3 Research Population

The research population is the complete set of occurrences, individuals, or entities that the researcher focuses on during an investigation (Sekaran, 2016). The research is based on entities responsible for road infrastructure in South Africa and uses GRAP as a financial reporting framework. These entities operate in the national, provincial and local spheres of government, including SANRAL, RAL, and municipalities scattered across all provinces in the country. The research was conducted by analysing published annual reports containing detailed operational results of the entities against set targets and the annual financial statements for the periods evaluated. The narrated operational results are used in conjunction with the information reported in the annual financial statements to form a holistic understanding of the entities' overall performance.

3.4 Research Sample

Sampling entails the choice of a fraction of the population from a total to approximate the features of the entire population. The significant motivations for sampling are expediting data acquisition and reducing expenses (Singh & Masuku, 2014). The research was conducted on three of the entities that represent the national, provincial and local government spheres in carrying out the mandate for management and accounting for road infrastructure. The three entities were chosen as they fairly represent the accounting for road infrastructure within the various spheres of government. The examination of the sample is possible and appropriate for this research as the sample is small, consists of specific organisations, and information is easily accessible online. The five-year period was chosen as an appropriate period to gain sufficient insights with limited data saturation. The period enabled the researcher to acquire a comprehensive understanding of the research by identifying trends throughout the period examined. The research period also has the advantage of enhancing the validity of the results.

3.5 Data Collection Methods and Instruments

3.5.1 Data Collection Methods

In this research, data was primarily gathered from the published annual reports of SANRAL, RAL and JRA/COJ for the financial years covering 2019 to 2023 with specific reference to the annual financial statements and narrative statements in the annual reports. As data was collected from historical documents, content analysis was used to gather data from the identified sources. This method uses text element analysis and spotting patterns to reveal their underlying meanings and possible relationships among the facts (Stemler, 2000).

3.5.2 Data Collection Instrument

The researcher developed a structured disclosure index based on the literature review as a research guide to address the research objectives. The index focused on the coverage of the disclosure design, considering several information items, which are measured in terms of dummy variables. It consisted of a series of questions across the eight accounting elements as detailed in the literature review. The disclosure index serves as an essential instrument for assessing the information presented in structured financial reports, which encompass financial statements, management narrative statements and analyses, and other regulated submissions (Urquiza et al., 2009).

Abasi et al. (2022) assert that the predominant method for assessing a firm's compliance with disclosure requirements is the unweighted disclosure index (UDI). This method utilises a binary measurement technique, assigning a value of 1 if an item is disclosed and 0 if it is not. The UDI method presumes that an item will either be disclosed (1) or remain undisclosed (0), thereby neglecting to account for the varying number of items encompassed by different accounting standards (Abasi et al., 2022). In this research, a score of 1 represents no disclosure, 2 minimum disclosures, and a score of 3 represents comprehensive disclosure. Unweighted indices serve as appropriate research tools in corporate disclosure studies when the focus is on all groups that utilise a company’s annual report, rather than catering to the needs of any specific user category. The scores are based on the information disclosed in the individual entity’s annual report per financial year. The research was conducted under strict time constraints, and a disclosure index was selected as a suitable research instrument due to its popularity in the accounting field, efficiency and cost-effectiveness in gathering both qualitative and quantitative data. The disclosure index was completed by the researcher, who has extensive knowledge and experience in accounting for road infrastructure assets.

Using content analysis, the narrated parts of the annual report with specific reference to asset management, construction, and maintenance work done on road infrastructure for each period under review were documented to identify entity-specific conditions that provided a qualitative context. A similar approach was used for collecting data relating to accounting policies and disclosures in the annual financial statements.

The disclosure index below was used to conduct the research on the three selected entities over five years, from 2019 to 2023:

Table 3.1: Disclosure Index

Component 1: Infrastructure asset identification and recognition	
Question	**Scoring scale**
1.1 How is control determined?	0 - Not applicable 1 - No reference to control 2 – Control is determined through the entity's mandate, mandate not clear 3 – Control is determined through the entity's mandate, mandate clearly specified
1.2 How are assets under construction (WIP) recognised and disclosed in the AFS?	0 - Not applicable 1 - No reference to the WIP 2 - WIP disclosed within other categories 3 - WIP disclosed separately
1.3 Qualitative observations	
Component 2: Asset management	
Question	**Scoring scale**
2.1 How does the entity track and record infrastructure condition and performance?	0 - Not applicable 1 - No reference to assessed asset condition and performance 2 - Condition assessment conducted

	3 - Condition assessment conducted with the effect of the assessment disclosed
2.2 How often are road asset inspections/condition assessments conducted?	0 - Not applicable 1 - No reference to asset inspections 2 - Asset inspection frequency not disclosed in the afs 3 - Asset inspection frequency disclosed in the afs
2.3 What purpose do the road inspections/condition assessments serve?	0 - Not applicable 1 - No reference to asset inspections 2 - The purpose not specified 3 - Purpose of the inspections/condition assessment specified
2.4 Qualitative observations	
Component 3: Measurement of road infrastructure assets	
Question	**Scoring scale**
3.1 What is the accounting policy for the subsequent measurement?	0 - Not applicable 1 - Measurement basis not disclosed 2 - Measurement basis vaguely disclosed 3 - Measurement basis disclosed
3.2 If measured at the revaluation model, how is the revaluation performed? -Who performs the evaluation (qualifications, internal/external expert) -How fair value is determined -Some inputs into determining the value	0 - Not applicable 1 - Road infrastructure not revalued 2 - Road infrastructure revalued as part of impairment testing or review of useful life 3 - Road infrastructure revalued at specified intervals

-At what intervals	
3.3 Qualitative observations	
Component 4: Componentisation	
Question	**Scoring scale**
4.1 What classes of road infrastructure assets are in the AFS?	0 - Not applicable 1 - Assets disclosed as a single line/category 2 - Asset disclosed as a single line with a footnote 3 - Major components disclosed separately
4.2 How does the asset classification as disclosed in the AFS align with the principles of the Asset Management Framework?	0 - Not applicable 1 - Assets disclosed as a single line/category 2 - Asset disclosed as a single line with a footnote 3 - Major components disclosed separately
4.3 Qualitative observations	
Component 5: Repairs and maintenance	
Question	**Scoring scale**
5.1 Under what circumstances would repairs and maintenance expenditures be capitalised (if they increase the useful life of the assets, a determined threshold - from the accounting policy)?	0 - Not applicable 1 - No policy on repairs and maintenance disclosed 2 - No reference to the capitalisation of repairs in the accounting policy 3 - Policy on repairs and maintenance, and application disclosed in the notes i.e repairs and maintenance expenditure capitalised and increase in useful life of assets as a result of repairs and maintenance
5.2 Qualitative observations	

Component 6: Useful life and depreciation	
Question	**Scoring scale**
6.1 Which depreciation method is applied for road infrastructure assets?	0 - Not applicable 1 - Depreciation method not disclosed 2 - Depreciation method disclosed 3 - Depreciation method disclosed and consistently applied
6.2 Which assumptions/methodology are applied to determine the useful life of road infrastructure assets?	0 - Not applicable 1 - No reference to how the review of useful life is determined 2 - Useful life policy disclosed 3 - Useful life policy disclosed and applied
6.3 How often are useful life and depreciation methods reviewed (annually)?	0 - Not applicable 1 - No reference to the review of useful life 2 - Review of useful life policy disclosed 3 - Review of useful life policy disclosed and applied
6.4 How are the results of the review of useful live disclosed (e.g as change in accounting estimate)	0 - Not applicable 1 - No reference to the review of useful life 2 - Review of useful life results not disclosed 3 - Review of useful life disclosed
6.5 Qualitative observations	
Component 7: Impairment	
Question	**Scoring scale**
7.1 How does the entity designate road assets as cash or non-cash generating asset?	0 - Not applicable 1 - No policy on impairment 2 - Policy vague/generic 3 – Clear and specific policy and application

7.2 What are the accounting policies for determining impairments of cash and non-cash generating assets?	0 - Not applicable 1 - No policy on impairment 2 - Policy on impairment vague/generic 3 – Clear and specific policy and application
7.3 How is impairment assessment performed for cash and non-cash generating assets (how are events that trigger an impairment for road infrastructure assets identified and disclosed)?	0 – Not applicable 1 – No policy on impairment 2 – Policy on impairment vague/generic 3 – Clear policy and application
7.4 Qualitative observations	
Component 8: Disclosures in the annual financial statements	
Question	**Scoring scale**
8.1 How does the financial statement disclose the carrying amount of PPE under construction?	0 - Not applicable 1 - WIP not disclosed 2 - WIP disclosed within the main asset category 3 - WIP disclosed separately
8.2 How are halted projects disclosed?	0 - Not applicable 1 - Information on halted projects under construction not disclosed 2 - Information on halted projects under construction vaguely disclosed 3 - Information on halted projects under construction disclosed with reasons
8.3 How are expenditure incurred on repairs and maintenance disclosed?	0 - Not applicable 1 - Repairs not disclosed separately 2 - Repairs and maintenance separately disclosed

	3 - Repairs and maintenance separately disclosed under PPE note
8.4 How are restrictions or contractual commitments related to road infrastructure disclosed?	0 - Not applicable 1 - Restrictions not disclosed separately 2 - Restrictions disclosed 3 - Restrictions disclosed under PPE note
8.5 How is the methodology and significant assumptions used for impairment testing disclosed?	0 - Not applicable 1 - No policy on impairment 2 - Policy on impairment vague/generic 3 - Clear policy and application
8.6 Qualitative observations	

Content analysis was employed to document the narrated sections of the annual report, with specific reference to asset management, construction and maintenance work on road infrastructure for each period under review, to identify entity-specific conditions that provided a qualitative context. A similar approach was used for collecting data relating to accounting policies and disclosures in the annual financial statements.

3.6 Data Validity and Reliability

Research validity represents the magnitude to which a principle is precisely assessed (Heale & Twycross, 2015). Heale and Twycross (2015) further distinguish three kinds of validity: 1) Content validity, meaning the comprehensive evaluation of all dimensions of a research construct by a research instrument. 2) Construct validity, meaning the accuracy with which the research instrument (or tool) assesses the envisioned construct; and 3) Criterion validity relates to the degree of correlation between a research instrument and other instruments measuring the same variables.

The information was gathered from the published annual reports, which are audited. These were obtained from the organisations' websites. This eliminated the risk of subjectivity and bias usually presented by interviews and surveys. The researcher developed a disclosure index from which content analysis was applied, minimising subjective scoring as it captures detailed

information. The scoring scale approach is characterised by its reliability, verifiability, and repeatability (Abasi et al., 2022).

3.7 Data Presentation and Analysis

The objective of the data analysis phase is to organise and condense the acquired data for clarity and to ascertain its relevance to the research questions defined in chapter one. The data analysis plan, as articulated by Amaratunga et al. (2002), encompasses several key stages essential to rigorous research. Initially, the process involves a thorough evaluation of the raw data collected, ensuring its relevance and reliability for subsequent analysis. Following this, the data is systematically inputted and transferred into appropriate formats or databases to facilitate smooth handling. Once the data is suitably organised, the next stage is data processing, where analytical methods are applied to extract meaningful patterns and insights. The findings derived from this analysis are then disseminated, allowing for their integration into the broader academic or operational context. Finally, the acquired data and its findings are interpreted critically, drawing out implications and contributing to a deeper understanding of the research questions under investigation.

Analysis of the collected data utilising statistical methods reveals insights into various factors and the linkages and patterns established, and the information gathered must align with the evaluated literature (Amaratunga et al., 2002). Quantitative data analysis involves an organised procedure of gathering and assessing quantifiable and supportable data. It encompasses a numerical method for evaluating quantitative data (Ali, 2021). The various factors, linkages, and patterns were established through descriptive statistics, comparative and trend analysis as statistical methods.

Descriptive statistics summarise information and provide a numerical description of the data (Rana et al., 2021). It is used to depict data in a readily available, quantitative state (Ali, 2021). The disclosed elements in the financial statements for each entity were evaluated against the checklist. Subsequently, each item was assigned a score. This was done for each entity for each year, covering five years. The results are presented using descriptive statistics, which offer a succinct summary of the data under investigation and can be used to summarise data using fundamental quantitative measures (Kaliyadan & Kulkarni, 2019). Descriptive comparison describes the practices adopted by the entities and how these practices vary between the

entities, while trend analysis determines the patterns observed over the selected five-year period.

Qualitative data analysis is a method utilised by researchers to interpret extensive amounts of data, allowing them to present this information systematically to their audience (Archer, 2018). The research results were scrutinised and presented using thematic analysis. As a qualitative data analysis technique, thematic analysis involves a search across a set of data for recurring patterns, which are then analysed and reported (Kiger & Varpio, 2020).The flexibility with which thematic analysis can be implemented across a broad spectrum of theoretical and epistemological frameworks, as well as on several distinct questions, methods, and selection dimensions, is one of its essential qualities (Kiger & Varpio, 2020). Data will be analysed using framework analysis. The analysis was carried out manually by documenting information collected from the annual report and identifying common themes. The themes were then grouped and analysed using framework analysis. A framework analysis is a kind of scrutiny that is intrinsically comparative. It applies a designed structure consisting of ideas produced from non-logical and logical reasoning. The principal goal of framework analysis is to discern, elucidate, and understand key patterns within and through instances and ideas within the subject of relevance (Goldsmith, 2021). The process has the primary elements of developing and implementing an analytical framework.

A comprehensive analytical framework was developed by utilising the research questions and disclosure developed with the guidance from the literature review. The subsequent outcomes are organised under the key components and examined according to themes drawn from the documented qualitative observations. The overall results are detailed in a table supported by a graphical presentation for each entity. Results were displayed in a mind map structure for research Question 1, a clustered column chart was used for Question 2 results, and a comparison picture was used for Question 3.

3.8 Summary

This chapter provided a synopsis of the methods and techniques employed to address the objectives of the research by outlining the research philosophy, design, population, population sample, information-gathering procedures and tools, information validation and trustworthiness, details of how the research results are presented, analysed and discussed, and the conclusion.

CHAPTER 4: DATA PRESENTATION AND ANALYSIS

4.1 Introduction

The preceding chapter established the approach followed by the research. This chapter presents and interprets the outcome and discusses the detailed findings of the research. The results are organised by the research questions with the details organised by the respective themes. The analysis is presented in tables, figures and graphs with interpretations provided for each presentation.

4.2 Results Presentation and Analysis

The detailed results are presented according to the themes established in the literature in the table below and are discussed and analysed according to the research questions.

Table 4.1: Comprehensive Results

Entity/ Component	Identification and recognition	Asset management	Measurement basis	Componenti-sation	Repairs and maintenance	Useful lives and depreciation	Impairment	Disclosure
COJ	i. Control is determined by reference to the municipality's assigned mandate and jurisdiction. ii. Roads and related infrastructure are disclosed	Although no reference is made to the condition assessment in the COJ financial statements, JRA uses the RAMS to assess the condition of the assets.	COJ measures infrastructure assets at cost less accumulated depreciation and impairment.	Roads and related infrastructure are disclosed as "infrastructure", i.e. not distinguished per category such as roads, bridges, etc.	i. Accounting policy on repairs and maintenance not disclosed ii. Maintenance activities include routine maintenance, resurfacing and rehabilitation.	i. The accounting policy states that the expected economic lifespan of assets is established based on the projections made by management, which take into account technology, service needs, and the	i. The accounting policy states that assets undergo annual impairment testing and are evaluated anytime there are indications of potential impairment. ii. There is no evidence of testing	i. The policy/methodology for determining impairment loss is not specific and clear. ii. The assumptions used are not disclosed.

Entity/ Component	Identification and recognition	Asset management	Measurement basis	Componenti-sation	Repairs and maintenance	Useful lives and depreciation	Impairment	Disclosure
	as "infrastructure", i.e. not distinguished per category such as roads, bridges, etc. iii. WIP is reported separately in the notes to the financial					determined earnings on assets. ii. It also states that the residual values consider the condition of the assets at the conclusion of their determined lifespan. iii. It is asserted that the determined lifespan and scrap values are evaluated at every period-	disclosed, however, impairment loss has been recognised.	

Entity/ Component	Identification and recognition	Asset management	Measurement basis	Componenti-sation	Repairs and maintenance	Useful lives and depreciation	Impairment	Disclosure
	statements.					end using the relevant market information and management's consideration, however, no evidence of this review has been disclosed. iv. The cost of road assets is written down and on an equal basis over their determined lifespan to recognise wear and tear expenses.		

Entity/ Component	Identification and recognition	Asset management	Measurement basis	Componenti-sation	Repairs and maintenance	Useful lives and depreciation	Impairment	Disclosure
						v. The useful life of infrastructure assets has changed from 10-30 years in 2020 to 10-50 years in 2021. The circumstances that necessitated the change and the resulting change in the estimate note have not been disclosed.		
RAL	i. Control is determine	Updated RAMS	i. Road infrastruc	i. There are four	i. In RAL, maintenance	i. The cost of road assets is written	i. The accounting	i. The circumsta

Entity/ Component	Identification and recognition	Asset management	Measurement basis	Componenti-sation	Repairs and maintenance	Useful lives and depreciation	Impairment	Disclosure
	d by reference to the entity's assigned mandate and jurisdiction. ii. Roads and related infrastructure are disclosed as "roads and bridges" i.e. not	condition assessment reports were a key performance area from 2019 to 2022.	ture assets are carried at cost less accumulated depreciation and impairments. ii. In 2022, the replacement cost of assets that were recorded at zero	major categories of road infrastructure assets according to the accounting policy: roadbeds, pavement layers, bridges, and unpaved	activities include re-gravelling, blacktop patching, resurfacing and rehabilitation. ii. In 2023, RAL spent R1.4 billion on resurfacing and rehabilitation of the road network.	down and on an equal basis over their determined lifespan to recognise wear and tear expenses. ii. However, with reference to 2023, the equal cost allocation method of recognising wear and tear was diluted as the results of the condition assessments	policy on impairment of non-cash generating units is generic and does not provide the actual process that RAL follows to assess and calculate impairment. ii. It only states that entity uses the depreciated	nces that led to the impairment are not disclosed either in the financial statements or the accounting officer's report. ii. The methodology and assumptions used to

Entity/ Component	Identification and recognition	Asset management	Measurement basis	Componenti-sation	Repairs and maintenance	Useful lives and depreciation	Impairment	Disclosure
	distinguished per category. iii. WIP is reported separately in the notes to the financial statements.		cost was established using the cost of comparable assets on the asset register. iii. To determine the effect of the maintenance, condition	layers. However, roads and related infrastructure are disclosed as "roads and bridges", i.e. not distinguished per category. ii. Compon	iii. This prompted the entity to review the determined assets' lifespan and determine the carrying amount of assets that were carried at zero. iv. The accounting policy states that the RAL separately	were used to determine the carrying amount of the assets. This may be the case for the coming years, depending on the frequency of the assessments. iii. These effects need to be disclosed as changes in estimate, which was not the case in 2023. iv. When the useful	replacement cost approach to determine value in use.	determine impairment are not disclosed. iii. The entity was not fully compliant with PPE disclosure requirements until 2023, e.g. disclosure on PPE repairs and maintenan

Entity/ Component	Identification and recognition	Asset management	Measurement basis	Componenti-sation	Repairs and maintenance	Useful lives and depreciation	Impairment	Disclosure
			assessments were conducted, and the VCI was used to arrive at the carrying amount of the assets and the revised lifespan.	entisation aligns with the Asset Management Framework and COTO provisions	discloses expenditure to repair and maintain property, plant and equipment in the notes to the financial statements.	life was reviewed in 2023, it was accounted for as an error and not a change in estimate, meaning that the entity still maintains that the assets are written down on an equal basis over the assets' determined lifespan. v. There are no scrap values.		ce expenses not reported under PPE note, PPE reported at zero carrying amount, restrictions and assets under construction delayed or halted.

Entity/ Component	Identification and recognition	Asset management	Measurement basis	Componenti-sation	Repairs and maintenance	Useful lives and depreciation	Impairment	Disclosure
						Instead, the process of evaluating assets' determined lifespan is used to revive the useful lives of assets that have reached zero carrying amount while still in use.		
SANRAL	i. Control is determined by reference to the	i. The entity uses the RAMS to	i. Road infrastructure assets are revalued	i. Road infrastructure assets are	i. Maintenance activities include routine maintenance	i. Roadbeds are depreciated over a useful life. ii. Pavement layers and road	i. The entity distinguishes between the impairment of cash-	• In terms of IFRS, which SANRAL applied up

Entity/ Component	Identification and recognition	Asset management	Measurement basis	Componenti-sation	Repairs and maintenance	Useful lives and depreciation	Impairment	Disclosure
	entity's assigned mandate and jurisdiction. ii. Road infrastructure assets are disclosed under two categories, namely, road structures and road network.	update the overall condition index. ii. Condition assessments on road networks and road structures are conducted every 1-	annually. ii. The entity applies a benchmark treatment of IAS 16, which permits asset valuation at fair value. ii. The fair value of infrastruc	disclosed under two categories, namely, road structures and road networks. ii. The categories could be extended to	and network resurfacing ii. Network resurfacing can potentially increase the useful life of road networks. iii. The condition assessment conducted in 1-5 intervals accounts for the improvement	structures are depreciated at a rate associated with the condition indices computed from detailed condition assessment. iii. The regularity of the condition assessment is linked to the asset's diminishing pattern. iv. As the roads are	generating (toll roads) and non-cash-generating (non-toll roads) units. ii. For non-toll roads, impairment is determined in accordance with IPSAS 21, and the calculation is conducted at the point of	to 2023, It is required to disclose the amount of contractual commitments for the acquisition of property, plant and equipment, any restrictions to PPE, WIP temporarily idle assets,

Entity/ Component	Identification and recognition	Asset management	Measurement basis	Componenti-sation	Repairs and maintenance	Useful lives and depreciation	Impairment	Disclosure
	iii. WIP is reported separately in the notes to the financial statements.	5 years.	ture assets represents the DRC and considers the asset's unit cost, condition and remaining useful life. v. The valuation calculations are	account for assets that have different measurement bases, like road beds and pavement layers. iii. Componentisation aligns with the Asset Manage	s derived from maintenance.	primarily publicly owned and are not sold on the open market, residual values are not determined. v. Instead, a minimum remaining life of 3 years has been set to avoid assets that still have service potential and are still used being carried at zero	revaluation with reference to DRCs. iii. The valuation calculations are performed using the ITIS. iv. The accounting policy states that the impairment is determined when there is	retired assets and fully depreciated assets not in the PPE. • These disclosures are not evident in the AFS except the disclosure of WIP.

Entity/ Component	Identification and recognition	Asset management	Measurement basis	Componenti-sation	Repairs and maintenance	Useful lives and depreciation	Impairment	Disclosure
			performed using the Integrated Transportation Information System (ITIS). v. The overall priority and condition indexes are used	ment Framework and COTO provisions.		carrying amount. vi. The residual lifespan of assets is factored into the assessment of their DRC, considering the state of the pavement.	an indicator that assets may be impaired. v. This may be inconsistent for impairment of non-toll roads, which is determined annually at a point of revaluation without necessarily having a specific	

Entity/ Component	Identification and recognition	Asset management	Measurement basis	Componenti-sation	Repairs and maintenance	Useful lives and depreciation	Impairment	Disclosure
			to compute the write-down on the reassessment gain.				trigger or indicator. vi. For toll roads, LSR is used to assess impairment vii. fThe LSR represents the present value of the loans a toll expects to make regular payments on and repay from its net income	

Entity/ Component	Identification and recognition	Asset management	Measurement basis	Componenti-sation	Repairs and maintenance	Useful lives and depreciation	Impairment	Disclosure
							during the specified assessment period. By predicting the capital and money market debt levels at the conclusion of each financial year, the model enables SANRAL to assess the financial	

Entity/ Component	Identification and recognition	Asset management	Measurement basis	Componenti-sation	Repairs and maintenance	Useful lives and depreciation	Impairment	Disclosure
							viability of its toll plazas, both in the present and predicted future. viii. An adverse outcome of an individual toll plaza indicates that the toll value is diminished.	

4.2.1 Research Question 1: Which accounting and reporting practices are adopted by the entities in accounting for infrastructure assets?

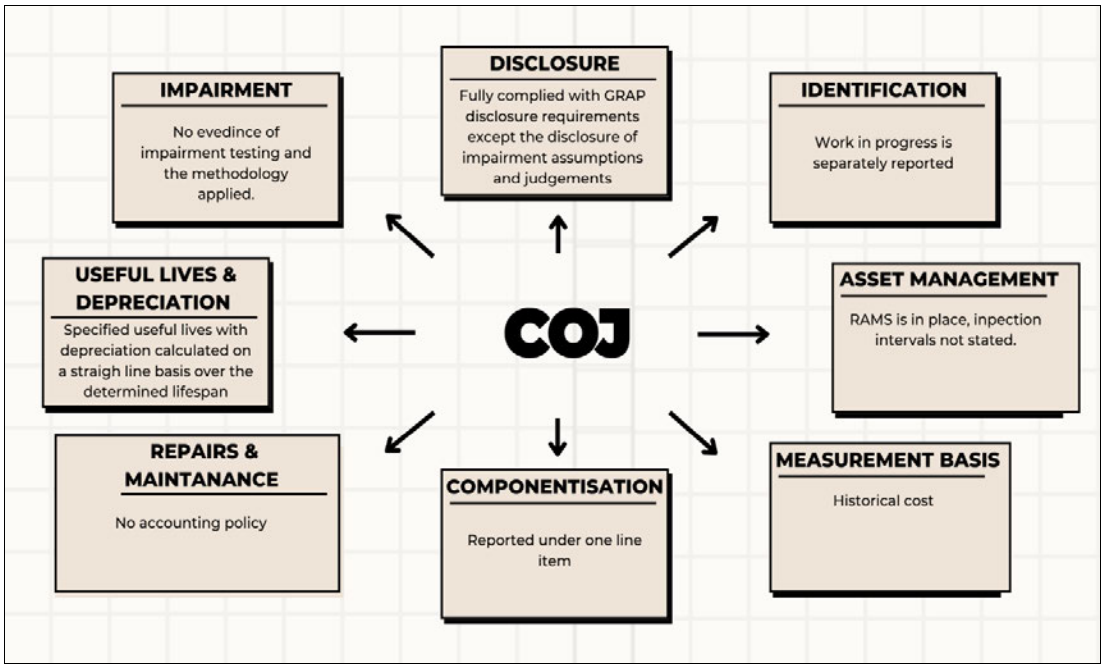


Figure 4.1: Summarised Entity Results – COJ

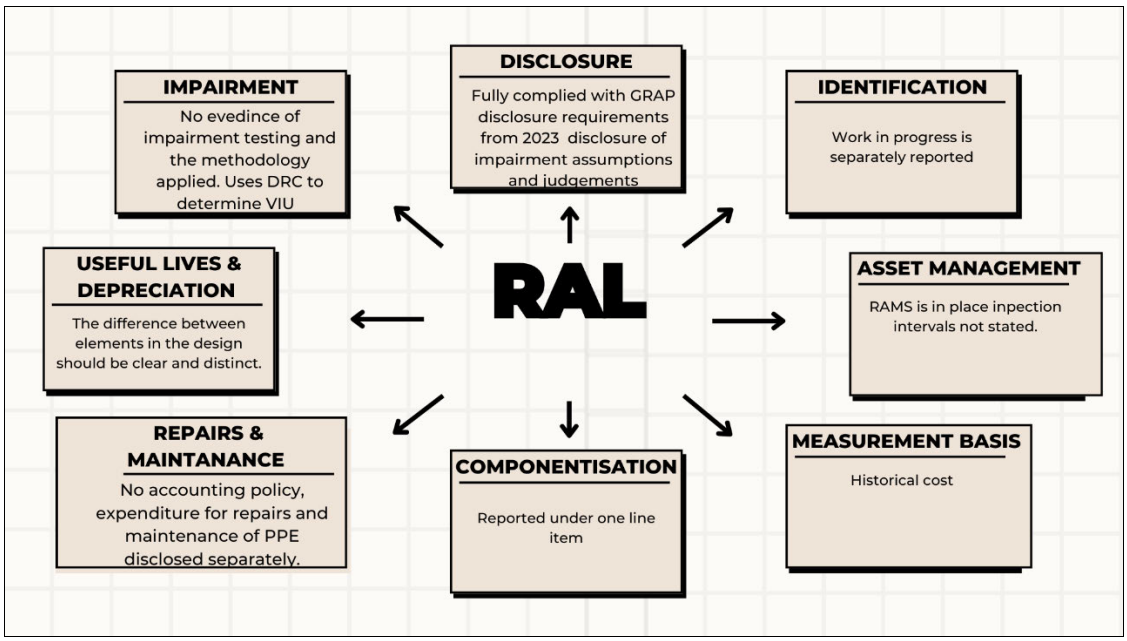


Figure 4.2: Summarised Entity Results – RAL

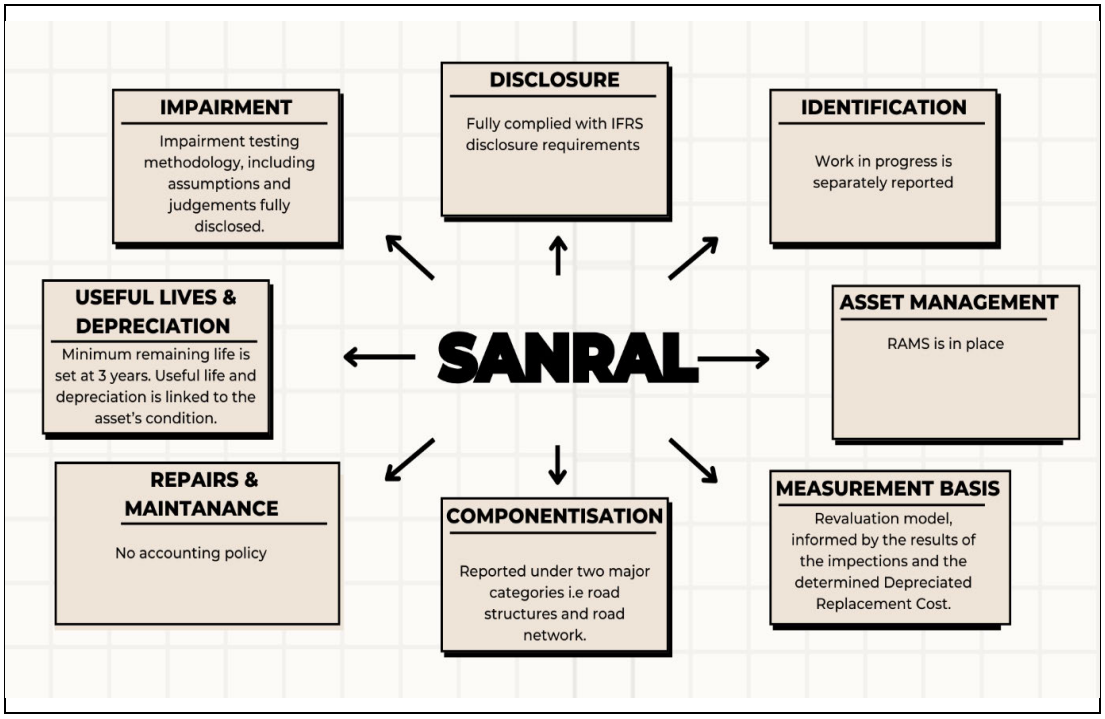


Figure 2.3: Summarised Entity Results – SANRAL

Figures 4.1, 4.2 and 4.3 above represent summarised entity results derived from the comprehensive results in Table 4.1. The detailed findings are discussed under each theme below.

4.2.1.1 Component 1: Identification and Recognition

All four entities disclose WIP as an individual line item in the financial statements. COJ and RAL disclose infrastructure assets as a single line, such as infrastructure and roads and bridges, respectively. In contrast, SANRAL discloses the road infrastructure assets in two categories, namely, road structures and road networks.

4.2.1.2 Component 2: Asset Management

All entities use the RAMS to assess and update the state of the road infrastructure assets. This affirms that the RAMS is essential for road infrastructure asset management.

4.2.1.3 Component 3: Measurement

COJ and RAL use a cost model to measure infrastructure assets, while SANRAL uses a revaluation model with revaluations performed annually. The valuation calculations are performed using the ITIS. The fair value of infrastructure assets represents the DRC and considers the asset's unit cost, condition and remaining useful life.

4.2.1.4 Component 4: Componentisation

According to GRAP 17, an organisation allocates the initially identified value of a specific asset to the asset's significant categories and calculates depreciation for each category independently. In the case of road infrastructure, this means separately depreciating elements such as pavements, foundations, curbs and gutters, walkways, bridges and lighting systems within the road network. Assets are categorised for diverse purposes, including the determination of the asset's worth, assessments of the state of the assets, restoration and replacement planning, etc.

The results of this component are addressed within Component 1 above.

4.2.1.5 Component 5: Repairs and Maintenance

Implementing proactive maintenance and asset management strategies aimed at extending the service life can have a substantial effect on depreciation accounting (Leviäkangas et al., 2019). None of the entities has a policy on capitalising repairs and maintenance. However, in 2023, RAL spent R1.4 billion on resurfacing and road network rehabilitation. This expenditure was not capitalised. However, it prompted the entity to review the asset's determined lifespan, acknowledging that the work done increased the asset's life beyond preservation. The condition assessment conducted by SANRAL in one to five-year intervals accounts for the improvements derived from maintenance, as the condition assessments are used as one of the inputs when performing annual revaluation.

4.2.1.6 Component 6: Depreciation and Useful Life

The asset's determined lifespan are determined according to the estimates made by management and assessed annually. There is no entity-specific methodology for determining useful lives disclosed by COJ and RAL. However, all entities have no residual values as the roads are primarily publicly owned and not sold on the open market; residual values are not determined. In COJ and RAL, depreciation is determined on an equal basis for the asset's determined lifespan. Comparatively, SANRAL depreciates roadbeds over their useful life, while pavement layers and road structures are depreciated at a rate associated with condition indicators computed from the detailed condition assessment results. The minimum remaining life of 3 years has been set to avoid assets that still have service potential and are still used being carried at zero carrying amount. This means that assets that are still in use are not depreciated to a zero carrying amount. In accordance with GRAP, the useful life of such assets

should be reassessed and accounted for as a change in accounting estimate.

4.2.1.7 Component 7: Impairment

The accounting policy on impairment states that assets are assessed for impairment on an annual basis, and if there is evidence suggesting potential impairment of the asset. There is no evidence of testing disclosed; however, impairment loss has been recognised. The accounting policy on impairment of non-cash generating units is generic and does not provide the actual process that RAL follows to assess and calculate impairment. SANRAL, on the other hand, details how impairment is triggered and calculated. The entity differentiates between the impairment of cash-generating (toll roads) and non-cash-generating (non-toll roads) units. For non-toll roads, impairment is established in accordance with IPSAS 21, and the calculation is conducted at the point of revaluation with reference to DRC. The valuation calculations are performed using the ITIS. The accounting policy states that the impairment is determined when there is an indicator that assets may be impaired. This may be inconsistent for impairment of non-toll roads, which is determined annually at a revaluation point without necessarily having a specific trigger or indicator. For toll roads, LSR is used to assess impairment. The LSR represents the present value of the loans a toll expects to make regular payments on and repay from its net income during the specified assessment period. By predicting the capital and money market debt levels at the conclusion of each financial year, the model enables SANRAL to assess the financial viability of its toll plazas, both in the present and predicted future. An adverse outcome of an individual toll plaza indicates that the toll value is diminished.

4.2.1.8 Component 8: Disclosures

COJ and RAL primarily complied with the GRAP disclosure requirements on PPE per the disclosure index. The entities complied with the disclosure of PPE under construction and the requirement to disclose those that are delayed and halted during the construction period. They also disclosed whether there are restrictions imposed on PPE, and expenditure incurred in repairing and maintaining PPE has been disclosed under PPE as required by GRAP 17. However, while impairment loss was recognised in both entities, the circumstances that led to impairment and the assumptions used are not disclosed. In contrast, the policies/methodology for determining impairment loss is generic and not entity-specific, making it unclear and not replicable. SANRAL did not have to comply with GRAP disclosure requirements as permitted by the National Treasury for the periods under review. However, SANRAL complied with IFRS disclosure requirements as permitted.

4.2.2 Research Question 2: How do the adopted accounting and reporting practices differ from one period to another within the individual entities?

For RAL, the accounting and disclosure of road infrastructure with specific reference to WIP, the review of useful lives, restrictions imposed on assets and repairs and maintenance disclosures evolved over the years. In 2023, a complete condition assessment was conducted on the entire road network. This allowed RAL to evaluate the roads valued at zero carrying amount. The assessment further necessitated the revision of the asset's useful lives and impairment assessment. The entity began to disclose information regarding the delayed projects under construction in 2021, while the restrictions imposed on the assets and the reporting of expenses incurred on repairing and maintaining assets under the PPE section were done from the 2022 financial year. The disclosure on PPE repairs and maintenance expenses was not reported under the PPE note until 2023.

The policies and practices applied by COJ and SANRAL were consistent over the period under review, except for the change of useful life of infrastructure from 10–30 years to 10–50 years in 2021 that occurred in COJ.

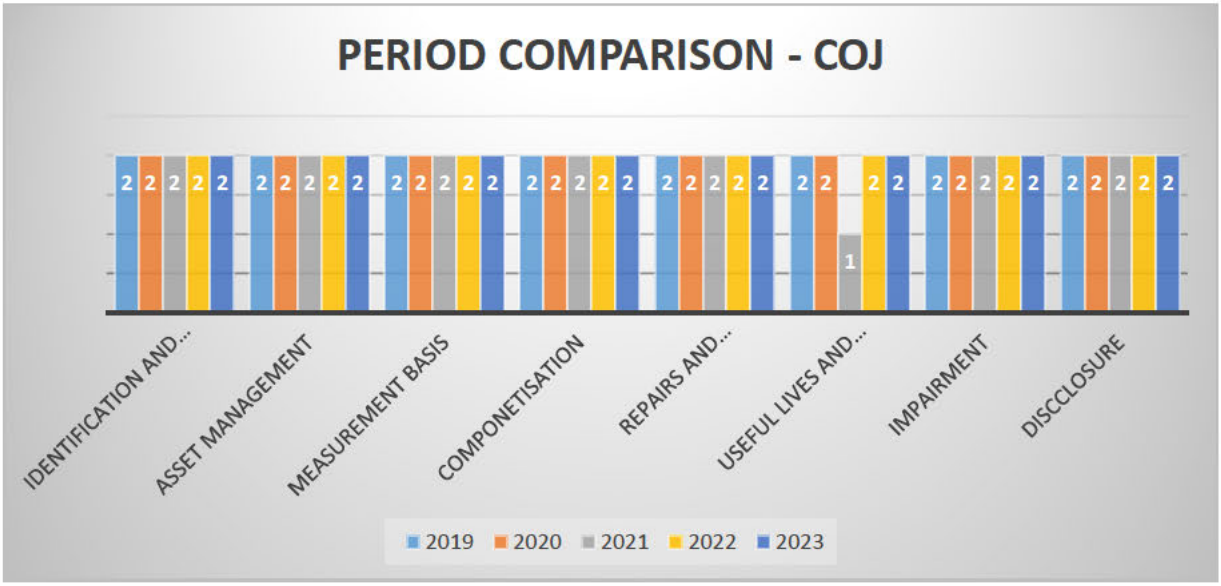


Figure 4.4: Period comparison – COJ

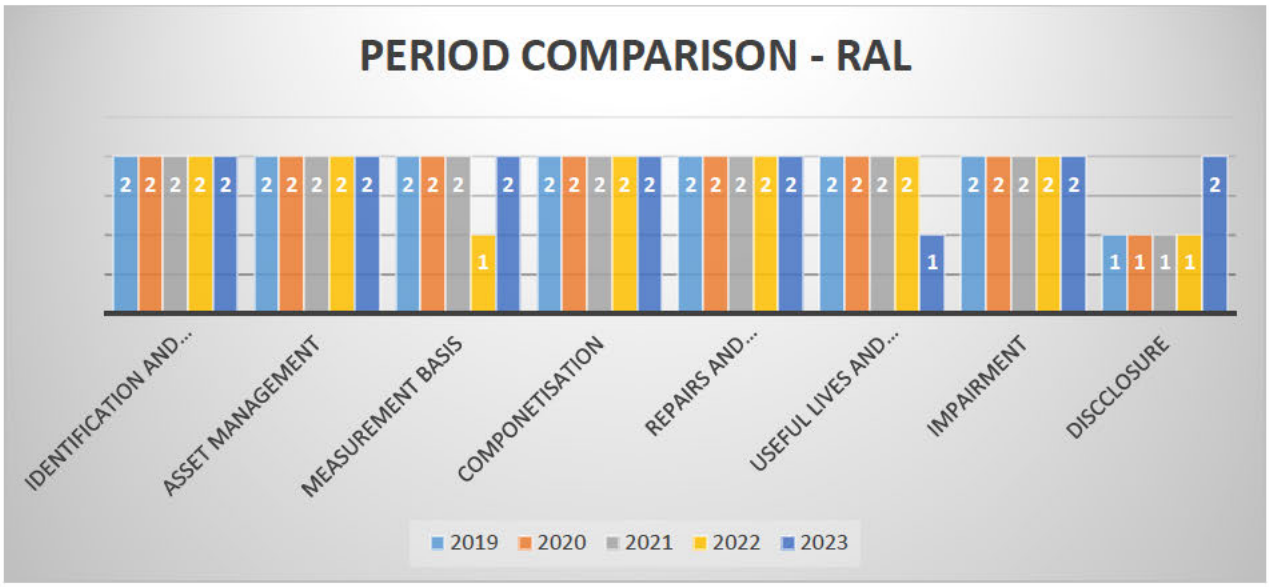


Figure 4.5: Period Comparison – RAL

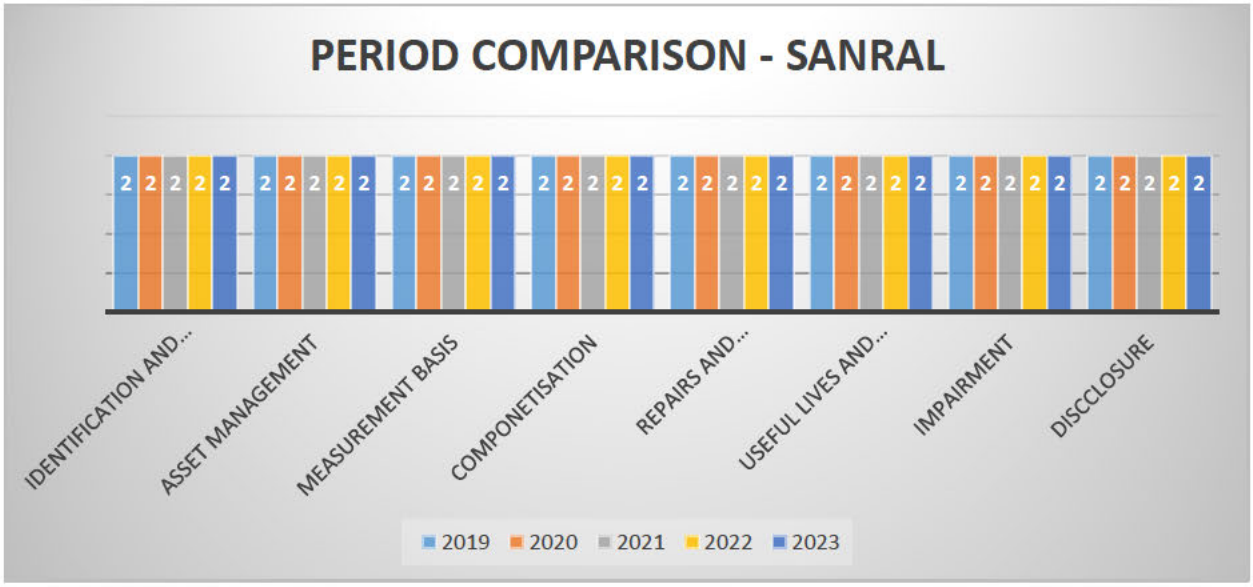


Figure 4.6: Period Comparison – SANRAL

Figures 4.4, 4.5 and 4.6 depict the consistency of the accounting policies implemented by the entities over the five-year period. A score of 2 represents consistency, and a score of 1 represents identified inconsistency. The results show that SANRAL applied the policies consistently throughout the five years. COJ deviated once in 2021, and RAL demonstrated the most inconsistent policy application over the period, evidently in 2022 and 2023.

4.2.3 Research Question 3: What are the distinctions and similarities between the adopted accounting and reporting practices among the selected entities?

SANRAL has specific processes to value the assets and assess impairment annually. A minimum useful life is set to ensure that the assets do not reach a zero carrying amount, and precise inspection intervals are set.

In contrast, COJ and RAL either have generic accounting policies or do not apply the policies as stated, especially where the entities need to apply entity-specific methodologies. These policies are reflected under significant judgements and sources of estimation uncertainty, property, plant and equipment and impairment of non-financial assets. For example, GRAP 21.79(g) specifically requires the disclosure of the method and significant assumptions applied, including the discount rate(s) used in the current estimate and previous estimate (if any) of value in use. The policies disclosed do not reflect the assumptions and estimations applied by the entities. Examples:

SANRAL

Property, plant and equipment

"For pavement layers and structures, the associated depreciation rate is related to condition indexes calculated from detailed condition assessments. The frequency of these condition assessments is related to the deterioration trend of the asset component and ranges from one to five years. For roads that are still in use, the road beds will have a minimum remaining life of three years. This limit is introduced to prevent the anomaly of road sections that are in daily use yet the roadbed is valued at zero (SANRAL, 2023, p. 98)".

"Impairment indicators include the deterioration of physical condition of office furniture, equipment and vehicles. SANRAL uses the loan supportable by revenue (LSR) model to assess impairment for toll plazas. The LSR is defined as the present value of the capital and/or money market loans that a toll project will be able to service and repay from its net revenue during a selected evaluation period. The model provides the predicted capital and money market debt levels at the end of each financial year, putting SANRAL in a position where it can evaluate its current and predicted financial viability of toll plazas. Thus, the LSR model represents the value in use. A negative result of a particular toll plaza means the plaza is impaired (SANRAL, 2023, p. 98)".

Impairment of non-financial assets

"The value in use of a non-cash-generating asset is the present value of the asset's remaining service potential. The present value of the remaining service potential of the asset is determined using depreciated replacement cost. The entity measures its non-toll assets (road network, structures and land) based on the Depreciated Replacement Cost (DRC). Therefore, the entity's valuation already takes any impairment effect into consideration, and no further specific impairment test is performed on non-toll assets" (SANRAL, 2023, p. 109).

COJ

Impairment of property, plant and equipment

"The Group assesses at each reporting date whether there is any indication that an asset may be impaired. If any such indication exists, the Municipality then estimate the recoverable service amount of the asset. The recoverable amounts of cash-generating units and individual assets are determined based on the higher of value in use calculations and fair values less costs to sell. These calculations require the use of estimates and assumptions. It is reasonably possible that the fair value assumption may change which may then impact estimations and may then require a material adjustment to the carrying value of cash-generating units and individual assets (COJ, 2023, p.22)".

Useful life of PPE

"The useful life of assets are based on management's estimates. Management considers the impact of technology, service requirements and the required return on assets to determine the optimum useful life expectation, where appropriate. The estimated residual value of assets is also based on management's judgement which takes into account the condition of assets at the end of their useful lives (COJ, 2023, p.23).

RAL

Impairment of non-cash-generating assets

The entity assesses at each reporting date whether there is any indication that an asset may be impaired. The main impairment indicator for the road infrastructure assets is the results of the visual condition assessment. If any such indication exists, the entity then estimates the

recoverable service amount of the non-cash-generating asset. The recoverable service amount of non-cash-generating assets has been determined as the higher of value-in-use and fair value less cost to sell. These calculations require the use of estimates and assumptions. The excess of the carrying amounts over the recoverable service amount is recognised as an impairment loss in the statement of financial performance (RAL, 2023, p. 108)".

Useful lives of property, plant and equipment

"The entity's management determines the estimated useful lives and related depreciation charges for property, plant and equipment. This estimate is based on industry norms. The industry norm is adjusted for entity-specific considerations. Management will increase the depreciation charge where useful lives are less than previously estimated useful lives (RAL, 2023, p.109)".

Additionally, RAL was not fully compliant with PPE disclosure requirements until 2023. For example, repairs and maintenance expenses related to PPE were not reported under the PPE note, some PPE was reported at a zero carrying amount, and information on restrictions and assets under construction that were delayed or halted was not disclosed.

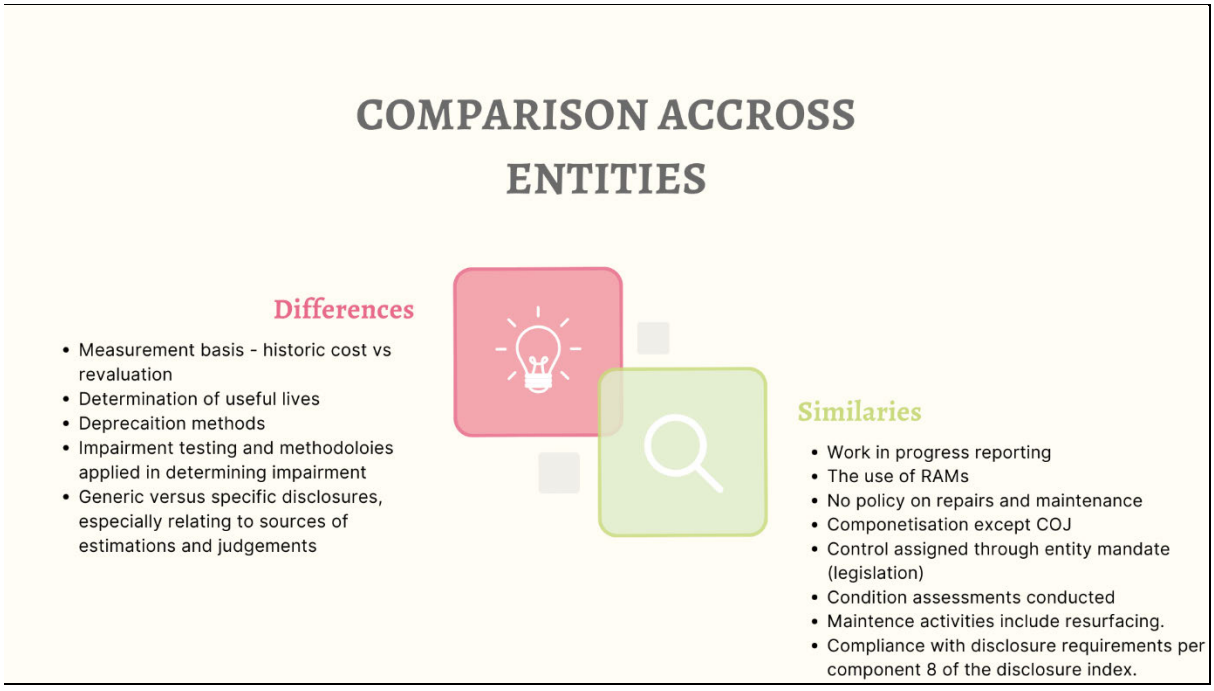


Figure 4.7: Entity Comparison Summary

Figure 4.7 summarises the similarities and differences identified across the entities throughout the five years.

4.3 Summary

This chapter provided detailed analyses, interpretations, and a discussion of the results from the data collected to achieve the research objectives. The results revealed that the entities apply different accounting policies for road infrastructure assets. No changes in accounting policies occurred during the periods under review; therefore, any discrepancies are solely attributable to inconsistent reporting. SANRAL shows the application closest to the proposals suggested by the reviewed literature, providing the opportunity for the other two entities to follow.

CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The preceding chapter presented and discussed the outcomes of the research comprehensively. This chapter summarises the research and concludes whether the research questions have been answered based on the results. The chapter also covers the recommendations and suggestions for future studies.

5.2 Summary of the Research

The South African Government has spent R86.4 billion on transport and logistics infrastructure in the 2022/2023 financial year (Treasury, 2024). This makes up 36.18% of the country's total infrastructure spending, highlighting the significance of these assets. Reliable and publicly accessible accounting information about infrastructure assets serves as a valuable resource when evaluating the magnitude and nature of investments in such assets (Ehalaiye et al., 2021). Currently, no specific accounting standards regulate the accounting for road infrastructure assets. Accounting professionals encounter difficulties on a global scale when attempting to apply accounting principles in IPSAS 17 to road assets (Lombardi et al., 2021). The research intended to assess the influence of the current accounting practices adopted by the three road authorities in South Africa. The evaluation was conducted in the context of a lack of definitive standards for accounting for road infrastructure assets in their annual financial statements on the uniformity of financial reporting. This research used qualitative content analysis to identify and analyse the current accounting practices adopted by the three road authorities in South Africa in accounting for road infrastructure assets in their annual financial statements. A disclosure index was developed, established based on the literature review and employed to gather the facts. Data was analysed using framework analysis, carried out manually by documenting information collected from the annual report and identifying common themes. The results revealed that the entities apply different accounting policies for road infrastructure assets. SANRAL's exemption from GRAP means the entity does not disclose delayed or halted PPE under construction, restrictions on PPE, or expenditure on PPE repairs and maintenance. Despite the exemption, SANRAL shows the application closest to the proposals suggested by the reviewed literature, providing the opportunity for the other two entities to follow the same practices. It adds to the knowledge base on infrastructure accounting. It will assist the standard setters in setting the standards that will guide the accounting for infrastructure assets and allow stakeholders to better understand the data reported in the annual financial statements.

5.3 Conclusions

The key qualities of information presented in the financial statements of public entities include relevance, accuracy, clarity, timeliness, comparability across entities and verifiability (ASB, 2019). Reliable and publicly accessible accounting information about infrastructure assets serves as a valuable resource when evaluating the magnitude and nature of investments in such assets (Ehalaiye et al., 2021). Adequate accounting practices for infrastructure assets serve as a foundation for evaluating transport investment alternatives and determining suitable funding levels. Additionally, they raise awareness regarding the value of assets and promote informed decision-making, thereby aiding the government in substantiating the ability of assets to offset liabilities and borrowings for credit rating objectives (O'Shea, 1990).

Infrastructure assets constitute a substantial proportion of the whole public sector assets and serve as a significant source of government expenditures. Given these economic resources' political, social and economic importance, it is essential to analyse how infrastructure assets are disclosed in the financial statements (Lombardi et al., 2021). Given the significant value placed on the government's asset portfolio, endorsing accurate accounting and reporting procedures related to these assets is vital for financial reports' users to confidently depend on the annual financial statements to form well-informed conclusions (Ivannikov et al., 2018). Government entities' determination of the value of infrastructure assets presents challenges primarily due to the complexities of applying traditional commercial accounting methods, which are sometimes irrelevant due to the distinctive nature of these assets (Ivannikov et al., 2018).

The research aimed to assess the influence of the current accounting practices adopted by the three road authorities in South Africa on the uniformity of financial reporting. The evaluation was conducted in the context of a lack of definitive accounting standards for road infrastructure assets in their annual financial statements. Based on the results, the research concludes that:

i. The entities adopt different accounting practices and policies to account for road infrastructure assets.
ii. The accounting policies are not always applied consistently over the period reviewed.
iii. Accounting policies are not adequately documented to allow stakeholders to understand the judgements and assumptions applied by management in order to estimate the reported information.

iv. The policies and practices adopted by SANRAL were found to be consistent with the literature reviewed.

v. The conceptual framework aims to assist preparers of financial statements in developing common accounting policies when no relevant standard exists for a particular matter or occurrence or when a standard allows for alternative accounting procedures. It also seeks to enhance the understanding and interpretation of the standards by all stakeholders (IASB, 2018). However, due to the complexity of the infrastructure assets, the framework failed to assist the entities in this regard.

vi. At the centre of financial reporting are the stakeholders, who should confidently depend on the annual financial statements to make well-informed conclusions. Informed decisions can be made by comparing entities' reports within the same sector. The results reveal that differences in policies and practices would deny the stakeholders the opportunity to compare the reports and make informed decisions.

5.4 Recommendations

It is recommended that the standard setters develop the guidelines for accounting for road infrastructure assets to support preparers of financial statements in establishing uniform accounting policies. In doing so, the IPSASB and ASB in South Africa will demonstrate the considerations of the perspectives and will enhance the comprehensiveness, credibility, and transparency of reporting.

In developing the standards, consideration should be given to the impact of accurately valuing assets, ensuring proper resource allocation for continued operational capacity and, where necessary, asset replacement. Asset valuation, including the capitalisation of maintenance costs for initiatives that enhance road functionality, is the most critical aspect of financial reporting, followed by disclosures that enable stakeholders to make informed decisions.

The challenge of asset management is widely recognised, with the primary obstacle being the lack of sufficient data on the condition and value of assets (Leviäkangas, 2019). The pavement and road management information systems developed by road authorities in South Africa to help manage and maintain the road network may be the solution to this problem.

A debate on reporting infrastructure options is essential, emphasising the ways in which stakeholders in the public sector could be better informed regarding crucial fiscal and other infrastructure attributes. It will consequently help the accounting professionals within the

public sector, including the Auditor General, with the consistent application of the standards for determining the road infrastructure assets value and disclosures, financial statements users by promoting consistency and comparability of financial information and the IPSASB by developing clear standards that are applicable in South Africa and globally.

This research explored the various policies/practices that can be formalised into standards and adopted by road authorities and municipalities in South Africa and internationally.

5.5 Suggestions for Further Research

Similar studies involving a larger sample of entities, such as South African metropolitan municipalities, could enable more robust statistical analysis and enhance the credibility and generalisability of the results. This research investigated the accounting and reporting practices from 2019 to 2023. Future studies could be conducted to assess practices following the 2023 financial year. Evaluating entity-specific policies regarding the management of assets and the utilisation of the RAMS may provide an understanding of the context and how entities may draw from each other to navigate related challenges. This research could be expanded to include a cross-country analysis, significantly contributing to the global body of knowledge and serving as a reference for international standard-setting.

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APPENDIX A: DISCLOSURE INDEX

An Analysis of Roads Infrastructure Accounting in South Africa

Disclosure checklist

Entity:

Component 1: Infrastructure asset identification and recognition

Question	Scoring scale	2019	2020	2021	2022	2023
1.1 How is control determined?	0 - Not applicable 1 - No reference to control 2 – Control is determined through the entity's mandate, mandate not clear 3 – Control is determined through the entity's mandate, mandate clearly specified					
1.2 How are assets under construction (WIP) recognised and disclosed in the AFS?	0 - Not applicable 1 - No reference to the WIP 2 - WIP disclosed within other categories 3 - WIP disclosed separately					
1.3 Qualitative observations						

Component 2: Asset management

Question	Scoring scale	2019	2020	2021	2022	2023
2.1 How does the entity track and record infrastructure condition and performance?	0 - Not applicable 1 - No reference to assessed asset condition and performance					

	2 - Condition assessment conducted 3 - Condition assessment conducted with the effect of the assessment disclosed					
2.2 How often are road asset inspections/condition assessments conducted?	0 - Not applicable 1 - No reference to asset inspections 2 - Asset inspection frequency not disclosed in the afs 3 - Asset inspection frequency disclosed in the afs					
2.3 What purpose do the road inspections/condition assessments serve?	0 - Not applicable 1 - No reference to asset inspections 2 - The purpose not specified 3 – Purpose of the inspections/condition assessment specified					
2.4 Qualitative observations						

Component 3: Measurement of road infrastructure assets

Question	**Scoring scale**	**2019**	**2020**	**2021**	**2022**	**2023**
3.1 What is the accounting policy for the subsequent measurement?	0 - Not applicable 1 - Measurement basis not disclosed 2 - Measurement basis vaguely disclosed 3 - Measurement basis disclosed					
3.2 If measured at the revaluation model, how is the revaluation performed? -Who performs the evaluation (qualifications, internal/external	0 - Not applicable 1 - Road infrastructure not revalued 2 - Road infrastructure					

expert) -How fair value is determined -Some inputs into determining the value -At what intervals	revalued as part of impairment testing or review of useful life 3 - Road infrastructure revalued at specified intervals					
3.3 Qualitative observations						

Component 4: Componentisation

Question	Scoring scale	2019	2020	2021	2022	2023
4.1 What classes of road infrastructure assets are in the AFS?	0 - Not applicable 1 - Assets disclosed as a single line/category 2 - Asset disclosed as a single line with a footnote 3 - Major components disclosed separately					
4.2 How does the asset classification as disclosed in the AFS align with the principles of the Asset Management Framework?	0 - Not applicable 1 - Assets disclosed as a single line/category 2 - Asset disclosed as a single line with a footnote 3 - Major components disclosed separately					
4.3 Qualitative observations						

Component 5: Repairs and maintenance

Question	Scoring scale	2019	2020	2021	2022	2023

5.1 Under what circumstances would repairs and maintenance expenditures be capitalised (if they increase the useful life of the assets, a determined threshold - from the accounting policy)?	0 - Not applicable 1 - No policy on repairs and maintenance disclosed 2 - No reference on the capitalisation of repairs on the accounting policy 3 - Policy on repairs and maintenance and application disclosed in the notes i.e repairs and maintenance expenditure capitalized and increase in useful life of assets as a result of repairs and maintenance					
5.2 Qualitative observations						

Component 6: Useful life and depreciation

Question	Scoring scale	2019	2020	2021	2022	2023
6.1 Which depreciation method is applied for road infrastructure assets?	0 - Not applicable 1 - Depreciation method not disclosed 2 - Depreciation method disclosed 3 - Depreciation method disclosed and consistently applied					
6.2 Which assumptions/methodology are applied to determine the useful life of road infrastructure assets?	0 - Not applicable 1 - No reference to how the review of useful life is determined 2 - Useful life policy disclosed 3 - Useful life policy disclosed and applied					

6.3 How often are useful life and depreciation methods reviewed (annually)?	0 - Not applicable 1 - No reference to the review of useful life 2 - Review of useful life policy disclosed 3 - Review of useful life policy disclosed and applied					
6.4 How are the results of the review of useful live disclosed (e.g as change in accounting estimate)	0 - Not applicable 1 - No reference to the review of useful life 2 - Review of useful life results not disclosed 3 - Review of useful life disclosed					
6.5 Qualitative observations						

Component 7: Impairment

Question	**Scoring scale**	**2019**	**2020**	**2021**	**2022**	**2023**
7.1 How does the entity designate road assets as cash or non-cash generating asset?	0 - Not applicable 1 - No policy on impairment 2 - Policy vague/generic 3 – Clear and specific policy and application					
7.2 What are the accounting policies for determining impairments of cash and non-cash generating assets?	0 - Not applicable 1 - No policy on impairment 2 - Policy on impairment vague/generic 3 – Clear and specific policy and application					

7.3 How is impairment assessment performed for cash and non-cash generating assets (how are events that trigger an impairment for road infrastructure assets identified and disclosed)?	0 – Not applicable 1 – No policy on impairment 2 – Policy on impairment vague/generic 3 – Clear policy and application					
7.4 Qualitative observations						

Component 8: Disclosures in the annual financial statements

Question	Scoring scale	2019	2020	2021	2022	2023
8.1 How does the financial statement disclose the carrying amount of PPE under construction?	0 - Not applicable 1 - WIP not disclosed 2 - WIP disclosed within the main asset category 3 - WIP disclosed separately					
8.2 How are halted projects disclosed?	0 - Not applicable 1 - Information on halted projects under construction not disclosed 2 - Information on halted projects under construction vaguely disclosed 3 - Information on halted projects under construction disclosed with reasons					

8.3 How are expenditure incurred on repairs and maintenance disclosed?	0 - Not applicable 1 - Repairs not disclosed separately 2 - Repairs and maintenance separately disclosed 3 - Repairs and maintenance separately disclosed under PPE note					
8.4 How are restrictions or contractual commitments related to road infrastructure disclosed?	0 - Not applicable 1 - Restrictions not disclosed separately 2 - Restrictions disclosed 3 - Restrictions disclosed under PPE note					
8.5 How is the methodology and significant assumptions used for impairment testing disclosed?	0 - Not applicable 1 - No policy on impairment 2 - Policy on impairment vague/generic 3 - Clear policy and application					
8.6 Qualitative observations						

APPENDIX B: ETHICAL CLEARANCE



11 August 2025

Miss Motshewa Charlotte Makaringe (204518730)
School Of Acc Economics&Fin
Westville

Dear Miss Motshewa Charlotte Makaringe,

Original application number: 00026672
Amended title: A comparative analysis of roads infrastructure accounting in South Africa

Exemption from Ethics Review

In response to your application received on 8 August 2025, your school has indicated that the protocol has been granted **EXEMPTION FROM ETHICS REVIEW.**

Any alteration/s to the exempted research protocol, e.g., Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through an amendment/modification prior to its implementation. The original exemption number must be cited.

For any changes that could result in potential risk, an ethics application including the proposed amendments must be submitted to the relevant UKZN Research Ethics Committee. The original exemption number must be cited.

In case you have further queries, please quote the above reference number.

PLEASE NOTE:
Research data should be securely stored in the discipline/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours sincerely,

[redacted]

Prof Claire Lauren Vermaak
Academic Leader Research
School Of Acc Economics&Fin

APPENDIX C: TURNITIN REPORT

MACC- MC MAKARINGE -204518730 - TURNITIN1.odt

ORIGINALITY REPORT

9%	8%	5%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

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3	www.ekurhuleni.gov.za Internet Source	1%
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8	provincialgovernment.co.za Internet Source	<1%
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APPENDIX D: LANGUAGE DECLARATION



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30 January 2025

To whom it may concern

This is to confirm that I, the undersigned, have language edited the dissertation entitled: An Analysis of Roads Infrastructure Accounting in South Africa

No changes were permanently affected and were left to the discretion of the author. The responsibility of implementing the recommended language changes rests with the author of the dissertation.

Yours truly

[redacted]
Jomoné Müller