

Supply chain management and municipal service quality: The mediating influence of innovation



Authors:

Gladys N. Mahache¹ 
Chengedzai Mafini² 

Affiliations:

¹Graduate School of Business Leadership, University of South Africa, Pretoria, South Africa

²Faculty of Management Sciences, Vaal University of Technology, Vanderbijlpark, South Africa

Corresponding author:

Gladys Mahache,
nobusukum@gmail.com

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Orientation: South African municipalities rely heavily on effective supply chains for public service delivery, making it vital to adopt models that foster innovation. Understanding innovation helps municipalities to make informed decisions to improve service quality.

Research purpose: This study examined the impact of Supply Chain Management (SCM) practices on service delivery quality in selected South African municipalities, focusing on the mediating role of innovation.

Motivation for the study: Persistent service delivery challenges highlight the need to explore the combined potential of SCM and innovation as strategic interventions. This study investigates whether their integration can offer a sustainable solution.

Research design, approach and method: A quantitative, cross-sectional survey was conducted among 315 SCM professionals drawn from municipalities in Gauteng and North West provinces. Partial least squares structural equation modelling was used to test the proposed hypotheses.

Main findings: The SCM practices, specifically strategic supplier partnerships, internal lean practices, and information sharing, significantly drive municipal innovation. Innovation, in turn, strongly enhances service delivery quality. The mediating role of innovation was confirmed through lean practices.

Practical/managerial implications: The study encourages municipalities to align SCM initiatives with strategic goals and strengthen innovation capacity to improve service performance.

Contribution/value-add: The findings underscore the importance of SCM and innovation in advancing municipal service delivery and support evidence-based policy and practice improvements.

Keywords: Innovation Performance, Service Delivery, South African Municipalities, Supply Chain Management, SCM Practices.

Introduction

In most countries, the responsibility to provide basic services, create and maintain healthy environments and promote local development lies with local government authorities such as municipalities. In the South African context, municipalities are classified into three categories: metropolitan, which are the largest in scale, followed by district and local, the last of which are the smallest (Republic of South Africa 1998). Regardless of their classifications, the common role of all municipalities in the country is recognised as providing essential public services and enhancing the overall quality of life for residents within their respective jurisdictions (Development Bank of South Africa 2022). However, most municipalities in the country have failed to meet their mandates, owing to various internal and external constraints. Some of these constraints include the lack of skills and administrative capacity, political interference, poor planning and policy implementation and wasteful expenditures linked to supply chain management (SCM) irregularities (Ngxesha, Langton & Mafini 2024). The result has been poor or a lack of services, which has in many cases resulted in decreased property values, infrastructural decay, high poverty and unemployment levels in municipal constituencies (Bester 2024; Ngobeni 2025). In response, residents of various municipalities have resorted to public protests as a way of demonstrating their displeasure.

The challenges facing South African municipalities have opened up avenues for the adoption of context-specific innovative interventions aimed at resolving service delivery challenges for the

benefit of residents in constituencies. The unanimous view among policymakers and scholars is that innovation serves as a key enabler in expanding access to basic services (Council for Scientific and Industrial Research [CSIR] 2024). Consistent with this view, Ramoroka, Booyens and Jacobs (2018) advocate for promoting public sector innovation within local government, especially as a remedy for persistent service delivery deficits and infrastructure failures in under-resourced and rural areas. Likewise, cities around the world are actively transforming themselves and their institutional frameworks to better respond to changing conditions by developing adaptive policies, programmes and services that meet shifting demographic, cultural, social, economic and environmental demands (Burgalassi & Matsumoto 2024; Duminy & Parnell 2020). As a result, municipalities are ushering in a new era of public sector innovation to address their challenges and seize available opportunities.

This study sets out to investigate the impact of SCM practices on the quality of service delivery (SDQ) within selected municipalities in South Africa, with a particular focus on the mediating influence of innovation performance in this relationship. The ability of a municipality to manage its SCM effectively may determine its success or failure (Zindi & Sibanda 2022). Within South Africa, SCM is recognised as a critical function that facilitates the implementation of governmental policies at the municipal level. Nevertheless, concerns persist regarding the underperformance of numerous municipalities, prompting inquiries into whether SCM could serve as a catalyst for both innovation and improved service delivery within local government institutions. The present paper is drawn from doctoral research conducted by the authors at a South African University. As such, the study builds upon the theoretical foundation and methodology established in the original thesis.

Municipalities are mandated to provide high-quality services that are essential for sustaining and enhancing the well-being of communities. As such, they are expected to continuously innovate to meet service delivery demands. Drawing on the perspective of Shava and Vyas-Doorgapersad (2023), innovations, particularly digital technologies, are enabling municipal governments to respond more effectively to the public's growing expectations for improved service quality and cost-efficiency. An example is the use of innovative technologies as a tool to manage the residents' complaints and suggestions within municipalities (Parliament Monitoring Group 2017). Still, such innovations are acquired and deployed through the SCM system, creating a necessity to assess how the latter can be successfully harnessed to foster the former in municipalities. Hence, the study approached the service delivery dilemmas faced by South African municipalities from an SCM perspective because of its strategic importance in organisations, using the mediating effects of innovation to improve SDQ.

To further bolster the need for the present study, a comprehensive review of literature indicated that few, if any, empirical studies have examined the specific research model

considered in this study, highlighting an existing knowledge gap. Accordingly, the study explores the interrelationship between SCM practices, municipal innovation performance (MIP) and SDQ in municipalities, by so doing expanding the existing knowledge base on municipal SCM, especially in relation to the mediating effects of innovation. It emphasises that although all SCM practices play a vital role in improving innovation and service delivery within South African municipalities, their individual effects may vary, depending on prevailing circumstances and context.

Literature review

Supply chain management in South African municipalities

The adoption of SCM in South African municipalities began in 2005, following a series of reforms aimed at aligning procurement practices with globally recognised standards (Ambe 2016). The SCM process is regulated by a framework of established policies and legislative guidelines by the government with a view to streamlining the procurement functions within the public sector (Mabotja, Mokoena & Ndlovu 2024). Key legislative instruments that shape municipal SCM include the Broad-Based Black Economic Empowerment (B-BBEE), the *Municipal Systems Act* (MSA), the *Municipal Finance Management Act* (MFMA), and the *Preferential Procurement Policy Framework Act* (PPPPFA), among others. Nonetheless, the presence of these regulatory frameworks has not translated into operational efficiency within many municipalities. A recent report by the Auditor General of South Africa (2024), for example, indicates that 85 municipalities in the country attained qualified audits. The major reasons specified for these results include non-compliance with legislation, inadequate internal controls, unauthorised and wasteful expenditure, and governance failures, among others. Therefore, SCM constraints and the lack of innovation remain among the major bottlenecks preventing municipalities from fulfilling their mandate.

Strategic supplier partnerships

Strategic supply chain partnerships refer to long-term, mutually beneficial relationships between organisations and their key material suppliers (Bicen, Hunt & Madhavaram 2021; Sukati, Sanyal & Awaain 2020). These collaborations enable firms to jointly assume responsibility for the success of products or services, reinforcing the importance of supplier involvement. According to Yang et al. (2021), the formation of such alliances is often driven by goals such as market competitiveness, fostering innovation, building legitimacy, enhancing corporate reputation, and sharing both risks and rewards (Yang et al. 2021). Furthermore, cultivating strong supplier relations is increasingly viewed as a vital element for maintaining a sustainable competitive edge (Rebelo, Nobre & Szczygiel 2019). Within South African municipalities, a large share of income is directed towards the procurement of goods, services and infrastructure needs. By doing so, they gain time, reduce costs, and conclude long-term partnerships with suppliers and other stakeholder organisations within their supply chains.

Customer relationship

Customer relationship management (CRM) refers to a holistic strategy aimed at understanding, reaching and retaining loyal customers over time by utilising a structured system of interpersonal relationship management (Sukati et al. 2020; Zips et al. 2024). Modern business organisations are increasingly adopting a customer-centric approach, striving to cultivate strong relationships and foster loyalty, as markets shift quickly and product designs are easily replicated. To stand out, business organisations concentrate on trust, experience quality, and ongoing engagement, rather than just competing on price or product features (Sankur et al. 2024). In municipal SCM, there is typically no direct, external-facing interaction with end recipients of goods and services procured, which partly explains the limited use of the term 'customer' within public sector SCM discourse (Zips et al. 2024). Rather, procurement activities are conducted on behalf of an internal end-user department, which is responsible for the final delivery of services to the customer (Setino 2018). However, it is important to note that municipal employees and departments are also users of the outputs of the SCM process and can thus be considered internal customers (Muringa & Mutereko 2024). These end-user departments rely on the SCM function to fulfil service obligations, making it essential to closely manage the relationship between the end-user and SCM. Service level agreements (SLAs) are commonly used as a mechanism to govern these internal relationships, ensuring performance expectations are clearly defined and monitored (Muringa & Mutereko 2024).

Cross-functional teams

A cross-functional team (CFT) consists of individuals with diverse areas of expertise who collaborate towards a shared objective, with the aim of achieving greater creativity, innovation and success (Dussart, Van Oortmerssen & Albronda 2021). Within organisations, CFTs are instrumental in building market competitiveness and driving overall success (Jansson & Persson 2020). These teams often serve as platforms for experimentation and adaptive learning in unfamiliar or changing environments, enabling organisations to develop effective responses (Nanda et al. 2021). A culture of high performance can emerge when departments engage in cross-functional cooperation, facilitated through the mediating influence of SCM. The degree and quality of interdepartmental collaboration are key factors that influence the successful execution and impact of SCM practices in organisations (Thanh Hoai & Nguyen 2021). In municipal supply chains, CFTs are enhanced by the establishment of diverse bid committees with a view to influencing decisions that will be best for the organisation and customers, but not necessarily for the performance of an individual functional management area (Ambe & Badenhorst-Weiss 2021).

Strategic sourcing

Strategic sourcing (SS) represents a structured and ongoing process within SCM, through which organisations continuously reassess and enhance their procurement practices (Ramakrishnan 2018). The goal of this approach is to secure optimal products and services at the best possible value (Ramakrishnan 2018). In dynamic and uncertain environments, making proactive procurement decisions becomes essential for managing evolving risks and external changes (Juma 2021). Like elsewhere, South African municipalities invest substantial public funds annually in acquiring the goods and services required to fulfil policy mandates and operational goals (National Treasury 2022). In this way, SS is key for successful SCM in municipalities, as it ensures that the procurement process is executed with precision and efficiency.

Internal lean practice

Lean is commonly understood as a methodology for continuous improvement aimed at boosting organisational efficiency (Hopp & Spearman 2021). At its core, lean thinking and lean practices seek to maximise customer value by eliminating waste and enhancing product or service attributes without incurring additional costs (Gutierrez et al. 2022). The application of Lean SCM practices offers various advantages, including lower operational costs, reduced cycle times and improved quality outcomes (Moyano-Fuentes et al. 2021). In the public sector, growing societal demands for better services have compelled organisations to embrace more adaptive and innovative management approaches, such as Lean SCM. They have responded by seeking efficiency throughout government services, having identified lean as a tool for improving quality and reducing costs (Andersson et al. 2020). However, implementing lean processes in the public sector is often more complex than in the private sector, as process changes such as Business Process Re-engineering (BPR) or Business Process Automation (BPA) are subject to legislative governance structures and typically require approval from the National Treasury Department (Mojaki, Tuyikeze & Ndlovu 2024). The adoption of lean practices by public sector entities, including municipalities, can lead to more efficient and streamlined processes, while also establishing structures that enhance the accountability of political stakeholders (Ambe & Badenhorst-Weiss 2021).

Information sharing

Information sharing (IS) entails the exchange of data between people, organisations and technologies through activities such as creation, representation, organisation, maintenance, visualisation, reuse, sharing, communication and disposal (Mathu 2019). Effective IS enables organisations to better align with their partners by improving communication and achieving outcomes in a more cost-efficient manner (Ahmed 2022; Sukati et al. 2020). A supply chain is composed of various stakeholders, including manufacturers, suppliers,

distributors and retailers, who collaborate to fulfil the primary objective of delivering goods and services that meet consumer demand (Hassan & Nasereddin 2018). These stakeholders possess different types of information that must be exchanged to maintain coordination and efficiency (Hassan & Nasereddin 2018). Within municipal settings, the exchange of accurate, high-quality and timely SCM-related information between municipalities and their procurement partners plays a critical role in streamlining procurement planning, reducing acquisition costs and order cycles, enhancing transparency, and ultimately elevating the quality of service delivery (Ngxesha et al. 2024).

Municipal innovation performance

Municipal innovation can be defined as ‘the adoption of new or enhanced processes, services, or products by municipal organisation’ (South African Local Government Association [SALGA] 2018). It encompasses enhancement to public services for which the municipality is accountable, including those provided through external partners, and relates both to the substance of the services and the tools or mechanisms used for their delivery (SALGA 2018). Importantly, innovation within the municipal context may range from simple adjustments in policy or management practices to significant changes that enhance the quality, quantity or efficiency of services (SALGA 2018). Innovation can lead to improved efficiency by lowering costs and streamlining service delivery (Amusa & Fadiran 2024), and it can also influence demand by creating new channels for accessing or procuring services (Adjei-Bamfo et al. 2023). Because of the significant economic role of the public sector, there is an increasing policy focus on promoting innovation within government institutions (Torfing & Ansell 2017).

Municipal service delivery

Service delivery involves the provision of essential public services, including access to clean water, electricity, health care, roads, street lighting, traffic management, waste removal, sewage disposal and maintenance, as along with municipal parks and recreation (Development Bank of Southern Africa 2022). Service provision in South Africa is governed by the principles of the Batho Pele initiative, launched in 1997 by Mandela’s government, which created relatively transparent formula-based allocations for local financial support (De Kadt & Lieberman 2017). The principles of consultation, service standards, accessibility, courtesy, IS, openness and transparency, redress mechanisms, and value for money are designed to drive transformation across all spheres of public service delivery (Molobela 2024). As a result, municipalities are urged to engage with citizens regarding service quality and, where feasible, offer them options in the types of services provided (Masiya, Davids & Mangai 2021).

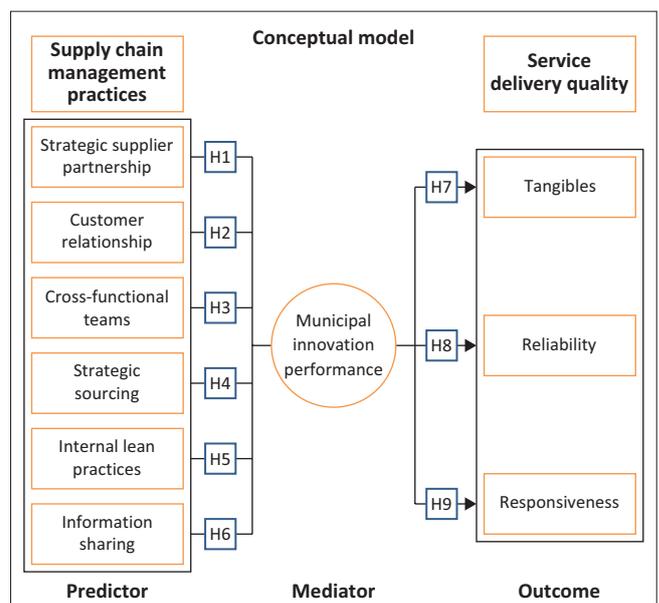
In this study, municipal service delivery quality is conceptualised using three key dimensions from the

SERVQUAL model, namely, tangibles, reliability and responsiveness. According to Pakurár et al. (2019), tangibles refer to the physical aspects of a service environment, including infrastructure, staff and communication tools. These elements form the visible image of the service, which clients often rely on to evaluate its quality. Reliability, as defined by Setiono and Hidayat (2022), is linked to the expertise, politeness and professionalism of employees, which helps instil customer confidence and trust in the organisation’s credibility. In a municipal context, this involves the consistent and accurate execution of promised services, such as routine waste collection or timely infrastructure maintenance. Responsiveness, meanwhile, is associated with the readiness and speed of service personnel in assisting clients (Setiono & Hidayat 2022). Within local government, this dimension reflects the degree to which municipal staff are attentive and quick to respond to citizens’ needs, illustrating the quality of support and care provided during service delivery.

Research model

Figure 1 illustrates the proposed research model, which includes six predictor constructs: Strategic Supplier Partnership, Customer Relationship, Cross-Functional Teams, Strategic Sourcing, Information Sharing and Internal Lean Practice. Municipal innovation performance serves as the mediating variable, while service delivery quality represents the outcome variable.

The constructs identified above are considered key enablers of effective service delivery. The proposed model posits that SCM practices exert a direct predictive effect on MIP (H1–H6), while MIP subsequently impacts service delivery (SD) directly (H7–H9). This study aims to empirically examine these proposed relationships.



H, hypothesis.

FIGURE 1: Research model.

Hypotheses development

Supply chain management practices and municipal innovative performance

Innovation within supply chains has transformed business models across various industries, leading to significant advancements in product development, production techniques, operations and after-sales services (Wu, Tseng & Chiu 2017). The adoption of robust SCM practices plays a crucial role in strengthening competitiveness throughout the supply chain. Organisational performance is often assessed in relation to innovation outcomes (Xu & Zhao 2022). Previous research suggests that SCM practices influence overall supply chain performance, as both efficiency and effectiveness are key components of SCM. Within this framework, innovation serves as a direct explanatory factor for organisational performance in the context of SCM implementation (Khuram, Rashid & Nawaz 2019). In general, SCM practices contribute to business innovation by coordinating and integrating tasks and activities throughout the chain (involving customers, vendors and the central organisation) to support the creation, advancement and implementation of tailored solutions. Thus, the following hypotheses are proposed:

- H₁: Strategic Supplier Partnership (SSP) has a positive relationship with Municipal Innovation Performance (MIP).
- H₂: Customer Relationship positively influences Municipal Innovation Performance (MIP).
- H₃: Cross-Functional Teams (CFTs) positively affect Municipal Innovation Performance (MIP).
- H₄: Strategic Sourcing positively influences Municipal Innovative Performance (MIP).
- H₅: Internal Lean Practice (ILP) positively affects the Municipal Innovation Performance (MIP).
- H₆: Information sharing positively influences the Municipal Innovation Performance (MIP).

Municipal innovation performance and service delivery quality

The study examined the impact of MIP on three key dimensions of SD: Tangibles (TAN); Reliability (REL); and Responsiveness (RES). Hypotheses H8 through to H10 posit that MIP positively influences the quality of service delivery within South African municipalities. This view is supported by Thusi, Ragolane and Matyana (2023), who argue that innovation enhances the quality of public services and the problem-solving capacity of governmental organisations facing societal issues. Similarly, Mhlanga, Ndhlovu and Hofisi (2021) emphasise that innovation plays a pivotal role in strengthening public service provision, serving as the foundation for strategic frameworks, policies and delivery models. In line with this, Demircioglu and Audretsch (2019) affirm that public sector innovation contributes to improved service quality. Based on this, the following hypotheses are proposed:

- H₇: Municipal Innovation Performance leads to improved service delivery (TAN) of South African municipalities.

H₈: Municipal Innovation Performance leads to improved service delivery (REL) of South African municipalities.

H₉: Municipal Innovation Performance leads to improved service delivery (RES) of South African municipalities.

Research method and design

The deductive reasoning approach was chosen for this study and focused on the positivist philosophy as it allows quantitative methods to test hypotheses deductively and to determine, through statistical analysis, the existence of predictive relationships (Creswell & Creswell 2018). A quantitative method was employed by combining the correlational and survey designs. Use of a quantitative design ensured that the study findings could be generalised to municipalities in other contexts, while a correlational design facilitated the testing of predictive relationships between the different research constructs considered in the study. A survey strategy was useful for collecting data from large groups of respondents using a questionnaire (Flynn, Pagell & Fugate 2018). A cross-sectional research design was utilised, as data were gathered during a single time period. This design was deemed suitable for capturing respondents' views across multiple municipalities within a defined timeframe.

Sampling

The targeted population included management and staff who are SCM role-players employed from the selected municipalities in Gauteng and North West Provinces. According to Ambe (2016), key role-players in municipal SCM include SCM officials, municipal executives and functional management teams. These role-players were selected because they possess valuable knowledge of SCM, hold strategic influence over SCM decision-making, and are responsible for overseeing and assessing the implementation of SCM processes within their municipalities. The sampling frame was derived from lists of SCM role-players obtained from selected municipalities in the Gauteng and North West Provinces. The municipalities targeted in this study were the West Rand District Municipality (WRDM), Rand West City Local Municipality (RWCLM), Mogale City Local Municipality (MCLM), Bojanala Platinum District Municipality (BPD) and Madibeng Local Municipality (MLM). To ensure fair representation across all selected municipalities, a probability-based cluster random sampling technique was applied to select participants. Only participants with relevant knowledge and expertise in the subject area were included. The cluster sampling approach was chosen to ensure an equitable representation of respondents across geographically dispersed municipal structures while maintaining control over the selection process.

A final sample comprised 315 participants, which was deemed sufficient as it surpassed the recommended minimum of 150 participants for quantitative studies utilising Partial Least Squares Structural Equation Modelling (PLS-SEM) (Hair et al. 2021).

Instrumentation

The measurement scales used in this study were adapted from established research. Each of the seven SCM practices, as well as the MIP construct, was measured using five items. The sources of the adapted items are as follows: Strategic Supplier Partnerships (SSP) from Al-Madi et al. (2021); Customer Relationship from Mashiloane, Mafini and Pooe (2018); CFT from Monczka et al. (2012); SS from Willy and Njeru (2014); Internal Lean Practices (ILP) from Antony, Snee and Hoerl (2017), and Govender and Jason (2018); IS from Mashiloane et al. (2018); MIP from Ju, Ferreira and Wang (2020), and Booyens et al. (2018). The sub-components of SD were measured using four items each, drawn from the SERVQUAL framework, as adapted from Ko and Chou (2021), and Kowalska and Ostrega (2020).

The questionnaire used in the study was self-administered and administered online using Google Forms, a free and accessible web-based survey platform. Participants responded using a 6-point Likert scale, ranging from (1) strongly disagree to (6) strongly agree. To enhance the content validity of the instrument, a pilot study involving 43 participants was conducted prior to the rollout of the main survey. The pilot test offered an opportunity to refine the questionnaire, particularly by modifying the response format from a 5-point to a forced-choice 6-point scale. This change aimed to encourage respondents to take a clear stance, thereby enhancing data quality and addressing issues identified during the pilot phase, including a high occurrence of neutral responses across several constructs. To ensure face validity, two SCM experts reviewed the questionnaire. Participants took part in the study voluntarily, and no form of compensation or incentive was offered for their participation. Each participating municipality designated an internal administrator to act as a liaison. This liaison circulated the survey link internally via email to selected respondents after receiving basic research fieldwork training from the primary researcher.

Several ethical considerations were followed throughout the research process. First of all, all participants were provided with a study information sheet, which explained the purpose of the research, assured them of their anonymity, and clarified that participation was entirely voluntary. As such, by completing the questionnaire, informed consent was implied. The primary researcher did not have direct contact with the respondents, and confidentiality was maintained throughout the research process. No personally identifiable information was collected, and all data were stored securely in a password-protected cloud folder accessible only to the researchers.

Data analysis

Descriptive statistics were processed using SPSS version 27.0, while inferential statistical analysis for hypothesis testing was conducted using Smart-PLS version 4.0.

Ethical considerations

Ethical clearance to conduct this study was obtained from the University of South Africa, Graduate School of Business Leadership RERC (2023_SBL_DBL_026_FA_1465).

Results

Respondent demographic profiles

Out of the 350 questionnaires distributed, 315 valid responses were received, resulting in a 90% response rate. According to Wang et al. (2020), this response rate is considered acceptable. The profile of respondents is presented in Table 1.

As indicated in Table 1, female participants made up 53% of the respondents ($n = 167$). When age groups were combined, 69% ($n = 216$) were over 35 years old. Approximately 41% ($n = 129$) held a first-degree qualification. The majority of respondents were from municipalities in Gauteng Province (65%; $n = 204$), while the remaining 35% ($n = 111$) were from the North West Province. Notably, 60% ($n = 188$) of respondents had over 10 years of service in their respective municipalities. Regarding job positions, 31% ($n = 99$) worked as divisional managers or assistant directors.

Common methods variance

Common methods variance (CMV) was minimised by using measurement scales obtained from different sources. A pilot test was conducted to identify and address potential ambiguities, thereby enhancing the clarity and effectiveness of the questionnaire. To evaluate CMV, Harman's single-factor test was applied, revealing 10 factors that together explained 73.7% of the variance. The factor with the highest variance accounted for 42.7%, indicating that no single factor dominated. This is consistent with the guideline provided by Fuller et al. (2016), who suggest that the first factor should account for no more than 50% of the total variance.

Analysis of reliability and validity

To assess reliability, both Cronbach's alpha (α) and the composite reliability (CR) coefficients were utilised. Cronbach's alpha was used to evaluate the internal consistency of each construct. Following the refinement of the measurement scale, the alpha values presented in Table 2 ranged from 0.744 to 0.980, all exceeding the minimum acceptable threshold of 0.7 (Hussey et al. 2023). Similarly, CR values fell between 0.854 and 0.984, surpassing the recommended cut-off point of 0.7 (Hair et al. 2021), thereby confirming strong internal reliability within the constructs measured in this study.

Scale validity

Convergent and discriminant validity

Convergent validity was evaluated through the average variance extracted (AVE) and outer loadings, both of which are expected to exceed a threshold of 0.5 to be considered

acceptable (Al-Zwainy & Al-Marsomi 2023). As shown in Table 2, the AVE values for the study's constructs ranged from 0.615 to 0.927, while factor loadings were between 0.553 and 0.981. These results indicate that the criteria for convergent validity were satisfactorily met (Roebianto et al. 2022).

To assess discriminant validity, the heterotrait-monotrait (HTMT) ratio was applied, as displayed in Table 3. Heterotrait-monotrait values serve as indicators of correlation between different constructs. According to Pehlivan et al. (2024), values below 0.90 suggest adequate discriminant validity and are deemed acceptable (Pehlivan et al. 2024). The HTMT results presented in Table 3 were all below the 0.90 threshold, thereby confirming that the scale demonstrated sufficient discriminant validity.

Effect sizes

Effect size (f^2) measures the strength of the relationship between two variables on a numeric scale (Bilal et al. 2021). The F -square (effect size) of 0.02 is considered minor, a value of 0.15 is regarded as moderate, while 0.35 indicates a strong effect (Cohen, West & Aiken 2013). The F -square statistic measures the impact of each predictor variable on the dependent variable (Pratiwi & Irawan 2021). The findings from the F -square are displayed in Table 4.

Based on Cohen's effect size guidelines, the influence of the SCM practices on MIP was generally weak, with CFT (f^2 0.004), CR (f^2 0.003), IS (f^2 0.003), SSP (f^2 0.006), SS (f^2 0.000), and ILP (f^2 0.067) all falling within the small effect size range. The effect of MIP on service delivery sub-components also showed limited impact, particularly on RES with an f^2 of 0.027. However, the effect of MIP on REL and TAN was moderate, with values of $f^2 = 0.15$ and $f^2 = 0.228$, respectively. Therefore, the strongest relationship occurred between MIP and TAN ($f^2 = 0.228$).

Path analysis

Structural path analysis was conducted to examine the proposed relationships between SCM practices, MIP and service delivery. The path model and the construction of pathways among the research constructs are displayed in Figure 2. The results show path coefficients ranging between -0.027 and 0.768 , demonstrating the existence of a mix of associations between the constructs. The findings reveal that all relationships were positive, with the exception of CR, CFT and SS which did not exhibit a positive association.

Discussion

This study explored the association between SCM practices, MIP and SDQ in selected municipalities in South Africa. Table 5 summarises the outcomes, presenting the path coefficient (β), t -statistics (t) and the p -values (p) for each hypothesised relationship.

The results of this study are interpreted through the lens of the Practice Based View (PBV), which provides a theoretical foundation for understanding the extent to which MIP and SDQ are shaped by routinised and situated practices of individuals and collectives. Accordingly, the significant relationships observed among the constructs, namely SSP, CR, CFT, SS, ILP and IS (as predictors), reflect the central role of SCM in driving MIP and SDQ outcomes.

TABLE 1: Demographic profiles of respondents ($N = 315$).

Category	<i>n</i>	%
Gender		
Male	148	47.0
Female	167	53.0
Age (years)		
18 to 25	4	1.3
26 to 30	29	9.2
31 to 35	66	21.0
36 to 40	118	37.5
41 to 50 \geq	98	31.1
Level of education		
Matric	3	1.0
Degree	129	41.0
Master's degree	29	9.2
Diploma	101	32.1
Postgraduate diploma	33	10.5
PhD/Doctoral degree	0	0.0
Other	20	6.3
Business unit		
Financial services	44	14.0
Corporate services	40	12.7
Community services	28	8.9
Public safety	22	7.0
Human resources	11	3.5
Project management unit	10	3.2
Technical services	42	13.3
Other	118	37.5
Province		
Gauteng	204	64.8
North West	111	35.2
Race		
African people	237	75.2
Coloured people	27	8.6
Indian people	7	2.2
White people	44	14.0
Other people	0	0.0
Employment period (years)		
< 2	8	2.5
2–5	46	14.6
6–10	68	21.6
11–15	81	25.7
16–20	62	19.7
> 20	45	14.3
Job position		
Supply Chain Manager	3	1.0
Supply Chain Professional	25	7.9
Executive Director	2	0.6
Assistant Director	22	7.0
Divisional Manager	77	24.4
Divisional Technician	28	8.9
Superintendent	20	6.3
Operations Manager	8	2.5
Other	130	41.3

TABLE 2: Scale accuracy.

Research construct	Item descriptions	Cronbach's alpha	CR	AVE	Outer loadings
		α			
SSP	We conduct supplier performance reviews quarterly.	0.883	0.920	0.743	0.917
	We involve our key suppliers in planning and goal-setting activities.	-	-	-	0.860
	Our suppliers are held accountable for poor performance.	-	-	-	0.926
	We settle supplier invoices within 30 days of receipt.	-	-	-	0.732
CR	We frequently interact with customers to set reliability, responsiveness, and other standards.	0.848	0.892	0.627	0.798
	SCM unit manages internal relationships with user departments.	-	-	-	0.733
	Customer service is incorporated into our Key Performance Indicators (KPIs).	-	-	-	0.893
	We periodically evaluate the importance of our relationship with our customers.	-	-	-	0.903
CFT	We have clearly defined roles for bid committee members.	0.932	0.949	0.824	0.880
	Our bid committee members sign the code of conduct.	-	-	-	0.891
	Our SCM is implemented in collaboration with end-user departments.	-	-	-	0.933
	Our SCM processes enhance joint decision-making.	-	-	-	0.926
SS	Strategic sourcing is aligned with organisation's annual procurement plan.	0.744	0.898	0.815	0.891
	We conduct industry analysis.	-	-	-	0.915
ILP	Our municipality reduces set-up time.	0.891	0.920	0.696	0.793
	Our municipality has a continuous quality improvement programme.	-	-	-	0.859
	Our municipality pushes suppliers for shorter lead times.	-	-	-	0.874
	Our municipality streamlines ordering, receiving and other paperwork from suppliers.	-	-	-	0.800
	Our municipality creates value by cutting unnecessary costs, reducing and recycling waste.	-	-	-	0.844
IS	Creating SCM teams to include different companies.	0.895	0.927	0.762	0.785
	Our organisation is working to create an appropriate information system.	-	-	-	0.866
	We and our trading partners keep each other informed about events or changes that may affect the other partners.	-	-	-	0.925
	Our trading partners keep us fully informed about issues that affect our business.	-	-	-	0.909
MIP	The municipality offers an enabling environment for innovation.	0.980	0.984	0.927	0.973
	The municipal management provides leadership and support for innovation.	-	-	-	0.978
	Individual officials learn and expand their innovation capabilities.	-	-	-	0.907
	Innovation is regarded as necessary for the municipality's activities and processes.	-	-	-	0.982
	Our municipality has a pervasive innovation culture and environment.	-	-	-	0.972
TAN	Our municipality has reliable, up-to-date equipment for service delivery.	0.779	0.861	0.615	0.750
	The appearance of the physical facilities is consistent with the type of service industry.	-	-	-	0.885
	Physical facilities are visually appealing.	-	-	-	0.899
	Employees are well-dressed and neat.	-	-	-	0.553
REL	Our municipality meets their promised timeframes for response.	0.814	0.879	0.648	0.928
	We provide services at the times promised.	-	-	-	0.905
	We keep accurate records.	-	-	-	0.842
RES	We should not be expected to tell customers exactly when the service will be performed.	0.758	0.854	0.661	0.858
	Employees do not always have to be willing to help customers.	-	-	-	0.807
	It is OK to be too busy to respond promptly to customer requests.	-	-	-	0.773

SSP, strategic supplier partnership; CR, customer relationship; CFT, cross-functional teams; SS, strategic sourcing; ILP, internal lean practice; IS, information sharing; MIP, municipal innovation performance; TAN, tangibles; REL, reliability; RES, responsiveness; AVE, average variance extracted; SCM, supply chain management.

TABLE 3: Heterotrait-monotrait ratio analysis.

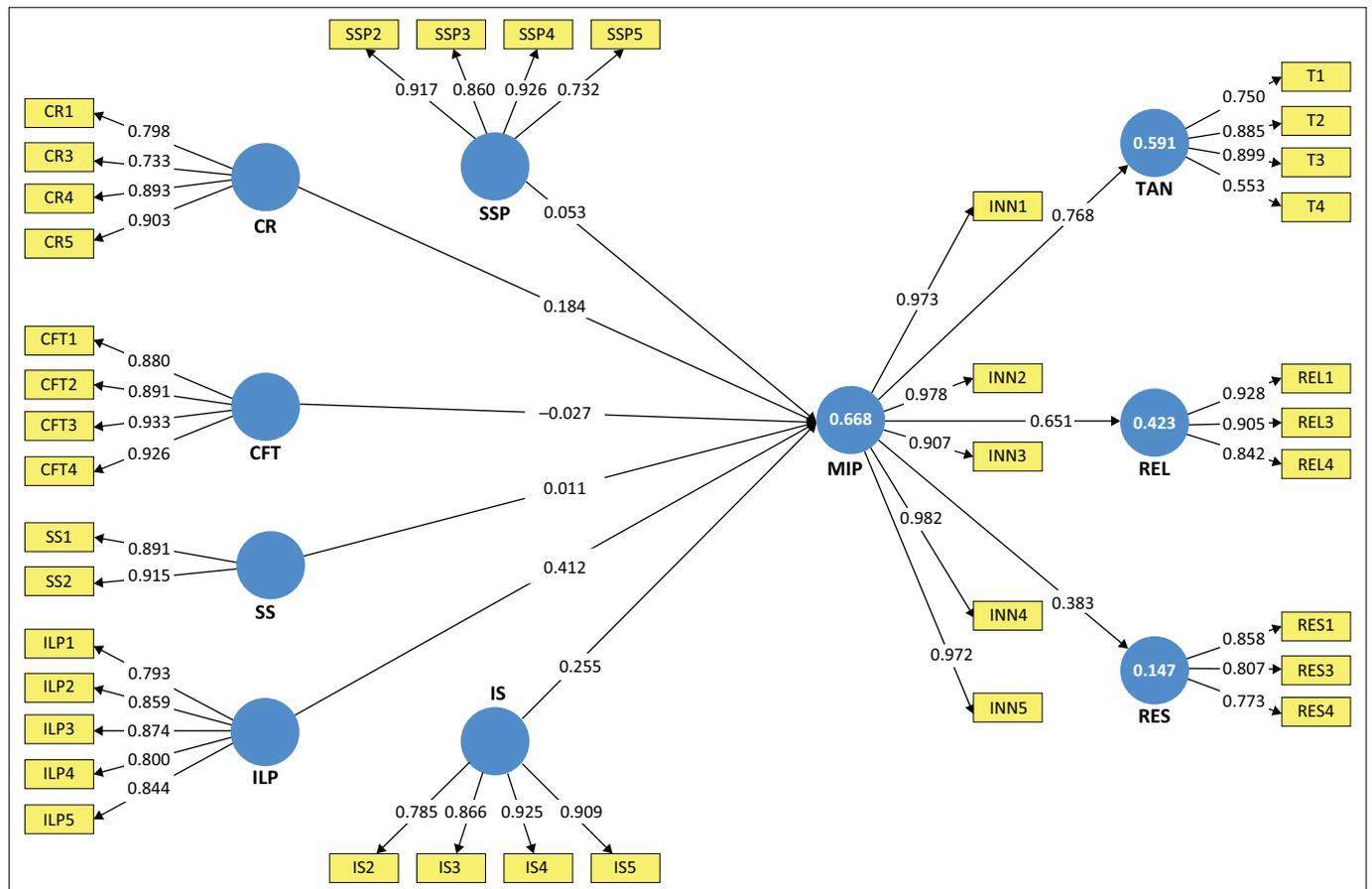
Research construct	CFT	CR	ILP	IS	MIP	REL	RES	SS	SSP	TAN
CFT	-	-	-	-	-	-	-	-	-	-
CR	0.264	-	-	-	-	-	-	-	-	-
ILP	0.213	0.597	-	-	-	-	-	-	-	-
IS	0.200	0.695	0.871	-	-	-	-	-	-	-
MIP	0.161	0.563	0.819	0.793	-	-	-	-	-	-
REL	0.254	0.527	0.785	0.761	0.780	-	-	-	-	-
RES	0.227	0.405	0.454	0.396	0.413	0.477	-	-	-	-
SS	0.219	0.627	0.737	0.790	0.654	0.642	0.401	-	-	-
SSP	0.225	0.604	0.800	0.797	0.736	0.713	0.418	0.755	-	-
TAN	0.225	0.626	0.865	0.842	0.868	0.961	0.472	0.694	0.801	-

SSP, strategic supplier partnership; CR, customer relationship; CFT, cross-functional teams; SS, strategic sourcing; ILP, internal lean practice; IS, information sharing; MIP, municipal innovation performance; TAN, tangibles; REL, reliability; RES, responsiveness.

TABLE 4: *F*-square matrix analysis.

Research construct	CFT	CR	ILP	IS	MIP	REL	RES	SS	SSP	TAN
CFT	-	-	-	-	0.004	-	-	-	-	-
CR	-	-	-	-	0.003	-	-	-	-	-
ILP	-	-	-	-	0.067	-	-	-	-	-
IS	-	-	-	-	0.003	-	-	-	-	-
MIP	-	-	-	-	-	0.148	0.027	-	-	0.228
REL	-	-	-	-	-	-	-	-	-	-
RES	-	-	-	-	-	-	-	-	-	-
SS	-	-	-	-	0.000	-	-	-	-	-
SSP	-	-	-	-	0.006	-	-	-	-	-
TAN	-	-	-	-	-	-	-	-	-	-

SSP, strategic supplier partnership; CR, customer relationship; CFT, cross-functional teams; SS, strategic sourcing; ILP, internal lean practice; IS, information sharing; MIP, municipal innovation performance; TAN, tangibles; REL, reliability; RES, responsiveness.



SSP, strategic supplier partnership; CR, customer relationship; CFT, cross-functional teams; SS, strategic sourcing; ILP, internal lean practice; IS, information sharing; MIP, municipal innovation performance; TAN, tangibles; REL, reliability; RES, responsiveness.

FIGURE 2: Path model: Supply chain management practices, municipal innovation performance and quality of service delivery.

TABLE 5: Path coefficient, *t*-statistics and the *p*-values.

Path	Path coefficient (β)	Significance		Decision
		<i>t</i>	<i>p</i>	
H1: SSP → MIP	0.053	2.522	0.012	Accepted
H2: CR → MIP	0.184	0.581	0.561	Rejected
H3 CFT → MIP	-0.027	0.701	0.483	Rejected
H4 SS → MIP	0.011	0.078	0.938	Rejected
H5 ILP → MIP	0.412	4.793	0.000	Accepted
H6 IS → MIP	0.255	2.705	0.007	Accepted
H7 MIP → REL	0.651	28.046	0.000	Accepted
H8 MIP → RES	0.383	8.848	0.000	Accepted
H9 MIP → TAN	0.768	31.816	0.000	Accepted

SSP, strategic supplier partnership; CR, customer relationship; CFT, cross-functional teams; SS, strategic sourcing; ILP, internal lean practice; IS, information sharing; MIP, municipal innovation performance; TAN, tangibles; REL, reliability; RES, responsiveness; H, hypothesis.

Path analysis

Supply chain management practices and municipal innovation performance

The study revealed significant positive relationships between three SCM practices and MIP. Specifically, SSP ($\beta = 0.053$; $t = 2.522$; $p = 0.012$), ILP ($\beta = 0.412$; $t = 4.793$; $p = 0.000$), and IS ($\beta = 0.255$; $t = 2.705$; $p = 0.007$) were all found to exert a positive influence on MIP. These results suggest that when municipalities adopt and effectively implement SSP, ILP and IS, their capacity for innovation improves. This result is consistent with previous findings by Zhang (2023) and Huo, Liu and Li (2023).

The significant relationship between SSP and MIP underscores the importance of collaborative practices between municipalities and their stakeholders. The positive association between ILP and MIP indicates that ILP, as a routinised activity, contributes to innovation in local government institutions. The significant link between IS and MIP reflects that knowledge exchange is a practice that shapes municipal capabilities and innovation.

In contrast, three SCM practices, CR ($\beta = 0.184$; $t = 0.581$; $p = 0.561$), CFT ($\beta = -0.027$; $t = 0.701$; $p = 0.483$), and SS ($\beta = 0.011$; $t = 0.078$; $p = 0.938$) exerted no effect on MIP. These outcomes align with an earlier study by Gil-Gomez et al. (2020). These results could be reflective of the challenges municipalities face in fostering trust with customers and maintaining structured, well-led CFTs. Given the enduring climate characterised by poor service delivery, public distrust in municipalities may hinder the effectiveness of customer engagement strategies. Similarly, inadequate leadership may prevent municipalities from functioning optimally, reducing their potential to drive innovation.

Municipal innovation performance and service delivery quality

The path analysis results show that MIP significantly and positively affects SDQ through its dimensions: TAN ($\beta = 0.768$; $t = 31.816$; $p = 0.000$), REL ($\beta = 0.651$; $t = 28.046$; $p = 0.000$) and RES ($\beta = 0.383$; $t = 8.848$; $p = 0.000$). These results indicate that innovative approaches adopted by municipalities contribute meaningfully to enhancing service quality by providing more dependable services, enabling them to respond more effectively to stakeholders' needs, including the physical aspects of service.

Mediation analysis

As shown in Table 6, the mediation analysis revealed that MIP significantly mediates the relationship between ILP and two specific dimensions of service delivery quality, namely, REL and TAN. The mediation effects were statistically significant, with β values of 0.105 ($t = 3.422$; $p = 0.001$) for REL and 0.116 ($t = 3.449$; $p = 0.001$) for TAN. This implies that ILP's influence on service delivery is amplified when innovation is integrated into municipal systems and processes. These findings highlight the crucial role of innovation in bridging SCM practices with improved public service quality, suggesting that municipalities that invest in and promote innovation are more likely to see greater benefits from their SCM strategies, particularly in delivering more reliable and tangible services. The results align with Phudetch et al. (2020), who argue that increased innovativeness allows organisations to manage operations and material flows more effectively, enhancing service quality and efficiency. Similarly, Alabdullah and Kanaan (2023) observed that adopting lean practices fosters an environment conducive to innovation, which, in turn, drives organisational performance.

Moreover, the analysis revealed that no mediation effects were identified in the remaining relationships, such as, but not limited to, CR on REL ($\beta = 0.017$, $t = 1.004$, $p = 0.315$), RES ($\beta = 0.010$, $t = 0.923$, $p = 0.356$), and TAN ($\beta = 0.018$, $t = 0.986$, $p = 0.324$) indicating that the presence of MIP in those cases did not produce any significant indirect impact. The findings suggest that adopting ILP is a critical SCM approach that significantly improves both SDQ and innovation performance in the context of the selected South African municipalities.

Conclusion

Theoretical and practical contributions

The study examined the influence of SCM practices on SDQ in selected South African municipalities, while assessing the mediating role of MIP in this relationship. It confirms the importance of SSP, ILP and IS as essential driving factors of improved innovation in municipalities. However, CR, CFT and SS emerged as insignificant drivers of innovation. Mediation effects of MIP were realised on the connection of ILP and REL only, indicating that innovation plays a vital role in enhancing the reliability component of SDQ through the adoption of lean practices. No additional significant mediation effects were identified in the study.

This research examined multiple dimensions of SCM practices, including SSP, CR, CFT, ILP, IS and SS, as key predictors of innovation performance aimed at enhancing service delivery in South African municipalities. The study developed a model illustrating the impact of SCM practices on innovation performance, which subsequently impacts service delivery outcomes. Drawing from the results, the study makes several notable theoretical contributions. Firstly, it offers fresh perspectives on the interrelationships among the key constructs, expands the existing literature on

TABLE 6: Mediation analysis of the research constructs.

Mediation path	Specific indirect effect	T statistics	P	Decision
CR -> MIP -> REL	0.017	1.004	0.315	No mediation
CR -> MIP -> RES	0.010	0.923	0.356	No mediation
IS -> MIP -> REL	0.024	1.063	0.288	No mediation
IS -> MIP -> RES	0.014	1.001	0.317	No mediation
CR -> MIP -> TAN	0.018	0.986	0.324	No mediation
IS -> MIP -> TAN	0.027	1.078	0.281	No mediation
SS -> MIP -> REL	-0.004	0.220	0.826	No mediation
SS -> MIP -> RES	-0.002	0.212	0.832	No mediation
SS -> MIP -> TAN	-0.005	0.220	0.826	No mediation
CFT -> MIP -> REL	-0.014	1.142	0.254	No mediation
CFT -> MIP -> RES	-0.008	1.037	0.300	No mediation
ILP -> MIP -> REL	0.105	3.422	0.001	Full mediation
ILP -> MIP -> RES	0.061	2.668	0.008	No mediation
CFT -> MIP -> TAN	-0.015	1.102	0.271	No mediation
ILP -> MIP -> TAN	0.116	3.449	0.001	Full mediation
SSP -> MIP -> REL	0.028	1.104	0.269	No mediation
SSP -> MIP -> RES	0.017	1.020	0.308	No mediation
SSP -> MIP -> TAN	0.031	1.109	0.267	No mediation

SSP, strategic supplier partnership; CR, customer relationship; CFT, cross-functional teams; SS, strategic sourcing; ILP, internal lean practice; IS, information sharing; MIP, municipal innovation performance; TAN, tangibles; REL, reliability; RES, responsiveness.

municipal SCM, particularly in relation to innovation, and reveals that different SCM practices carry varying levels of importance in enhancing innovation performance and service delivery quality within the South African municipal context. Secondly, the study establishes a theoretical foundation for future empirical research, encouraging further investigation into the dynamics between SCM practices, innovation performance and service delivery in local government settings across South Africa.

Practically, the study contributes to developing progressive municipal SCM policies and regulations. Managers are provided with new perspectives on how to align the SCM practices with chosen supply chain strategies to meet the demands of their customers and to enhance the effectiveness of their supply chains. For instance, municipalities could pilot AI-enabled process mining tools to analyse workflows and eliminate inefficiencies, thereby reinforcing internal lean practices and fostering continuous innovation. Additionally, investing in integrated digital platforms, such as cloud-based SCM systems and real-time collaboration dashboards, can significantly improve IS both within departments and with external stakeholders. Municipalities should also consider formalising long-term supplier partnerships through strategic supplier development programmes, co-innovation initiatives, or shared digital infrastructure that enables more agile and responsive service delivery. Finally, the study outcomes create awareness among municipalities about the importance of continuously reviewing, monitoring and managing their supply chain operations to mitigate risks and address potential vulnerabilities. This could be achieved through the implementation of real-time risk visualisation dashboards powered by predictive analytics, enabling supply chain teams to anticipate disruptions, assess impact levels, and prioritise mitigation strategies before issues escalate.

Limitations and implications for further research

This study has limitations worth noting. It targeted the SCM role-players in only five selected South African municipalities located in two provinces, namely Gauteng and North West, restricting its geographic scope. As such, although the study was quantitative in nature, allowing the findings to be generalised to other municipal environments, this should still be done cautiously. Future studies should consider expanding the scope to other municipalities excluded from the study. The study was quantitative, which misses the in-depth insights that could be collected through qualitative research. A mixed methods approach could be used for future studies to obtain both qualitative and quantitative insights. Unlike the current study that utilised a cross-sectional design, future research may benefit from adopting longitudinal or time series approaches to track the evolution of these relationships over various timeframes. Additionally, subsequent studies should consider analysing the distinct categories of municipalities, including metropolitan, district and local, separately instead of treating them as homogeneous organisations.

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This article is based on data from a larger study. A related article focusing on the impact of supply chain management dimensions on service delivery quality in selected South African municipalities has been published in *Journal of Transport and Supply Chain Management* 19(0) a1157. The present article addresses a distinct research question, focusing on the mediating role of innovation.

Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

CRedit authorship contribution

Gladys N. Mahache: Conceptualisation, Methodology, Writing – original draft. Chenedzai Mafini: Supervision.

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Data availability

The data that support the findings of this study are not openly available because of confidentiality and are available from the corresponding author, Gladys N. Mahache, upon reasonable request.

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