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Exploratory Assessment of the Current State of Supply Chain Processes in South Africa: Insights from the Mining Sector

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Abstract
The mining sector remains a cornerstone of South Africa's economy, yet its supply chain (SC) processes face persistent inefficiencies that undermine operational performance and global competitiveness. This study aimed to explore the current state of supply chain processes in South African mining, examining how policies, technology, governance, and operational practices collectively shape SC effectiveness. Understanding the status of these processes is academically and practically important, as mining SCs are capital-intensive, production-driven, and directly impact employment, exports, and economic growth, yet empirical insights in developing contexts remain limited. Adopting an interpretivist qualitative approach, the study conducted semi-structured interviews with 31 SC managers across 16 mining organisations, employing thematic analysis supported by ATLAS.ti to identify patterns, relationships, and sector-specific dynamics. Findings reveal a paradoxical state: SC processes are formally robust, technologically enabled, and governance-driven, yet fragmented in implementation, constrained by limited human capacity, siloed communication, infrastructure decay, and regulatory rigidity. Policy adherence, performance monitoring, and ERP systems provide structural stability, but relational coordination failures and contextual pressures compromise overall effectiveness. The study concludes that South African mining SCs exemplify governance-driven and technologically aware systems that are operationally brittle, providing a theoretical contribution by demonstrating how Network Theory, Resource-Based Theory, and SERVQUAL collectively explain relational and context-specific SC vulnerabilities. Practically, the findings suggest that mining firms should pursue relationally integrated, capability-driven SC management, strengthening cross-functional coordination, strategic human capital development, digital integration, and context-sensitive procurement and risk strategies to enhance resilience, responsiveness, and sustainable performance.

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1. Introduction

The mining sector remains one of the most strategically significant industries globally and is particularly central to African economies, where mineral resources account for approximately 30% of global reserves and contribute more than 10% of GDP in several countries (Aslam, Muzammil, Shahid, and Bano, 2025) [15]. South Africa occupies a distinctive position within this global mining landscape, ranking among the top ten producers of key commodities such as gold, coal, iron ore, diamonds, chrome, manganese, and platinum, and holding global leadership positions in chrome, manganese, and platinum production (Leighton, 2024) [28]. Despite this resource endowment and historical prominence, recent evidence suggests that the performance of the South African mining sector has stagnated, with declining output across several major commodities and a gradual erosion of global market share (Lumadi and Nyasha, 2024) [33]. Central to this decline is the phenomenon of ineffective

and inefficient supply chain (SC) processes, which increasingly constrain production continuity, service delivery quality, and competitiveness within the mining sector.

Supply chain processes form the operational nucleus of mining activities, integrating sourcing, logistics, production support, and distribution across geographically dispersed and capital-intensive operations (Anggay and Hamiche, 2021) [1]. In the mining context, inefficient SC processes translate directly into production delays, cost overruns, unreliable order-to-delivery cycles, and diminished service quality to downstream markets (Masenya and Aroba, 2025; Muzaffar, 2025) [38, 45]. Given the sector's contribution to employment, export earnings, balance of payments, and GDP in South Africa (Loewald *et al*., 2021; Boateng *et al*., 2025) [31, 7], weaknesses in mining supply chains have systemic economic and social implications. From an academic standpoint, while supply chain management (SCM) has been extensively studied in manufacturing and service industries, empirical research that systematically examines the current state and quality of SC processes within the mining sector in developing economies remains limited (Hu *et al*., 2024; Osei *et al*., 2023) [23, 53]. This gap is particularly salient given the distinctive characteristics of mining supply chains, which are asset-heavy, risk-intensive, infrastructure-dependent, and deeply embedded within inter-organisational networks.

Existing literature highlights persistent supply chain disruptions across global mining industries, including logistics failures, infrastructure bottlenecks, coordination breakdowns, and regulatory constraints (Wincewicz-Bosy *et al*., 2021; Mathu, 2014; Malebana, 2024) [69, 39, 35]. Studies in South Africa's coal and mineral sectors further demonstrate that SC inefficiencies undermine energy security, export reliability, and socio-economic development in mining-dependent regions (Mathu, 2014; Malebana, 2024) [39, 35]. However, much of this literature remains descriptive or sector-specific, offering limited theoretical integration. To address this limitation, the present study draws on three complementary theoretical lenses. First, the SERVQUAL model provides a service quality perspective through which SC processes can be evaluated in terms of reliability, responsiveness, assurance, and timeliness of service delivery across the mining value chain (Alkebaisi, 2022) [54]. Second, Resource-Based Theory (RBT) conceptualises efficient supply chain processes as strategically valuable, rare, and inimitable organisational resources that underpin sustained competitive advantage in globally contested mining markets (Tiwari, Bryde, Stavropoulou, and Malhotra, 2024) [3]. Third, Network Theory emphasises the relational and inter-organisational nature of mining supply chains, highlighting how coordination, integration, and trust among suppliers, logistics providers, regulators, and mining firms shape overall supply chain performance (Navarrete-Cruz and Birkenberg, 2024) [46].

Despite the relevance of these theories, empirical research that jointly applies service quality, resource-based, and network perspectives to mining supply chains—particularly within the South African context—is notably sparse. Prior studies tend to examine either operational inefficiencies or macroeconomic outcomes without systematically assessing the current state of SC processes as experienced across organisational and inter-organisational levels. Moreover, to the best of the author's knowledge, no prior empirical study has explicitly explored mining supply chain processes in South Africa through an integrated SERVQUAL–RBT–Network Theory framework. This study addresses this gap by offering an exploratory, theory-informed assessment of mining SC processes, thereby contributing new empirical evidence and extending the applicability of these theories to an under-researched industrial context.

Against this background, the core research question guiding this study is: What is the current state of supply chain processes in South Africa, with specific insights from the mining sector? The primary objective is to explore and assess the effectiveness and quality of SC processes within South African mining operations. The study is situated within the South African mining industry and adopts a multi-level analytical perspective. The units of analysis span organisational-level SC processes within mining firms, inter-organisational relationships across supply chain networks, and industry-level patterns affecting competitiveness and service delivery outcomes. Key constructs of interest include supply chain efficiency, service quality, resource utilisation, coordination, and competitive performance.

Theoretically, this study advances programmatic knowledge in SCM by empirically linking service quality theory (SERVQUAL), strategic management theory (RBT), and inter-organisational theory (Network Theory) within the mining domain. It demonstrates how supply chain processes function simultaneously as service delivery mechanisms, strategic resources, and networked relationships. Practically, the findings inform mining executives, policymakers, and supply chain practitioners by identifying systemic weaknesses and capability gaps which may undermine competitiveness. The study further lays the foundation for the development of a recommendations aimed at improving mining supply chain management in South Africa.

The remainder of the article is structured as follows. The next section reviews relevant literature and develops the theoretical framework underpinning the study. This is followed by a description of the research methodology. The subsequent section presents and discusses the findings, while the final section concludes the article by giving conclusions and recommendations for practice and future research.

2. Review of Literature

The global mining sector serves as a strategic cornerstone for industrial stability, yet its operational efficiency is increasingly contingent upon the robustness of supply chain (SC) processes. In South Africa, the mining industry is a primary driver of the national economy, contributing over 10% to the GDP and positioning the country as a leader in commodities like platinum and manganese (Leighton, 2024) [28]. However, recent trends indicate a stagnation in performance, largely attributed to ineffective supply chain mechanisms that disrupt production continuity and market competitiveness (Lumadi and Nyasha, 2024) [33]. This literature review explores the current state of supply chain processes by moving from a broad global perspective to the specific intricacies of the South African mining landscape. It critically engages with existing scholarly works to identify how service quality, strategic resources, and network integration shape supply chain outcomes. Ultimately, the review aims to situate the research within the gaps of existing empirical data, particularly regarding integrated theoretical assessments in developing economies.

2.1. Empirical Literature

2.1.1. Global and Local Perspectives on Supply Chain Processes

Supply chain processes are fundamentally defined as the integrated network of activities, resources, and stakeholders required to move products from raw material acquisition to final delivery (Näslund, Kale, and Paulraj, 2010; Sanders, 2025) [47, 63]. Globally, these processes are viewed as the operational nucleus of capital-intensive industries, where planning, sourcing, and distribution must be seamlessly aligned to ensure profitability (Anggay and Hamiche, 2021) [1]. In the South African context, the SC process is further complicated by geographical dispersion and a heavy reliance on aging infrastructure (Loewald *et al*., 2021) [31]. While international models emphasize lean efficiency, South African mining firms often struggle with localized bottlenecks that hinder the "order-to-delivery" cycle (Masenya and Aroba, 2025) [38]. Although the foundational stages of planning and sourcing are well-documented, the application of these stages within the volatile South African minerals sector requires deeper empirical scrutiny. Consequently, understanding the state of SC processes necessitates a dual focus on global standards and local operational realities.

2.1.2. Service Quality and Reliability in Mining Supply Chains

The evaluation of supply chain effectiveness often hinges on the quality-of-service delivery, which directly impacts downstream market satisfaction. The SERVQUAL model serves as a vital tool in this regard, measuring performance through dimensions such as reliability, responsiveness, and assurance (Ramya *et al*., 2019; Dovbischuk, 2023) [61, 55]. Within the mining value chain, a lack of reliability in SC processes manifests as production delays and cost overruns (Muzaffar, 2025) [45]. While Supardi *et al*. (2022) [66] argue that service quality is a primary driver of customer satisfaction in mining, others suggest that the model's focus on perceptions may overlook the physical and structural complexities of mineral logistics. In South Africa, the pressure to maintain "just-in-time" delivery is often thwarted by unresponsive supply networks, leading to a gap between expected and actual service levels (Mahache, Mafini, and Langton, 2025) [17]. Therefore, assessing the state of SC processes requires a critical look at how service quality dimensions are integrated into the daily operations of mining firms.

2.1.3. Strategic Resource Management and Competitive Advantage

From a strategic management perspective, supply chain processes are not merely operational tasks but are valuable organizational resources. The Resource-Based Theory (RBT) posits that for a firm to achieve sustained competitive advantage, its resources—including its SC processes—must be valuable, rare, inimitable, and organized (Barney, 2001; Tiwari *et al*, 2024) [5, 3]. In the South African mining sector, efficient SC processes are increasingly seen as a differentiator in a contested global market (Ngcobo *et al*., 2025) [49]. However, Marin and Cunial (2025) [36] note that RBT often fails to account for external dependencies, such as the volatility of factor markets where firms compete for labor and technology. This competition for scarce resources, explained by Factor Market Rivalry Theory, forces mining companies to innovate their supply chain capabilities to survive (Markman *et al*., 2009; Bhamra *et al*., 2025) [37, 6]. Thus, the current state of SC processes in South Africa may reflect how well firms manage these internal and external resource pressures to maintain a competitive edge.

2.1.4. Technological Disruption and the Fourth Industrial Revolution

The advent of the Fourth Industrial Revolution (4IR) has introduced both opportunities and significant hurdles for South African mining supply chains. Technologies such as blockchain and advanced analytics are being adopted to improve transparency and decision-making (Queiroz *et al*., 2021; Ulfath *et al*., 2025) [59, 68]. Despite these advancements, Zulu *et al*. (2021) [72] point out that many 4IR implementation projects in the South African mining industry have failed due to a lack of organizational readiness and technological capability. These failures exacerbate existing data quality issues and limit the ability of firms to conduct accurate Total Cost of Ownership (TCO) analyses (Muhammed *et al*., 2025) [44]. Furthermore, while technology adoption is a strong predictor of supply chain agility, its success is often mediated by the willingness of personnel to adapt to new systems (Loury-Okoumba & Mafini, 2021) [32]. As a result, the technological state of the SC remains fragmented, with a wide gap between digital potential and operational reality.

2.1.5. Sustainability and Green Supply Chain Management

Sustainability has emerged as a critical theme in the discourse on mining SC processes, particularly regarding environmental and social governance. Green Supply Chain Management (GSCM) practices are being integrated into the South African mining sector to mitigate environmental damage and improve corporate performance (Ngcobo *et al*., 2022) [50]. Research indicates that GSCM not only improves enterprise performance directly but also boosts internal dynamics like employee job satisfaction and relational efficiency (Ngcobo *et al*., 2025) [49]. However, the transition to green practices is often hindered by the high costs of sustainable procurement and a lack of clear regulatory incentives (Njagi, 2023) [52]. While some firms view GSCM as a strategic necessity, others struggle with the "trade-off" between immediate profitability and long-term sustainability. Consequently, the extent to which green practices are embedded in SC processes remains a defining characteristic of the sector's current evolution.

2.1.6. Risk and Ethical Challenges in the Supply Network

Mining supply chains in South Africa are inherently vulnerable to a variety of risks, ranging from logistical bottlenecks to ethical lapses in procurement. Supply chain risks—including demand, delay, and disruption—significantly undermine the flow of goods and services (Ho *et al*., 2015; Tshifhumulo *et al*., 2025) [22, 67]. These risks are often compounded by unethical behavior and corruption, which persist despite the presence of robust legal frameworks like the South African Constitution (Enaifoghe *et al*., 2024; Cartwright *et al*., 2023) [18, 11]. While risk mitigation strategies such as avoidance and reduction are theoretically available, their implementation is often inconsistent across the sector (Aqlan & Lam, 2015; Monczka *et al*., 2020) [2, 42]. Furthermore, the lack of transparency in supplier selection and inter-departmental communication failures continue to

expose mining firms to reputational and operational damage (Islam *et al*., 2024) [25]. Ultimately, the current state of SC processes are profoundly influenced by the ability of firms to navigate these ethical and risk-laden environments.

2.1.7. Synthesis of Literature and Identified Gap

The prevailing literature underscores that while mining firms may possess significant resource endowments, their supply chain processes are often hindered by systemic inefficiencies, technological gaps, and risk vulnerabilities. Scholars agree that SC processes function as critical service delivery mechanisms and strategic resources, yet most studies remain either purely descriptive or narrowly focused on single themes like risk or technology (Mathu, 2014; Malebana, 2024) [39, 35]. A significant gap exists in the lack of an integrated empirical assessment that simultaneously examines these processes through the lenses of service quality, strategic resource management, and network dynamics within the South African context. Furthermore, there is a dearth of research that uses a multi-level analytical approach to connect internal firm operations with broader inter-organizational networks. This study addresses these gaps by employing an integrated SERVQUAL–RBT–Network Theory framework to provide a comprehensive exploratory assessment of the mining SC state.

2.2. Theoretical Framework

This study is grounded in an integrated theoretical framework that combines Network Theory, Resource-Based Theory (RBT), and the SERVQUAL model. Network Theory serves as the primary lens, conceptualizing the supply chain as a complex web of interconnected nodes (suppliers, mines, and distributors) where performance is determined by the quality of coordination and information flow (Zhao *et al*., 2020; Bhamra *et al*., 2025) [71, 6]. This is complemented by RBT, which views these networked processes as strategic assets that provide a competitive advantage when they meet the VRIO criteria (Barney, 2001; Tiwari *et al*., 2024) [5, 3]. Finally, the SERVQUAL model provides the metrics to evaluate the output of these processes in terms of service reliability and responsiveness (Dovbischuk, 2023) [55]. By synthesizing these three theories, the study creates a robust foundation for analyzing how relational dynamics and internal capabilities culminate in supply chain excellence or failure.

2.3. Conceptual Framework

The conceptual framework for this study maps the relationships between supply chain inputs, process stages, and performance outcomes within the South African mining sector. It identifies Planning, Sourcing, Production, Delivery, and Returns as the core process stages, which are influenced by moderators such as technology adoption, ethical culture, and risk mitigation (Gartner, Abasse, Bergeron, Landa, Lemaire, and Cote, 2022) [20]. The framework posits that the quality of these stages, measured through SERVQUAL dimensions, directly determines Supply Chain Efficiency and Strategic Competitiveness (Clegg, 2023) [16]. Unlike general models, this framework specifically incorporates the unique constraints of the mining industry, such as infrastructure bottlenecks and factor market rivalry (Ketels, 2016; Pence *et al*., 2022) [26, 56].

This visual and structural representation allows for a systematic exploration of the research question regarding the current state of SC processes in South Africa.

3. Methods

Research Design and Philosophical Orientation: This study adopted an interpretivist qualitative research design to explore the current state of supply chain (SC) processes in South Africa, with specific insights from the mining sector. A research design provides the overarching framework that guides data generation, analysis, and interpretation (Huntington-Klein, 2021; Reddy and Pulluru, 2024) [24, 62]. In this study, the design was structured to ensure coherence between philosophical assumptions, methodological choices, and the central research question: What is the current state of supply chain processes in South Africa, with specific insights from the mining sector? SC processes within mining organisations are not objective phenomena but are shaped through organisational relationships, institutional arrangements, and contextual constraints. Accordingly, the study was positioned within an interpretive paradigm that prioritises meaning, context, and stakeholder experience over causal generalisation on supply chain process (Piotrowicz, Ryciuk and Szymczak, 2023) [57].

The study further drew on Network Theory as the primary analytical framework, enabling an examination of relational interdependencies among actors within mining supply chains. To ensure philosophical consistency, Mouton (1996) [43] three-world framework was used to align ontology, epistemology, and methodology, strengthening the internal coherence of the research design. This alignment was essential for exploring how SC processes operate in practice and how they influence efficiency and competitiveness in the South African mining sector.

Ontological, Epistemological and Axiological Assumptions: The study is grounded in a relativist ontology, which recognises that realities within supply chain processes are socially constructed through human interaction and organisational networks (Mbanaso, Abrahams and Okafor, 2023) [40]. SC processes in the mining sector are embedded in institutional, historical, and operational contexts, meaning that multiple realities coexist across organisations and stakeholder groups. As a result, a single objective account of SC effectiveness is neither feasible nor desirable.

Correspondingly, an interpretivist epistemology was adopted, emphasising knowledge generation through understanding participants' subjective meanings, experiences, and interpretations rather than through objective measurement (Bonache, 2021) [8]. Although positivist epistemologies facilitate generalisation and causal explanation, they were considered unsuitable for investigating SC processes that are inherently contextual and relational. Interpretivism therefore provided an appropriate epistemological lens for examining the lived realities of SC practitioners within mining organisations.

From an axiological perspective, the researcher acknowledged that prior professional experience within SC contexts could shape interpretations. To mitigate potential bias, reflexive strategies were applied throughout data collection and analysis, ensuring that participant voices

remained central in the interpretation of findings (Klakegg and Tvedt, 2024; Lim, 2024) [27, 29]. These philosophical assumptions collectively informed the choice of a qualitative, exploratory research strategy.

Research Approach and Strategy: A qualitative deductive research approach was employed to guide the study of supply chain processes in the South African mining sector. While deduction is traditionally associated with positivist inquiry, it is increasingly recognised as compatible with interpretive qualitative research when theory guides empirical exploration rather than hypothesis testing (Casula, Rangarajan and Shields, 2021; Qerimi *et al*., 2023) [12, 58]. In this study, Network Theory, Resource Based Theory (RBT) and SERVQUAL informed the analytical lens through which empirical insights were interpreted, particularly in understanding relational dynamics, service quality and coordination challenges across SC networks.

An exploratory research strategy was adopted because limited qualitative evidence exists on the operational realities of SC processes within South African mining organisations (Badke, 2021) [4]. Exploratory research is appropriate when a phenomenon is under-researched or poorly understood, as it enables the generation of new insights and conceptual clarity. Although descriptive elements were incorporated to contextualise existing practices, the primary aim was to uncover constraints, patterns, and opportunities shaping the current state of SC processes in the mining sector.

The study employed a cross-sectional time horizon, capturing participant perspectives at a single point in time over a two-month data-collection period (Maier *et al*., 2023) [34]. This approach provided a contemporary snapshot of SC practices and challenges as experienced by practitioners across the mining supply chain.

Sampling Strategy and Participants: The research population comprised employees involved in supply chain functions within mining and related organisations in South Africa, while the target population focused specifically on senior managers responsible for procurement, materials management, and SC oversight (Saunders *et al*., 2019; Rahman, 2023) [64, 60]. These individuals were considered best positioned to provide strategic and operational insights into the state of SC processes.

A purposive non-probability sampling technique was employed to identify information-rich participants with direct experience and decision-making authority within mining SC contexts (Campbell *et al*., 2020) [10]. Sixteen mining organisations operating across platinum, chrome, coal, iron ore, diamond, gold, salt, and manganese sectors were selected as the units of analysis, reflecting the diversity and economic significance of South Africa's mineral economy. From each organisation, one SC manager was selected as the unit of observation, given their responsibility for overseeing SC processes and performance.

To enhance contextual understanding and comparative insight, fifteen general SC practitioners from across different sectors were also included. The final sample therefore consisted of thirty-one participants, a size deemed adequate for in-depth qualitative analysis while ensuring sectoral diversity and analytical richness.

Data Collection: Data were collected using semi-structured open-ended interview questionnaires, which allow for consistency across interviews while enabling participants to elaborate on their experiences and perspectives (Mlitwa, 2014; Yu, Qian and Chen, 2022) [41, 70]. This method was particularly suited to exploring complex and context-dependent SC processes within mining organisations.

Participants were senior managers with a minimum of five years' experience in SC-related roles, ensuring informed and reflective responses. Prior to participation, the objectives of the study were clearly explained, and written informed consent was obtained from all participants. Interviews were conducted at times and in formats convenient to participants, primarily through scheduled engagements and email correspondence. This flexible approach facilitated candid discussion while accommodating the professional demands of senior practitioners.

Data Analysis: Qualitative data were analysed using Braun and Clarke's thematic analysis, supported by ATLAS.ti (version 25) software (Braun, and Clarke, 2006) [9]. The analysis followed six iterative stages: data familiarisation, initial coding, theme development, theme review, theme definition, and reporting (Christou, 2022) [13]. This structured approach enabled systematic engagement with participant narratives while remaining sensitive to contextual nuance.

An axial coding process was applied to group related codes and identify patterns across participant accounts, thereby enhancing analytical rigour and coherence (Lochmiller, 2021) [30]. Emergent themes were continuously evaluated against the study's research question concerning the current state of SC processes in South Africa, with specific reference to the mining sector. The use of qualitative software ensured transparency, consistency, and traceability throughout the analytical process, strengthening the credibility of the findings.

Pilot Study and Trustworthiness: A pilot study involving five participants was conducted to assess the clarity, relevance, and sequencing of interview questions (Seth, Gupta and Singh, 2022) [65]. Feedback from the pilot informed minor refinements to the interview guide, ensuring that questions elicited meaningful and focused responses.

Trustworthiness was ensured through the application of credibility, confirmability, transferability, and dependability criteria (Saunders *et al*., 2019) [64]. Credibility was ensured by engaging senior decision-makers with direct SC oversight, while confirmability was supported through systematic documentation, coding, and reflexive analysis (Lim, 2024) [29]. Transferability was addressed by providing detailed contextual descriptions of the mining SC environment, and dependability was ensured through transparent reporting of methodological procedures (Hammerton and Munafò, 2021) [21].

Ethical Considerations: Ethical clearance was obtained from the UNISA Research Ethics Committee prior to data collection. Participation in the study was voluntary, with informed consent obtained from all participants, who were assured of anonymity and confidentiality. Data were reported at an aggregate level, and no identifying information was disclosed. All research procedures complied with institutional ethical guidelines, and care was taken to ensure that participation posed no harm to individuals or organisations. The researcher respected participants' rights, values, and professional responsibilities throughout the research process.

4. Results

To address the research question, "*What is the Current State of Supply Chain Processes in South Africa: Insights from the Mining Sector*?", the qualitative interview data analysis revealed fifteen broad themes and corresponding subthemes. These findings offer a comprehensive picture of the current situation in SC processes across various organisations, with a specific focus on the South African mining industry. Table 1 presents the network of relationships among these 15-supply chain (SC) themes.

Table 1: Network Analysis on Status of SC Processes Generally and in the Mining Sector

Source Theme	Linking phrase/word (Relation)	Target Theme
1. Policy Adherence	is governed by	10. Governance
1. Policy Adherence	is monitored by	12. Performance Monitoring
2. Training and Capacity	enables effective	3. Technological Tools
2. Training and Capacity	is essential for	6. Risk Management
3. Technological Tools	facilitates	4. Communication
3. Technological Tools	supports	8. Inventory Management
4. Communication	is a key element of	11. Integration
5. Customer Satisfaction	is the ultimate goal of	12. Performance Monitoring
6. Risk Management	informs	7. Procurement Strategy
6. Risk Management	is required by	1. Policy Adherence
7. Procurement Strategy	determines practices for	8. Inventory Management
7. Procurement Strategy	is constrained by	14. Resource Allocation
8. Inventory Management	is supported by	9. Logistics
9. Logistics	is measured by	12. Performance Monitoring
10. Governance	shapes	13. Organisational Culture
10. Governance	is directly related to	1. Policy Adherence
11. Integration	requires strong	4. Communication
12. Performance Monitoring	provides feedback for	14. Resource Allocation
13. Organisational Culture	influences successful	11. Integration
14. Resource Allocation	impacts all aspects of	9. Logistics
15. Industry-Specific Factors	contextualizes all of	10. Governance
15. Industry-Specific Factors) strongly dictates		6. Risk Management
15. Industry-Specific Factors	informs	7. Procurement Strategy

The results show that Table 1 depicts a dense relational network in which governance (Theme 10), policy adherence (Theme 1), and performance monitoring (Theme 12) occupy structurally central positions, signifying their importance in shaping SC processes both at a general organisational level and within the mining sector specifically. Policy adherence (Theme 1) is governed by governance and monitored through performance systems, while training and capacity (Theme 2) enable the effective use of technological tools (Theme 3) and support risk management (Theme 6). Furthermore, the network illustrates that procurement strategy (Theme 7), inventory management (Theme 8), and logistics (Theme 9) form an operational core that translates strategic intent into execution (Themes 7–9). Industry-specific factors (Theme 15) further contextualise governance and strongly dictate both risk management and procurement strategies, highlighting the distinctive regulatory and operational pressures of the mining sector.

Taken together, the results show that weaknesses in one thematic area cascade across the network, thereby shaping the overall state of SC processes. While such interdependencies are evident across organisations generally, in the South African mining sector, insufficient training constrains the effective use of technological tools, which in turn weakens risk management and policy adherence, including compliance with sector-specific regulations such as the Mining Charter. This interconnectedness explains the persistence of documented SC inefficiencies, particularly in logistics coordination and local supplier development, and directly responds to the research question: *What is the current state of supply chain processes in South Africa: insights from the mining sector*?

Below, Table 2 presents the themes and subthemes on the status of SC processes in tabular form. The results show that these themes provide the analytical structure for the detailed presentation of results that follows, allowing for clear comparative understanding of SC practices as they exist generally and as they manifest within the mining environment.

Table 2: Themes and subthemes based on the current status of SC processes (i) generally, and in (ii) the mining sector?

Theme	Subtheme(s)
1. Policy Adherence	1.1 Standard SC policies
	1.2 Procedure compliance
2. Training and Capacity	2.1 Formal training
	2.2 On-the-job training
3. Technological Tools	3.1 ERP and integrated systems
	3.2 Specialized software
4. Communication	4.1 Internal coordination
	4.2 External communication
5. Customer Satisfaction	5.1 Timely delivery
	5.2 Quality assurance
6. Risk Management	6.1 Contingency planning
	6.2 External disruption mitigation
7. Procurement Strategy	7.1 Strategic sourcing
	7.2 Supplier development
8. Inventory Management	8.1 Stock control
	8.2 Tracking and visibility
9. Logistics	9.1 Transport management
	9.2 Fleet and delivery tracking
10. Governance	10.1 Compliance
	10.2 Ethical procurement
11. Integration	11.1 Interdepartmental systems
	11.2 End-to-end SC visibility
12. Performance Monitoring	12.1 KPIs
	12.2 Continuous improvement
13. Organisational Culture	13.1 Leadership accountability
	13.2 Staff engagement
14. Resource Allocation	14.1 Budgeting
	14.2 Human resources
15. Industry-Specific Factors	15.1 Mining operational alignment
	15.2 Regulatory compliance

4.1. Theme 1: Policy Adherence

The results show that generally, the efficacy of SC processes is deeply entrenched in the existence and rigorous application of formal policies and procedures. This is particularly evident in the South African mining sector, where this theme was explored through the subthemes of Standard SC policies and Procedure Compliance.

Subtheme 1.1: Standard SC Policies

The results show that generally, organisations maintain elaborate and standard SC policies because they are considered essential navigational tools for the entire SC team. Reflecting the status in the South African mining sector specifically, Participant 2 stated, *"Yes, 100%..."* while Participant 16 affirmed the presence of such structures in mining, reporting, *"...African Rainbow Minerals (ARM) has established standard SC policies and procedures that guide all procurement, logistics, and supplier management activities..."* Furthermore, Participant 7 attributed policies to broader human capital development, saying, *"Yes, our business is developed in a way that proper training and skills transfer policies are in place..."* In addition, Participant 29 noted renewal efforts, adding, *"We have a SC charter, and it is currently undergoing a review to support our strategy for the next 5 years..."* These assertions collectively shows that standard SC policies are not only present across organisations generally but are also actively refined within the South African mining sector to align with long-term operational and strategic demands.

Subtheme 1.2: Procedure Compliance

The results show that generally, while formal procedures and Standard Operating Procedures (SOPs) are well-defined, their strict implementation often depends on external factors. Reflecting the status in the South African mining sector, Participant 5 was categorical: *"Yes – the company had standard procedures and SOPs,"* and Participant 19 confirmed, *"We have well formalised SC processes and policies that are documented and implemented..."* Participant 6 illustrated a practical use of such documentation, stating, *"Yes, we do have procedures that we follow when we deliver, and we attend to them..."* However, a contrasting perspective emerged when Participant 17 noted, *"...We do have procedures in place, but they depend solely on the requirements received from clients..."* This shows that although procedures exist both generally and in the South African mining sector, their application is often shaped by operational pressures and external stakeholder demands such as client dynamics.

4.2. Theme 2: Training and Capacity

The results show that generally, significant attention is paid to improving staff capacity since it is critical to the proper implementation of SC policies. This emphasis is mirrored in the South African mining sector through the following subthemes:

Subtheme 2.1: Formal Training

The narrative insights show that generally, formal training programs are regularly conducted so that employees can formally acknowledge and implement SC procedures. In the South African mining sector, Participant 1 affirmed this by saying, *"Yes, we do receive training on these policies and are required to acknowledge the receiving said training."* Participant 16 noted similar efforts in mining: *"Yes, training on SC policies and procedures is provided at African Rainbow Minerals (ARM)..."* Moreover, Participant 19 indicated the presence of internal support: *"We have an inhouse academy that provides training as per the relevant developed business manuals..."* These accounts indicate that structured training underpins SC capability both broadly and within the South African mining-specific operations.

Subtheme 2.2: On-the-Job Training

The results show that generally, on-the-job training serves as a primary approach to skills transfer, particularly during new system implementations. Highlighting the status in the mining sector, Participant 27 noted, *"Yes, mostly on-the-job training. Training is provided when there are new system implementations or updates..."* Participant 17 experienced this directly: *"...On-the-job training was done as I was taking over someone else's responsibility..."* Furthermore, Participant 10 added that this applies even to those not directly involved in SC activities: *"Yes, mostly on the job training as I am not directly involved in the SC activities."* Therefore, in the South African mining industry, on-the-job learning supplements formal training to meet immediate operational requirements.

4.3. Theme 3: Technological Tools

The results show that generally, modern SC processes are highly reliant on the assimilation of technological resources. In the South African mining sector, such tools enhance efficiency and decision making.

Subtheme 3.1: ERP and Integrated Systems

The results show that generally, Enterprise Resource Planning (ERP) systems are central drivers of SC management because they integrate core business processes. Regarding the South African mining sector, Participant 20 emphasized their prominence: *"...the well-known tools driving SC is software for enterprise resource management (ERP)..."* Participant 25 referenced implementation, saying *"...JDE Enterprise Resource Planning system..."* while Participant 10 stressed their operational value: *"...SAP is most critical for Capturing and scheduling of orders..."* These narratives affirm that ERP systems form the technological foundation of SC processes.

Subtheme 3.2: Specialized Software

The results show that generally, organisations utilise specialized software platforms to coordinate niche operations. In the mining sector, this occurs specifically in procurement and supplier management. Participant 23 emphasized cloud-based automation: *"...COUPA, a cloud-based procurement and spend management platform, automates supplier onboarding..."* Participant 21 added that they use *"...Procurement Platforms to help with Supplier Management..."* Similarly, for smaller-scale transactions, Participant 31 stated, *"...Zoho, for quotations and purchase orders, invoicing, and issuance of the monthly statements..."* Consequently, while ERP systems offer basic integration, specialized software optimizes specific financial and supplier processes.

4.4. Theme 4: Communication

The results show that generally, the efficient functioning of SC processes depends on sound communication. In the South African mining sector, this is important in the coordination of internal operations and enhance external relationships.

Subtheme 4.1: Internal Coordination

The results show that generally, there is high agreement on the need for internal coordination, specifically the de-siloing of departments to improve problem-solving. In terms of the mining sector status, Participant 13 explained, *"...departments must not work in silos and share information across the company..."* Participant 7 highlighted team synergies: *"...Cross-departmental teams improve problem-solving..."* Yet operational challenges persist as Participant 17 admitted: *"...We are currently operating in silos, which has resulted in poor communication..."* This demonstrates that while internal coordination is recognised as essential both generally and, in the mining, its practical implementation in the South African mining industry remains inconsistent.

Subtheme 4.2: External Communication

The results show that generally, effective SC practices are anchored on robust external communication and cooperative relationships with clients and suppliers. In the mining industry, Participant 4 emphasized collaboration: *"...we always collaborate with our customers in trying to draft the solutions..."* Ethical considerations were also noted as Participant 22 stressed, *"...transparency, competitiveness and being accountable..."* Thus, external communication is defined by transparency and long-term cooperation.

4.5. Theme 5: Customer Satisfaction

The results show that generally, customer satisfaction is a primary indicator of SC performance. This is achieved in the mining sector by relying heavily on consistent delivery and product quality.

Subtheme 5.1: Timely Delivery

The results show that generally, prompt delivery is a key performance indicator (KPI) of SC success because it guarantees product availability. In the mining context, Participant 4 noted that SC processes ensure *"...there is always a product available, and its delivered-on time..."* Participant 23 confirmed industry performance: *"Materials, equipment, and inputs are generally delivered on time."* Additionally, Participant 2 stressed strategic necessity: *"We deliver what is required at the right time and maintain the service level to remain competitive."* Therefore, results show that in the South African mining sector, timely delivery is critical due to production dependencies and limited tolerance for delays.

Subtheme 5.2: Quality Assurance

The results show that generally, SC operations play a critical role in providing high-quality products and value-added services. Specific to the mining sector, Participant 6 affirmed: *"...Good service is rendered to our clients in terms of supplying good quality product..."* Participant 7 reinforced value creation: *"SC processes provide a value-added service*

to the clients." Furthermore, Participant 10 highlighted systemic integration: *"...Integrated systems to link customer demand, ordering, and scheduling..."* These narratives indicate that quality assurance is embedded within SC systems generally and reinforced through integration in the South African mining operations.

4.6. Theme 6: Risk Management

The results show that generally, risk management is an intrinsic part of SC operations. In the context of South African mining sector, proactive contingency planning was found to be a priority.

Subtheme 6.1: Contingency Planning

The results show that generally, contingency planning is institutionalized within the SC framework so that mitigation controls exist at various organisational levels. In the mining sector, Participant 20 affirmed this methodical process: *"...All these key steps are at different levels in our organisation with appropriate risk management and mitigation controls..."* This suggests that contingency planning is a core, integrated component intended to protect operational continuity.

Subtheme 6.2: External Disruption Mitigation

The results show that generally, SC operations are designed to reduce the effects of external shocks, such as market volatility and strikes. Regarding the status in mining, Participant 9 mentioned *"External disruptions like strikes and fuel price fluctuations..."* while Participant 18 observed: *"...Somehow good as they manage to get what is needed when it is needed..."* Consequently, SC teams remain alert to unstable environments and implement mechanisms to ensure supply continuity in mining operations.

4.7. Theme 7: Procurement Strategy

The results show that generally, procurement is conducted strategically. In the South African mining sector, this shows that sourcing acts as a competitive advantage rather than a mere transaction.

Subtheme 7.1: Strategic Sourcing

The results show that generally, strategic sourcing is a primary method for procuring goods efficiently, often through centralized models. In mining, Participant 1 stated, *"...some goods and services can be strategically sourced with a shared services model..."* Participant 2 noted: *"...we deliver what is required at the right time and maintain the service level to remain competitive..."* Moreover, Participant 21 affirmed: *"...we have established systems for sourcing equipment, spare parts, and materials efficiently."* These results show that sourcing is systemized to optimise reliability in both general and mining-specific contexts.

Subtheme 7.2: Supplier Development

The results show that generally, local procurement policies support strategic goals while fostering a trustworthy supplier network. In the South African mining industry, Participant 16 attested: *"...supplier Development and Local Procurement Policy ensure alignment with company strategy..."* This has practical implications, as described by Participant 31: *"Develop a reliable supplier network and arrange transport for efficient deliveries..."* Thus, there is a clear commitment to developing suppliers rather than merely purchasing from them.

4.8. Theme 8: Inventory Management

The results show that generally, inventory management practices are essential for SC operational stability. In the mining sector such practices ensure materials are available when required while maintaining visibility across the chain.

Subtheme 8.1: Stock Control

The results show that generally, stock control is a key operational process since it requires regular inspections. In the South African mining sector, this is key in the management of essential inputs. Participant 28 illustrated this immediate need by referring to *"...stocktaking of reagents on a daily basis..."* Consequently, high-frequency inventory management is essential for maintaining schedules and avoiding stock-outs in the mining environment.

Subtheme 8.2: Tracking and Visibility

The results show that generally, organisations pursue full SC visibility by using technology to monitor end-to-end processes. Regarding the status in the South African mining sector, Participant 30 affirmed the implementation of advanced solutions: *"...end-to-end visibility tools to monitor the SC..."* As a result, the focus on tracking is technologically motivated and aimed at enhancing real-time decision-making and responsiveness to disruptions in mining supply chains.

4.9. Theme 9: Logistics

The results show that generally, logistics management aims to ensure effective transportation. In the South African mining sector, this is coupled with providing thorough assets monitoring during transit.

Subtheme 9.1: Transport Management

The results show that generally, efficient transport management is facilitated by robust infrastructure and advanced distribution systems. Specific to the South African mining sector, Participant 9 cited the use of *"...reliable transportation infrastructure (rail and road) ..."* while Participant 28 noted that *"...logistics arrange dispatches on time..."* Participant 23 further mentioned, *"...pipeline distribution systems to enhance delivery efficiency..."* Therefore, these narratives confirm that transport systems are generally key and central to mining SC performance.

Subtheme 9.2: Fleet and Delivery Tracking

The results show that generally, GPS and tracking devices are used regularly so that vehicles and goods are monitored for security and visibility. In the context of South African sector mining sector, Participant 7 stated the use of a *"...logistic tracking tool to assist with tracking vehicles on the road..."* and Participant 9 affirmed that *"...GPS vehicle tracking and inventory control systems are used..."* This indicates a high level of control over mobile assets within the mining logistics, which is essential for ensuring material security.

4.10. Theme 10: Governance

The results show that generally, effective governance serves as the foundation for SC processes. Within the South African mining sector, all activities must align with internal policies and ethical principles.

Subtheme 10.1: Compliance

The results show that generally, SC processes are strictly controlled by adherence to internal policies and external

rules. In the mining sector, this extends to health and safety rules. Participant 9 stated, *"Yes, we follow established internal SC management policies including supplier selection, logistics coordination, quality assurance, health and safety compliance, and procurement..."*
Participant 10 emphasized safety, noting that *"SHE policy provides direction and safe execution of SC activities."* Furthermore, Participant 31 added: *"...we always give preferences to local and B-BBEE suppliers to support local economic development..."* Thus, compliance spans safety, internal management, and socioeconomic requirements in mining SCs.

Subtheme 10.2: Ethical Procurement
The results show that generally, ethical behavior and compliance policies are major drivers that inform procurement decisions. Reflecting South African mining sector standards, Participant 16 described the holistic character of these guidelines, noting an *"...ethical Conduct and Compliance Policy"* and a *"Risk Management and Quality Assurance Policy..."* Participant 29 highlighted that *"...policies and procedures to guide management of the SC process is key..."* This emphasis shows a commitment to integrity, which is critical for reducing reputational risk in mining procurement.

4.11. Theme 11: Integration
The results show that generally, high levels of internal and external integration underpin modern SC processes. In the South African mining sector result shows that this is used to facilitate seamless data flow.

Subtheme 11.1: Interdepartmental Systems
The results show that generally, interdepartmental systems are actively used to connect SC transactions with other business functions. In the mining sector status, results show that this includes connections to finance. Participant 31 stated: *"...therefore SC transactions are linked with our financial system to improve cash flow monitoring..."* In addition, Participant 3 added: *"...we look at SC Management as an integrated process, followed by a simplified data flow process for managing the Materials Management cycle..."* This indicates a strategic attempt to dismantle internal barriers by using technology in the mining SCs.

Subtheme 11.2: End-to-end SC Visibility
The results show that generally, companies are adopting centralized software and data analytics to gain total visibility. In the South African mining sector specifically, Participant 3 stated: *"Centralised software system and automation improve SC process efficiency,"* while Participant 16 added: *"...data analytics and reporting tools improve decision-making..."* Therefore, technological integration raises the status of SC processes by offering real-time information in the mining SCs.

4.12. Theme 12: Performance Monitoring
The results show that generally, performance monitoring is a systematic and constant process. In the South African mining industry, it serves as an essential component of the SC structure.

Subtheme 12.1: Key Performance Indicators (KPIs)
The results show that generally, operational Key Performance Indicators (KPIs) are established to quantify effectiveness. In the South African mining sector, they are used to ensure competitiveness. Participant 19 listed focus areas such as *"Planning, Budgeting, Sourcing, Stock, Operational KPI's etc..."* These measures relate to service delivery, as Participant 2 stated: *"...deliver what is required at the right time and maintain the service level to remain competitive..."* This proves that KPIs are practically applied to measure performance against strategic objectives in the mining sector.

Subtheme 12.2: Continuous Improvement
The results show that generally, continuous improvement is a clear organizational goal. In the South African mining sector results shows that this is reached through frequent feedback and audits. Participant 21 confirmed: *"...our SC processes are improved constantly to support mining operations..."* and Participant 20 stated: *"...continuous improvement is achieved through feedback and audits..."* Moreover, Participant 28 noted that *"...refresher training is offered yearly to ensure all stakeholders are knowledgeable..."* Consequently, SC processes are proactively managed to remain flexible in the mining sector.

4.13. Theme 13: Organisational Culture
The results show that generally, organizational culture significantly influences SC performance. Regarding the status in the South African mining industry, this is particularly relevant regarding role clarity and leadership.

Subtheme 13.1: Leadership Accountability
The results show that generally, leadership establishes the standard for SC compliance. In the mining sector, results show that this is done by outlining roles and positioning the SC as a responsible unit. According to Participant 1, *"...all those directly or indirectly concerned with SC are required to adhere to these set out policies..."* Furthermore, Participant 5 validated this structural significance: *"...SC is an independent department within our organization and is responsible for responsible sourcing..."* This leadership positioning strengthens SC accountability in mining.

Subtheme 13.2: Staff Engagement
The results show that generally, involvement of members is actively promoted. In the mining sector, the results show that this is done so that internal knowledge and adherence to policies are maximised. Participant 29 observed that: *"...participation of members is always encouraged, helping to drive knowledge of the policies..."* Furthermore, Participant 12 noted: *"...training staff on SOPs ensures compliance."* This supports behavioural alignment in mining SCs.

4.14. Theme 14: Resource Allocation
The results show that generally, effective SC organisation depends on the strategic distribution of financial and human resources. This status is confirmed in the generally and in the mining sector through**:**

Subtheme 14.1: Budgeting

The results show that generally, financial resources and capital investments are primary enablers of SC operations. In the South African mining sector, results reveal that they ensure the efficiency of processes. Participant 29 stated: *"...financial resources are key to ensure effective management of the SC processes..."* while Participant 30 added: *"Capital and investments ensure all SC processes function efficiently..."* Thus, a specific budget is regarded as key to supporting system needs. in mining SCs.

Subtheme 14.2: Human Resources

The results show that generally, the constant improvement of human resources is vital to the skill levels of the SC. Reflecting the status in the South African mining sector, results reveal that competent staff are as important as technology. Participant 16 emphasized that *"...allocation of experienced staff ensures minimal delays..."* Moreover, Participant 31 mentioned: *"...upskilling our labour force is key to efficiency in our SC processes..."* This emphasis on human capital demonstrates that skilled personnel are required for a high-performing mining SCs.

4.15. Theme 15: Industry Specific Factors

The results show that generally, SC processes are influenced by their specific industrial context. In the South African mining industry, SC processes depend heavily on production requirements and stringent regulatory standards.

Subtheme 15.1: Mining Operational Alignment

The results show that specifically in the South African mining sector, the supply chain is inherently related to production so that it can maintain a smooth flow of commodities. Participant 16 explained: *"ARM's SC supports mining operations across several commodities... and therefore plays a critical role in maintaining smooth production and delivery..."* Moreover, Participant 28 stated: *"...mining underground supply enough material to keep the plant running..."* Therefore, the SC functions as a vital engine for combined mining production. This confirms the production-driven nature of mining SCs.

Subtheme 15.2: Regulatory Compliance

The results show that generally, regulatory adherence is standard; however, in the South African mining industry, compliance—especially regarding Safety, Health, and Environment (SHE)—is obligatory and core to all mining SC operations. Participant 31 added: *"...complying with customs duties and HSE policies is mandatory..."* while Participant 10 stated: *"Safety, Health and Environment (SHE) Policy is key to SC."* These reports affirm that regulatory safety is an a priori requirement for SC operations in the South African mining sector.

5. Discussion of Findings

The discussion interprets the findings through the integrated theoretical framework drawing primarily on Network Theory, Resource-Based Theory (RBT), and SERVQUAL, while engaging relevant empirical literature. Rather than reiterating descriptive patterns, the discussion uses theory as an analytical lens to interrogate how supply chain (SC) processes currently function, where they fracture, and why these fractures persist within the South African mining sector. In doing so, the discussion positions the mining context not merely as an empirical setting but as a theoretically generative space that exposes the limits of linear, maturity-based, and best-practice SCM assumptions. The discussion is anchored in a specific theme (Theme 1–Theme 15) and advances a theoretically meaningful interpretation of the findings, culminating in a consolidated response to the research question on the current state of SC processes in South Africa.

Theme 1: *Policy Adherence* reveals that supply chain processes are formally structured but unevenly enacted, indicating a state of procedural robustness coupled with operational fragility. Generally, the presence of standard SC policies (Subtheme 1.1) and documented procedures (Subtheme 1.2) align with global SCM prescriptions that emphasize codification as a foundation for control and predictability (Sanders, 2025). In the South African mining sector, participants confirmed the existence and periodic renewal of policy frameworks, suggesting alignment with governance expectations (Theme 10) and performance monitoring systems (Theme 12). However, the conditional application of procedures based on client demands or situational pressures reveals a gap between formal compliance and enacted practice, a tension also observed by Loewald *et al*. (2021) [31] in infrastructure-constrained contexts. Network Theory helps explain this inconsistency by showing that policy effectiveness depends on relational coordination rather than mere documentation (Zhao *et al*., 2020) [71]. These findings challenge linear SCM models that assume policy presence equates to process stability. Ultimately, the status of SC processes is one of formal maturity but relational vulnerability, particularly acute in mining operations exposed to external pressures.

Theme 2: *Training and Capacity* indicate that supply chain capability is institutionally recognised yet unevenly institutionalised, shaping the effectiveness of downstream SC processes. Generally, both formal training (Subtheme 2.1) and on-the-job learning (Subtheme 2.2) are used to build SC competence, reflecting SERVQUAL's emphasis on assurance and reliability as performance enablers (Dovbischuk, 2023) [55]. In the South African mining sector, structured training academies coexist with ad hoc experiential learning, especially during system transitions, suggesting a hybrid capability model. While RBT would interpret training investments as attempts to develop valuable and inimitable resources (Barney, 2001) [5], the findings reveal that skills development is often reactive rather than strategically orchestrated. This aligns with Loury-Okoumba and Mafini's (2021) [32] observation that skills lag frequently undermines technological investments in African supply chains. Theoretically, the findings extend RBT by illustrating that resource value is contingent on timing and integration, not merely possession. Consequently, SC processes remain functional but brittle, with capacity gaps amplifying systemic risk in mining operations.

Theme 3: *Technological Tools* demonstrates that the current state of SC processes is technologically enabled yet digitally fragmented. Generally, ERP systems (Subtheme 3.1) form the backbone of SC integration, consistent with global SCM models that prioritise data centralisation and process visibility (Queiroz *et al*., 2021) [44]. In the South African mining sector, widespread use of SAP, JDE, and specialised

platforms (Subtheme 3.2) suggests a relatively advanced digital infrastructure compared to other developing contexts. However, empirical literature cautions that technology adoption does not automatically translate into performance gains when organisational readiness is weak (Zulu *et al*., 2021; Muhammed *et al*., 2025) [68, 36]. Network Theory explains this gap by highlighting misalignments between technological nodes and human actors, which disrupt information flows (Bhamra *et al*., 2025) [7]. These findings therefore challenge the assumption of technological determinism in SCM theory. The status of SC processes is thus digitally ambitious but socio-technically constrained, particularly in mining environments where system integration is uneven.

Theme 4: *Communication* reveals that SC processes are conceptually integrated but practically siloed, reflecting a partial realisation of networked coordination. Generally, internal coordination (Subtheme 4.1) and external communication (Subtheme 4.2) are recognised as critical enablers of SC integration (Theme 11). In the mining sector, while collaborative intent is evident, persistent silo behaviour undermines end-to-end process alignment, corroborating findings by Masenya and Aroba (2025) [34]. Network Theory directly supports these results by positing that communication quality determines network effectiveness more than structural design alone (Zhao *et al*., 2020) [71]. The inconsistency between espoused collaboration and lived fragmentation exposes a theoretical blind spot in SCM models that overestimate managerial intentionality. These findings suggest that the status of SC processes is communicatively aware but structurally misaligned, limiting adaptive responsiveness in mining supply chains.

Theme 5: *Customer Satisfaction* positions SC processes as outcome-oriented yet operationally constrained, particularly under mining-specific production pressures. Generally, timely delivery (Subtheme 5.1) and quality assurance (Subtheme 5.2) reflect SERVQUAL's core dimensions of reliability and responsiveness (Ramya *et al*., 2019) [47]. In the South African mining sector, the criticality of uninterrupted production amplifies the consequences of delivery failures, aligning with Muzaffar's (2025) [37] argument that mining SCs operate with minimal slack. However, while participants report high delivery reliability, broader literature highlights systemic logistics inefficiencies that contradict this perception (Loewald *et al*., 2021) [31]. This tension suggests a perceptual-performance gap, challenging SERVQUAL's assumption that perceived quality reliably reflects operational reality. Theoretically, the findings imply that customer satisfaction in mining SCs is often locally optimised rather than systemically assured. Thus, the current SC status is performance-focused but structurally fragile.

Theme 6: *Risk Management* shows that SC processes are risk-aware but structurally exposed, reflecting a defensive rather than anticipatory posture. Generally, contingency planning (Subtheme 6.1) and disruption mitigation (Subtheme 6.2) align with established risk management frameworks (Ho *et al*., 2015; Aqlan & Lam, 2015) [22, 3]. In the mining sector, exposure to strikes, fuel volatility, and regulatory shocks confirms Factor Market Rivalry Theory's emphasis on external uncertainty (Markman *et al*., 2009) [35]. However, the reliance on mitigation rather than transformation indicates that risk is managed within existing structures rather than prompting structural redesign. This challenges dominant SCM theories that equate risk awareness with resilience. The status of SC processes is therefore risk-conscious but adaptation-limited, particularly in South Africa's volatile mining environment.

Theme 7: *Procurement Strategy* illustrates that sourcing practices are strategically framed yet resource constrained. Generally, strategic sourcing (Subtheme 7.1) and supplier development (Subtheme 7.2) are aligned with RBT's view of procurement as a competitive lever (Barney, 2001) [5]. In the South African mining sector, local procurement and supplier development are also shaped by regulatory and socio-economic imperatives, extending procurement beyond efficiency goals (Ngcobo *et al*., 2025) [39]. However, resource allocation constraints (Theme 14) often limit the depth of supplier development, echoing Njagi's (2023) [41] critique of policy-driven procurement without capability investment. Theoretically, these findings suggest that procurement strategy in mining operates under competing institutional logics. Consequently, SC processes exhibit strategic intent but uneven execution.

Theme 8: *Inventory Management* indicates that SC processes prioritise availability over cost optimisation, reflecting production-driven logic. Generally, stock control (Subtheme 8.1) and visibility (Subtheme 8.2) are foundational to operational stability. In mining, high-frequency stocktaking and real-time tracking underscore the sector's intolerance for material shortages. While technology supports visibility, empirical literature notes that infrastructure bottlenecks often negate these gains (Loewald *et al*., 2021) [31]. Network Theory explains this by highlighting dependencies between inventory nodes and logistics performance (Theme 9). The status of SC processes is therefore availability-focused but cost-intensive.

Theme 9: *Logistics* reveals that logistics capability is a decisive determinant of SC performance in the mining sector. Generally, transport management (Subtheme 9.1) and fleet tracking (Subtheme 9.2) align with global logistics best practices. In South African mining, reliance on rail, road, and pipelines exposes SC performance to systemic infrastructure decay, a point emphasised by Lumadi and Nyasha (2024) [33]. This contradicts SCM models that assume stable logistics environments. Theoretically, the findings extend Network Theory by foregrounding physical infrastructure as a non-negotiable network constraint. Thus, SC processes are operationally sophisticated but structurally vulnerable.

Theme 10: *Governance* confirms that SC processes are compliance-driven and ethically framed, particularly in mining. Generally, compliance (Subtheme 10.1) and ethical procurement (Subtheme 10.2) align with governance-centric SCM models (Cartwright *et al*., 2023) [12]. In the mining sector, SHE and B-BBEE requirements elevate governance to a central coordinating mechanism (Theme 1). However, Enaifoghe *et al* (2024) [18] notes that formal governance often coexists with informal practices, a tension echoed in the findings. The status of SC processes is thus normatively strong but enforcement sensitive.

Theme 11: *Integration* shows that SC processes aspire to end-to-end visibility but achieve partial connectivity. Generally, interdepartmental systems (Subtheme 11.1) and end-to-end visibility (Subtheme 11.2) are hallmarks of advanced SCM. In mining, integration with finance and analytics platforms supports decision-making, aligning with Queiroz *et al*. (2021) [44]. Yet silo persistence (Theme 4) limits full integration, challenging maturity-stage SCM models. Theoretically, the findings suggest integration is emergent rather than linear. SC processes are therefore semi-integrated and unevenly synchronised.

Theme 12: *Performance Monitoring* indicates that SC processes are measurement-intensive yet learning-constrained. Generally, KPIs (Subtheme 12.1) and continuous improvement (Subtheme 12.2) reflect performance-oriented SCM logic (Monczka *et al*., 2020) [38]. In mining, frequent audits and feedback loops exist, but improvement often targets compliance rather than innovation. This supports critiques that KPI regimes can entrench path dependency (Clegg, 2023) [14]. The status of SC processes is thus controlled but not necessarily transformative.

Theme 13: *Organisational Culture* highlights that SC processes are leadership-driven but behaviourally uneven. Generally, leadership accountability (Subtheme 13.1) and staff engagement (Subtheme 13.2) support policy adherence and integration. In mining, formal role clarity strengthens accountability, yet engagement varies across levels. This aligns with Bhamra *et al*.'s (2025) [7] view that culture mediates network effectiveness. SC processes are therefore culturally anchored but inconsistently internalised.

Theme 14: *Resource Allocation* shows that SC processes are resource-dependent and investment-sensitive. Generally, budgeting (Subtheme 14.1) and human resources (Subtheme 14.2) underpin SC capability. In mining, capital intensity amplifies the consequences of misallocation. RBT supports these findings by framing resources as performance determinants (Barney, 2001) [5], yet the data reveal trade-offs between technology and skills. The status of SC processes is thus investment-aware but allocation-constrained.

Theme 15: *Industry-Specific Factors* confirms that SC processes in mining are production-driven and regulation-bound. Generally, industry context shapes SC design, but in South African mining, operational alignment (Subtheme 15.1) and regulatory compliance (Subtheme 15.2) dominate all processes. This supports Ketels' (2016) [16] argument that sectoral conditions redefine SCM logic. Theoretically, the findings challenge universal SCM models by foregrounding context-specific constraints. SC processes are therefore highly contextualised and structurally rigid.

Ultimately, the research question—*What is the current state of supply chain processes in South Africa: insights from the mining sector?* —is answered by demonstrating that SC processes are formally developed, technologically enabled, and governance-driven, yet operationally fragmented, resource-constrained, and contextually bounded. By mobilising Network Theory, RBT, and SERVQUAL as both interpretive lenses and engines of theoretical extension, the study shows that South African mining supply chains expose critical limitations in linear, maturity-based SCM frameworks. The central theoretical contribution lies in revealing how interdependencies, contextual rigidity, and institutional pressures reconfigure supply chain processes in ways that existing models insufficiently explain, thereby advancing SCM theory toward a more relational, contingent, and context-sensitive understanding.

6. Conclusion and Recommendations

This study set out to explore the current state of supply chain (SC) processes in South Africa, with specific insights from the mining sector, and the findings demonstrate a paradoxical condition of formal advancement alongside operational fragility. Drawing on an integrated framework of Network Theory, Resource-Based Theory (RBT), and SERVQUAL, the study concludes that South African mining supply chains are characterised by well-established policies, governance structures, technological systems, and performance monitoring mechanisms (Themes 1, 3, 10, and 12), yet these strengths are undermined by fragmented implementation, uneven capability development, siloed communication, and strong contextual constraints (Themes 2, 4, 11, 14, and 15). While ERP systems, ethical procurement standards, and KPI regimes signal alignment with global SCM best practices (Queiroz *et al*., 2021; Cartwright *et al*., 2023) [44, 12], their effectiveness is mediated by relational coordination failures, skills gaps, infrastructure decay, and regulatory rigidity, which Network Theory helps to explicate (Zhao *et al*., 2020; Lumadi & Nyasha, 2024) [71, 33]. From an RBT perspective, SC resources—such as technology, human capital, and supplier relationships—are present but not consistently orchestrated to yield sustained competitive advantage (Barney, 2001) [5], while SERVQUAL-based outcomes like reliability and responsiveness are locally achieved but systemically vulnerable (Ramya *et al*., 2019; Loewald *et al*., 2021) [47, 31]. Overall, the current state of SC processes in South African mining can be described as governance-driven, technologically enabled, and performance-aware, yet relationally brittle, resource-constrained, and deeply shaped by mining-specific operational

Based on these conclusions, the study recommends a shift from compliance-oriented and functionally siloed SC management toward a relationally integrated and capability-driven approach that explicitly addresses interdependencies across themes. First, mining firms should strengthen cross-functional and inter-organisational coordination by institutionalising network-based governance forums that link policy adherence, communication, integration, and performance monitoring (Themes 1, 4, 10, 11, and 12), thereby translating formal rules into enacted practice (Zhao *et al*., 2020) [71]. Second, sustained investment in human capital development should be prioritised alongside digitalisation, ensuring that training and capacity-building (Theme 2) are strategically aligned with technological tools and analytics systems (Themes 3 and 11), in line with RBT's emphasis on complementary resources (Barney, 2001; Loury-Okoumba & Mafini, 2021) [5, 32]. Third, procurement strategy and supplier development initiatives (Theme 7) should be better resourced and integrated with risk management and logistics planning (Themes 6 and 9) to enhance resilience against infrastructure failures, labour disruptions, and market volatility (Ho *et al*., 2015; Lumadi & Nyasha, 2024) [22, 33]. Finally, policymakers and industry leaders should recognise the structurally rigid and

production-driven nature of mining supply chains (Theme 15) and design context-sensitive SCM frameworks that balance regulatory compliance, sustainability imperatives, and operational flexibility, rather than relying on linear or maturity-based SCM models (Ketels, 2016; Loewald *et al*., 2021) [16, 31].

Collectively, these recommendations aim to transform South African mining supply chains from formally robust but operationally fragile systems into relationally resilient, strategically integrated, and context-responsive networks.

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