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Exploring the Role of Effective Supply Chain Management in Enhancing Organizational Competitiveness

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Abstract
In an era of intensifying global competition and operational volatility, supply chain management (SCM) has become a decisive strategic capability for organisations operating in resource-intensive industries such as mining. This study aims to explore the role of effective supply chain (SC) management in enhancing organisational competitiveness within the South African mining sector. The study is academically significant as it addresses a persistent gap in SCM literature on mining in developing economies by integrating Resource-Based Theory, Network Theory, and the SERVQUAL model, while practically it responds to industry challenges of declining productivity, rising costs, and reputational pressures. An interpretivist qualitative research design was adopted, employing a deductive exploratory approach. Data were collected through semi-structured interviews with 31 senior supply chain practitioners drawn from 16 mining organisations and 15 general sectors, analysed using thematic analysis supported by ATLAS.ti.25. The findings reveal that effective SC processes enhance competitiveness through improved operational efficiency, cost management, customer satisfaction, risk management, technological integration, human resource development, reputational strength, sustainability, and positive community and socio-economic impact, with these dimensions operating as an interdependent network of capabilities rather than isolated factors. The study concludes that SC effectiveness constitutes a systemic and multidimensional source of competitive advantage in the mining sector, thereby filling a theoretical gap by demonstrating how strategic, relational, and service quality perspectives jointly explain competitiveness. Practically, the study highlights the need for mining managers to adopt an integrated, strategically governed SCM approach and proposes a quality service framework to guide investments in technology, skills development, risk management, and sustainable supply chain practices to strengthen long-term organisational competitiveness.

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1. Introduction

Supply chain management (SCM) has increasingly become a central organisational capability through which firms seek to achieve and sustain competitiveness in global markets. In resource-intensive industries such as mining, supply chains are not merely operational support systems but constitute the nucleus of production, value creation, and service delivery processes (Navarrete-Cruz and Birkenberg, 2024) [50]. The mining sector, particularly in developing economies, is characterised by complex, capital-intensive, and geographically dispersed supply networks that span sourcing, logistics, processing, distribution, and export markets. Consequently, the effectiveness of supply chain (SC) processes has emerged as a critical phenomenon

influencing organisational competitiveness, operational efficiency, and long-term sustainability in the mining industry.

The academic and practical importance of understanding effective SCM in the mining sector is underscored by the sector's substantial contribution to economic growth, employment creation, export earnings, and fiscal revenues. Globally, mining contributes over 10% of GDP in many economies, while in Africa the sector plays a particularly strategic role due to the continent's possession of approximately 30% of the world's mineral reserves (Zhou, 2025; Tost, 2025) [70, 65]. South Africa, as one of the world's most prominent mining countries, features among the top global producers of gold, platinum, manganese, chrome, coal, and diamonds (Leighton, 2024) [33]. Despite this strong resource endowment, the sector has experienced declining productivity, output volatility, and eroding global market share in key commodities (Lumadi and Nyasha, 2024) [39]. These trends raise a fundamental question for scholars and practitioners alike: why resource-rich mining firms struggle to translate mineral endowments into sustained competitive advantage, and whether ineffective SC processes constitute a critical explanatory factor.

Prior research has widely acknowledged that effective SC processes enhance organisational performance by improving cost efficiency, responsiveness, service quality, and market positioning (Anggay and Hamiche, 2021; Lima, 2025) [2, 36]. In mining contexts, SC failures—particularly in logistics coordination, procurement integration, and service delivery—have been identified as key sources of production disruption and competitive decline (Wincewicz-Bosy, Dymyt and Wasowska, 2021; Mathu, 2014; Malebana, 2024) [68, 43, 41].

Theoretically, this study draws on Resource-Based Theory (RBT) to conceptualise effective SC processes as strategic organisational resources that are valuable, rare, and difficult to imitate, thereby enabling firms to achieve sustained competitive advantage (Kero, and Bogale, 2023) [30]. Network Theory further explains competitiveness in mining as an outcome of coordinated inter-organisational relationships among suppliers, logistics providers, regulators, and customers, where value is co-created through integration and trust across the SC network (Abdelilah, Korchi and Balambo, 2025) [1]. In addition, the SERVQUAL model provides a service-oriented lens to evaluate how SC process quality—reflected in reliability, responsiveness, timeliness, and efficiency—shapes service delivery outcomes and market competitiveness in industrial settings (Li, Li, Tang, and Sun, 2022) [34].

Despite the richness of SCM literature, significant gaps remain. Existing studies predominantly focus on manufacturing and service sectors, with limited empirical attention given to mining supply chains in developing economies such as South Africa (Hu, Wang and Elshkaki, 2024; Osei *et al*., 2023) [26, 51]. Moreover, while SCM and quality management have increasingly been studied as complementary disciplines, few studies integrate service quality perspectives (e.g., SERVQUAL) with strategic theories such as RBT and Network Theory to explain competitiveness in mining contexts. This fragmentation has resulted in an incomplete understanding of how SC process effectiveness translates into service delivery quality and organisational competitiveness in mining firms. This study addresses this gap by empirically examining SC processes as strategic and relational capabilities that shape competitive outcomes in the South African mining sector.

Against this background, the core research question guiding this study is: What is the significance of effective supply chain processes on the competitiveness of the South African mining sector? The primary objective is to explore how efficient SC processes enhance organisational competitiveness within mining firms. The study is conducted within the context of the South African mining industry, a globally significant yet performance-challenged sector. The levels of analysis span the organisational and inter-organisational levels, focusing on mining firms and their supply chain networks rather than individuals or teams. Key constructs of interest include SC process efficiency, service delivery quality, organisational resources and capabilities, network coordination, and competitiveness outcomes.

The study contributes to theory by testing the propositions of Resource-Based Theory and Network Theory within a mining SCM context, while extending SERVQUAL beyond traditional service industries into industrial supply chains. By integrating these theoretical perspectives, the study advances programmatic knowledge on how SC processes function as both internal strategic resources and external relational mechanisms that jointly enhance competitiveness. Practically, the study proposes a quality service framework for Mining Supply Chain Management (MSCM) that offers actionable guidance for improving SC efficiency, service delivery, and competitive positioning in the South African mining sector.

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 analyses the findings, after which the discussion links the results to theory and practice. The article concludes by outlining implications, limitations, and directions for future research.

2. Literature Review

The global business environment has undergone a radical transformation where traditional operational silos are being replaced by integrated supply chain networks. Supply Chain Management (SCM) has increasingly become a central organisational capability through which firms seek to achieve and sustain competitiveness in volatile global markets (Navarrete-Cruz and Birkenberg, 2024) [50]. Within the context of resource-intensive industries, supply chains are no longer viewed merely as operational support systems but rather as the nucleus of production, value creation, and service delivery (Navarrete-Cruz and Birkenberg, 2024) [50]. This literature review explores the intricate relationship between effective supply chain processes and organisational competitiveness, with a specific focus on the South African mining sector. By adopting a broad-to-narrow approach, the following sections synthesize current scholarship, identify critical operational gaps, and establish the theoretical and conceptual boundaries of the study.

This review systematically unpacks the evolution of SCM from a logistical function to a strategic driver of competitive advantage. In mining contexts, the effectiveness of supply chain (SC) processes has emerged as a critical phenomenon influencing organisational efficiency and long-term sustainability (Mathu, 2014; Malebana, 2024) [43, 41]. The subsequent discussion will evaluate global and local

perspectives while contrasting various theoretical models such as Resource-Based Theory and Network Theory. Ultimately, the section aims to clarify how effective SCM addresses the declining productivity and output volatility currently plaguing the South African mining industry (Lumadi and Nyasha, 2024) [39]. Through this critical engagement, the study situates itself within the broader academic discourse to justify the development of a quality service framework for mining operations.

2.1. Empirical Literature

2.1.1. Global Perspectives on SCM and Organisational Competitiveness

Effective supply chain management serves as the primary engine for enhancing organisational performance by improving cost efficiency, responsiveness, and market positioning across various global sectors. According to Sanders (2025), SCM involves the strategic coordination of a network responsible for providing products and services to meet evolving market needs. While traditional views focused primarily on cost reduction, contemporary scholars like Anggay and Hamiche (2021) argue that the true value of SCM lies in its ability to enhance service quality and service delivery outcomes. Consequently, firms that master these processes can achieve a superior competitive position compared to those that treat logistics as a secondary concern. The global marketplace now demands that supply chains be agile and integrated to survive the pressures of international competition (Lima, 2025).

The relationship between SCM and competitiveness is further complicated by the diverse ways in which different industries define "effectiveness." For instance, Naslund and Williamson (2010) suggest that SC processes must span the entire lifecycle from raw material acquisition to final customer delivery to be truly effective. In contrast, other authorities emphasize that the planning stage is the most foundational element because it shapes the coordination among all downstream stakeholders (Goh, and Eldridge, 2024). Although these perspectives differ in focus, they collectively highlight the interdependence of supply chain components in achieving organisational goals. This global understanding suggests that competitiveness is not merely an internal metric but a result of how well a firm integrates with its external partners. Therefore, global supply chain excellence is increasingly defined by the ability to co-create value through transparency and trust across the network (Abdelilah, Korchi and Balambo, 2025) [1].

2.1.2. The Strategic Significance of Mining Supply Chains in Africa

The mining sector occupies a strategic role in the economic growth of developing nations due to its substantial contribution to export earnings and fiscal revenues. Globally, mining contributes over 10% of GDP in many economies, yet its impact is most profound in Africa, where the continent holds approximately 30% of the world's mineral reserves (Tost, 2025) [65]. Because mining operations are capital-intensive and geographically dispersed, the supply chains supporting them must be exceptionally robust. Leighton (2024) notes that South Africa remains a top global producer of platinum, gold, and manganese, making its mining supply chain a matter of national economic security. However, despite this wealth of resources, many African mining firms struggle to maintain their global market share due to logistical bottlenecks.

The disconnect between mineral endowment and sustained competitive advantage suggests that resource wealth alone is insufficient for success. Lumadi and Nyasha (2024) observe that the South African mining sector has experienced declining productivity and eroding market share in key commodities over the past decade. This trend raises the question of whether ineffective SC processes constitute a critical explanatory factor for this decline. While some researchers focus on labor unrest or regulatory shifts, others argue that the failure to optimize logistical models is the primary culprit (Tucker, Viljoen and Viljoen, 2016). Consequently, the significance of effective supply chain processes becomes evident when one considers how disruptions in service delivery can halt production entirely. Because the sector is a major employer, the health of its supply chain directly affects the livelihoods of thousands of workers and the broader social stability of the region.

2.1.3. Critical Risks and Challenges in Mining Supply Chain Processes

Mining supply chains face unique risks and disruptions that are often more severe than those found in the manufacturing or retail sectors. These challenges stem from remote locations, limited supplier options, and a high dependency on specialized inputs that are difficult to source (Hamdy and Zaazou, 2024; Jitta *et al*., 2025) [22, 29]. Ho *et al*. (2015) categorize these risks into demand, delay, disruption, inventory, and production risks, all of which can lead to massive operational instability. Because mining is a continuous process, even a minor delay in the delivery of a critical component can result in significant financial losses. Furthermore, the lack of standardized systems often prevents mining firms from having clear visibility into their upstream supply tiers (Chan *et al*., 2021).

In addition to environmental and geographical risks, structural inefficiencies within the firm often exacerbate supply chain failures. Suwandi (2025) highlights that supplier concentration risks and aging equipment frequently lead to poor performance and production disruptions. This is exemplified by cases like the Hwange Colliery Company, where capacity challenges were directly linked to logistical and procurement failures (Mathe and Motsaathebe, 2025). Although some firms attempt to mitigate these issues through increased inventory, this often leads to higher holding costs and reduced liquidity. Therefore, the challenge lies in balancing the need for resilience with the requirement for cost-efficient distribution (Islam *et al*., 2024). Without a strategic approach to these risks, mining firms remain vulnerable to external shocks that undermine their competitive positioning.

2.1.4. Technological and Ethical Dimensions of SCM Efficiency

The modern mining supply chain is increasingly reliant on data-driven decision-making, yet many firms continue to struggle with technological integration. Poor data quality and insufficient analytical capabilities often limit the ability of managers to conduct accurate Total Cost of Ownership (TCO) analyses (Ulfath *et al*., 2025; Muhammed *et al*., 2025) [67, 48]. According to Suganthi *et al*. (2025), weak cost breakdown systems prevent firms from identifying the hidden expenses within their procurement cycles. Although advanced technologies like AI and blockchain offer potential

solutions, the high cost of implementation remains a significant barrier for many operations. Consequently, a digital divide persists between leading global mining houses and smaller regional players.

Beyond technology, the ethical dimension of SCM plays a vital role in determining the long-term sustainability and reputation of mining organisations. Unethical behavior in procurement remains a prevalent issue in South Africa despite the presence of robust regulatory frameworks like the Constitution (1996) and anti-corruption legislation (Enaifoghe, 2024) [18]. Cartwright *et al*. (2023) [10] argue that an ethical culture and strong governance are essential for maintaining supplier integrity and minimizing reputational risk. Conversely, when corruption or nepotism enters the supply chain, it inevitably leads to higher costs and inferior service quality (Mbu and Nso, 2022). Therefore, the selection of suppliers must extend beyond price and capacity to include considerations of legal compliance and shared values (Anggay and Hamiche, 2021). Building trust within the supply chain network is thus both an ethical imperative and a strategic necessity.

2.1.5. SCM and Service Delivery Quality in South African Mining

The South African mining sector presents a unique case where historical reliance on resource extraction has sometimes overshadowed the need for service-oriented supply chain excellence. Historically, the sector focused more on technological acquisition for extraction rather than on sophisticated logistical optimization models (Tucker, Viljoen and Viljoen, 2016). However, the shift toward a more competitive global market has forced a re-evaluation of how service delivery quality impacts the bottom line. Li, Li, Tang, and Sun (2022) suggest that dimensions of service quality—such as reliability, responsiveness, and timeliness—are just as critical in industrial settings as they are in the service industry. This means that a mining firm's competitiveness is directly tied to how well its supply chain supports internal production "customers."

The significance of effective processes in this context cannot be overstated, as they form the backbone of the entire value chain. When SC processes are efficient, they enable the firm to respond more quickly to market fluctuations and customer demands (Sun, and Xu, 2025) [62]. On the other hand, failures in procurement integration or logistics coordination have been identified as primary sources of competitive decline in South African mines (Wincewicz-Bosy, Dymyt and Wasowska, 2021) [68]. Because the industry is currently facing performance challenges, there is an urgent need for a mining-specific quality service framework (Ketels, 2016) [31]. This study addresses this need by examining how these processes function as strategic capabilities. Ultimately, the goal is to transform the South African mining supply chain into a source of sustained competitive advantage through improved service delivery and productivity.

2.1.6. Synthesis of Literature and Identified Gap in Knowledge

The reviewed literature establishes that while SCM is a recognized driver of competitiveness, its application within the mining sector of developing economies remains under-researched. Existing studies have predominantly focused on the manufacturing and service sectors, often ignoring the unique capital-intensive and high-risk nature of mining (Hu, Wang and Elshkaki, 2024; Osei *et al*., 2023) [26, 51]. While scholars like Barney (2001) and Zhao *et al*. (2020) provide strong theoretical foundations through Resource-Based Theory and Network Theory, these frameworks are rarely integrated with service quality models like SERVQUAL in a mining context. Consequently, there is a fragmentation in the literature that fails to explain how internal strategic resources and external relational mechanisms jointly enhance competitiveness.

The primary gap identified is the lack of a mining-focused quality service framework that accounts for the specific operational and ethical challenges of the South African environment. Although general SCM strategies exist, they often fail to address the "resource-rich but performance-challenged" paradox observed in South Africa (Lumadi and Nyasha, 2024) [39]. This study builds on this gap by empirically examining supply chain processes as both strategic and relational capabilities. By situating the research within the South African mining sector, the study seeks to provide actionable guidance for improving efficiency and competitive positioning. This research will fill the identified niche by testing propositions of strategic theories within this unique industrial setting.

2.2. Theoretical Framework

The theoretical framework for this study is primarily grounded in Network Theory, supported by Resource-Based Theory (RBT) and the SERVQUAL model. Network Theory is particularly relevant because it examines the interconnected relationships among actors, systems, and processes within complex environments (Zhao *et al*., 2020) [70]. In the context of mining, this theory explains competitiveness as an outcome of coordinated inter-organisational relationships among suppliers, logistics providers, and regulators (Abdelilah, Korchi and Balambo, 2025) [1]. Because value is co-created through integration and trust across the network, this theory allows the researcher to analyze the mining supply chain as a series of vertices and edges linked by information and resource flows (Bhamra *et al*., 2025) [7].

Complementing this, Resource-Based Theory (RBT) posits that internal resources and capabilities are the true sources of sustainable competitive advantage (Barney, 2001) [4]. Using the VRIO framework (Valuable, Rare, Inimitable, and Organized), RBT helps conceptualize effective supply chain processes as strategic organisational assets that are difficult for competitors to replicate (Chatterjee *et al*., 2025) [14]. Furthermore, the SERVQUAL model provides a service-oriented lens to evaluate the quality of these processes through five dimensions: reliability, assurance, tangibles, empathy, and responsiveness (Ramya, Kowsalya and Dharanipriya, 2019) [55]. By integrating these theories, the study develops a holistic perspective that accounts for both internal operational strengths and external relational dynamics.

2.3. Conceptual Framework

The conceptual framework for this study illustrates the relationship between Effective Supply Chain Processes (the independent variable) and Organisational Competitiveness (the dependent variable).

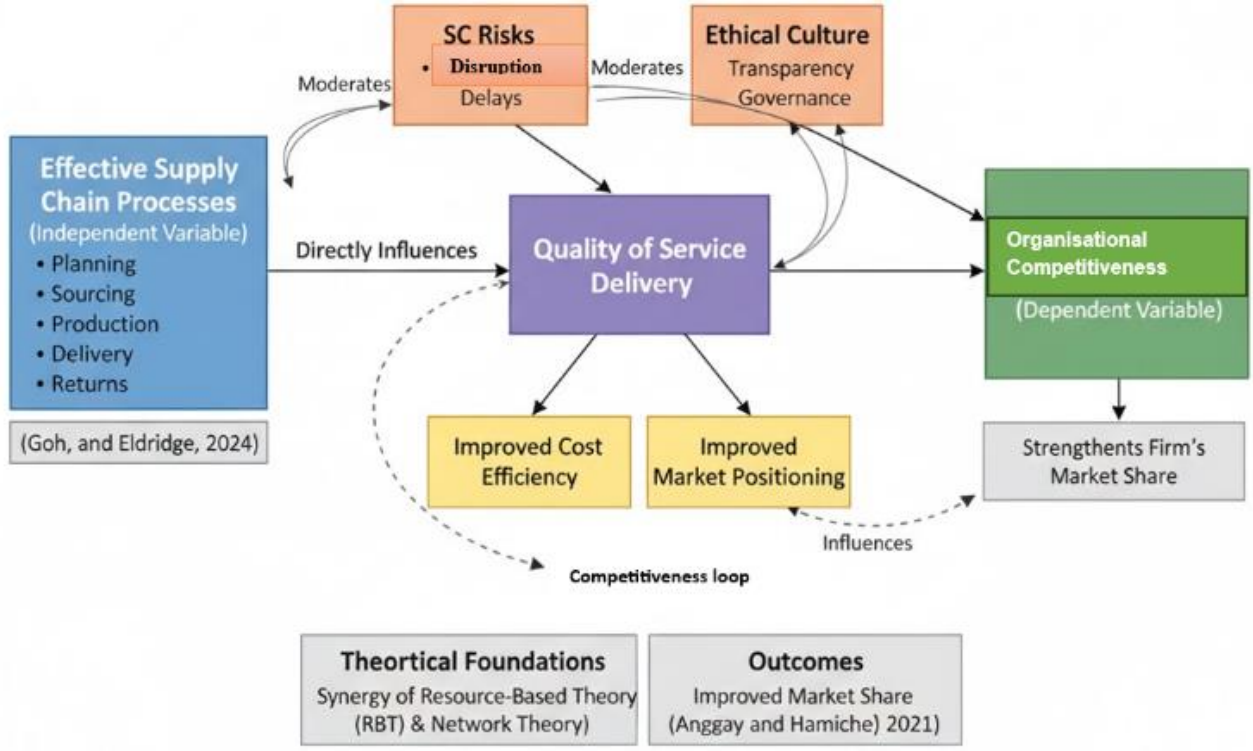

Fig 1: Conceptual Framework: Supply Chain Efficiency and Market Competitiveness

At the heart of this framework is the idea that SC efficiency—encompassing planning, sourcing, production, delivery, and returns—directly influences the quality-of-service delivery within the mining firm (Goh, and Eldridge,2024) [21]. As defined by the integrated theories, these processes act as the "engine" that transforms raw inputs into competitive outputs. The framework suggests that when a firm achieves high levels of reliability and responsiveness in its supply chain, it experiences improved cost efficiency and market positioning (Anggay and Hamiche, 2021) [2].

Furthermore, the framework incorporates moderating factors such as SC Risks (disruptions and delays) and Ethical Culture (transparency and governance) that can either facilitate or hinder this relationship. According to Clegg (2023) and Gartner *et al*. (2022), a robust conceptual model must link supplier quality directly to performance outcomes to be effective. This study proposes that the synergy between internal resources (RBT) and external coordination (Network Theory) creates a "competitiveness loop" where efficient processes lead to better service, which in turn strengthens the firm's market share. This conceptualization moves beyond traditional linear models to reflect the complex, multi-level nature of the South African mining industry.

3. Methods

Research Design and Philosophical Orientation: This study adopted an interpretivist qualitative research design to examine the significance of effective supply chain (SC) processes in enhancing organisational competitiveness in the South African mining sector. A research design provides the strategic framework guiding data generation, analysis, and interpretation (Huntington-Klein, 2021; Reddy and Pulluru, 2024) [27, 56], and in this case it was structured to align philosophical assumptions with the study's central research question.

SC processes in mining are not objective or naturally occurring phenomena but socially constructed practices shaped by organisational relationships and contextual constraints (Clarke, 2024; Piotrowicz, Ryciuk and Szymczak, 2023) [16, 52]. For this reason, the study was positioned within an interpretive paradigm that prioritises meaning, context, and stakeholder experience over causal generalisation. Drawing on Mouton's (1996) [47] three-world framework, the design ensured coherence between ontology, epistemology, and methodology. This positioning enabled an in-depth exploration of how SC effectiveness contributes to competitiveness within mining organisations.

Ontological, Epistemological and Axiological Assumptions: The study is grounded in a relativist ontology, which recognises multiple realities constructed through human interaction within organisational networks (Mbanaso, Abrahams and Okafor, 2023) [44]. Correspondingly, an interpretivist epistemology was adopted, emphasising knowledge generation through understanding participants' subjective meanings and experiences rather than through objective measurement (Bonache, 2021; Bell, Harley, and Bryman,2022) [8, 6]. While positivist approaches facilitate generalisation and causal explanation, they were considered unsuitable for investigating SC practices that are embedded in context, relationships, and institutional arrangements. Interpretivism therefore provided an appropriate lens for examining the quality and effectiveness of SC processes in the mining sector (Piotrowicz *et al*., 2023) [52]. From an axiological perspective, the researcher acknowledged the influence of professional experience in SC contexts while applying reflexive strategies to minimise bias during data interpretation (Klakegg and Tvedt, 2024; Lim, 2024) [32, 35]. These philosophical assumptions collectively informed the study's methodological choices.

Research Approach and Strategy: A qualitative deductive approach was employed to guide the investigation of SC effectiveness and competitiveness. Although deduction is

commonly associated with positivist inquiry, it is increasingly recognised as compatible with qualitative interpretive research where theory guides empirical exploration rather than hypothesis testing (Casula, Rangarajan and Shields, 2021; Qerimi *et al*., 2023) [11, 53]. In this study, Network Theory served as the analytical framework for examining interdependencies and relational dynamics across mining supply chains. An exploratory research strategy was adopted to generate insights in a context where limited qualitative evidence exists on SC practices in South African mining (Badke, 2021; Gaffley and Pelser, 2021) [3, 19]. While descriptive elements were incorporated to contextualise existing practices, the primary aim was to uncover constraints and opportunities for improving SC effectiveness. A cross-sectional time horizon was used, capturing participant perspectives over a two-month period and providing a contemporary snapshot of SC processes (Maier *et al*., 2023) [40].

Sampling Strategy and Participants: The population for the study comprised employees involved in SC functions within mining and related organisations, with the target population focusing on senior managers responsible for procurement and materials management (Saunders *et al*., 2019; Rahman, 2023) [58, 54]. Purposive non-probability sampling was employed to identify information-rich participants with direct strategic and operational insight into SC processes (Campbell *et al*., 2020) [9]. Sixteen mining organisations across platinum, chrome, coal, iron ore, diamond, gold, salt, and manganese sectors were selected as units of analysis, reflecting the diversity of South Africa's mineral economy. From each organisation, one SC manager was selected as the primary unit of observation, while fifteen general SC practitioners from across sectors were included to provide comparative perspectives. The final sample consisted of thirty-one participants, enabling a robust qualitative examination of SC effectiveness and competitiveness in the mining sector.

Data Collection: Data were collected using semi-structured open-ended interview questionnaires, which allow consistency across interviews while permitting in-depth exploration of participant experiences (Mlitwa, 2014; Yu, Qian and Chen, 2022) [46]. Participants were senior managers with a minimum of five years' experience in SC-related roles, ensuring informed and reflective responses. Prior to participation, the study objectives were explained and written informed consent was obtained. Interviews were conducted at times and in formats convenient to participants, primarily through scheduled engagements and email correspondence. This 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. The analysis followed six iterative stages: data familiarisation, initial coding, theme development, theme review, theme definition, and reporting (Christou, 2022) [15]. Axial coding was used to group related codes and identify patterns across participant accounts, thereby enhancing analytical rigour (Lochmiller, 2021) [37]. Emergent themes were systematically evaluated against the research question concerning the significance of effective SC processes for organisational competitiveness in the South African mining sector. The use of qualitative software ensured transparency, consistency, and traceability throughout the analytical process.

Pilot Study and Trustworthiness: A pilot study involving five participants was conducted. This enabled the assessment of the clarity, relevance, and sequencing of interview questions (Seth, Gupta and Singh, 2022) [59]. Feedback from the pilot informed minor refinements to the data collection instrument. Trustworthiness was ensured through the application of credibility, confirmability, transferability, and dependability criteria (Saunders *et al*., 2019) [58]. Credibility was enhanced by engaging senior decision-makers, while confirmability was supported through systematic documentation and coding of data (Lim, 2024) [35]. Transferability was addressed by providing detailed contextual descriptions, and dependability was ensured through transparent reporting of methodological procedures (Hammerton and Munafò, 2021) [23].

Ethical Considerations: Ethical clearance was obtained from the UNISA Research Ethics Committee prior to data collection. Participation was voluntary, with informed consent obtained from all participants, who were assured of anonymity and confidentiality (Lokot, 2021) [38]. 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.

3. Results

The research sought to understand the critical role of effective SC processes in bolstering the competitiveness of the South African mining sector. Results shows that effective SC processes are not merely operational necessities; rather, they are strategic assets influencing efficiency, cost structure, service quality, and resilience. To better illustrate the given themes, a network of relationships found through network analysis is presented in Table 1.

Table 1: Network analysis of major themes on the significance of effective SC process on the competitiveness of the South African mining sector?

Source Theme	Linking Word/phrase (Relation)	Target Theme
Operational Efficiency (1)	Leads to	Cost Management (3)
Operational Efficiency (1)	A prerequisite for	Customer Satisfaction (2)
Technological Integration (8)	Facilitates	Operational Efficiency (1)
Risk Management (4)	Ensures stability of	Operational Efficiency (1)
Cost Management (3)	Is a major factor in	Competitiveness (5)
Customer Satisfaction (2)	Strengthens	Reputation and Brand (6)
Reputation and Brand (6)	Contributes to	Competitiveness (5)
Technological Integration (8)	Supports	Risk Management (4)
Human Resource Development (7)	Is essential for	Operational Efficiency (1)
Human Resource Development (7)	Is required for	Technological Integration (8)
Sustainability (10)	Encompasses	Community and Socio-Economic Impact (9)
Sustainability (10)	Is often in tension with	Cost Management (3)
Community and Socio-Economic Impact (9)	Positively affects	Reputation and Brand (6)
Competitiveness (5)	Is influenced by	All other themes
Risk Management (4)	Mitigates threats to	Sustainability (10)

The network diagram illustrates the causal and influential relationships among the themes pertinent to the South African mining sector's competitiveness. Operational Efficiency (1) is central, being facilitated by Technological Integration (8) and ensured by Risk Management (4) and being essential to Human Resource Development (7). It Leads to Cost Management (3) and is a prerequisite for Customer Satisfaction (2). Ultimately, Cost Management (3) and Reputation and Brand (6) both directly contribute to Competitiveness (5), with Reputation and Brand (6) being Strengthened by Customer Satisfaction (2) and positively affected by Community and Socio-Economic Impact (9). Sustainability (10), which Encompasses Community and Socio-Economic Impact (9), is shown to be often in tension with Cost Management (3), and its threats are Mitigated by Risk Management (4). Finally, Competitiveness (5) is explicitly stated as being Influenced by All other themes. Figure 2 disaggregate these themes into subthemes for further exploration.

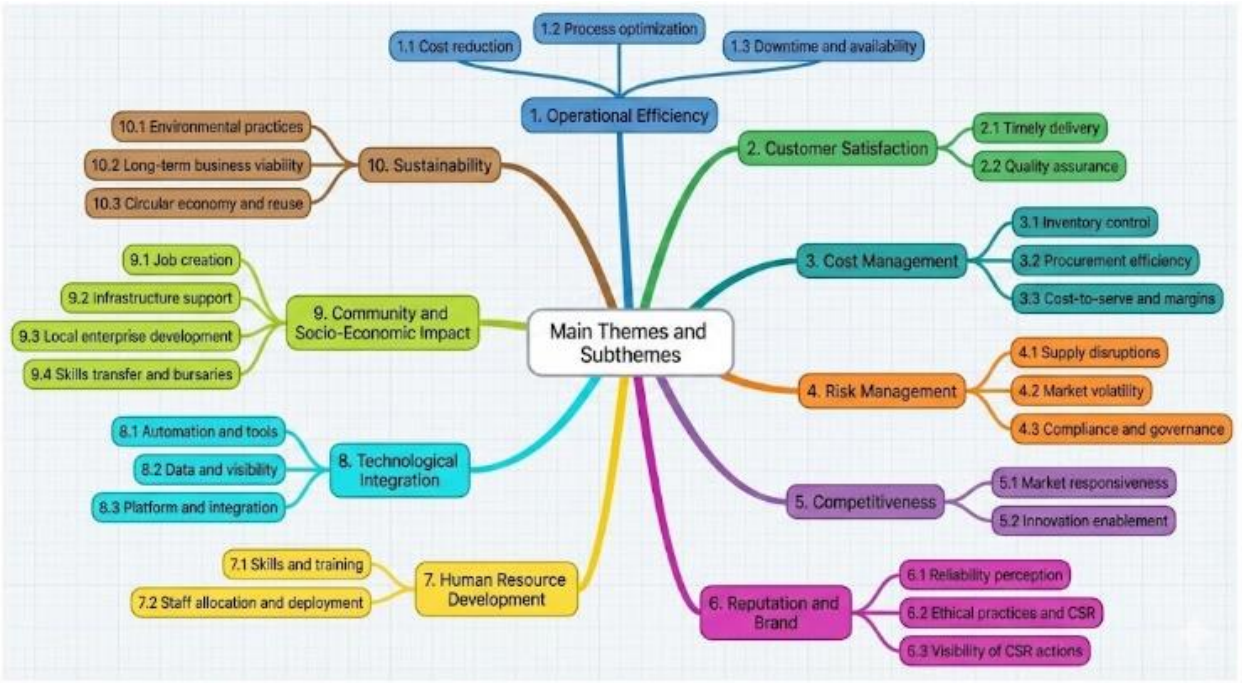

Fig 2: Themes and subthemes based on the significance of effective SC process on the competitiveness of the South African mining sector.

Figure 2 systematically outlines the themes and subthemes that emerged from the qualitative data, providing a structured overview of the factors that underscore the significance of effective SC processes in the industry.

4.1. Theme 1: Operational Efficiency

The narratives show that effective SC processes are fundamentally linked to achieving high levels of operational efficiency within the South African mining sector. Consequently, efficiency is realised through the intersection of cost reduction, process optimisation, and minimising downtime.

Subtheme 1.1: Cost reduction: As presented in the Figure 2, a primary benefit of effective SC processes is the significant opportunity for cost reduction because efficient SC management acts as a powerful lever for financial control. Participant 1 noted, *"SC processes are integral to the operative nature of the business, effecting day to day activities… whether fixed… or variable,"* emphasising the

pervasive financial impact. Likewise, Participant 10 confirmed this, stating, *"Effective SC is the lifeline of every business. Efficient SC ensures reduced cost…"*

Subtheme 1.2: Process Optimization: The narratives show that effective SC processes are critical for systematic process optimization, leading to better project execution and resource utilisation. Participant 3 stated that effective SC will have the following benefits: *"Prevent project cost overruns; Prevent unnecessary project delays; Ensure seamless flow of information."* Moreover, Participant 30 explained that a *"Clearly mapped out implemented SC process, dogmatically reviewed daily assist the business in reducing costs, improving efficiency, reducing waste, rework…"*

Subtheme 1.3: Downtime and Availability: Results show that the relationship between SC effectiveness and operational resources availability, as measured by minimized downtime, is paramount for competitiveness. Participant 23 explicitly noted this critical relationship: *"When materials, parts, or labour don't arrive on time due to SC disruptions, production stops."* Furthermore, the cumulative effect of poor SC practices is a significant drain on profitability and market reach, with Participant 29 observing that *"Poor SC processes lead to excessive cost to serve and hinder our ability to serve the market."* Conversely, the effectiveness of the SC ensures *"smooth operation and profitable business. Minimize stop and starting due to low stock of raw material…"* as Participant 28 concluded, directly supporting the significance of SC in maintaining high asset availability.

4.2. Theme 2: Customer Satisfaction

The narratives show that successful SC processes are at the heart of providing an excellent product and service experience, which eventually leads to customer satisfaction and long-term contracts.

Subtheme 2.1: Timely Delivery: The narratives show that timely delivery is a non-negotiable component of customer satisfaction and a direct reflection of an efficient SC process. Participant 9 underscored this necessity, explaining that *"SC processes form the backbone of our business operations. Efficient coordination… ensures consistent product availability and delivery reliability."*

Subtheme 2.2: Quality Assurance: The narratives show that effective SC processes are crucial for upholding quality assurance, which is intrinsically linked to market reputation. Participant 4 emphasized this point: *"SC process is the heart of any business; it requires supplying quality products to our customers…"* Furthermore, participant 12 added that, "*receiving correct products according to what you have required… All this ensures the company remains effective and competitive*."

4.3. Theme 3: Cost Management

The narratives show that effective SC processes are fundamental to superior cost management, which is a decisive factor in the price-sensitive global commodity market. This theme is further explored through the subthemes of inventory control, procurement efficiency, and cost-to-serve and margins.

Subtheme 3.1: Inventory Control: The narratives show that effective SC allow companies to maintain optimal inventory levels, which directly impacts cash flow and operational stability. Participant 25 explained that "*Effective SC processes improve efficiency in the operation by ensuring there are optimum inventory levels in time for production."* Additionally, Participant 26 mentioned that effective SC processes *"really assist with the growth of the business…and you will end up with customers that are satisfied."*

Subtheme 3.2: Procurement Efficiency: The narratives show that procurement efficiency, driven by effective SC processes, is critical for achieving optimal value from suppliers so that the business can maximise profit margins. Participant 5 emphasized: *"SC processes are key… to ensure that we get value from each of our suppliers and partners."* This efficiency directly translates into cost savings and better service quality, as Participant 29 pointed out: *"Effective SC processes result in cost savings… and improve the quality of service to customers."*

Subtheme 3.3: Cost-To-Serve and Margins: The narratives show that SC efficiency profoundly affects the cost-to-serve and profit margins of the mining business. Results show that inefficiencies create a cost burden that erodes a company's competitiveness. Participant 29 explained, *"Poor SC processes lead to excessive cost to serve and hinder our ability to serve the market."* Furthermore, this cost pressure is especially acute for smaller players, which must find ways to reduce their operating expenses to remain competitive, leading Participant 31 to share, *"As a small business, we face pressure to offer competitive pricing, which might minimise our profit margins…"*

4.4. Theme 4: Risk Management

The narratives statements show that effective SC processes are a vital mechanism for identifying, assessing, and mitigating risks that could impact the South African mining sector's financial stability.

Subtheme 4.1: Supply Disruptions: The narratives show that SC disruptions pose a direct threat to production, consequently highlighting the need for proactive risk management. Participant 23 provided a clear example, stating, *"When materials, parts, or labour don't arrive on time due to SC disruptions, production stops…Downtime increases the cost per ton…"* This threat underscores the need for formalised risk tools and strategies, as recommended by Participant 26: *"I would recommend a risk management tool… identifying and mitigation supply risk."*

Subtheme 4.2: Market Volatility: The narratives show that the SC process is closely connected to managing unpredictable fluctuations in commodity prices. Participant 1 noted the SC's exposure to *"The interaction with the mining market… that affect the availability of products and services, and how they affect market prices."* This volatility translates into pressure on suppliers to reduce costs, with Participant 31 observing that *"The mine operation requests that suppliers reduce their prices…. matching the declining commodity prices…"*

Subtheme 4.3: Compliance and Governance: As presented in the Figure 2, effective SC processes are essential for ensuring adherence to legal, regulatory, and internal governance frameworks, crucial for ethical and sustainable operations. Results show that transparent and accountable SC practices are a safeguard against fraud and poor practice. Participant 29 stressed that *"SC processes should be supported by policies and procedure… ensuring transparency and accountability in the SCs."* Furthermore, the integration of SC processes into broader management systems demonstrates a commitment to operational excellence and quality, as Participant 30 indicated that their processes are *"Integrated into our Quality, Cost, Production, Safety, Moral management System, 20 Keys, ISO 9001 / 1500."* Consequently, results shows that a well-governed SC is fundamental to maintaining a license to operate and protecting the company's reputation.

4.5. Theme 5: Competitiveness

The narratives statements show that the SC is a strategic enabler that moves a company beyond simple cost-cutting to achieving superior market standing.

Subtheme 5.1: Market Responsiveness: The narratives show that a highly efficient SC process grants the agility to respond quickly to changes in market demand. Participant 9 state that a *"…well-functioning SC enhances competitiveness, profitability, reliability and service quality"* encapsulates this linkage between operational excellence and market standing. Moreover, the enhanced clarity and structure provided by strong SC processes allow for faster and more informed decisions, which is a critical aspect of rapid market adaptation. Participant 29 summarized this by noting that" …*a strong SC gives the business a competitive advantage, it enhances and accelerates decision making because processes are clearer to everyone."*

Subtheme 5.2: Innovation Enablement: The narratives statements show that an effective SC process serves as an enabler for business growth and innovation while allowing companies to focus on core competencies and new ventures. Participant 27 noted this connection, stating that *"SC processes are an effective tool to ensure the business growth and innovation… customers will be satisfied."* Furthermore, satisfied customers, a direct result of effective SC management, become an organic marketing tool that drives further business growth. Participant 8 observed this virtuous cycle: *"We look at how happy our customers are…and the business growth and innovation of the business. This also assists with marketing our business through the happy customers."*

4.6. Theme 6: Reputation and Brand

The narratives show that effective SC processes are linked to a mining company's brand integrity, which is invaluable non-financial assets in the South African mining sector. This theme is explained through reliability perception, ethical practices/CSR, and CSR visibility.

Subtheme 6.1: Reliability Perception: The narratives show that mining company's reliability is a direct function of its SC performance and impacts the ability to secure and retain clients. Participant 4 warned that non-compliance with requirements leads to *"financial implications…and reputational damage with the customer because obviously, the customer is expecting us to deliver."* Moreover, the necessity of an effective SC for continued business underscores its role as a reputation guarantor, with Participant 6 stating: *"For any organisation to continue business with the clients, SC processes must be effective and relevant. This is very much important for securing and maintaining the company's reputation."*

Subtheme 6.2: Ethical Practices and CSR: The narratives show that the SC process is a crucial vehicle for implementing and demonstrating a mining company's commitment to ethical practices and CSR. Participant 2 described their company's pride is gained *"through supplier developments… sharing the skill and knowledge through rigorous programs."* Furthermore, the SC's impact extends to broader community support, with Participant 13 noting that *"Through our SC processes, our communities are taken care of through bursaries and community developments programmes…"*

Subtheme 6.3: Visibility of CSR Actions: The narratives show that the SC process provides tangible, visible avenues for demonstrating a company's commitment to social empowerment and development. Participant 10 noted that the SC *"can be a good empowerment opportunity for local communities via skills development."* Furthermore, the creation of specific developmental programs for emerging local enterprises demonstrates a deep commitment to upliftment, such as the *"refencing programs where emerging transporters are given an opportunity to collaborate and be developed,"* as mentioned by Participant 14.

4.7. Theme 7: Human Resource Development

The narratives show that effective SC processes are inextricably linked to the development of human resources, which is vital for sustained high-performance in the South African mining sector. This theme is explored through skills and training, and staff allocation and deployment.

Subtheme 7.1: Skills and Training: The narratives show that continuous training and skills transfer are essential components of an effective SC process, ensuring that the workforce possesses the required capabilities. Furthermore, investing in local workers is seen as a long-term strategy for community sustainability, as Participant 23 noted that "*Training and capacity-building initiatives for local workers can improve long-term employability*." Results, show that training can be leveraged not only for current employees but also as a mechanism for community upliftment and local capacity building. Participant 2 shared how their company *"share the skill and knowledge through rigours programmes"* by buying fleet for selected individuals.

Subtheme 7.2: Staff Allocation and Deployment: The presented narratives show that the organisational structure and the efficient deployment of staff are integral to the effectiveness of the SC process. Misallocation or the promotion of unqualified individuals can severely undermine the SC's capability, as Participant 26 lamented: *"Inexperienced people are promoted internally who most of the time can't do the job."* Conversely, the SC process must be integrated with the core operational departments of the business to ensure a coordinated effort. Participant 11

described the interconnectedness of operational departments that *"drives the business, such as the washing bay and production department where the fleet is maintained*."

4.8. Theme 8: Technological Integration

The narratives show that effective SC processes in the competitive South African mining sector increasingly rely on the strategic integration of technology to enhance predictability, visibility, and coordination. This theme is detailed through the subthemes of automation and tools, data and visibility, and platform and integration.

Subtheme 8.1: Automation and Tools: Results show that the appropriate use of automation and tools within the SC process enhances operational reliability and enables preventive maintenance, thereby reducing the risk of costly breakdowns. Participant 18 simply stated the requirement for *"…tools and equipment that arrive on time..."* Furthermore, the predictability afforded by a well-managed SC allows for the proactive scheduling of asset maintenance, as Participant 23 observed: *"Predictable supply flows allow for preventive maintenance lowering the risk of breakdowns."*

Subtheme 8.2: Data and Visibility: The narratives show that the effectiveness of the SC process hinges on the availability of accurate data and end-to-end visibility. Results show that better data enables superior planning and optimisation of assets and resources. Participant 9 highlighted that good SC systems *"…enable better forecasting and stock control… optimal utilisation of assets like trucks and the various collieries."* Moreover, enhanced visibility strengthens relationships with external partners, potentially leading to more advantageous contractual terms, as Participant 22 noted that *"Stronger relationships and better visibility allow for more favourable terms with suppliers."*

Subtheme 8.3: Platform and Integration: The narratives show that the strategic use of integrated platforms is essential for ensuring seamless coordination between the mining operation and external logistics stakeholders. Results show that effective integration, particularly with major infrastructure providers, significantly reduces transit delays and improves overall efficiency. Participant 23 noted that *"Strong SC systems improve coordination with transport providers such as Transnet, reducing delays in moving minerals from mine to port."* Furthermore, the establishment of regular, formalized communication channels ensures that all stakeholders' demands and expectations are consistently met, as indicated by Participant 7: *"We facilitate monthly meeting... to ensure we meet their demands and expectations."*

4.9. Theme 9: Community and Socio-Economic Impact

The narratives show that effective SC processes offer a profound opportunity for the South African mining sector to create a positive community and socio-economic impact, thereby strengthening its social license to operate.

Subtheme 9.1: Job Creation: The narratives show that the SC process is a direct source of job creation, especially for individuals residing in neighbouring communities near mining operations. Participant 8 explained that *"Through SC processes, we create jobs using work that is given to contractors… most drivers are hired from the neighbouring communities."* Similarly, Participant 11 confirmed that *"Most of our drivers are from neighbouring communities."*

Subtheme 9.2: Infrastructure Support: Narratives show that the SC process, particularly logistics, leads to community expectations for investment in and support of local infrastructure. Participant 4 noted, *"The community expects infrastructural development such as roads…we use the roads to go and deliver to the customer."* Furthermore, strategic investments related to the SC can enhance overall community infrastructure, as Participant 23 noted that *"Investments in roads, utilities, and facilities related to SC operations can enhance community infrastructure."*

Subtheme 9.3: Local Enterprise Development: The narratives show that effective SC process is a powerful tool for promoting local enterprise development and ensuring a balanced relationship with all business stakeholders. Results show that procurement policies must be aligned to actively support the needs and growth of local communities. Participant 29 emphasized the need for an *"inclusive SC process that will ensure a balanced relationship among all business stakeholders… for SC processes to be effective, procurement policies must align to support the needs of the communities."* Furthermore, companies are actively engaging in sourcing and transportation from local suppliers to meet these growing expectations, as Participant 27 noted: *"We have since embarked on introducing local suppliers to deliver and transport our products."*

Subtheme 9.4: Skills Transfer and Bursaries: The presented narratives show that the SC process can be leveraged to facilitate skills transfer and educational support through bursaries, thereby improving long-term employability and community capacity. Results show that these initiatives are seen as a form of community care and development. Participant 13 shared that *"Through our SC processes, our communities are taken care of through bursaries and community developments programmes..."* Moreover, the specific focus on training and capacity building for local workers is a critical step in *"improving long-term employability and overall community skills," as Participant 23 concluded.*

4.10. Theme 10: Sustainability

Effective SC processes are increasingly recognised as a vital determinant of the long-term sustainability and viability of the South African mining sector, encompassing environmental stewardship and the circular economy. This theme is explored through the subthemes of environmental practices, long-term business viability, and circular economy and reuse.

Subtheme 10.1: Environmental Practices: Results show that SC processes have a measurable impact on pollution and waste generation. An ineffective SC can exacerbate environmental issues, whereas an efficient one can mitigate them. Participant 3 noted the SC *"could contribute to increasing or decreasing pollution and waste generation..."* Conversely, optimizing logistics, *"…. a key SC function, directly reduces environmental and safety risks associated with transport disruptions,"* as highlighted by Participant 9. Thus, results show an environmentally conscious SC is a significant factor in a mining company's overall sustainability

performance.

Subtheme 10.2: Long-Term Business Viability: The narratives show that the strength of the SC process is a critical predictor of a mining company's long-term business viability and its ability to weather challenges. Participant 16 warned that *"A strong SC gives the business a major advantage, while a weak one can led to delays, financial losses, and damaged reputation."*

Subtheme 10.3: Circular Economy and Reuse: The narratives show that, effective SC processes are fundamental to implementing the principles of the circular economy, which involves recycling and reusing materials to reduce the environmental footprint. Results show that the SC is the enabler of these regenerative practices. Participant 30 specifically noted the SC's role in *"Recycling – Circular Economy; Enabler to re-generative environment."* Moreover, the SC's impact on communities extends to considering its overall footprint, driving the necessity of sustainable SCs, as Participant 22 concluded, stating, *"SCs affect the sustainability of cities and their communities necessitating the concept of sustainable SCs."*

5. Discussion of Findings

Operational efficiency results in several benefits for organisational competitiveness in the South African mining sector. The narratives show that Theme 1 (Operational Efficiency), comprising cost reduction, process optimisation, and downtime and availability, confirms that effective supply chain (SC) processes lead to lower operational costs and reduced downtime, which directly enhances productivity and throughput. These results are consistent with the similar studies that explore the role of effective supply chain management in enhancing organisational competitiveness, where efficiency is conceptualised as a strategic capability rather than a purely operational outcome. Specifically, the findings align with Sherman (2022) [60] and Handley (2023) [24], who argue that logistical integration and process discipline are central to mining productivity. Moreover, the central positioning of Operational Efficiency (1) in Table 1, where it leads to Cost Management (3) and is a prerequisite for Customer Satisfaction (2), reflects Network Theory's assertion that performance outcomes emerge from interdependent process nodes rather than isolated functions (Zhao *et al*., 2020) [70]. Consequently, the smoother flow of materials and information lowers the cost-to-serve while sustaining production continuity. These results therefore directly answer the research question by demonstrating that effective SC processes significantly enhance competitiveness through immediate operational gains, although the literature cautions that long-term competitiveness requires governance structures to sustain these efficiencies (Goh, and Eldridge, 2024) [21].

Competitiveness is mediated by cost management in terms of inventory and procurement efficiency. The narratives show that Theme 3 (Cost Management), encompassing inventory control, procurement efficiency, and cost-to-serve, illustrates how Operational Efficiency (1) leads to improved cost outcomes that are a major factor in Competitiveness (5). This supports the argument advanced in the results section that cost discipline is a central transmission mechanism between SC effectiveness and market positioning. The findings are consistent with Mathu (2014) [43] and Lima (2025) [36], who highlight procurement optimisation and inventory rationalisation as strategic levers in mining competitiveness. Furthermore, Ho *et al*. (2015) [25] support the participants' narratives that inventory optimisation and supplier value extraction reduce unit costs and protect margins, reinforcing the cause-and-effect relationship depicted in Table 1. However, the literature highlights countervailing evidence that structural constraints such as ageing assets and supplier concentration can dilute these cost advantages (Suwandi, 2025 [64]; Mathe and Motsaathebe, 2025 [42])—a limitation that some participants were reluctant to acknowledge. Thus, while cost management contributes to competitiveness, the literature suggests that sustainable gains depend on upstream procurement sophistication and risk-aware supplier strategies rather than short-term cost cutting alone.

Customer satisfaction and reputation jointly strengthen market standing. The narratives show that Themes 2 (Customer Satisfaction) and 6 (Reputation and Brand), when analysed together, demonstrate that Operational Efficiency (1) is a prerequisite for Customer Satisfaction (2), which in turn strengthens Reputation and Brand (6) and contributes to Competitiveness (5). This confirms the study's proposition that effective SC processes generate both tangible and intangible competitive advantages. The findings are aligned with SERVQUAL-based arguments that reliability, responsiveness, and quality assurance are decisive determinants of perceived service performance (Ramya *et al*., 2019 [55]; Supardi *et al*., 2022 [63]). The literature further supports this linkage by emphasising that service-oriented SC excellence is increasingly critical in mining contexts where internal production units function as primary customers (Li *et al*., 2022) [34]. Additionally, reputational spillovers into CSR visibility and community legitimacy, as reflected in Theme 9, reinforce Navarrete-Cruz and Birkenberg's (2024) [50] argument that reputational capital is essential for maintaining a social licence to operate. Therefore, the results indicate that effective SC processes extend competitiveness beyond price by embedding trust, reliability, and legitimacy within the supply chain network.

Resilience is underpinned by risk management and technological integration. The narratives show that Theme 4 (Risk Management) ensures stability of Operational Efficiency (1), while Theme 8 (Technological Integration) supports Risk Management (4) and facilitates Operational Efficiency (1). Participants' emphasis on predictive visibility and formal risk tools aligns with Ho *et al*. (2015) [25] and Islam *et al*. (2024) [28], who argue that digital visibility reduces exposure to disruptions and volatility. Consistent with Network Theory, Table 1 illustrates how Technological Integration (8) reinforces multiple nodes simultaneously, validating Bhamra *et al*.'s (2025) [7] proposition that interconnected systems enhance overall SC resilience. However, the literature cautions that digital investments alone are insufficient without complementary skills and governance structures (Chatterjee *et al*., 2025 [14]; Ulfath *et al*., 2025 [67])—a concern echoed by participants. Thus, the findings suggest that resilience, as a dimension of competitiveness, emerges from the coordinated interaction of technology, risk controls, and human capability rather than isolated interventions.

Supply chain enactment is enabled through human resources and skills development. The narratives show that Theme 7 (Human Resource Development) is essential for Operational Efficiency (1) and is required for Technological Integration

(8), confirming that human capability is a prerequisite for SC effectiveness. This aligns with Resource-Based Theory, which posits that inimitable internal capabilities underpin sustainable competitive advantage (Barney, 2001 [4]; Chatterjee *et al*., 2025 [14]). Participants' concerns about inexperienced promotions directly reflect Section C's warning that skill gaps weaken both technological adoption and governance (Suwandi, 2025) [64]. Therefore, the study Exploring the Role of Effective Supply Chain Management in Enhancing Organisational Competitiveness is reinforced by evidence that investment in training, skills transfer, and strategic staff deployment is not optional but foundational to SC-driven competitiveness.

Community impact and sustainability enhance legitimacy but may increase short-term costs. The narratives show that Sustainability (10) encompasses Community and Socio-Economic and Community Impact (9) positively affects Reputation and Brand (6), thereby indirectly contributing to Competitiveness (5). This supports Lima (2025) [36] and Navarrete-Cruz and Birkenberg (2024) [50], who frame sustainability as both a reputational and operational necessity in mining. However, Table 1 explicitly shows that Sustainability (10) is often in tension with Cost Management (3), reflecting participants' concerns about short-term cost pressures associated with environmental and social investments. The literature reinforces this tension by highlighting the trade-offs between immediate financial performance and long-term legitimacy (Wincewicz-Bosy *et al*., 2021) [68]. Accordingly, the findings suggest that phased and risk-prioritised sustainability investments are the most effective way to reconcile cost pressures with long-term competitiveness.

Network theory explains the observed interdependence of supply chain outcomes. The narratives show that the empirical findings across Themes 1–10 are consistently interconnected, validating Network Theory as the primary explanatory lens for this study (Bhamra *et al*., 2025) [7]. Operational Efficiency (1), Cost Management (3), and Competitiveness (5) form a tightly linked core, while Resource-Based Theory complements this by explaining how firm-level capabilities such as skills, technology, and governance create durable advantages (Chatterjee *et al*., 2025) [14]. The literature also acknowledges counter-evidence that structural constraints—such as ageing infrastructure and supplier market power—can limit the realisation of SC benefits (Russel, 2022; Mathe and Motsaathebe, 2025 [42]). Consequently, the combined application of Network Theory and Resource-Based Theory provides the most comprehensive explanation of the results.

Overall, the narratives show that effective SC processes are a key determinant of competitiveness in the South African mining sector because they lead to Operational Efficiency, strengthen Customer Satisfaction and Reputation, contribute to Cost Management and Competitiveness, and mitigate threats to Sustainability through Risk Management. These interconnected outcomes directly address the research question by demonstrating that SC effectiveness is not a single-dimensional construct but a systemic source of competitive advantage. The findings confirm that competitiveness emerges when SC processes are strategically coordinated through investment in technology, human resources, governance, and community engagement.

6. Conclusions and Recommendations

This study concludes that effective supply chain (SC) processes are a critical and multidimensional determinant of organisational competitiveness in the South African mining sector. Drawing on Network Theory, Resource-Based Theory, and SERVQUAL, the findings demonstrate that operational efficiency, cost management, customer satisfaction, reputation, risk management, technological integration, human resource development, and sustainability are not independent drivers but interconnected elements that collectively influence competitiveness. In line with the literature, the results show that effective SC processes lead to cost reduction, improved service reliability, enhanced resilience, and strengthened reputational capital, thereby enabling mining firms to respond more effectively to market volatility and competitive pressures. However, the study also concludes that structural constraints such as ageing infrastructure, skills shortages, and short-term cost pressures associated with sustainability initiatives may limit the full realisation of SC-driven competitive advantages if not strategically managed (Suwandi, 2025 [64]; Mathe and Motsaathebe, 2025 [42]).

Based on these conclusions, the study recommends that mining firms adopt an integrated and strategically governed approach to supply chain management. Specifically, organisations should prioritise investments in technological integration and data visibility to enhance risk management and operational efficiency, while simultaneously strengthening human resource development to ensure that digital and process innovations are effectively utilised (Ho *et al*., 2015 [25]; Chatterjee *et al*., 2025 [14]). In addition, cost management strategies should extend beyond short-term savings to include upstream procurement sophistication and supplier collaboration, thereby supporting sustainable competitiveness (Mathu, 2014 [43]; Lima, 2025 [36]). Finally, the study recommends phased and risk-focused sustainability and community engagement initiatives that balance short-term cost implications with long-term reputational and legitimacy gains, reinforcing the mining sector's social licenses to operate and its enduring competitive position (Navarrete-Cruz and Birkenberg, 2024 [50]; Wincewicz-Bosy *et al*., 2021 [68]).

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