Information Management and Business Review (ISSN 2220-3796)
Vol. 16, No. 1, pp. 305-313, March 2024

Supply Chain Limitations in the South African Engineering Sector-Supply Chain Professionals Views

Kansilembo Aliamutu & Msizi Mkhize*
Department of Financial Accounting, School of Accounting, Economics and Finance,
University of KwaZulu Natal, South Africa
mkhizem4@ukzn.ac.za, *freddyali6@gmail.com

Abstract: The engineering industry has several obstacles as the worldwide economy slows, including macroeconomic hardship, lack of resources, organizational deficiencies, and an overall incapacity to respond to major concerns. In the past few years, they have gotten increasingly intense and serious. Empirical supply chain administration studies identify impediments that hinder the engineering industry in emerging nations, such as South Africa. This research aims to investigate supply chain limitations in the South African engineering industry. The literature was evaluated as well as interviews that were semi-structured and were used to get thoughts from 15 senior supply chain professionals. To examine qualitative data, ATLAS.ti (version 7) software was used for content analysis. The conversations revealed six topics, such as a shortage of capital in supply chains, innovative supply chain process restrictions, supply chain administration changes, supply chain cooperation, supply chain administration, and scheduling administration. engineering companies should use systems to manage their supply chains, integrated options, and collaboration managing project techniques and technology. The findings reveal a shortage of expenditure in supply management processes and the fact that engineering companies are still lacking a strategic perspective on managing their supply chains. However, it seems that supply chain tactics may improve an organization's efficiency and business performance in engineering companies.

Keywords: *Supply chain limitations, engineering sector, supply chain professionals.*

1. Introduction

Despite the reality that the engineering sector has been in a depression since 2009, it continues to be one of South Africa's major businesses, providing considerably to job creation and economic development, Loosemore et al. (2020). In the opinion of Sibanda et al. (2020), the ongoing worldwide crisis has had an especially severe effect on the engineering industry. Hence, the engineering sector provides a large amount of gross domestic product (GDP) in several nations, with certain projections ranging from 6% to 9% of GDP in developing nations (Othman et al., 2021). Throughout 2008 and 2016, the engineering sector employed around 1.4 million individuals and contributed to approximately 8% of total official labor and 9.6% of the average GDP in South Africa (Engineering Sector Improvement Board (CIDB)). However, in the opinion of Emrouznejad et al. (2023), the engineering sector is still plagued by disintegration, ineffectiveness, overruns of costs and timelines, and other issues. In reducing economies worldwide, the engineering sector encounters an assortment of difficulties, including economic status seems to anxiety, lack of resources, organizational shortcomings, and an overall failure to address major problems, with these difficulties enhancing and becoming more prevalent in recent years (Bag et al., 2022). Not unexpectedly, regulators and scholars together are searching to gain greater awareness of the construction sector's hurdles and limits, both at the socioeconomic and organizational levels.

Moshood et al. (2021) stated in this respect that scientific study remained an essential channel for the formation of new viewpoints. Because the efficiency of supply chains is frequently favorably connected with company success, a knowledge of the limits below its connected issues is required if the efficiency of the sector is to be addressed. Bag et al. (2020b) discovered that various problems experienced in major construction initiatives are caused by a shortage of appropriate collaboration in the supply chain both within and among supply chain participants. Development interruptions, price increases, and deviations in quality, which result in unsuccessful projects and disgruntled clients, are all prevalent difficulties in the construction sector (Mafini et al., 2020). In addition, there is a widespread belief that the undertaking execution procedure in construction administration is expensive compared to other industries like production as well as retailing. Dahooie et al. (2020) observed that the importance of these inadequacies within the sector is heightened by schedule and cost delays. Eliminating these shortcomings causes the use of supply chain administration. even though a variety of research initiatives from several nations are currently examining different facets of the supply chain administration

arena in the engineering sector, there are currently a few research investigations that explore the limitations of supply chains in the construction sector (Talwar et al., 2021).

Investigations into science concentrating on the engineering sector, based in Pournader et al. (2021), remained an essential route for the production of such fresh viewpoints. Supply chain management synchronizes important company functions and operations to meet the demands of clients. These comprise the initial exploitation of raw materials for the ultimate client, as well as intermediary interpreting, shipping, and warehousing operations, as well as the final delivery to the ultimate consumer (Menon and Ravi, 2021). Based on Taddei et al. (2022), supply networks differ in length, width, and amount of intricacy; and a company that manufactures many different kinds of goods is obligated to be a member of several supply chains, based on the resources and services utilized for producing and distributing those goods. The cornerstone of supply chain administration is that it is tactical in its very nature, with the production of value for clients being a primary driver of the whole supply chain operation (Ambe, 2016). Recognizing this truth frequently necessitates a considerable adjustment in the members' attitude towards collaborating, working together, and mutual advantages. It is not shocking that just a few sophisticated uses in the engineering sector have been described (Bizana et al., 2015). Luo et al. (2020) has noted that, compared to never previously, construction endeavors appear to be developing relationships of cooperation among major workers, subcontractors, and providers, albeit slowly.

Based on Menon and Ravi (2021) a cooperative arrangement in purchasing is still not commonly adopted, in which enterprises profit jointly by decreasing costs and inventories, and the consumer benefits as a result by receiving the highest possible value for money. Because there is no single purchasing approach that functions optimally for all building circumstances, a thorough examination of customer requirements is essential before applying a purchasing approach. Taddei et al. (2022) contends that effective procurement techniques are essential to lower total expenses, improve the overall financial effectiveness of the engineering sector, and guarantee that initiatives are suitable for use when completed. Procurement is one of the areas with the most prospects for lowering expenses and increasing the worth of every link in the supply chain (Wieland, 2021). According to Khan et al. (2021), the benefit of optimizing the complete supply chain is unable to be realized without the procedures involved with the beginning and middle, along with the downstream transportation of knowledge, tangible goods, and products from various pathways to final users. Because monitoring the constantly changing connections and exchanges that occur between suppliers may grow complicated, successful project incorporation into the wider structure of supply chain administration is required.

For example, considering the vital function of subcontractors in engineering initiatives, any increase in overall efficiency necessitates acknowledging the reality that the main supplier must rely on the dependability of subcontractors for the completion of the task (Ramos, 2004). Bag et al. (2020a) argue that prompt subcontractor participation and incorporation necessitate prompt procurement by subcontractors, and their choice ought to be determined by standards including inventiveness, capacity to work together, and position of the strategic goals with the primary metrics discovered for the work, rather than simply the cheapest rate. The role of logistics in managing projects gets somewhat more difficult when large amounts of supplies, parts, tools, and other supplies are needed for engineering. According to Bag et al. (2021), every component congregates at the building site, where the structure is constructed from arriving materials and initiatives needing customized supply chains, with every endeavor resulting in the creation of a fresh facility. This necessitates a deep grasp of customer needs, as well as a reduction of trash across the supply chain to save costs and ensure that the project is completed and delivered on time. Zekhnini et al. (2022) emphasizes the significance of logistics, claiming that hardly any emphasis has been devoted to supply chain management (SCM) or transportation, with the engineering industry only seeing the last stage of the delivery process as particularly vital.

Bag et al. (2021) further claim that, although there have been advancements in ICT systems, little effort is being made to comprehensive assessments before adoption. This means that optimizing transport vehicle utilization can considerably enhance engineering effectiveness. Furthermore, because materials contribute about 55%-60% of overall building costs, productive and effective control of inventory is critical to completing effective building endeavors. Because of inefficient product storage and transportation on the building site, it can be challenging to monitor and find supplies precisely when they are required (Dobroszek, 2020). The administration of materials is concerned with the regular flow of supplies. Again, inadequate

engineering supply processing and administration have an impact on the overall success of engineering initiatives in terms of schedule, price (expense), effectiveness, and efficiency (Helo and Hao, 2022). Material waste in engineering activities may end up in significant financial losses as well as negative effects on wellness and the natural world (Selomo and Govender, 2016). One issue related to managing inventory for engineering initiatives is a shortage of or unfinished current knowledge concerning on-site supplies, and based on Bag et al. (2021) the introduction of innovations that include bar codes for substance monitoring and tracking across engineering initiatives will merely simplify and enhance live inventory control procedures.

The transient project-oriented structure of building projects appears to impede engineering supply chain convergence (Turker and Altuntas, 2014). Furthermore, Menon and Ravi (2021) noted that because supply chains for engineering are extremely volatile in the sense that organizational structures and teams of contractors shift often, it is not probable that the initiative subjects will have the opportunity to establish enough confidence and freely disclose knowledge. However, as noted by Seuring et al. (2019) enterprises rely on their supply networks to live and prosper since each company is involved in one or more logistics networks. Matto (2017) argue that while understanding the present functioning conditions and interrelationships between the different aspects of the supply chain structure is vital, it is equally crucial for pursuing improving the efficiency of specific manufacturing procedures inside the supply chain. Menon and Ravi (2021) suggests that the major reasons for limits or obstacles in the context of supply concerns be identified. As a result, the present research was simultaneously pertinent and noteworthy in that it aimed to investigate supply chain limitations in the South African engineering industry which will lead to the sector's improved performance.

2. Research Methodology

This research employed an exploratory qualitative research design, which allows for in-depth knowledge of the circumstances and is employed when a scholar investigates an emerging field or when the topic of inquiry is fairly fresh and unexplored, based on Pandey and Pandey (2021). In the present research, individuals were chosen via purposeful sampling. Purposive sampling, which entails locating and choosing persons with an understanding or expertise concerning a topic under examination, was utilized in the present research, as per Mishra and Alok (2022). The author's knowledge and understanding of the South African engineering sector permitted and allowed relatively straightforward accessibility to top management and prominent participants in the research, particularly chief procurement managers. Those in attendance were top executives from engineering companies. Therefore, fifteen (15) contributors were chosen from engineering company employees. Semi-structured interviews were carried out. The responses from the respondents' profiles are shown in Table 1.

Table 1: Profile of those who participated.

Respondent Coding	Position Controlled	Years	Engineering Sector Location
R1	Transportation Supervisor	14	Gauteng
R2	Procurement Analyst	12	Kwazulu natal
R3	Product Supervisor	13	North West
R4	Senior purchaser	10	Western Cape
R5	Procurement Manager	14	Gauteng
R6	Procurement Analyst	12	Mpumalanga
R7	Regional purchaser	12	Easter cape
R8	Senior Procurement Manager	23	Gauteng
R9	commodities trader	12	Easter Cape
R10	Senior Procurement Manager	27	Limpopo
R11	Activities Supervisor	16	Limpopo
R12	Manager of Purchasing	15	Western Cape
R13	Procurement Manager	19	Free state
R14	Senior purchaser	11	Gauteng
R15	Establish and resource management	22	Mpumalanga

Based on Eton et al. (2018), semi-structured interviews refer to a variety of distinct types of interviews that are distinguished by their adaptable and dynamic structure. A digital recording device was used to record the interviews. The transcribing procedure required close observation of data via continuous attentiveness (and looking), and it was a critical initial step in data processing. Recording, as an interpretative activity instead of a technical method, may contribute to the discovery of unexpected occurrences (Gold and Heikkurinen, 2018). Trustworthiness, as defined by Queiroz et al. (2023), comprises the validity and credibility of the data presented to an inquirer and is composed of four components: credibility, conformability, transferability, and dependability. The triangulation approach was used to determine trustworthiness in the present research. Triangulation is a strategy of increasing validity by approaching the problem from several perspectives, such as diverse methods or analysis methodologies. It also has the potential to improve data collection's complexity (Lauwo et al., 2022). When the investigator was engaged with those who took part throughout the conversation preparation phase and after the interviews were completed, member verification was used to collect any additional information from written critiques and compliments (Sibanda, 2017).

To establish confirmability, a verification record was created for every conversation by allowing respondents to see their transcripts of the interviews. ATLAS.ti (version 7) software for analyzing qualitative data, particularly huge portions of written, visually appealing, and audio information, was utilized for content analysis (Mastos et al., 2021). ATLAS.ti (version 7) software for assessing qualitative data, particularly huge portions of written, visually appealing, and audio information, was utilized for content analysis. Given the volume of written information collected from the interviews, implementing ATLAS.ti is acceptable for this investigation (Selomo and Govender, 2016). A three-step approach proposed by Nkwanyana and Agbenyegah (2020) was adhered to while utilizing this program. The initial step was to find recurring groups that provided the data significance. The coding technique was then developed, which involves the researcher attaching labels to areas of the data based on interpretations determined by the data. After all the data had been sorted and processed, comparable sentences were placed into the same categories. The interviewer documented the themes that emerged from the coding. This technique was continued until the saturation threshold was achieved, at which time themes recurred frequently, suggesting that no more studies were required. The collected themes reflected the research's main results.

3. Results and Discussion

The current analysis revealed a few obstacles that the sector has to conquer. They involve a shortage of supply chain investment, procedural restrictions in supply chain inventiveness, supply chain change administration, supply chain cooperation, supply chain administration, and time of administration.

Theme 1: The Shortage of Investment in Supply Chain Systems: The research's first topic was named as such because the responses of participants revealed a widespread lack of investment in logistics administration systems. In answer to whether the business has an approach established to identify and handle supply chain limitations, the subsequent replies were got from individuals, marked by the letter P:

'Our firm lacks a suitable system. They signed a contract for an excellent supply chain structure, largely installed it, and then terminated the agreement before enjoying any of the benefits it provided (Respondent 1 (R1)). A product administrator and a senior purchaser addressed themselves in regard to this in this manner: 'We utilize Build smart because it's supposed to be an excellent system. According to the documentation from headquarters, it is an initiative tool for administration and not for procurement. I just utilize the structure as is, and I have no idea who changes what to it. (Respondent 3 (R3); we have a purchasing system and around eight (8) systems throughout the organization. We prefer to consolidate procurement data into a single centralized accounting system; however, this is challenging since we only have provider expenditure, not product expenditure (R4)'.

These comments indicate that engineering businesses have been hesitant about investing in, or even fully utilizing, supply chain administration technologies that could allow them to simplify procedures to save time and money. The shortage of expenditure in supply management processes illustrates the fact that engineering companies are still lacking a strategic perspective of managing their supply chains, as it appears that there is an overall lack of understanding of how supply chain tactics may improve an organization's efficiency and

business performance. In certain circumstances, it seems that every aspect of the purchasing department lacks an organizational strategy within some companies, resulting in subpar procurement processes. Nzimakwe and Biyela (2021) discovered that, in comparison to other sectors, the engineering sector in South Africa is somewhat tardy in adopting supply chain administration systems and other kinds of standards of excellence. Critical functions such as expenditure analysis and strategic purchasing are perpetually hindered in the absence of an adequate supply chain administration system. Adopting best practices will require engineering companies to accept the supply chain administration concepts and apply them.

Theme 2: Processes Limitations in Supply Chain Inventiveness: The research's theme 2 was dubbed "lack of a supply chain inventiveness strategy." The subject evolved as a result of subsequent replies from respondents. According to procurement analysts: 'In my opinion, this sector is stuck at a point in time, having not embraced excellent company procedures and concepts, and continuing to do the same things repeatedly while expecting outcomes that vary. I came on board at the peak of the conspiracy scandal. The 'free meals and high profits were finished,' but the corporation neglected to loosen its belt and prioritize the fundamental cost factors to be competitive successfully (R2). 'The sector is typified by the same important people going from one business to the next - fresh faces, thus innovative thinking isn't occurring on an ongoing basis,' he continued.

Lastly, the commodity's manager answered: "There's nothing that has radically shifted in my experience during the past 10 strange years." They continue to do the same activities over and over again (R4). The industry is unwilling to invest in costly supply chain technologies until it understands how supply chain tactics may improve an organization's efficiency and competitiveness. Engineering will struggle to shift to excellent best practices unless it recognizes that supply chains contain more than simply buying functions. Procurement systems remained unsatisfactory (C) because even the purchasing function lacks an organizational strategy in certain businesses. Mafini (2016) have also noted the engineering sector's hesitation to devote its assets, both monetary and time-dependent, to innovations. He claims that if engineering companies took invention seriously enough, it would immediately improve the entire procedure for managing projects and result in the formation of more skilled and efficient employees.

Theme 3: Supply Chain Change Administration: The research's third theme was dubbed "a shortage or supply chain change administration." "A few of these initiatives had the aim of ensuring every aspect of the supply chain reported to a focused resulting structure, carrying out fresh procedures (agreements abandoned), and additionally carrying out excellent procedures by all functioning operations," said one respondent. The strategy additionally underperformed because it caused system and procedure modifications, and while the corporation invested money in determining the issues in its present procedures, it declined to invest cash in correcting them (R6)'. 'Regarding corporate abilities, company processes, and work experience not related to engineering, as well as the capacity to adopt fresh ideas, engineering is inexperienced (R13)'. Shift administration is definitely an issue in the industry, and opposition to transformation is rampant in certain businesses. This is because of past habits and managerial methods that the industry is unwilling to change. Because of established and long-serving executives' insufficient knowledge about excellent managerial ideas and procedures, specifically supply chain improvements throughout the last decades, most long-serving workers will be unfamiliar with these new methods.

Conventional change administration approaches are intentionally designed to fail or be fought until they are abandoned. As a result, a stricter approach to enforcing transformation is necessary in the industry and certain companies. Also, provided the importance of the limitations noticed, it is additionally essential to note that whereas the shift is beneficial, if not controlled correctly via an established change administration procedure, it could have an enormous effect as it interferes with the job and influences its smooth cycle, negatively affecting efficiency and resulting in timetable interruptions and expense excesses. In addition, change administration continues inefficient since most of these processes appear to be missing. Although Dlova and Nzewi (2014) understand that establishing a successful engineering change administration procedure is difficult to accomplish because of the causes of a comprehensive remedy, they contend that an integrated modification administration system causes help in technology from various technologies, such as working together on project administration technologies and instruments.

Theme 4: Supply Chain Cooperation: Theme 4 arising from the research was marked "a shortage or lack of supply chain cooperation'. This trend arose from the local consumer and senior purchasing officer's comments as follows: 'There are three distinct supply chain/ purchasing structures in our business - the first is the strategic purchasing split produced up of highly capable, helpful purchasing professionals and commodities supervisors submitting to the corporate level as a service department to the whole organization. The second type of purchaser is the practical consumer, who reports to every company division and is primarily managerial. They are constructed of people who are inadequately educated or equipped and have 10 to 20 years of experience. They are usually clerks who 'become purchasers'. Engineering, statisticians, construction employees, marketing and agreements management make up the third group, and they hire subordinates and choose providers for highly valuable goods in bulk. This serves to veil the supply chain because weak systems obscure rules, procedures, activities, requests, and suppliers (R7).

'This is problematic because there is a perpetual conflict between activities, consumers, and strategic purchasing. Lacking a solid foundation, everything we try hits a brick wall. I believe that 50% of strategic purchasing activities were lost because purchasers disregarded suggestions (R10). Several participants expressed unwillingness to work together and share knowledge with their colleagues. Respondents showed that collaborating cooperatively on pre-qualifying current supply chains might minimize the total time required for evaluating the skills of providers and contractors. As a result, the purchasing industry may concentrate its attention on the official tendering procedure and getting the greatest value. Particularly as the engineering sector grows in South Africa, there currently must be a greater amount of time accessible for concentrating on developed supply chain administration, getting lasting connections, expressing hazards and possibilities, and revealing inventiveness to deliver the most effective options for customers and other interested parties.

Maramura and Shava (2021), said that trust between organizations is critical in retaining a competitive edge inside the supply chain. When confidence is built via interactions among persons, it develops a link or tie that binds individuals collectively. Binding may be classified into two types: architectural and interpersonal. Legal agreements and arrangements are examples of structuring connections, which are financial and political linkages that connect consumers with sellers. Sienkiewicz-Małyjurek and Szymczak (2023) said that as defective as each of the components of a building supply chain are, they are made considerably more difficult since a new supply chain or management element must be built every single time a fresh endeavor begins. The modifications that take place from one task to the following one avoid the education that occurs in production.

The Fifth Theme: Supply Chain Management: The research's sixth topic was branded "lack of supply chain management." This topic evolved as a result of the items that followed replies from those who participated: *Management and public encouragement of supply chain activities, as well as addressing compliance clearly (P1)'. 'A shortage of organizational support and knowledge regarding what we do. In this firm, regardless of how competent or skilled a worker is, we are treated as second-class people, despite just agreements' management, QS's, engineers, and so on being acknowledged. Titles are important in this firm (R5). In addition, respondents noted that senior executives from enterprises engaged in an endeavor seldom agree on common goals. It was discovered that difficulties are not always handled at the point of happening, and collaborators on the project do not adopt transparent pricing. Respondents observed that 'reinventing' the design of previous errors was not prevented, and learning learned was not utilized. Program outcomes are inconsistent, and no official or unofficial evaluations of achievements are done.

A recognized edge in competition is meaningless if the engineering business cannot preserve it from project to project, therefore engineering sector executives must maintain a core attitude of anticipating (rather than responding) to developments and challenges (Sienkiewicz-Małyjurek and Szymczak, 2023). Recognizing that the majority of important gains are the outcome of little adjustments as time passes the engineering sector needs to promote a culture of continual projects and process (such as job technique) development. Training for workers and motivation is required, as these tiny improvements will be more successful if the labor force is of high quality. The results further demonstrate that the introduction of management-based approaches has resulted in no discernible positive influence on the engineering sector and might not provide a successful answer when managing supply chains. According to Pooe et al. (2015), management-based mindset might even be restraining the transition to a performance-oriented workplace. According to the study, leadership-based

approaches could prove more profitable. Leadership-based approaches additionally involve based on data remedies, which reduce managerial decisions, administration, and outside influence while increasing guidance, autonomy, and cooperation.

The Sixth Theme: Managing Time: 'Time' was the research's sixth and concluding theme. This topic evolved as a result of a couple of replies from those who participated: 'Time is a problem that isn't perpetually present because when you have an undertaking, there are a lot of events that must take place when you do the beginning. So timing is a barrier, but if you currently have your procedures as well as location information, there is no explanation why it can't operate greater (R2)'. 'There isn't sufficient time for the estimations or estimate teams to adequately prepare the offer inquiries documentation. So, whenever you, as the QS, ultimately obtain the subcontractor papers, you must conduct conversations or interact with the subcontractor for the purpose to finish the agreement (R5). 'As a result, I believe that the time necessary to prepare a suitable offer or RFQ is frequently insufficient. So, from bidding to implementation, how long does it take? Notice that I believe that in terms of implementation, we are often guided by who is the lowest (R9)'. Efficient time administration is critical in building projects. Nyide (2022) goes on to say that interruptions are expensive and are particularly discussed in contract papers in expectation of assessed and other penalties. Engineering costings may include additional, agreed upon, or unit prices. As stated by Setino and Ambe (2016), all engineering costs are based on the time that the contractor estimates it will require to finish a task. Excluding any difficulties created by the task owners and beyond the provider's management, the subcontractor must fulfill the product proprietor's deadline or risk losing cash. Engineering time variables are much more problematic since workers may be outdoors for part or all of an endeavor, meaning their progress is impacted by weather-related factors.

4. Conclusion

This research concentrated on the supply chain limitations in the South African engineering sector. Because empirical research in this field is limited, particularly in South Africa, this research should offer a foundation for future regional studies aimed at improving the administration of supply chains and project efficiency in the engineering sector. Although the empirical research-based discussion on supply chain limitations concentrates primarily on the production and manufacturing contexts, the conversation on engineering continues primarily theoretically. The research looked into supply chain restrictions in the South African engineering sector. It commented on the important way that the engineering sector contributes to the South African economy in a variety of methods, including the development of required facilities for both personal and business purposes, its influence on GDP, and job opportunities, in both official and informal capacities. The literature regarding the characteristics of the nation's engineering sector, and also the relevance of supply chain administration to specific enterprises and the sector as an entire, was evaluated. The paper also described the qualitative research technique used for the research, following which the empirical results were published. Six significant themes emerged from the data analysis of the basic data gathered. The findings reveal a shortage of expenditure in supply management processes and the fact that engineering companies are still lacking a strategic perspective on managing their supply chains. However, it seems that supply chain tactics may improve an organization's efficiency and business performance in engineering companies. These findings were compared to pertinent previously published research to determine whether the results of the present research are consistent with the pertinent published literature.

References

AMBE, I. M. (2016). Insight into supply chain management in a municipal context. *Public and Municipal Finance,* 5**,** 20-29.

BAG, S., DHAMIJA, P., BRYDE, D. J. & SINGH, R. K. (2022). Effect of eco-innovation on green supply chain management, circular economy capability, and performance of small and medium enterprises. *Journal of Business Research,* 141**,** 60-72.

BAG, S., GUPTA, S., CHOI, T. M. & KUMAR, A. (2021). Roles of innovation leadership on using big data analytics to establish resilient healthcare supply chains to combat the COVID-19 pandemic: A multimethodological study. *IEEE Transactions on Engineering Management,* 12, 25-27.

BAG, S., GUPTA, S., KUMAR, S. & SIVARAJAH, U. (2020a). Role of technological dimensions of green supply chain management practices on firm performance. *Journal of Enterprise Information Management,* 34**,** 1-27.

BAG, S., WOOD, L. C., XU, L., DHAMIJA, P. & KAYIKCI, Y. (2020b). Big data analytics as an operational excellence approach to enhance sustainable supply chain performance. *Resources, Conservation and Recycling,* 153**,** 104-559.

BIZANA, N., NAUDE, M. & AMBE, I. (2015). Supply chain management as a contributing factor to local government service delivery in South Africa. *Journal of Contemporary Management,* 12**,** 664-683.

DAHOOIE, J. H., DEHSHIRI, S. J. H., BANAITIS, A. & BINKYTĖ-VĖLIENĖ, A. (2020). Identifying and prioritizing cost reduction solutions in the supply chain by integrating value engineering and gray multi-criteria decision-making. *Technological and Economic Development of Economy,* 26**,** 1311-1338.

DLOVA, V. & NZEWI, O. (2014). Developing and Institutionalising Supply Chain Management Procedures: A Case Study of the Eastern Cape Dept of Roads and Public Works. *Africa's Public Service Delivery & Performance Review,* 2**,** 5-22.

DOBROSZEK, J. (2020). Supply chain and logistics controller–two promising professions for supporting transparency in supply chain management. *Supply Chain Management: An International Journal,* 25**,** 505-519.

EMROUZNEJAD, A., ABBASI, S. & SıCAKYÜZ, Ç. (2023). Supply chain risk management: A content analysis-based review of existing and emerging topics. *Supply Chain Analytics,* 3**,** 100-131.

ETON, M., MUREZI, C., MWOSI, F. & OGWEL, P. B. (2018). Internal control systems and financial accountability in Uganda: A case of selected districts in western Uganda. *International Journal of Commerce and Management Research,* 4**,** 106-111.

GOLD, S. & HEIKKURINEN, P. (2018). Transparency fallacy: Unintended consequences of stakeholder claims on responsibility in supply chains. *Accounting, Auditing & Accountability Journal,* 31**,** 318-337.

HELO, P. & HAO, Y. (2022). Artificial intelligence in operations management and supply chain management: An exploratory case study. *Production Planning & Control,* 33**,** 1573-1590.

KHAN, S. A. R., ZKIK, K., BELHADI, A. & KAMBLE, S. S. (2021). Evaluating barriers and solutions for social sustainability adoption in multi-tier supply chains. *International Journal of Production Research,* 59**,** 3378-3397.

LAUWO, S. G., AZURE, J. D. C. & HOPPER, T. (2022). Accountability and governance in implementing the Sustainable Development Goals in a developing country context: evidence from Tanzania. *Accounting, Auditing & Accountability Journal,* 35**,** 1431-1461.

LOOSEMORE, M., ALKILANI, S. & MATHENGE, R. (2020). The risks of and barriers to social procurement in construction: a supply chain perspective. *Construction Management and Economics,* 38**,** 552-569.

LUO, L., JIN, X., SHEN, G. Q., WANG, Y., LIANG, X., LI, X. & LI, C. Z. (2020). Supply chain management for prefabricated building projects in Hong Kong. *Journal of management in engineering,* 36**,** 1502-15011.

MAFINI, C. (2016). Barriers to public supply chain management strategy implementation: an exploratory diagnosis. *Problems and Perspectives in Management,* 14**,** 256-265.

MAFINI, C., DHURUP, M. & MADZIMURE, J. (2020). E-procurement, supplier integration and supply chain performance in small and medium enterprises in South Africa. *South African Journal of Business Management,* 51**,** 1-12.

MARAMURA, T. C. & SHAVA, E. (2021). Ethics and accountability in municipal supply chain management in Zimbabwe. *International Journal of Management Practice,* 14**,** 621-635.

MASTOS, T. D., NIZAMIS, A., TERZI, S., GKORTZIS, D., PAPADOPOULOS, A., TSAGKALIDIS, N., IOANNIDIS, D., VOTIS, K. & TZOVARAS, D. (2021). Introducing an application of an industry 4.0 solution for circular supply chain management. *Journal of Cleaner Production,* 300**,** 126-186.

MATTO, M. C. (2017). Analysis of factors contributing to poor performance of procurement functions in local government authorities: empirical evidence from audit reports. *European Journal of Logistics, Purchasing and Supply Chain Management,* 5**,** 41-52.

MENON, R. R. & RAVI, V. (2021). Analysis of barriers of sustainable supply chain management in the electronics industry: An interpretive structural modeling approach. *Cleaner and Responsible Consumption,* 3**,** 100-126.

MISHRA, S. B. & ALOK, S. (2022). Handbook of research methodology. *Educreation publishing,* 3, 25-29.

MOSHOOD, T. D., NAWANIR, G., MAHMUD, F., SOROOSHIAN, S. & ADELEKE, A. (2021). Green and low carbon matters: A systematic review of the past, today, and future on sustainability supply chain management practices among manufacturing industry. *Cleaner Engineering and Technology,* 4**,** 100-144.

NKWANYANA, N. S. & AGBENYEGAH, A. T. (2020). The effect of supply chain management in governance: Public sector perspectives. *Journal of Transport and Supply Chain Management,* 14**,** 1-9.

NYIDE, C. J. (2022). MUNICIPAL FINANCIAL MANAGEMENT PRACTICES FOR IMPROVED COMPLIANCE WITH SUPPLY CHAIN MANAGEMENT REGULATIONS. *Journal of Management Information & Decision Sciences,* 25, 31-35.

NZIMAKWE, T. I. & BIYELA, A. C. (2021). Exploring the procurement challenges in the South African public sector. *Public procurement, corruption and the crisis of governance in Africa***, 12,** 73-92.

OTHMAN, I., KINEBER, A., OKE, A., ZAYED, T. & BUNIYA, M. (2021). Barriers of value management implementation for building projects in the Egyptian construction industry. *Ain Shams Engineering Journal,* 12**,** 21-30.

PANDEY, P. & PANDEY, M. M. (2021). Research methodology tools and techniques, *Bridge Center,* 30, 26-29.

POOE, D. R., MAFINI, C. & MAKHUBELE, D. T. (2015). Investigating municipal procurement challenges in South Africa: A qualitative study. *International Business & Economics Research Journal (IBER),* 14**,** 67-78.

POURNADER, M., GHADERI, H., HASSANZADEGAN, A. & FAHIMNIA, B. (2021). Artificial intelligence applications in supply chain management. *International Journal of Production Economics,* 241**,** 108-250.

QUEIROZ, M. M., WAMBA, S. F., PEREIRA, S. C. F. & JABBOUR, C. J. C. (2023). The metaverse as a breakthrough for operations and supply chain management: Implications and call for action. *International Journal of Operations & Production Management,* 43**,** 1539-1553.

RAMOS, M. M. (2004). Interaction between management accounting and supply chain management. *Supply Chain Management: An International Journal,* 9**,** 134-138.

SELOMO, M. R. & GOVENDER, K. K. (2016). Procurement and supply chain management in Government Institutions: A case study of select Departments in the Limpopo province, South Africa. *Dutch Journal of Finance and Management,* 1**,** 37-45.

SETINO, R. & AMBE, I. M. (2016). Supply chain management practices in state-owned enterprises environment. *Risk Governance & Control: Financial Markets & Institutions,* 6**,** 380-391.

SEURING, S., BRIX-ASALA, C. & KHALID, R. U. (2019). Analyzing base-of-the-pyramid projects through sustainable supply chain management. *Journal of Cleaner Production,* 212**,** 1086-1097.

SIBANDA, M. M. (2017). Control, ethics and accountability in the financial management performance of Eastern Cape municipalities. *Journal of Public Administration,* 52**,** 313-339.

SIBANDA, M. M., ZINDI, B. & MARAMURA, T. C. (2020). Control and accountability in supply chain management: Evidence from a South African metropolitan municipality. *Cogent Business & Management,* 7**,** 178-5105.

SIENKIEWICZ-MAŁYJUREK, K. & SZYMCZAK, M. (2023). Understanding public service supply chain management: a systematic literature review. Management Review Quarterly**,** 1-65.

TADDEI, E., SASSANELLI, C., ROSA, P. & TERZI, S. (2022). Circular supply chains in the era of Industry 4.0: A systematic literature review. *Computers & Industrial Engineering,* 170**,** 108 - 268.

TALWAR, S., KAUR, P., FOSSO WAMBA, S. & DHIR, A. (2021). Big Data in operations and supply chain management: a systematic literature review and future research agenda. *International Journal of Production Research,* 59**,** 3509-3534.

TURKER, D. & ALTUNTAS, C. (2014). Sustainable supply chain management in the fast fashion industry: An analysis of corporate reports. *European Management Journal,* 32**,** 837-849.

WIELAND, A. (2021). Dancing the supply chain: Toward transformative supply chain management. *Journal of Supply Chain Management,* 57**,** 58-73.

ZEKHNINI, K., CHERRAFI, A., BOUHADDOU, I., CHAOUNI BENABDELLAH, A. & BAG, S. (2022). A model integrating lean and green practices for viable, sustainable, and digital supply chain performance. *International Journal of Production Research,* 60**,** 6529-6555.