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Exploring Factors Enhancing the Implementation of Supply Chain Management in the Nigerian Construction Industry: A Qualitative Study

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Abstract

Supply Chain Management (SCM) plays a pivotal role in driving economic growth by enhancing efficiency, reducing costs, and fostering competitiveness in Nigeria. Despite the growing importance of SCM in the construction industry, many construction firms in Nigeria are yet to effectively implement SCM practices. This has led to inefficiencies, delays, cost overruns, and poor project outcomes. Therefore, there is a need to establish factors that enhance the implementation of SCM in construction firms in Nigeria. The study relied on qualitative research using a case study methodology, primarily employing interviews to gather data from twenty construction companies in Abuja, Nigeria. Ten medium-scale and ten large-size (total of twenty) construction firms were interviewed, however, only ten out of twenty targeted interviews were achieved within four months. The interview response rate is fifty percent, and this showed the trait of multiple case studies. The study applied content analysis, which is an explicit approach in thematic analysis. The study deploys content analysis to explore a detailed conversation, ensuring clear interpretation. The study established undertaking digital transformation/technological innovation, collaboration, training and development, and information sharing as critical factors enhancing the implementation of SCM. The study has provided enhancements to help construction firms implement SCM in the industry. The study contributes to the body of knowledge on SCM construction and provides a practical model for its implementation. The study recommends investments in digital transformation and training and skill development programs for the enhancement of SCM capabilities.

Keywords: Case study, Construction industry, Qualitative method, and Supply Chain Management

1.0 INTRODUCTION

Nigeria's construction industry (CI) has significantly boosted the economy, reduced unemployment, provided housing, roads, infrastructure, water supplies, and power lines, supported various industries, and employed the unemployed and unskilled in developing countries like Nigeria (Boadu et al., 2020). Nigeria's construction sector (CI) contributed 6.17% of the country's GDP in the first quarter of 2019 (National Bureau of Statistic, 2019) but experienced a decline in 2021 due to disruptions in construction material supply (McKinsey Institute, 2022). To minimise disruption, construction supply chain management (SCM) techniques must be applied. SCM involves connecting multiple construction firms to provide items to customers using a single method, technique, and set of activities. Key SCM practices include process integration, risk and award sharing, information sharing, long-term connections, cooperation, and leadership. The five best SCM approaches identified by Studer and De Brito Mello (2021) and McKinsey Global Institute (2022) are just-in-time, lean thinking, continuous improvement, offshore manufacturing, and sustainability. By incorporating long-term partnerships and trust among supply chain partners, SCM strategies could transform the Nigerian construction sector and become an essential player in the country's economy. Amade et al. (2017) posited that SCM practices must incorporate long-term partnerships and trust among supply chain partners. The implementation of SCM in the construction sector could transform the sector into an indisputable player in the country's economy, SCM practices could completely transform the sector (Amade et al., 2017). Although the construction sector faces numerous challenges, including delays, overruns, and corruption. Nigeria's construction sector faces issues like a lack of skilled workers, power shortages, and unavailability of materials (Okafor et al., 2021). The challenges could be as a result of ineffective policies, weak institutions, and complex social and cultural practices that contribute to the industry's challenges (Ayodele et al., 2011; Oyewobi et al., 2011). Nigeria's construction industry faces significant performance challenges due to a lack of resources and organisations, and overtime affects 40% of construction projects, causing concern among stakeholders (Tunji-Olayeni et al., 2016). The construction sector is fragmented, with contractors, subcontractors, and suppliers all contributing to project control. For the construction industry to overcome these issues, effective implementation of SCM should

be the critical solution. Construction firms can only achieve this by exploring factors that enhance the implementation of SCM. Construction firms need to implement SCM to compete in the worldwide market. Uncertainties in supply and demand may be brought on by competing goals and a lack of collaboration among supply chain participants.

Current research on enhancing SCM implementation in Nigeria's construction industry highlights significant challenges, including fragmentation, inadequate IT investment, and poor communication (Okafor et al., 2021). Effective SCM is critical for businesses to remain competitive in today's globalised and dynamic marketplace. However, the successful implementation of SCM is often hindered by barriers such as technological limitations, operational inefficiencies, and resource constraints. Identifying and leveraging factors that enhance SCM implementation is essential to overcoming these barriers and achieving streamlined operations, cost reduction, and improved customer satisfaction. While significant advancements have been made in SCM practices, there is limited research on how businesses can systematically address these barriers by leveraging key enablers. This gap underscores the need for a comprehensive understanding of the factors that enhance SCM implementation. Additionally, integrating technologies is proposed as essential for modernising SCM practices (Osunsanmi et al., 2022). However, the absence of a tailored SCM model for Nigeria remains a critical gap that needs addressing to improve project delivery outcomes (Moneke & Echeme, 2016; Okafor et al., 2021; Osunsanmi et al., 2022).

The factors enhancing the implementation of SCM have been the subject of numerous studies, but none of them has looked at these factors from the viewpoint of medium- and large-sized construction firms. Due to a dearth of resources and guidance, construction firms in Nigeria and other emerging nations have difficulty implementing SCM. There is a significant gap in research on factors enhancing the implementation of SCM in Nigeria, despite the growing importance of SCM in Nigeria's economic development, few studies have focused on those factors (Sundram et al., 2016; Barata et al., 2023). Notwithstanding the several studies conducted on factors enhancing/enabling the implementation of SCM practices across the globe, there is limited information in the literature on factors enhancing the implementation of SCM practices in the Nigerian construction industry. This creates gaps in both empirical data and knowledge. In light of this, the study seeks to establish factors enhancing the implementation of SCM in Nigeria to enhance supply chain operations.

■2.0 LITERATURE REVIEW

2.1 Concept of SCM

The concept of SCM has been increasingly applied to the construction sector to improve business performance, such as faster response to a variety of customer demands, lower cost, and better quality. Simultaneously, the application of SCM concepts in the construction sector is commonly used to instruct the project team in strategic, tactical, and operational planning to achieve supplier relationships and attain high operational efficiency (Singh et al., 2022). Although SCM can be strengthened using effective communication, integration, collaboration, and coordination between stakeholders throughout the project (Singh et al., 2022), understanding SCM in the construction industry is complex due to its high fragmentation and dynamic nature (Cheng et al., 2019). SCM practices include the coordination and optimisation of all activities involved in the production and delivery of goods and services to customers. Implementing effective SCM practices is crucial for improving efficiency, reducing costs, and enhancing customer satisfaction (Barata et al., 2023). The construction industry is a complex and dynamic industry with multiple stakeholders involved in the project supply chain. SCM practices are effective in managing the complexities of the supply chain in various industries. However, the adoption of SCM practices in the construction industry has been slow, despite the potential benefits.

2.2 Implementation of SCM

In the construction sector, SCM practices are becoming more and more acknowledged as being crucial for raising project results, cutting expenses, and increasing efficiency. However, depending on elements like organisational commitment, stakeholder integration, and technology uptake, implementation levels differ significantly between areas and businesses. The efficiency of SCM practices is greatly hampered by the fragmented and project-specific character of the construction industry (Osunsanmi et al., 2022). The construction industry has historically adopted SCM later than other industries. Inherent complications, including the involvement of several stakeholders, shifting project scopes, and the dependence on custom designs, might be blamed for this hesitancy (Osunsanmi et al., 2022). However, recent developments, including the technology of the Fourth Industrial Revolution (4IR), have accelerated the implementation of SCM processes. These technologies, which increase communication, transparency, and decision-making throughout the supply chain, include digital solutions for inventory management, procurement, and real-time data tracking (Osunsanmi et al., 2022; Ghurka, 2003). Centralised logistics systems, for example, are now considered best practices since they allow economies of scale and more efficient procurement procedures (Ghurka, 2003). Enhancing communication channels, choosing trustworthy suppliers, and utilising technological solutions are all examples of best practices in supply chain management (Trecek, 2024).

However, many businesses continue to encounter implementation challenges. According to research, common problems include inadequate planning, a lack of stakeholder integration, and poor communication (Serpell & Heredia, 2003). For instance, a diagnostic study of Chilean construction firms found that the majority were unable to create enduring connections with subcontractors and suppliers, which are essential for promoting cooperation and establishing trust (Serpell & Heredia, 2003). Serpell and Heredia (2003) further opined that erratic material demands, frequent design modifications, and short-term thinking exacerbate supply chain inefficiencies. SCM in construction must be implemented successfully, which calls for certain tactics and approaches. One useful framework that has been suggested is the Deming Cycle, also known as PDCA (Plan-Do-Check-Act). Through methodical supply chain process planning, execution, monitoring, and revision, this methodology places an emphasis on ongoing improvement (Serpell & Heredia, 2003). Additionally, by facilitating real-time

collaboration among all stakeholders, solutions such as Building Information Modelling (BIM) and integrated project delivery (IPD) models improve supply chain coordination.

According to Trecek (2024), SCM guarantees that materials move smoothly throughout the project lifetime and reduces hazards. Crucially, since it minimises delays and increases efficiency, cultivating cooperation and trust amongst stakeholders continues to be a fundamental component of efficient supply chain management (Osunsanmi et al., 2022). Despite advancements, many businesses have not yet fully adopted SCM techniques. For example, research shows that most businesses blame suppliers alone for supply chain inefficiencies, frequently ignoring internal flaws like poor communication or insufficient planning (Serpell & Heredia, 2003). For supply chain performance to improve over time, this mentality needs to change (Seth et al., 2015). The implementation of SCM practices in the construction industry is advancing, albeit unevenly. Emerging technologies and frameworks offer significant opportunities to address traditional shortcomings, enhancing cost efficiency, time management, and stakeholder integration (Osunsanmi et al., 2022). To fully unlock the benefits of SCM, companies must adopt a proactive, collaborative approach while leveraging advanced tools and methodologies. Addressing cultural and operational barriers is critical to achieving widespread success in implementing SCM practices within the construction sector (Okafor et al., 2021).

2.3 Factors Enhancing the Implementation of SCM

Developing a comprehensive supply chain strategy is a vital tool for implementing SCM in contracting organisations. Organisations need to develop a comprehensive supply chain strategy that aligns with their overall business strategy. This strategy should outline the goals, objectives, and key performance indicators that will guide the implementation of supply chain management practices (Christopher, 2016). The company's primary resources, which are a source of competitive advantage, are limited to resources within the company's organisation and the organisation as part of the SCM systems. An important task for top management is to manage the supply chain at the most cost-efficient level while maintaining high flexibility in building relationships with suppliers to respond to customer needs (Nurdianti et al., 2017).

2.3.1 Increase Competitive Advantage

Increased competition in business, increasingly complex customer demands, and more and more products are emerging. Currently, many factors trigger companies to compete to create innovative products (Barata et al., 2023). This is done to increase competitive advantage. A well-integrated network within a corporation is essential for increasing this competitiveness. Companies in the production, importation, and service industries have long recognised the value of optimising their supply chains to cut costs and improve their position in the market (Barata et al., 2023). Reducing costs and increasing competitiveness can be achieved by employing SCM to coordinate the flow of information, products, and materials between companies' suppliers and distributors. The rise of technology and the internet has unquestionably transformed the way businesses operate and provided new avenues for gaining a competitive advantage (Figures, 2017; Barata et al., 2023). Many previous studies examined a company's strategy to develop and improve its competitiveness to be more competitive in the global market competition (Sundram et al., 2016; Barata et al., 2023). To increase competitive advantage, companies must support their internal functions and communicate with supply chain partners effectively (Sundram et al., 2016; Barata et al., 2023). SCM practices positively impact competitive advantage. From several studies, it can be seen that there is a relationship between SCM practices and the competitive advantage of an organisation or company (Handoko et al., 2017).

2.3.2 Information Sharing

Information sharing has been identified as another key strategy for adopting SCM practices in the construction industry. This includes sharing information on project schedules, budgets, and quality requirements (Kim et al., 2019). Information sharing plays a vital role in SC integration. SC integration involves the coordination and collaboration of all stakeholders in the supply chain. This can be achieved through the use of technology, such as Building Information Modelling (BIM), to facilitate communication and collaboration (Papadonikolaki et al., 2021). Supplier selection is another important strategy for adopting SCM practices in the construction industry. The selection of suppliers should be based on their ability to deliver quality products and services and their willingness to collaborate with other stakeholders in the supply chain (Le et al., 2021).

2.3.3 Embracing Digitalisation

The use technology to improve supply chain visibility. Technology can be used to improve supply chain visibility, which in turn helps organisations make better decisions and respond more quickly to changes in demand. For example, real-time tracking of inventory and shipments can help organisations identify and address supply chain disruptions (Chopra & Meindl, 2016). Digitalisation involves using digital technologies to improve SCM processes. This can include using big data analytics to optimise SC operations, implementing blockchain technology to enhance transparency and security in the SC, and using artificial intelligence (AI) and machine learning (ML) to automate SC processes. By embracing digitalisation, organisations can improve efficiency and reduce costs (Sarkis et al., 2021). Singh et al. (2022) suggested that implementing proposed strategies in supply chain management (SCM) necessitates a thorough analysis of factors like technology adoption, contractor reward, training requirements, and grievance redressal.

2.3.4 Responsive Strategy

A responsive strategy involves market research to capture market needs and respond quickly, focusing on the supply chain's ability to handle large demand, meet consumer needs, and handle demand uncertainty. Effective SCM implementation in the construction industry requires collaboration with suppliers and customers, fostering a culture of open communication, sharing knowledge, and rewarding innovation (Beamon, 2018). This can be achieved through joint ventures, partnerships, or alliances (Tang et al., 2019). Investing in employee training and development, including training on SCM principles and specific tools and technologies, is crucial for ensuring employees have the knowledge and skills needed to effectively implement SCM practices. Inadequate training and lack of user participation can lead to SCM development failures (Fernie & Sparks, 2018); training should cover the benefits of SCM practices and the use of technology like BIM (Chen et al., 2020).

2.3.5 Integration of Lean Practices

Furthermore, implementing lean SCM practices is the right step in the right direction. Lean SCM practices involve minimising waste and inefficiencies in the SC. This can be achieved by reducing inventory, improving production processes, and optimising logistics. By implementing lean SC practices, organisations can improve efficiency and reduce costs. Lean principles have been identified as effective strategies for adopting SCM practices in the construction industry. This includes reducing waste, improving efficiency, and increasing collaboration between stakeholders (Yong et al., 2020). Sustainable SCM involves minimising the environmental impact of supply chain activities. This can include reducing packaging waste, optimising transportation routes, and sourcing materials from sustainable sources. By implementing sustainable supply chain practices, organisations can enhance their reputation and appeal to customers who value sustainability (Seuring & Müller, 2008).

2.3.6 Developing a Risk Management Plan

Waters (2018) further posited that developing a risk management plan is an effective step in the implementation of SCM. SC disruptions can have a significant impact on an organisation's operations and profitability. Construction firms need to develop a risk management plan that identifies potential risks and outlines the steps that will be taken to mitigate them. This plan should include contingency plans for dealing with supply chain disruptions (Waters, 2018). In addition, SCM is an ongoing process, and contracting organisations need to engage in continuous improvement to stay competitive. This can involve regularly reviewing and updating supply chain strategies and processes, as well as seeking feedback from customers and suppliers. By engaging in continuous improvement, organisations can identify and address issues before they become major problems (Ghiani et al., 2018). Continuous improvement is an important strategy for adopting SCM practices in the construction industry. This involves continually evaluating and improving the effectiveness of SCM practices to ensure that they meet the changing needs of the industry (Yong et al., 2020).

2.3.7 Developing a Performance Measurement System

Developing a performance measurement system could reposition construction firms in the implementation of SCM. Contracting organisations need to develop a performance measurement system that allows them to track key performance indicators (KPIs) related to supply chain management. By tracking KPIs such as inventory turnover, delivery performance, and supply chain costs, organisations can identify areas for improvement and make data-driven decisions (Stadtler & Kilger, 2015). Performance measurement is critical for evaluating the effectiveness of SCM practices in the construction industry. This includes measuring the performance of suppliers, contractors, and other stakeholders in the supply chain (Shen et al., 2020).

2.3.8 Ensuring Compliance with Regulations and Standards

Ensuring compliance with regulations and standards is vital in the implementation of SCM. Contracting organisations need to ensure compliance with regulations and standards related to supply chain management. This can include regulations related to product safety, environmental sustainability, and labour practices. By ensuring compliance with regulations and standards, organisations can reduce the risk of legal and reputational issues (Carter & Rogers, 2008). Wang et al. (2020) posited that incentives and rewards can be used to encourage stakeholders to adopt SCM practices in the construction industry. This includes providing financial incentives, such as bonuses or profit-sharing, for achieving project goals and objectives.

2.3.9 Top Management Support through Clear Vision and Change Management

Top management support is crucial for the successful implementation of SCM in construction firms. This involves providing attention, resources, and authority to align the system with current business practices and prepare employees for the new technology (Seth et al., 2015). Clear vision and change management are essential for successful implementation. Employees must be prepared for the changes and aligned with the organisational culture to avoid resistance and chaos (Seth et al., 2015). Adopting SCM practices in the construction industry improves project efficiency, reduces costs, and improves project outcomes. Despite user resistance and reluctance to establish a company culture open to sharing business processes, the success rate of the system increases if aligned with the organisational culture. The implementation of SCM practices in the construction industry requires a multifaceted approach that involves collaborative relationships, information sharing, supply chain integration, supplier selection, performance measurement, training and education, risk management, lean

principles, incentives and rewards, and continuous improvement. These enhancers help improve project outcomes, reduce costs, and increase stakeholder satisfaction.

The study on SCM in the Nigerian construction industry reveals a growing interest in addressing implementing effective practices. Research highlighting a low level of awareness among stakeholders about SCM concepts, with limited adoption across the industry, has been established in literature (Moneke & Echeme, 2016). However, trust-based relationships, effective communication, and financial flow management are increasingly recognised as critical practices for improving SCM, and efforts to incorporate IT tools, such as web-based portals and software, are gaining traction to enhance communication and efficiency (Moneke & Echeme, 2016). Moneke & Echeme (2016) used tools like the Relative Importance Index (RII) and found that trust-based relationships scored 0.82, while the human resource supply chain scored 0.69, reflecting their relative significance in enhancing SCM practices. This qualitative exploration underscores the need for collaborative efforts, technological integration, and stakeholder education to overcome barriers and optimise SCM in Nigeria's construction sector. Furthermore, in-depth qualitative methods like interviews are preferred for exploring nuanced factors specific to contexts like Nigeria's construction industry (Shekarian et al., 2022; Jodlbauer et al., 2023). Therefore, this study seeks to engage construction professionals to gather insights on factors enhancing SCM implementation.

■3.0 METHODOLOGY

The study adopted a case study approach in gathering qualitative data from medium- and large-scale construction firms in Nigeria. The Federation of Construction Industry (FOCI) directory is used to identify medium-sized and large-sized construction firms based on factors like annual revenue, workforce size, and project capacity. The construction firms examined in this study are registered with the FOCI. Medium- and large-scale contracting firms contribute significantly to infrastructural development. This study focuses on staff strength in establishing firm characteristics. Abuja is the construction hub of Nigeria, hosting several firm head offices and experiencing rapid construction compared to other parts of the country. The study aimed to investigate the factors that contribute to the successful implementation of Supply Chain Management (SCM) in Nigeria. The study adopted purposive sampling, a widely used approach in qualitative research. The study adopted interviews as the primary source of data collection to obtain detailed information on SCM implementation. The selection criteria for the sample (construction firms) are based on industry specialisation, firm size, and SCM experience. The size of the staff, yearly revenue, or project capability within a given range was used to identify the medium-sized construction firms. On the other hand, larger construction firms were identified by higher project scale, manpower, or revenue thresholds. One important criterion in this study is that construction firms actively apply or manage supply chain processes in important building sectors like residential, commercial, or infrastructure projects. The study utilised semi-structured interviews. The interview protocols began by gathering information about the characteristics of the interviewees before shifting focus to the subject matter, which includes factors that enhance the implementation of SCM. A follow-up question was asked to om what are the strategies for the implementation of SCM. This was done to ensure interviewees actually understand the initial questions. Furthermore, ten medium-scale and ten large-size (total of twenty) construction firms were interviewed, however, only ten out of twenty targeted interviews were achieved within four months. The interview response rate is fifty percent, and this showed the trait of multiple case studies. Cases of more than four are effective in generalising the study's findings (Eisenhardt, 1989). However, choosing the right sample size for qualitative research, the saturation principle is crucial. When no new themes or insights surface from further data gathering, saturation occurs, signifying that the sample size is adequate. According to Guest et al. (2006), 6–12 interviews are frequently sufficient to achieve saturation in qualitative research, especially when the research questions are targeted and the sample is homogeneous (Vasileiou et al., 2018; Sharma et al., 2024). Sharma et al. (2024) and Vasileiou et al. (2018) both underlined that if each interview produces high-quality, thorough data, fewer participants are required. Since it falls within this range, it is consistent with the usage of ten interviews. Furthermore, SCM-savvy stakeholders acted on behalf of the case firms. This offered high-quality information. These carefully chosen firms specialise in engineering, building construction, and general contracting. The recorded interview was manually transcribed. The study applied thematic analysis for clarity of interpretation and exploring a detailed conversation. Guest (2012) observed that the most used form of qualitative investigation is the thematic analysis. Thematic analyses are used to establish patterns, similarities, differences, and themes within data.

■4.0 RESULTS

4.1 Profile of interview respondents

The interviewing was used to obtain constructed views of participants representing case firms in SCM and other key professionals in the study area about critical components of the study. The interview theme focuses on factors influencing the implementation. Table 1 presents the background information of the interview subjects. A total of ten out of twenty targeted interviews were achieved within four months. The interview response rate is fifty percent. Varying ranges of professionals were interviewed, including supply chain managers, builders, civil engineers, quantity surveyors, and procurement managers, although supply chain managers and quantity surveyors dominated the sample. The selection of these professionals is based on their direct involvement in project delivery and their varied roles in the supply chain. Specifically, supply chain managers supervise the delivery of goods and services, and builders carry out construction plans with the help of efficient SCM. Quantity surveyors oversee budgeting and cost estimation, while civil engineers offer insights into project design and implementation. Procurement managers manage supplier relationships and purchases, whereas project managers oversee all project-related activities. When taken as a whole, these experts reflect key roles that impact supply chain performance and provide insightful viewpoints on problems and possible fixes to improve SCM procedures in the sector. Target professionals are decision-makers hence their selection. The

study explored the use of email invitations and phone calls with potential participants. The study further leverages industry networks to identify knowledgeable individuals willing to participate.

Table 1 Profile of interview respondents

Firm	Firm Category	Firm Representative Designation	Experience	Practice	Professional Qualification	Interview Method
CF1	Large-size	Supply chain manager	28 years	Private Practice	CSCP	E-mail
CF2	Large-size	Supply chain manager	20 years	Private Practice	CPIM	E-mail
CF3	Large-size	Civil engineer	17 years	Private Practice	COREN	Telephone
CF4	Large-size	Project Manager	17 years	Private Practice	PMP; Reg. Bldr.	E-mail
CF5	Large-size	Procurement manager	16years	Private Practice	CPIM	E-mail
CF6	Medium-size	Supply chain manager	21 years	Private Practice	CSCP	E-mail
CF7	Medium-size	Builder (CM Researcher)	15 years	Academic (PhD)	Reg. Bldr.	Telephone
CF8	Medium-size	QS/Procurement manager	27 years	Private Practice	PMP; Reg. QS	Telephone
CF9	Medium-size	QS/Project Manager	26 years	Academic (PhD)	PMP; Reg. QS	Telephone
CF10	Medium-size	Project Manager	14 years	Private Practice	Reg. QS	Telephone

CF = Construction firm; CPIM = Certified in production and inventory management; CSCP = Certified supply chain professional; COREN = Council of Registered Engineers of Nigeria; PMP = Project management professionals; Reg. = Registered; Bldr. = Builder; QS = Quantity surveyor

The dominance of supply chain managers/procurement managers in the sample is adequate since the study is supply chain research. The case firm representatives, or 'interviewees,' are registered, and four out of ten were certified with CSCP and CPIM. Other interviewees are registered professionals ranging from COREN, Bldr., and QS. The maximum and minimum years of experience are 28 and 14, respectively, with an average of 21 years. Table 1 further shows that 8 out of 10 of the interviewees are in private practice and 2 are in academia. These two were selected to contribute to deep knowledge of supply chain theories, and many academics maintain close ties with industry professionals, ensuring their perspectives remain relevant and applicable to practical supply chain challenges. Interviewees from academics enriched the data as they offered evidence-based recommendations and helped validate findings through rigorous methodologies. Three interviewing methods were also dominant: e-mail (five) and telephone (five). The interview was carried out between 1/8/2024 and 2/12/2024; the interview session lasted for 15 minutes and was recorded using a phone recorder. The interview questions were semi-structured with the view of enhancing flexibility in responses.

4.2 Qualitative Data on Factor Enhancing the Implementation of SCM

The interview data relating to factors enhancing the implementation of SCM are focused on improving SCM practices generated in the section. The data generated provided insights into subjective experiences and perceptions of the 'case firms' interviewed. This type of data identifies factors that may not be immediately apparent through the quantitative data set. Table 2 revealed themes of subjective perceptions on factors enhancing the implementation of SCM. Notable enhancers revealed are undertaking digital transformation, training and development, and information sharing, among many others. According to CF1, CF3, and CF5, the challenges that accompany SCM force us to document these constraints and navigate our way out, we needed a think-tank review of these challenges. The case firms' representatives further suggested a strategic approach to resolving extant problems in implementing SCM by revealing the crucial need for a performance framework that is integrated into digitalisation. These performance frameworks would pave the way for undertaking digital transformation, selecting competent suppliers, and effective collaboration (CF1), as shown in Table 2. Case firms (CF2 and CF4) suggested that the best implementation processes should be rooted in training and development, digital transformation, continuous improvement across all levels, collaboration among SC partners, and information sharing. According to CF4, the best approach for our firm was the digital transformation of our operations. This approach enhances information sharing and collaboration (CF2).

Digital transformation seems to be the most effective enhancer in the implementation of SCM. Construction firms are leveraging digital tools to streamline SC operations, reduce costs, improve efficiency, and enhance the overall SC performance. According to CF1 and CF8, digital transformation helps improve SC visibility. 'With digital transformation, the whole SC processes and practices are automated (CF4, CF7, and CF10). Digital transformation enables the use of predictive analytics to participate in SC disruption and take proactive measures to fix them, this is one deeper aspect our firm is working tirelessly to achieve, and this only comes with the digitalisation of SCM practices (CF9). Notably, CF6–CF10 revealed the need for training and development for effective implementation of SCM. 'There is a need to train our personnel to develop think-tank skills needed to manage SC (CF6). With adequate training, we will be able to select competent suppliers (CF7). Other critical approaches revealed by the case firms interviewed are customer focus, trust among SC partners, collaboration, external support via vendors, information sharing, digital transformation, and training and development (CF6-CF10).

Table 2 revealed similarities and differences in issues addressed by both large-size construction firms (CF1-CF5) and medium-size construction firms (CF6-10) on factors enhancing the implementation of SCM in Nigeria. Factors of enhancement such as developing a measurement performance framework, digital transformation, training and development, digital transformation, continuous improvement across all levels, collaboration among SC partners, information sharing, customer focus, trust among SC, external support via vendors, and top management support were revealed as critical enhancers/strategies for the implementation of SCM in Nigeria. Table 2 shows no difference in subjective perception between medium-size and large-size construction firms on undertaking digital transformation, and training

and development were equally revealed by the case firm representatives. However, large-size construction firms revealed developing measurement frameworks and continuous improvement across all levels.

In terms of selecting competent suppliers and collaboration, large-size construction firms revealed more when compared to medium-size construction firms. While medium-sized construction firms revealed more information sharing when compared to large-sized construction firms. Furthermore, medium-size construction firms revealed customer focus, trust among SC, external support via vendors, effective communication, and top management support. Therefore, it is evident that medium-sized firms revealed more factors enhancing the implementation of SCM when compared with large-sized construction firms. This is because medium-size construction firms want to gain a competitive advantage by collaborating more with suppliers, improving efficiency, and having greater control over their SC. By implementing SCM, construction firms can streamline their operations, improve delivery times, reduce waste, and partner with suppliers who share their values and can be trusted, which can lead to increased client satisfaction and loyalty.

Table 2 Theme identification

Key Info. Provider	Interview Findings	Problems Addressed
CF 1	"There critical factors that were vital in the implementation."	The factors revealed were developing a performance measurement framework, undertaking digital transformation, selecting competent suppliers, and effective collaboration
CF 2	"Fairly, the firm used enhancers to implement SCM"	The enhancers revealed were training and development, digital transformation, continuous improvement across all levels, collaboration among SC partners, information sharing.
CF 3	"The firm needed these factors to implement SCM."	The factors revealed were developing a performance measurement framework, training, undertaking digital transformation, selecting competent suppliers, and effective collaboration
CF 4	"One has to deploy strategies to implement SCM."	The enhancers revealed were training and development, continuous improvement across all levels, digital transformation, collaboration among SC partners, information sharing.
CF 5	"Honestly, without enablers, the firm should have struggled in the implementation."	The factors revealed were developing a performance measurement framework, undertaking digital transformation, selecting competent suppliers, and effective collaboration
CF 6	"These enablers played a critical role in the implementation."	The enablers revealed customer focus, trust among SC partners, collaboration, external support via vendors, information sharing, digital transformation, and training and development
CF 7	"We sort for a way to overcome barriers inhibiting SCM."	The factors revealed were digital collaboration, digital transformation, information sharing, training, selecting competent supplier
CF 8	There are ways one can use to implement SCM but the firm is still studying some enablers at the moment	The enablers revealed were digital top management support, effective communication, and digital transformation,
CF 9	"Yes, there are enhancers that aid the implementation of SCM"	The enablers revealed customer focus, trust among SC partners, collaboration, external support via vendors, information sharing, digital transformation, and training and development
CF 10	"Honestly, the firm used convinced approaches to aid the implementation"	The implementation approaches revealed were digital top management support, effective communication, and digital transformation

CF = Construction firm; 1-5 = Large-size construction firm; 6-10 = Medium-size construction firms

Table 3 shows that the themes of undertaking digital transformation (100%), collaboration (80%), training and development (60%), and information sharing (50%) occurred more frequently than other themes. However, the low percentage theme indicates a lack of attention to critical enhancers/strategies in the implementation of SCM. This can have negative implications for the collaboration, efficiency, client satisfaction and competitiveness of the construction firms. Hence, it is vital and significant for construction firms in Nigeria to prioritize these factors in their implementation of SCM.

Table 3 Cross-case analysis of interview issues on factors enhancing the implementation of SCM

S/N	Similarities of Issues Addressed	Differences in the Issues Addressed	Frequency of Occurrence of Issues	Percentage
1.	Developing a performance measurement framework was common to only CF (1, 3 and 5)	Developing a performance measurement framework was revealed only by large-size construction firms	3	30%
2.	Undertaking digital transformation was common to both categories of CF (1-10).	There was no difference between medium and large-scale construction firms as undertaking digital transformation was revealed equally	10	100%
3.	Selecting competent suppliers revealed by both medium- and large-size construction firms (1, 3, 5, and 7)	Selecting competent suppliers was revealed more by large-size construction firms when compared to medium-size construction firms	4	40%
4.	Collaboration was common in construction firm interviewed (1, 2, 3, 4, 5, 6, 7 and 9)	Collaboration was revealed more by large-size construction firms when compared to medium-size construction firms	8	80%
5.	Continuous improvement across all levels was common among construction firms (2 and 4)	Continuous improvement across all levels was only revealed more by large-scale construction firms	2	20%
6.	Information sharing was revealed by the interviewed firms (2, 4, 6, 7 and 8)	Information sharing was revealed more by medium-size construction firms when compared to large-size construction firms	5	50%
7.	Customer focus was revealed by the interviewed firms (6 and 9)	Customer focus was revealed only by medium-sized construction firms	2	20%
8.	Trust among SC was revealed by the interviewed firms (6 and 9)	Trust among SC was revealed only by medium-sized construction firms	2	20%
9.	External support via vendor was revealed by the interviewed firms (6 and 9)	External support via vendor was revealed only by medium-size construction firms	2	20%
10.	Effective communication was revealed by the interviewed construction firms (8 and 10)	Effective communication was revealed only by medium-sized construction firms	2	20%
11.	Training and development were revealed by both medium-size and large-size construction firms (2, 3, 4, 6, 7 and 9)	There is no difference as training and development were revealed by both medium-size and large-size construction firm	6	60%
12.	Top management support was only revealed by one construction firm (8)	Top management support was revealed only by medium-sized construction firms	1	10%

■5.0 DISCUSSION

The qualitative data of the study revealed that undertaking digital transformation/technological innovation, collaboration, training and development, and information sharing were mostly revealed by the interviewees as critical factor enhancing the implementation of SCM in Nigeria. Based on these results, the study infers that the implementation of SCM can be facilitated by focusing on digital transformation, collaboration, training and development, and information sharing. Stakeholders perceived and considered validated factors pertinent solutions that can improve SCM in Nigeria. Mainstreaming these elements into organisation reforms and structures would position construction firms to stimulate greater SCM performance.

The implications of these findings are as follows:

i. Construction firms should focus on implementing all the 22 factors to enhance the implementation of SCM.
ii. Construction firms should identify and prioritize the factors that are most relevant to their SCM goals and objectives.
iii. Construction firms should provide adequate resources, including financial, human, and technological resources, to support the implementation of these factors.
iv. Construction firms should ensure that there is adequate training and development for employees involved in the implementation of SCM.
v. Construction firms should establish effective communication and collaboration among all stakeholders involved in the SC.

One key critical strategy for the implementation of SCM is undertaking digital transformation.

5.1 Digital Transformation

Digital transformation has been projected to revolutionize the construction industry and it offers improved delivery of materials and also eliminates delays. Undergoing digital improves supply chain visibility. Technology can be used to improve supply chain visibility, which in

turn helps organisations make better decisions and respond more quickly to changes in demand. For example, real-time tracking of inventory and shipments can help organisations identify and address supply chain disruptions (Chopra & Meindl, 2016). This viewpoint is consistent with the position reported by Sarkis et al. (2021). Sarkis et al. (2021) postulated that digitalisation would improve SCM practices. This can include using big data analytics to optimise SC operations, implementing blockchain technology to enhance transparency and security in the SC, and using artificial intelligence (AI) and machine learning (ML) to automate SC processes. By embracing digitisation, organisations can improve efficiency and reduce costs (Sarkis et al., 2021). Singh et al. (2022) further agreed that implementing SCM requires an in-depth analysis of various factors such as the latest technology adoption, contractor reward and recognition, training requirements and grievance redressal. According to the study, improving supply chain management in the Nigerian construction sector requires a strong digital transformation. This is a reflection of the industry's increasing awareness of how technology can improve data accuracy, communication, and operational efficiency. However, prior studies have shown that insufficient investment in IT infrastructure continues to be a major obstacle (Moneke & Echeme, 2016; Okafor et al., 2021). Adopting digital tools like digital twins and Building Information Modelling (BIM) could promote stakeholder integration and reduce inefficiencies (Bello et al., 2024). To overcome technological obstacles and address digital transformation, a significant investment in IT infrastructure is necessary.

5.2 Collaboration

Another recurring theme was collaboration, which emphasised the value of partnerships founded on trust and concerted efforts among clients, suppliers, and contractors. One of the most frequently mentioned challenges in Nigeria's construction industry is fragmentation, which can be lessened by effective collaboration (Moneke & Echeme, 2016; Okafor et al., 2021). Aligning disparate goals along the supply chain requires forming partnerships and cultivating trust. Building trust should be a top priority for stakeholders to promote cooperation and coordinate goals. Furthermore, implementing SCM requires key support from the top management team through collaboration among management team. Although, top management support describes the extent to which executive managers of the adopting firm provide the attention, resources, and authority required for SCM implementation (Seth et al., 2015). The top management has the responsibility to align the SCM system with the current business practices and prepare the employees for the change brought by the new technology (Seth et al., 2015). Furthermore, improving the implementation of SCM requires external support, compliance with regulations and standards, and readiness for change which can be enhanced through collaboration. Collaboration with suppliers and compliance with regulations is essential for effective SCM. Construction firms need to work closely with their suppliers to ensure that they understand the organization's needs and can provide necessary goods and services on time and at the right price. Similarly, construction firms should also collaborate with their customers to understand their needs and preferences and to ensure that they receive the products or services they need (Beamon, 2018). Collaborative relationships between stakeholders are a key strategy for adopting SCM practices in the construction industry. These relationships can be established through joint ventures, partnerships, or alliances (Tang et al., 2019).

5.3 Training and Development

Training and development were found to be essential for giving stakeholders the know-how to implement contemporary supply chain procedures. One persistent problem has been the lack of knowledge and proficiency in supply chain management strategies (Moneke & Echeme, 2016; Okafor et al., 2021). Programs for structured training can fill in knowledge gaps and advance comprehension of cutting-edge techniques like lean construction. Supply chain management-specific training programs can enable experts to successfully use best practices. The result of the study also reinforces the need for adequate knowledge and experience. Knowledge and experience can be improved through training and development. To effectively implement SCM, construction firms need to invest in employee training and development. This can include training on SCM principles, as well as training on specific tools and technologies used in SCM. A study by Fernie and Sparks (2018) showed that by investing in employee training and development, construction firms can ensure that their employees have the knowledge and skills needed to effectively implement SCM practices (Fernie & Sparks, 2018). Similarly, Seth et al. (2015) posited inadequate training for the team members and lack of user participation in the project as one of the SCM development failure factors. The main goal of the training should be to gain an effective understanding of the various business processes and address all aspects of the system.

5.4 Information Sharing

Investing in integrated information systems can improve data flow across all stages of project delivery. Improved information-sharing mechanisms through digital tools can mitigate inefficiencies and improve project outcomes. Although ineffective communication channels have been a persistent challenge, the study affirms that information sharing is essential for transparency and efficiency in construction projects and that it improves decision-making and reduces errors (Moneke & Echeme, 2016; Okafor et al., 2021).These results highlight how crucial it is to implement contemporary methods in order to address structural issues in Nigeria's building sector and guarantee the completion of projects in a sustainable manner (Moneke & Echeme, 2016; Okafor et al., 2021).

■6.0 CONCLUSION

The implementation of SCM in emerging markets has begun and advanced in the last years, however, it is still in its infancy when compared to research on developed countries. However, factors such as undertaking digital transformation/technological innovation, collaboration, training and development, and information sharing were the frequently revealed theme. The successful integration of these factors could result in improved efficiency, cost reduction, increased profitability, and enhanced customer satisfaction. Additionally, it leads to better risk

management and improved decision-making processes. The construction industry has become increasingly competitive, and firms that implement effective SCM gain a competitive advantage over their rivals. This implies that firms should prioritise these enhancers to implement SCM to remain competitive and achieve sustainable growth. Furthermore, the construction industry should continue to explore innovative ways to enhance SCM practices for improved performance and customer satisfaction. The study recommends investments in digital transformation, training, and skill development programs for enhancement of SCM capabilities. This includes providing training on procurement strategies, inventory management techniques, and effective communication skills. One noticeable limitation of the study is the fact that the study only focused on medium- and large-sized construction firms, neglecting small firms' perspectives and experiences, therefore the findings of the study may not be generalisable. However, further studies can be carried out on small firms and other sectors of the Nigerian economy. Another limitation of the study is that, despite the interviewee's expertise in SC, the case companies were only represented by one representative during the interview. This suggests that obtaining a comprehensive understanding of the case company may not be possible. To overcome the limitations of the current study, a focus group could be used as a data collection method in future research.

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Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this paper.

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