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ASSESSMENT OF RISKS ASSOCIATED WITH SUPPLY CHAIN MANAGEMENT PRACTICE ON CONSTRUCTION PROJECTS IN ABUJA-NIGERIA

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ABSTRACT

The construction industry is one of the sectors that contribute meaningfully to every sector of the global economy and social development. However, the construction industry is often associated with poor performance such as time and cost overruns, poor quality and safety performance, product defects and high wastage due to lack of systematic and

Introduction

Construction business globally is next to the largest financial activity which is largely categorized into three market sectors as Real Estate, Industrial and Infrastructure (Nkolika *et al*., 2020). The construction industry plays a vital role in development and maintenance of infrastructural projects such as roads, bridges, residential and commercial housing. (Temidayo *et al*., 2022). The construction industry in Abuja, Nigeria has experienced rapid growth over the years, driven by the city's speedy urbanization and infrastructure development (Adebisi and Ogunsemi, 2016). Construction industry is one of the segments that contribute expressively to every sector and the

strategic approach to manage its supply chain. This paper therefore seeks to assess risks associated with Supply Chain Management (SCM) practice in construction sector in Nigeria with a view to improve project delivery. This paper adopt a quantitative research approach using questionnaires to sourced relevant information from respondents (Construction supply chain stakeholders). Simple random sampling technique was employed to select individual respondents within the selected study area. Data collection was done using questionnaire survey via self-administered questionnaires to construction stakeholders. Data was analyzed using descriptive statistics such as relative importance index. The study revealed risks associated with SCM practice amongst stakeholders in the study area, among risks identified was financial risk, ineffective collaboration and coordination, operatonal risks and inadequate risk management. Supply chain management practice is a management tool that aid smooth flow of material which aid project delivery. This study recommend that to achieve effective project delivery, it requires optimal knowledge on financial risk, effective collaboration and coordination, operatonal risks and adequate risk management to effectively manage the adoption of SCM practice in the construction projects in Abuja, Nigeria.

Keywords: Supply Chain Management; Construction projects; Risks.

global economy and social development. It also helps in generating wealth and development of the country. Globally, construction businesses encounter a lot of inherent uncertainties and issues and experienced a decrease in output and an increase in costs (Dhruv *et al.,* 2018).

This sector is often associated with high risks in terms of time and cost overruns, poor quality and safety performance, product defects and high wastage. Construction projects are becoming increasingly complex and the conventional approaches of managing them are still not sufficient in managing it (Nkolika *et al*., 2020). The construction process is denoted as one-of-a-kind, construction industry relationship dynamic is usually about a client whose needs are directly served by the main contractor who in turn relies on services provided by various sub-suppliers, this makes each party

seek to minimise its cost and risk exposure by passing them along the supply chain and relying on this contractual set-up, which further derails the entire endeavor (Chigozie *et al*., 2021).

Construction project has chains of activities, these activities requires various resources for it to be successful. The backbone of most projects success is supply chain management (SCM). Logistic affect efficient movement of materials, services funds and information in the supply chain. Effective SCM is crucial in the construction industry, as it ensures the timely availability of materials, equipment, and labor, which are essential for project completion within the planned timeline and budget (Akintoye *et al.,* 2018). SCM as it is a production-based project delivery approach that help to streamline all the experiences of extensive delays and abandonment that have bedeviled the Nigerian construction industry (Amade *et al.,* 2016). Unfortunately, supply chain management is poor in the study area due to numerous risks associated with it implementation such financial risk, ineffective collaboration and coordination, operatonal risks, inadequate risk management and many others which lead to poor supplier performance which in turn result to poor project delivery (Shah, 2019; Benton, 2017; Cousins *et al.,* 2008). Difficulties experienced in the construction supply chain (CSC) lead to waste and late delivery of construction materials on site (Temidayo *et al*., 2022). This paper seek to address risks associated with supply chain management (SCM) practice in the construction projects in Abuja, Nigeria with a view to improve project delivery.

Literature Review

Concept of Supply Chain Management.

The concept of supply chain management in the Nigerian construction industry can be traced back to the early 2000s when globalization and technological advancements prompted companies to seek more efficient ways of managing their resources and collaboration amongst stakeholder in the construction processes. Prior to this period, the construction industry relied heavily on traditional procurement methods, which often resulted in fragmented supply chains and inefficient resource utilization (Oseghale et

al., 2015). Moneke *et al.,* (2016) defined SCM as a set of activities undertaken in an organization to promote effective management of its supply chain. Khalfan *et al.,* (2015) further defined supply chain management as a network of different organizations, linked upstream and downstream in a chain, aiming to products for the end consumers through integrated process and activities. SCM is the integrated management of all global business activities includes sourcing, procurement, conversion, and management logistics activities also SCM can be streamline as Integration of key business processes, coordination across organisational boundaries, focus on customer value and efficient flow of products, services and information (Chopra and Meindl, 2016).

However, it can be deduced that components of SCM practices include supply and material management issues, operations, information sharing and customer service. Construction logistics is one of the critical subset of the broader field of construction supply chain management that involves the efficient planning, execution, and control of the flow of materials, equipment, and personnel to and from the construction site. Effective construction logistics can significantly impact project success by ensuring timely delivery of resources, minimizing delays, reducing costs, and enhancing overall productivity (Aghaee and Zandieh, 2019). Offsite construction logistics is part of SCM, in which various industries work collaboratively in forming a network of inter-related procedures to move material, services, funds and information in an effective way that lessens total costs, cuts total lead time, and advances total profits, keeps customer's value above all goals (Malek *et al*., 2018). Construction projects involve numerous stakeholders, each with unique roles, responsibilities, and interests. Failure to properly manage stakeholders leads to conflicts, delays, and potential project failure. Effective stakeholder management is a crucial componenet for an effective SCM practice in the construction projects (Walker *et al.*, 2008). The Construction Industry adopt and maintain strong customer relationships as a crucial element for project success. Effective customer relationship management (CRM) involves

understanding and meeting the needs and expectations of clients throughout the project lifecycle. Construction Customer relationship can be summarized into the following key aspects such as Clear and frequent communication to keep clients informed of progress, issues, and variations (Ozaki, 2003). Management of client target by setting realistic goals and timelines (Egan, 1998).

Construction projects involve complex supply chains that require effective management practices to ensure timely delivery of materials, minimize delays, and control costs. Ojo et al. (2015) opined benefits of adopting effective supply chain management (SCM) practices in the Nigerian construction industry to improve operational performance, enhanced compitive advantage and contribute positive impact in the industry**.** Therefore, in achieving effective project delivery, various SCM practices in the construction industry were identified, according to Bemardino *et al*., (2020) Strategic supplier partnership and collaboration. supply chain integration and information sharing (Akintan and Morledge, 2013; Oladinrin et al., 2020 and Olaniyi et al., 2020). Lean construction and just-in-time delivery (Vrijhoef and Koskela, 2000; Bamgbade *et al*., 2019 and Ogundipe *et al.,* 2021). Supplier prequalification and performance evaluation (Eadie *et al.,* 2013; Ogunbayo *et al*., 2018 and Ibem *et al*., 2016). Risk management and contingency planning (Lau and Kong, 2022). Sustainable and green supply chain practices (Ahn *et al*., 2019). Supply chain analytics and optimization (Papadonikolaki and Wamelink, 2017). Logistics management (Ogunde *et al.,* 2017; Oke and Ugoje, 2013). Effective supply chain management in construction requires a holistic approach that combines financial risk, ineffective collaboration and coordination, operatonal risks and inadequate risk management.

Risks Associated with Supply Chain Management (SCM) Practice on Construction Projects.

Supply chain management is one of the critical instruments that facilitates timely and efficient delivery of projects. However, SCM remains a less

unappreciated domain in construction circles to the degree that its strategic level of it effectiveness is yet to be acknowledged (Hawkins *et al.*, 2011). Implementing supply chain management (SCM) in construction projects comes with certain risks associated with its implementation. Risks associated with SCM implementation in construction industry can be managed through the use of a multifaceted approach involving strategic planning, technological investments, and robust risk management practices (Fan et al., 2008; Eybpoosh et al., 2011). Organisations need to develop strategies to mitigate operational disruptions, financial uncertainties, strategic shifts, technological vulnerabilities, environmental impacts, and the inherent complexity of modern supply chains. By addressing these risks proactively, it will enhance supply chain resilience, improve efficiency, and maintain a competitive edge in the construction market.

Operational risks in SCM pertain to disruptions in the day-to-day operations of the supply chain, these can arise from various factors including natural disasters, labor strikes, and equipment failures. SCM involves managing the flow of materials and coordinating deliveries from suppliers which counteract any disruptions in material flow, such as delays, shortages, or quality issues that can impact project schedules and increase costs (Song et al., 2020). Complexity risks arise from the intricate and interconnected nature of modern supply chains. Managing these complexities can be challenging and risky. Reliance on suppliers for timely and reliable deliveries is crucial in SCM. However, there is a risk of suppliers not meeting their obligations, resulting in project delays and disruptions (Pati et al., 2019). Complex supply chains with multiple tiers can create visibility issues and complicate management. Lack of transparency into lower tiers can lead to unforeseen problems and inefficiencies (Christopher and Peck, 2004). Financial risks, the construction industry is susceptible to price volatility of raw materials and fluctuating costs. SCM implementation involves managing price risks and mitigating the impact of cost fluctuations on project budgets (Elsawah et al., 2011). Inadequate risk management, Supply Chain Management implementation requires identifying and managing

supply chain risks effectively. Inadequate risk management processes can lead to supply chain disruptions, project delays, and increased costs (Khalfan et al., 2018). Ineffective collaboration and coordination Effective SCM relies on collaboration and coordination among project stakeholders. The lack of collaboration between owners, contractors, suppliers, and subcontractors can lead to ineffective SCM implementation and hamper project performance (Skitmore, 2011). Information technology risks are pertain to the challenges and vulnerabilities associated with the adoption and use of technology in SCM. Implementing SCM often involves adopting and integrating technology solutions (Pati et al., 2019). The increased reliance on digital systems makes supply chains vulnerable to cyberattacks (Sokolovsky, 2017). The SolarWinds cyberattack in 2020, which involved a sophisticated breach of IT management software, demonstrated the potential risks associated with technology in supply chains (Hern, 2020). Strategic risks in the Construction projects are subject to various regulations and compliance requirements (Kumaraswamy et al., 2010). Changes in regulations, such as environmental standards or trade policies, can affect supply chain operations. Construction industry must adapt to new regulations to avoid compliance issues and potential fines (KPMG, 2019). Strategic risks are related to decisions and strategies that impact the long-term success of supply chain practice. These risks include geopolitical issues, regulatory changes, and market dynamics. Environmental and social risks involve the impact of supply chain activities on the environment and society, as well as compliance with ethical standards. Companies are increasingly held accountable for their environmental footprint, and failing to meet sustainability goals can lead to reputational damage (Searcy, 2016). Limited visibility and transparency across the supply chain can hinder effective SCM implementation. Without real-time information and visibility into supplier activities, it becomes challenging to manage risks and optimize supply chain performance (Song et al., 2020). Issues related to labor practices and human rights in the supply chain leads to ethical concerns and consumer backlash. The Rana Plaza disaster 2013 as a notable example,

which exposed poor labor conditions in the construction industry (Donaghey, 2014).

Methodology

Research methodology provides a structured approach to investigating the risks associated with SCM practice in construction projects in Abuja, Nigeria. This study employed quantitative survey research design approach using, structured questionnaires to extract information on risks associated with supply chain management practice in the construction projects in Abuja Nigeria. This study target population are stakeholders in supply chain management in construction project, such as Quantity Surveyors, Architects, Engineers, Builders, Clients and Suppliers within Abuja. Data collected through self-administered questionnaire. 300 questionaires were administered, 273 were returned which represent 91% rate of returned and the all returned questionaires were analysed. The respondents were purposively selected based on their working experience and their involvement in SCM projects. Years of experience of the respondents purposively selected for questinaires administration is more than ten years. This study adopted well-structured close-ended questionnaire which was divided into two parts. Part A Covers general information relating to the characteristics of respondents, and part B covers information on risks associated with supply chain management practice in the construction projects. Data collected through administered questionaires was analysed using descriptive statistic such as Relative Importance Index (RII). This study RII was determined using equation such as: $\Sigma W / (N * A)$ where W is the weightage given to each factor by respondents which range from 1 to 5 using Likert's scale, N is the total number of respondents and A is the highest weight (5) which was aided by statistical software package SPSS 16. The variables were ranked using decision rule ranging from point 0.00-0.20 least severe, 0.21-0.40 less severe, 0.41-0.60 severe, 0.61-0.80 very severe and 0.81-1.00 extremely severe.

Data Analysis and Discussion of Results

Background to the study

The composition of the respondents were Quantity Surveyors 17.9%, Engineers 16.8%, Suppliers 16.8%, Architects 16.5%, Clients 16.5, and Builders with lowest percentage of 15.4%. The respondents professional status reveal that 11% of the respondent were Members Nigerian Institute of Quantity Surveyors (MNIQS), 6.9% of the respondents were Fellow Nigerian Institute of Quantity Surveyors (FNIQS), 16.8% of the respondents were Members Nigerian Society Engineers (MNSE), 16.5% of the respondents were Members Nigerian Institute of Architects (MNIA), 15.4% of the respondents were Members Nigerian Institute of Building (MNIOB) and 33.3% of the respondents were others. The respondents' highest academic qualification revealed that 37% of respondents has Bachelor Degree, 29.3% of respondents has Higher National Diploma (HND), 17.6% of respondents has Master Degree, 11% of respondents has National Diploma (ND) while 5.1% of the respondents has Doctor of Philosophy (PhD).

Risks Associated with Supply Chain Management

This study identified eight (8) risks associated with supply chain management practice as shown in Table 4.1. The study revealed extremely severe risk associated with SCM practice as financial risks ranked 1st with RII value of 0.82 followed by ineffective collaboration and coordination ranked 2nd with RII values of 0.82. The study further revealed the very severe risk associated with SCM practice as operational risks ranked 3rd with RII value of 0.67, inadequate risk management ranked 4th with RII value of 0.65, environmental and social risks, and strategic risks ranked 5th with RII value of 0.64, information technology risk ranked 6th with RII values of 0.63. More also the study revealed severe risk associated with SCM practice as supply chain complexity risks ranked 7th with RII value of 0.57. On the other hand, risks associated to supply chain management practice are very severe and was ranked on the average with the RII value of 0.68. This study reveals that risks associated with supply chain management in Nigeria's

construction industry are very severe, with factors such as financial risks, ineffective collaboration and coordination, operational risks, inadequate risk management and environmental and social risks, among others. To mitigate these risks, there is need to implement comprehensive risk assessment tools and formal risk management processes to systematically enhance supply chain visibility and transparency to enable organization diversify their supplier base to reduce dependency on single sources, thereby minimizing the impact of supplier-related risks on overall supply chain performance.

Table 4.1: Risk Associated with Supply Chain Management Practice

Code	Risk Associated with SCM Practice	RII	Rank	Decision
R5	Financial Risks	0.82	1st	Extremely Severe
R1	Ineffective Collaboration and Coordination	0.82	2nd	Extremely Severe
R6	Operational Risks	0.67	3rd	Very Severe
R2	Inadequate Risk Management	0.65	4th	Very Severe
R4	Environmental and Social Risks	0.64	5th	Very Severe
R8	Strategic Risks	0.64	5th	Very Severe
R7	Information Technology Risks	0.63	6th	Very Severe
R3	Supply Chain Complexity Risks	0.57	7th	Severe
Average RII		**0.68**		**Very Severe**

Source: Researcher's Field Survey (2024)

Conclusion

This study identified; eight (8) risks associated with supply chain management in Nigeria's construction industry are very severe, with factors such as financial risks, ineffective collaboration and coordination, operational risks, inadequate risk management and environmental and social risks, among others. To mitigate these risks, there is need to implement comprehensive risk assessment tools and formal risk management processes to systematically enhance supply chain visibility and transparency to enable organization diversify their supplier base to

reduce dependency on single sources, thereby minimizing the impact of supplier-related risks on overall supply chain performance.

Recommendations

In view of the findings and conclusions of this study, the following recommendations were made:

i. To achieve effective project delivery, it requires knowledge on effective internal and external factor of economic to effectively manage the adoption of SCM practice in construction industry in Abuja, Nigeria.

ii. All-inclusive knowledge on managerial skills to improve collaboration and coordination across the supply chain management practices to further aid the effectiveness of SCM practices on the construction projects.

iii. To overcome risks associated with SCM practice, this study recommends the need for comprehensive risk assessment tools to mitigate financial risks, ineffective collaboration and coordination and operational risks to enhance supply chain management practice, thereby minimizing the impact of risks on overall supply chain performance.

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