The Impact of Supply Chain Strategies on the Performance of Construction Companies: Moderating Effect of Institutional Support

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ABSTRACT

The construction sector has emerged as a leading contributor to a nation's economic advancement, and the efficacy of its supply chain (SC) strategies significantly influences its performance. This facet warrants the attention of both upcoming researchers and policy makers. Therefore, this current paper investigates how SC strategies, including lean practices, agile practices, and hybrid approaches, affect the performance of construction firms in Iraq. Additionally, the study explores how institutional support moderates the relationship between these SC strategies and construction firm performance in the Iraqi context. Survey questionnaires were employed to collect primary data from the chosen participants in the research. The utilization of SPSS-AMOS was also employed to assess the dependability of the data and the connections between variables. The results highlighted a favorable correlation between lean, agile, and hybrid supply chain practices and the performance of construction firms within Iraq. Additionally, the findings revealed a noteworthy moderating influence of institutional support on the relationship between lean, agile, hybrid supply chain practices, and the performance of construction firms in the Iraqi context. These findings offer valuable insights for regulators as they formulate regulations aimed at enhancing the performance of the construction industry through the implementation of effective supply chain strategies.

KEYWORDS: Lean supply chain practices, agile supply chain practices, hybrid supply chain practices, institutional support, construction firm performance

INTRODUCTION

In the contemporary landscape characterized by interconnectivity, ingenuity, and rivalry, the construction sector stands as a dynamic force, occupying a pivotal position in fostering community welfare and exerting a substantial impact on the economy. This industry is responsible for the creation of diverse types of infrastructure and real estate that envelop our surroundings, encompassing residential, commercial, transportation, and material-based infrastructure. Additionally, it extends to the construction of sustainable and socially significant institutional frameworks, as well as residential edifices (Del Giudice et al., 2021). Similar to enterprises operating in finance, manufacturing, technology, and service sectors, construction companies also require enhanced business efficiency and heightened performance to ensure their survival, gain competitive traction, and establish a strong foothold. Only those firms that attain a superior market position and consistently uphold it can prosper and maintain their reputation within the business landscape. Consequently, it has become imperative for companies to acquire insights into achieving elevated performance objectives. The overarching term "firm performance" encompasses a range of performance dimensions, including organizational, managerial, social, environmental, production, and financial aspects. Within the construction industry, achieving elevated performance levels entails maintaining operational consistency, enhancing business processes, embracing innovation, streamlining time utilization, curtailing costs, and mitigating the environmental impact of operational processes etc (Boamah et al., 2022).

Lean supply chain (SC) entails a set of managerial practices aimed at diminishing wastage while augmenting efficiency and productivity. Within the framework of lean SC, waste encompasses elements that fail to contribute value to the customer, encompassing aspects such as overproduction, idle waiting periods, defects, and redundant processes. The adoption of lean SC not only results in reduced inventory expenses but also leads to expedited delivery schedules, heightened quality standards, increased adaptability, and enhanced customer satisfaction. Consequently, companies stand to attain elevated performance levels through the implementation of these practices (Yu, Huo, & Zhang, 2021). Agile supply chain practices constitute a system characterized by responsiveness, adaptability, and cost-effectiveness. Relying on real-time data, synchronized processes, and market acumen, these practices facilitate the adjustment of strategies to accommodate evolving customer preferences and emerging opportunities. As a result, there is a notable enhancement in the operational and marketing performance of companies (Geyi et al., 2020). In the realm of sustainable supply chain (SC), interconnected businesses endeavor to account for the ecological and societal consequences throughout the entire production cycle, spanning procurement, storage, manufacturing, delivery, and transportation. The primary objective is to mitigate potential environmental harm arising from factors such as energy consumption, water utilization, and waste emissions, thereby fostering a positive impact on environmental well-being and the advancement of local communities associated with business activities. When companies integrate sustainability into their offerings and operations, they experience heightened market performance (Sahu et al., 2023).

The objective of this study is to investigate the effects of supply chain strategies, including lean, agile, and sustainable practices, on the performance of construction firms operating in Iraq. In the year 2022, the construction industry in Iraq boasted a market size of $11.5 billion. Projections indicate a definite compound annual growth rate (CAGR) of approximately 5% from 2024 to 2028. In conjunction with the favorable influence of increasing oil prices, the resumption of work

on various previously halted infrastructure projects is poised to contribute significantly to the prosperous growth of Iraq's construction sector (Al-Hashimy, Said, & Ismail, 2022). The commencement of new government initiatives in energy, oil and gas, as well as transportation development projects, will serve as a significant impetus for expansion. The pivotal segments within the construction sector encompass Commercial Construction, Industrial Construction, Infrastructure Construction, Energy and Utilities Construction, Institutional Construction, and Residential Construction. Among these sectors, the residential construction market took precedence in 2022. In the realm of commercial construction, investments are channeled into hotels, retail establishments, offices, sports facilities, and logistics. Industrial construction is witnessing growth owing to investments in industrial zones and free trade areas. Meanwhile, the advancement of institutional construction is attributed to projects in the realms of education and healthcare (Faeq, Garanti, & Sadq, 2021).

The construction sector holds a prominent position within Iraq, playing a crucial role in establishing the foundational structures for various other industries and communal frameworks. It has notably contributed to the nation's progress and the expansion of its GDP. However, the forthcoming trajectory of the construction industry demands enhanced focus, as noted by Zamim (2021). The current research endeavors to provide insights into enhancing and maintaining the performance of construction firms, thereby introducing a fresh perspective to the existing body of knowledge. Unlike prior literature that predominantly concentrated on supply chain management encompassing lean, agile, and sustainable practices, primarily exploring their influence on firm performance, this study stands apart by taking a novel approach. Limited discourse exists regarding the distinct impacts of lean, agile, and sustainable supply chain practices on firm performance. The present article takes a unique approach by individually and comprehensively investigating the influence of lean, agile, and sustainable supply chain practices on firm performance, thereby making a valuable contribution to the existing body of literature. Furthermore, previous studies have primarily focused on exploring the direct correlations between institutional support, lean, agile, sustainable supply chain practices, and firm performance. However, only a handful of studies have delved into the role of institutional support as a moderator within the context of the relationships between lean, agile, and sustainable supply chain practices and the performance of construction firms. The current research holds a distinct significance by addressing the notable role of institutional support as a moderator within the interplay of lean, agile, and sustainable supply chain practices and their impact on the performance of construction firms. Moreover, the study contributes to the existing body of knowledge by examining the influence of supply chain strategies on the performance of construction firms within the Iraqi context.

The subsequent section involves a thorough literature review, aimed at formulating hypotheses. The third segment offers a concise overview of the research methodology and the extraction of results. In the ensuing discussion section, the results are elucidated and substantiated through reference to prior literature. The research culminates with a conclusion that encompasses implications and limitations

LITERATURE REVIEW

The construction sector holds paramount importance in driving both economic expansion and overall national development. Its growth is instrumental in establishing crucial infrastructural assets for a country while also shaping various community structures. Enhancing the performance

of construction firms can be achieved through their integration into a supply chain (SC) framework and their engagement with practices rooted in lean, agile, and sustainable supply chain principles.

A wealth of pertinent literature delves into the role played by lean, agile, and sustainable supply chain practices in influencing the performance of construction firms. In the subsequent sections, the relationship between these supply chain practices and the performance of construction firms is meticulously explored, drawing insights from the wealth of previous research.

Within the framework of lean supply chain management, companies undergo effective management and regulation aimed at streamlining their operations by eliminating unnecessary interconnections, trimming superfluous project tasks, rectifying substandard materials, and ensuring a reduction in waste emissions. Consequently, the overall productivity of construction firms experiences an enhancement, (Istimaroh et al., 2022). Srinivasan, Srivastava, and Iyer (2020) conducted an exploration into the correlation between lean supply chain practices and firm performance. The study sourced data through on-site surveys conducted among 152 chosen companies spanning diverse sectors within the United States, including entities operating at the international level. The identities of the firms were sourced from Lexis-Nexis Academic 19 Hoover's manufacturing database. The hypotheses were subjected to examination through the application of partial least squares structural equation modeling (PLS-SEM). The study proposes that the implementation of lean supply chain practices leads to a reduction in firms' focus on allocating resources and processes that carry little significance or contribute minimal value to production operations. Consequently, attention naturally shifts towards critical aspects, culminating in the mitigation of waste, time inefficiencies, and an enhancement of overall business efficiency. This parallel applies to the construction sector as well, where companies that adopt lean supply chain practices demonstrate elevated performance levels In the study conducted by Novais, Maqueira Marín, and Moyano-Fuentes (2020), the correlation between lean supply chain practices, cloud-supported logistics, and firm performance is examined. The research utilized a survey methodology, where a random sample of 1,717 Spanish firms was selected, and data was collected through telephone surveys. The hypotheses were subjected to verification using SEM testing. The research suggests that when firms are interconnected within a supply chain and implement lean practices in their operational framework, they are able to effectively address environmental concerns stemming from redundant and unmonitored activities. This, in turn, contributes to the enhancement of both business operations and social performance. Therefore, we can say:

H1: *Lean SC practices have a positive linkage with construction firm performance.*

In their research, Waqas et al. (2022) delve into the intricate interplay between lean, green, and agile supply chain practices, green innovation, competitive advantages, and the sustainability of firm performance. To gather data about these variables, information was collected from employees within the manufacturing sector in China who were engaged in service provision. The conceptual model proposed by the researchers was rigorously examined and validated using structural equation modeling techniques. The findings of the study suggest that when firms are aligned with a supply chain and adopt agile supply chain practices, the resultant time and cost savings afford them the ability to drive green innovation and respond effectively to the evolving demands for eco-friendly solutions. Thus, companies can establish enduring performance sustainability. Rahimi et al. (2020) investigate the correlation between agile supply chain practices and firm performance. Expert questionnaires

were employed to gather data concerning agile supply chain practices and firm performance, sourced from the defense industry segment engaged in the production of military products in Iran. Employing Structural Equation Modeling (SEM), the proposed relationship was empirically tested. The study asserts that by incorporating agile practices into their business policies, firms spanning various sectors and interconnected through a supply chain can instigate value-adding changes and ensure prompt customer responsiveness. Consequently, the firm experiences an elevated level of market performance. Shastri, Hoda, and Amor (2021) investigate the correlation between agile supply chain practices and firm performance. The study posits that when companies adopt a strategic approach to implement agile supply chain practices, they effectively reclaim time that was formerly expended on non-value-added activities. This reclaimed time can then be judiciously utilized, potentially resulting in competitive advantages that contribute to heightened firm performance.

H2: *Agile SC practices have a positive linkage with construction firm performance.*

Effective management of sustainable supply chains involves overseeing a network of interconnected firms, spanning both upstream and downstream segments. This oversight entails ensuring that these firms' operations have minimal impact on the environment and the well-being of stakeholders. The design of practices within sustainable supply chain management is geared towards attaining predefined sustainability objectives (Shin, Park, & Park, 2019). Construction companies operating in environments characterized by inherent risks and requiring health safeguards can derive advantages from the adoption of sustainable supply chain management. The implementation of sustainable supply chain practices, such as the sourcing of environmentally friendly materials, adoption of energy-efficient technologies, waste reduction, and ecologically conscious production methods, culminates in an augmentation of the marketing performance of these firms (Shahzad et al., 2020). Mani, Jabbour, and Mani (2020) explore the correlation between sustainable supply chain practices and firm performance. Employing a blended research methodology, the authors engaged a sample of 327 small and medium enterprises within an Asian country. The study employed semi-structured interviews with supply chain managers and practitioners, while also incorporating structured questionnaires to amass quantitative data. The proposed research model underwent scrutiny through covariance-based structural equation modeling (CBSEM). The study asserts that sustainable practices within supply chain management effectively counteract challenges stemming from erroneous choices or excessive energy resource utilization. Moreover, such practices result in the mitigation of environmental pollution emissions, ultimately contributing to the sustainable performance enhancement of firms.

H3: *Sustainable SC practices have a positive linkage with construction firm performance.*

Various organizations, whether engaged in construction endeavors or offering products/services, depend on the performance of their workforce—the individuals entrusted with translating business strategies into tangible outcomes. When companies cultivate a constructive rapport with their employees, they have the potential to foster goodwill and garner support from their staff (Khalil, Khalil, & Khan, 2019). Employees harbor sentiments toward their respective companies, channeling their utmost capabilities into fulfilling their responsibilities and effectively implementing lean supply chain practices. Employee efficacy, productive involvement, and proficient execution of lean supply chain practices confer a competitive edge upon construction firms and other businesses, thereby leading to elevated performance levels vis-à-

vis their competitors. Consequently, institutional support serves as the foundation that strengthens and enhances the relationship between lean supply chain practices and the performance of construction firms (Iyer, Srivastava, & Srinivasan, 2019). Garcia-Buendia et al. (2021) investigate the interplay among institutional support performance, lean supply chain practices, and the performance of construction firms. The research encompassed the time span from 1996 to 2018. Employing bibliometric analysis, the study scrutinized various aspects, including published documents, journal impact factors, citations, h-index, geographic distribution of publications, influential papers, and notable authors. The research contends that the presence of institutional support cultivates a sense of dedication among employees towards the organization, fostering their unwavering commitment to realizing the institution's business objectives. These employees exhibit a heightened efficiency in the execution of lean supply chain practices, leading to favorable outcomes in terms of enhanced firm performance. Consequently, the presence of institutional support serves to enhance the impact of lean supply chain practices on the overall performance of construction firms. In a similar vein, Meng (2019) delves into the relationship connecting institutional support, lean supply chain practices, and the performance of construction firms. The study asserts that when employees are treated with supportive behaviors within the organizational context, they are motivated to wholeheartedly engage in lean supply chain practices, thereby elevating the overall performance of construction firms within the industry. That is why,

H4: *Institutional support performs a moderating role between lean SC practices and construction firm performance.*

The manner in which employees are treated by management or higher-ranking personnel directly impacts their work efficiency. When an institution demonstrates supportive behavior and extends economic or social assistance through its representatives, it not only provides a protective shield for employees' emotions but also shapes their mindset and refines their skill sets (Raji et al., 2021). In such a context, when management exhibits dedication and has proficient employees, the execution of agile supply chain practices, which predominantly involve activities related to product readiness and marketing, is carried out effectively. This streamlined process results in significant time savings and optimal utilization of time, consequently elevating overall productivity. As a result, companies can achieve heightened performance levels, positioning themselves competitively in the market. This underscores that institutional support plays a pivotal role in enhancing the influence of agile supply chain practices on the performance of construction firms (Oliveira-Dias, Moyano-Fuentes, & Maqueira-Marín, 2022). In a separate investigation conducted by Digalwar et al. (2020), the interconnection between institutional support performance, agile supply chain practices, and firm performance was explored. The research contends that institutional support serves to fortify the connections between agile supply chain practices and the overall performance of construction firms. Mathiyazhagan et al. (2021) additionally emphasize that an institution's approach towards its employees significantly influences their performance and the attainment of business objectives. When employees operate within a supportive environment, they are relieved of many concerns and can wholeheartedly concentrate on their responsibilities. In such a conducive environment, the implementation of agile supply chain practices by management becomes smoother. Within a construction firm that fosters a supportive culture and actively employs agile supply chain practices, the benefits extend beyond time savings; effective resource allocation and financial efficiency come into play, leading to optimal outcomes. Thus, it can be said that:

H5: *Institutional support performs a moderating role between agile SC practices and construction firm performance.*

The level of institutional support directed towards employees' emotions, focus, and conduct within the organization dictates their overall efficiency. With a foundation of institutional support, employees exhibit reduced absenteeism rates, heightened engagement, and a greater propensity to successfully complete assigned tasks. Under such circumstances, employees gain a deeper comprehension of the necessity for sustainable supply chain practices, encompassing areas such as water management, waste reduction, and energy efficiency, and earnestly strive to execute these practices with efficacy (Namagembe, Ryan, & Sridharan, 2019). According to Govindan et al. (2020), the adoption of sustainable supply chain practices, designed to mitigate the environmental and societal ramifications of business operations, results in firms meeting customers' ecological demands, subsequently leading to enhanced market performance. Hence, institutional support enhances the connection between sustainable supply chain practices and the performance of construction firms. Abdallah and Al-Ghwayeen (2020) examine the interplay among institutional support, sustainable supply chain practices, and the performance of construction firms. The research sourced data from 215 manufacturing firms spanning diverse sectors within Jordan. The validity and reliability of the collected data were assessed through SPSS and Amos, while relationships were elucidated using the Structural Equation Modeling (SEM) technique. The study suggests that institutional support not only facilitates the endeavor to implement sustainable supply chain practices but also paves the way for achieving the objective of elevated performance levels within the construction industry. So,

H6: *Institutional support performs a moderating role between sustainable SC practices and construction firm performance.*

METHODOLOGY

The study delves into the influence of lean supply chain (SC) practices, agile SC practices, and hybrid SC practices on the performance of construction firms. Additionally, it explores the moderating influence of institutional support within the context of lean SC practices, agile SC practices, hybrid SC practices, and the performance of construction firms in Iraq. Data collection was carried out using survey questionnaires, targeting chosen participants as the primary data source. The constructs chosen for the study are evaluated using questions sourced from previous scholarly works. For instance, lean supply chain practices are assessed using a set of four questions derived from Kumar Singh and Modgil's research (2023). Similarly, agile supply chain practices are appraised using six items taken from Waqas et al.'s study (2022). Hybrid supply chain practices are gauged with five questions modified from Digalwar et al.'s work (2020). Institutional support is evaluated using a set of four items drawn from Li, Bonn, and Ye's research (2019). Finally, the performance of construction firms is measured using four items extracted from Zheng, Deng, Song, Ye, and Luo's study (2022).

The participants for this study were picked from the supply chain department of the construction industry's workforce. The surveys were sent to the designated personnel through in-person visits. The method employed for personnel selection was simple random sampling. The researchers distributed a total of 546 surveys, of which 293 were successfully collected, indicating a response

rate of roughly 53.66 percent. Furthermore, the study employed the SPSS-AMOS software to assess the reliability of the data and examine the relationships between variables. The AMOS software is often regarded as the most effective tool for analyzing primary data (Hair et al., 2017). It is particularly well-suited for handling complicated frameworks and big data sets, resulting in superior output. The research employed three distinct constructs, namely lean supply chain practices (LSCP), agile supply chain practises (ASCP), and hybrid supply chain practises (HSCP). In addition, the research study incorporated a single dependent variable, specifically construction firm performance (CFP), alongside a moderating variable referred to as institutional support (INS). These variables are mentioned in Figure 1.

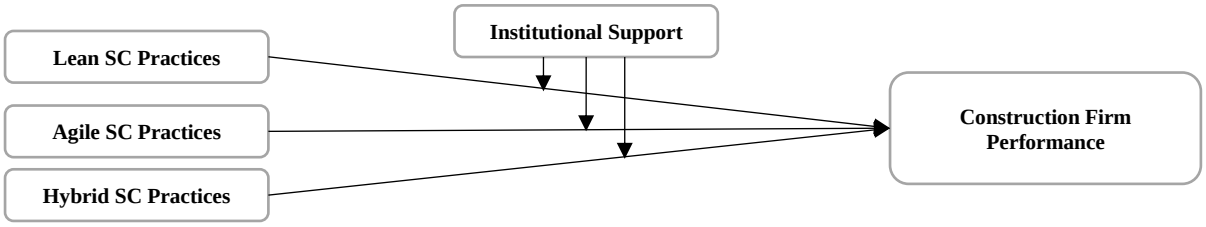

Figure 1: Research Model.

FINDINGS OF THE STUDY

The study findings demonstrated convergent validity, which was assessed using composite reliability (CR) with values exceeding 0.70. Furthermore, the examination also involves the utilization of average variance extracted (AVE), whereby the observed values surpass the threshold of 0.50. Furthermore, the examination is conducted by assessing factor loadings, with values exceeding 0.40. These data demonstrated a strong link between the items. These values are given in Table 1.

Table 1: Convergent Validity.

Constructs	Items			Loadings	CR	AVE	MSV	ASV
Lean SC Practices	LSCP1	<---	LSCP	0.800	0.885	0.657	0.315	0.282
	LSCP2	<---	LSCP	0.806				
	LSCP3	<---	LSCP	0.825				
	LSCP4	<---	LSCP	0.812				
Agile SC Practices	ASCP1	<---	ASCP	0.987	0.868	0.546	0.383	0.274
	ASCP2	<---	ASCP	0.845				
	ASCP3	<---	ASCP	0.509				
	ASCP4	<---	ASCP	0.418				
	ASCP5	<---	ASCP	0.566				
	ASCP6	<---	ASCP	0.912				
Hybrid SC Practices	HSCP1	<---	HSCP	0.942	0.925	0.715	0.526	0.291
	HSCP2	<---	HSCP	0.903				
	HSCP3	<---	HSCP	0.797				
	HSCP4	<---	HSCP	0.667				
	HSCP5	<---	HSCP	0.890				
Construction Firm Performance	CFP1	<---	CFP	0.399	0.787	0.517	0.314	0.248
	CFP2	<---	CFP	0.411				
	CFP3	<---	CFP	0.946				
	CFP4	<---	CFP	0.923				
Institutional Support	INS1	<---	INS	0.780	0.899	0.690	0.526	0.375
	INS2	<---	INS	0.889				
	INS3	<---	INS	0.850				
	INS4	<---	INS	0.799				

The study findings confirm the presence of discriminant validity, which was assessed using the Fornell-Larcker criterion. The observed correlations between the constructs themselves were found to be higher than the correlations between the constructs and other variables. The observed values exhibited a weak association among the variables. These values are given in Table 2.

Table 2: Discriminant Validity.

	CFP	LSCP	ASCP	HSCP	INS
CFP	0.646				
LSCP	0.560	0.811			
ASCP	0.517	0.471	0.739		
HSCP	0.366	0.528	0.474	0.846	
INS	0.526	0.561	0.619	0.725	0.831

The study also assessed the model's high level of fitness, which was evaluated through the use of the square error of approximation (RMSEA). The obtained values were found to be below the threshold of 0.05. Furthermore, the examination also involves the utilization of the comparative fit index (CFI), where values exceeding 0.90 are considered. Additionally, the Tucker-Lewis index (TLI) is employed, with values greater than 0.90 being evaluated. The values exposed by the model demonstrate a strong alignment. These values are given in Table 3.

Table 3: Model Good Fitness.

Selected Indices	Result	Acceptable level of fit
TLI	0.911	TLI > 0.90
CFI	0.912	CFI > 0.90
RMSEA	0.003	RMSEA < 0.05 good; 0.05 to 0.10 acceptable

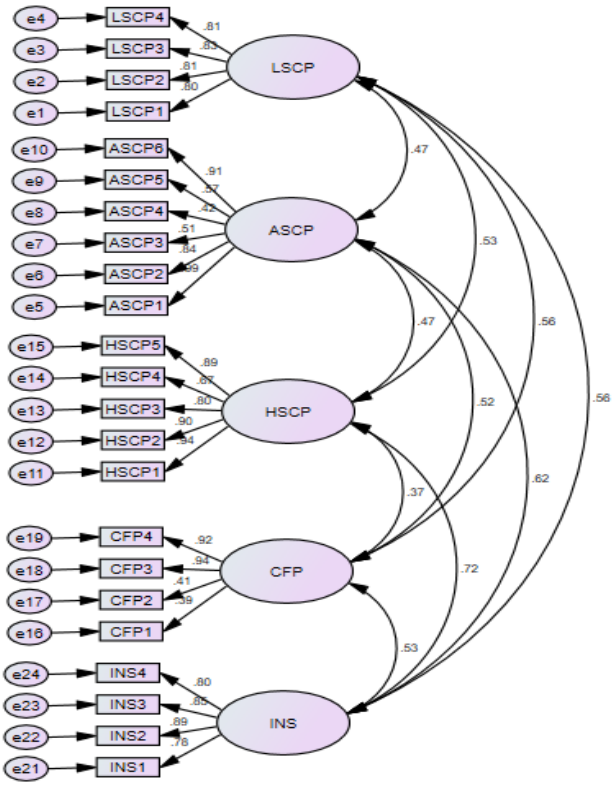

Figure 2: Measurement Model Assessment.

The outcomes of the study demonstrate that there is a favourable correlation between the implementation of lean supply chain practises, agile supply chain practices, and hybrid supply chain practices, and the performance of construction firms in Iraq. This supports the acceptance of hypotheses H1, H2, and H3. Furthermore, the results also revealed that institutional support has a substantial moderating role in the relationship between lean supply chain practices, agile supply chain practices, hybrid supply chain practises, and construction business performance in Iraq. This finding supports hypotheses H4, H5, and H6. These associations are given in Table 4.

Table 4: Path Analysis.

Relationships			Beta	S.E.	C.R.	P
Construction Firm Performance	<---	Lean SC Practices	0.411	0.031	13.197	0.000
Construction Firm Performance	<---	Agile SC Practices	0.634	0.031	20.357	0.000
Construction Firm Performance	<---	Hybrid SC Practices	0.461	0.032	14.257	0.000
Construction Firm Performance	<---	ASCP x INS	0.103	0.005	21.188	0.000
Construction Firm Performance	<---	Institutional Support	0.460	0.032	14.246	0.000
Construction Firm Performance	<---	HSCP x INS	0.109	0.005	23.645	0.000
Construction Firm Performance	<---	LSCP x INS	0.056	0.005	11.660	0.000

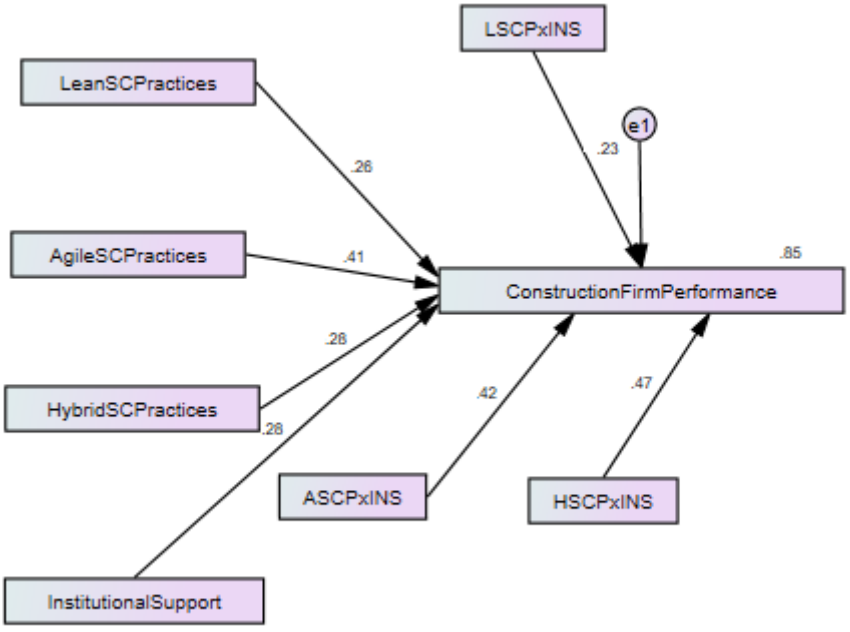

Figure 3: Structural Model Assessment.

DISCUSSIONS

The findings of the study suggest that there is a favorable association between the implementation of lean supply chain practices and the performance of construction firms. These results align with the research conducted by Fadaki, Rahman, and Chan (2020), which asserts that within a lean supply chain context, organizations undertake an evaluation of various techniques, processes, strategic measures, resources, and employee performance. Based on this evaluation, decisions are made regarding the elimination of those elements that are deemed ineffective and have no significant impact on productivity. Due to the implementation of cost-

cutting measures, construction businesses are able to achieve a majority of their project objectives while minimizing expenses. The performance of the firm exhibits improvement. The results that are presented in this study are substantiated by the research conducted by Zimmermann, Ferreira, and Moreira (2020). Their study focuses on investigating the impact of lean supply chain practices on the performance of construction firms. The study suggests that in lean supply chains designed for the construction or manufacturing industry, enterprises and resources are interconnected in a manner that minimizes resource waste and facilitates material exchange. However, the enhancement of processes leads to increased efficiency, resulting in improved outputs while utilizing fewer resources. Therefore, the aforementioned study validates the significance of implementing lean supply chain practices in construction companies, as it positively impacts their overall performance.

The outcomes of the study suggest that there is a favorable correlation between the implementation of agile supply chain practices and the performance of construction firms. The findings presented in this study are consistent with the assertions made by Raut et al. (2021). The authors argue that in the context of agile supply chain strategy, organizations are effectively managed and their operational practices are streamlined by eliminating time gaps in various areas such as procurement, business operations, and marketing. This approach aims to enhance the overall efficiency and effectiveness of business operations. This approach decreases the amount of time needed, minimizes opportunity costs, addresses deficiencies, and enhances market performance. The findings presented in this study are corroborated by the research conducted by Lee et al. (2022). Their study investigates the influence of agile supply chain practices on the performance of construction firms. In construction enterprises that engage in time contracts, there is a preference for implementing agile supply chain practices such as prompt decision-making, efficient procurement processes that prioritize speed and quality, empowering employees, facilitating effective communication, and fostering employee focus. These practices effectively mitigate time wastage by optimizing resource utilization and ensuring timely fulfillment of customers' time-related demands. This enhances the market reputation and performance of construction firms as well as firms operating in other industries.

The findings of the study suggest that there is a favorable correlation between the implementation of sustainable supply chain practices and the performance of construction firms. The findings align with the research conducted by Wang, Zhang, and Zhang (2020), which emphasizes that in the context of sustainable supply chain management, organizations are obligated to adhere to a set of guidelines aimed at promoting the well-being of end customers or customer enterprises engaged in any financial transactions. These organizations exercise oversight over their respective departments through the implementation of measures that promote responsibility and accountability. By adopting this approach, individuals or organizations may not prioritize the preservation of others' interests. However, they may gain certain competitive benefits, such as enhancing the value of their production and cultivating a positive perception of their firm among stakeholders. Therefore, it is possible that companies operating in other sectors, such as the construction business, may exhibit superior performance. The findings presented in this study align with the research conducted by Younis and Sundarakani (2020), which also highlights the positive impact of sustainable supply chain practices on business performance. This study elucidates the interconnectedness of business enterprises engaged in sustainable supply chains, examining the impact of resource flows and operational activities such as construction practices, manufacturing,

service provision, and trade on both societal welfare and the surrounding environment. All items with detrimental consequences are removed. By implementing this approach, individuals and organizations can also safeguard their interests through the enhancement of resource efficiency and allocation. Therefore, it is possible that they could exhibit enhanced levels of performance.

The outcomes of the study suggest that there is a moderating effect of institutional support on the relationship between lean supply chain practices and the performance of construction firms. The findings align with the research conducted by Jahanbakhsh Javid and Amini (2023), suggesting that when commercial firms offer support to their employees engaged in various activities, it fosters motivation and enhances the effective implementation of lean supply chain practices. The implementation of lean practices in construction enterprises has been observed to result in enhanced performance. The presence of institutional backing enhances the correlation between lean supply chain practices and the success of construction firms. The findings presented in Zaridis, Vlachos, and Bourlakis' (2021) study provide support for the notion that when firms offer support to their employees, the implementation of lean supply chain practices can be successful, leading to enhanced performance in construction firms.

The results of the study suggest that there is a moderating effect of institutional support on the relationship between agile supply chain practices and the performance of construction firms. This finding is consistent with the research conducted by Yadav and Kumar (2023), indicating that institutional support plays a crucial role in facilitating the implementation of agile supply chain practices and enhancing the performance of construction firms. Therefore, it can be inferred that when there is sufficient institutional support, the adoption of agile supply chain practices can have a more significant positive impact on the performance of construction firms. The findings of Lotfi (2019), suggest that when lean supply chain management is adopted by multiple firms operating within the same industry, these firms are compelled to include lean strategies into their operational processes. When a firm's internal management demonstrates support towards its employees, the implementation of agile supply chain practices can be carried out efficiently, leading to potentially greater performance for construction enterprises.

Results suggest that there is a moderating effect of institutional support on the relationship between sustainable supply chain practices and the performance of construction firms. These findings align with the research conducted by Gupta et al. (2020), which posits that when supply chain firms exhibit supportive behavior towards their employees, the employees develop a sense of attachment to the firms and engage in cooperative efforts to actualize the firms' objectives. Therefore, the successful implementation of sustainable supply chain practices can be achieved. The successful implementation of sustainable supply chain practices contributes to improved operational performance for construction companies. The results that were presented in this study are corroborated by the research conducted by Abdel-Basset et al. (2020). Their study suggests that in a sustainable supply chain (SC) context, organizations that foster a supportive climate for their employees through effective management practices experience enhanced levels of work engagement. Consequently, this increased work engagement leads to improved cooperation among employees, ultimately resulting in the successful implementation of sustainable SC practices and positively impacting the performance of construction firms.

IMPLICATIONS

The study provides academic guidance to researchers due to its significant contribution to the existing body of economic literature. This study attempts to examine the effects of supply chain (SC) strategies, namely lean SC practises, agile SC practises, and sustainable SC practices, on the performance of construction firms. In addition, the study explores the potential moderating role of institutional support in relation to these parameters. Additionally, this research offers recommendations to construction companies in South Carolina regarding strategies for enhancing business performance. It is imperative for construction enterprises to engage in collaborative efforts in order to effectively apply lean supply chain practises, hence enhancing their overall performance. The report additionally proposes that the use of agile supply chain practices is vital for construction enterprises to achieve a competitive advantage in terms of construction performance. Additionally, it is suggested that enterprises' management should implement sustainable supply chain practices in order to demonstrate enhanced performance within the construction industry. The study suggests that organizations engaged in construction activities should exhibit supportive behavior toward their staff and customers. This approach would enable them to implement lean supply chain practices, leading to enhanced construction performance. This suggestion suggests that construction institutions should demonstrate support towards their staff and clients in order to implement agile supply chain practices and enhance construction performance. The report provides guidance to regulatory bodies in formulating regulations aimed at enhancing the performance of the construction industry through the use of effective supply chain strategies. Additionally, the study suggests that institutions should embrace a supporting approach in implementing lean supply chain practices, which has the potential to enhance construction performance.

CONCLUSION

The objective of this study was to analyse the effects of lean supply chain practises, agile supply chain practises, and sustainable supply chain practices on the performance of construction firms. The study also sought to investigate the impact of institutional support on the relationship between lean supply chain practises, agile supply chain practises, sustainable supply chain practises, and construction business performance. The statistics were collected from construction enterprises operating in Iraq. The findings indicated a significant correlation between the implementation of lean supply chain practises, agile supply chain practises, sustainable supply chain practises, and the overall performance of construction firms. The results indicate that companies adopt lean supply chain practices and other operational techniques in order to minimize material and resource waste and mitigate the release of hazardous waste substances. In the present scenario, there is a decrease in expense and an enhancement in corporate efficiency. The performance of building firms shows a greater level. The findings also revealed that the construction firms involved in agile supply chain design are aiming to reduce superfluous practices and enhance the efficiency of business operations. By using such strategies, organizations are able to enhance the efficiency and overall effectiveness of their business processes, resulting in improved performance outcomes. The results also indicate that construction companies who have established sustainable supply chain organisations demonstrate a heightened level of concern for the welfare of their surrounding communities and the preservation of environmental quality. The individual's apprehension contributes to their ability to achieve optimal performance within the market. The findings of the study also indicated that there is a noteworthy influence of

institutional support on the relationship between lean supply chain practises, agile supply chain practises, sustainable supply chain practises, and the performance of construction firms. The findings of the study indicate that the presence of institutional support for employees and other stakeholders facilitates the implementation of lean supply chain practises, agile supply chain practises, and sustainable supply chain practises, hence leading to improved performance of construction firms.

LIMITATIONS

The current study exhibits many constraints, hence necessitating future efforts to address and mitigate these shortcomings. The authors have conducted an analysis focused solely on the influence of supply chain (SC) strategies on the performance of construction firms. Specifically, the study examines the effects of lean SC practices, agile SC practices, and sustainable SC practices as representative SC strategies. Various aspects, such as the adoption of innovation, energy efficiency, and corporate social responsibility, significantly influence the performance of construction firms. However, it is widely accepted in academic circles that there is a consensus regarding the relationship between these elements and the performance of construction firms. It is anticipated that the next authors will engage in discourse regarding these relationships. Furthermore, the authors expressed their apprehension regarding the performance of construction firms within the Iraqi economy and only gathered data from the construction business in Iraq. In order to conduct a comprehensive analysis, future researchers should adopt a holistic approach and gather data pertaining to the Iraqi building business.

REFERENCES

Abdallah, A. B., & Al-Ghwayeen, W. S. (2020). Green supply chain management and business performance. *Business Process Management Journal, 26*(2), 489-512. https://doi.org/10.1108/BPMJ-03-2018-0091

Abdel-Basset, M., Mohamed, R., Sallam, K., & Elhoseny, M. (2020). A novel decision-making model for sustainable supply chain finance under uncertainty environment. *Journal of Cleaner Production, 269*, 122324. https://doi.org/10.1016/j.jclepro.2020.122324

Al-Hashimy, H. N. H., Said, I., & Ismail, R. (2022). Evaluating the Impact of Computerized Accounting Information System on the Economic Performance of Construction Companies in Iraq. *Informatica*, *46*(7), 13-24. https://doi.org/10.31449/inf.v46i7.3920

Boamah, F. A., Zhang, J., Shehzad, M. U., Sherani, & Wen, D. (2022). Exploring the impact of social capitals and knowledge creation on construction firms performance in the COVID-19 era. *Journal of Engineering, Design and Technology*. https://doi.org/10.1108/JEDT-10-2021-0569

Del Giudice, M., Chierici, R., Mazzucchelli, A., & Fiano, F. (2021). Supply chain management in the era of circular economy: the moderating effect of big data. *The International Journal of Logistics Management, 32*(2), 337-356. https://doi.org/10.1108/IJLM-03-2020-0119

Digalwar, A., Raut, R. D., Yadav, V. S., Narkhede, B., Gardas, B. B., & Gotmare, A. (2020). Evaluation of critical constructs for measurement of sustainable supply chain practices in lean-agile firms of Indian origin: A hybrid ISM-ANP approach. *Business Strategy and the Environment, 29*(3), 1575-1596. https://doi.org/10.1002/bse.2455

Fadaki, M., Rahman, S., & Chan, C. (2020). Leagile supply chain: design drivers and business performance implications. *International Journal of Production Research, 58*(18), 5601-5623. https://doi.org/10.1080/00207543.2019.1693660

Faeq, D. K., Garanti, Z., & Sadq, Z. M. (2021). The Effect of Total Quality Management on Organizational Performance: Empirical Evidence from the Construction Sector in Sulaymaniyah City, Kurdistan Region–Iraq. *UKH Journal of Social Sciences, 5*(1), 29-41. https://doi.org/10.25079/ukhjss.v5n1y2021.pp29-41

Garcia-Buendia, N., Moyano-Fuentes, J., Maqueira-Marín, J. M., & Cobo, M. J. (2021). 22 Years of Lean Supply Chain Management: a science mapping-based bibliometric analysis. *International Journal of Production Research, 59*(6), 1901-1921. https://doi.org/10.1080/00207543.2020.1794076

Geyi, D. A. G., Yusuf, Y., Menhat, M. S., Abubakar, T., & Ogbuke, N. J. (2020). Agile capabilities as necessary conditions for maximising sustainable supply chain performance: An empirical investigation. *International Journal of Production Economics, 222*, 107501. https://doi.org/10.1016/j.ijpe.2019.09.022

Govindan, K., Rajeev, A., Padhi, S. S., & Pati, R. K. (2020). Supply chain sustainability and performance of firms: A meta-analysis of the literature. *Transportation Research Part E: Logistics and Transportation Review, 137*, 101923. https://doi.org/10.1016/j.tre.2020.101923

Gupta, S., Drave, V. A., Dwivedi, Y. K., Baabdullah, A. M., & Ismagilova, E. (2020). Achieving superior organizational performance via big data predictive analytics: A dynamic capability view. *Industrial Marketing Management, 90*, 581-592. https://doi.org/10.1016/j.indmarman.2019.11.009

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., & Thiele, K. O. (2017). Mirror, mirror on the wall: a comparative evaluation of composite-based structural equation modeling methods. *Journal of the Academy of Marketing Science, 45*(5), 616-632. https://doi.org/10.1007/s11747-017-0517-x

Istimaroh, I., Abu Seman, N. A., Setiaji, B., & Mhd Nor, N. (2022). The Key Practices of Lean Supply Chain Management Towards Sustainable Performance: A Review. In M. F. M. Din, N. E. Alias, N. Hussein, & N. S. Zaidi (Eds.), *Sustainability Management Strategies and Impact in Developing Countries* (Vol. 26, pp. 61-74). Emerald Publishing Limited. https://doi.org/10.1108/S2040-726220220000026006

Iyer, K. N. S., Srivastava, P., & Srinivasan, M. (2019). Performance implications of lean in supply chains: Exploring the role of learning orientation and relational resources. *International Journal of Production Economics, 216*, 94-104. https://doi.org/10.1016/j.ijpe.2019.04.012

Jahanbakhsh Javid, N., & Amini, M. (2023). Evaluating the effect of supply chain management practice on implementation of halal agroindustry and competitive advantage for small and medium enterprises. *International Journal of Computer Science and Information Technology, 15*(6), 8997-9008. https://ssrn.com/abstract=4348136

Khalil, M., Khalil, R., & Khan, S. (2019). A study on the effect of supply chain management practices on organizational performance with the mediating role of innovation in SMEs. *Uncertain Supply Chain Management, 7*(2), 179-190. http://dx.doi.org/10.5267/j.uscm.2018.10.007

Kumar Singh, R., & Modgil, S. (2023). Assessment of Lean Supply Chain Practices in Indian Automotive Industry. *Global Business Review, 24*(1), 68-105. https://doi.org/10.1177/0972150919890234

Lee, K., Azmi, N., Hanaysha, J., Alzoubi, H., & Alshurideh, M. (2022). The effect of digital supply chain on organizational performance: An empirical study in Malaysia manufacturing industry. *Uncertain Supply Chain Management, 10*(2), 495-510. http://dx.doi.org/10.5267/j.uscm.2021.12.002

Li, J., Bonn, M. A., & Ye, B. H. (2019). Hotel employee's artificial intelligence and robotics awareness and its impact on turnover intention: The moderating roles of perceived organizational support and competitive psychological climate. *Tourism Management, 73*, 172-181. https://doi.org/10.1016/j.tourman.2019.02.006

Lotfi, M. (2019). Which practices are lean, agile and resilient? Literature review and practitioners' perspective. *International Journal of Advanced Operations Management, 11*(1-2), 142-170. https://doi.org/10.1504/IJAOM.2019.098522

Mani, V., Jabbour, C. J. C., & Mani, K. T. N. (2020). Supply chain social sustainability in small and medium manufacturing enterprises and firms' performance: Empirical evidence from an emerging Asian economy. *International Journal of Production Economics, 227*, 107656. https://doi.org/10.1016/j.ijpe.2020.107656

Mathiyazhagan, K., Agarwal, V., Appolloni, A., Saikouk, T., & Gnanavelbabu, A. (2021). Integrating lean and agile practices for achieving global sustainability goals in Indian manufacturing industries. *Technological Forecasting and Social Change, 171*, 120982. https://doi.org/10.1016/j.techfore.2021.120982

Meng, X. (2019). Lean management in the context of construction supply chains. *International Journal of Production Research, 57*(11), 3784-3798. https://doi.org/10.1080/00207543.2019.1566659

Namagembe, S., Ryan, S., & Sridharan, R. (2019). Green supply chain practice adoption and firm performance: manufacturing SMEs in Uganda. *Management of Environmental Quality: An International Journal, 30*(1), 5-35. https://doi.org/10.1108/MEQ-10-2017-0119

Novais, L., Maqueira Marín, J. M., & Moyano-Fuentes, J. (2020). Lean Production implementation, Cloud-Supported Logistics and Supply Chain Integration: interrelationships and effects on business performance. *The International Journal of Logistics Management, 31*(3), 629-663. https://doi.org/10.1108/IJLM-02-2019-0052

Oliveira-Dias, D., Moyano-Fuentes, J., & Maqueira-Marín, J. M. (2022). Understanding the relationships between information technology and lean and agile supply chain strategies: a systematic literature review. *Annals of Operations Research, 312*(2), 973-1005. https://doi.org/10.1007/s10479-022-04520-x

Rahimi, A., Raad, A., Alem Tabriz, A., & Motameni, A. (2020). Providing an interpretive structural model of agile supply chain practices. *Journal of Modelling in Management, 15*(2), 661-684. https://doi.org/10.1108/JM2-09-2018-0142

Raji, I. O., Shevtshenko, E., Rossi, T., & Strozzi, F. (2021). Industry 4.0 technologies as enablers of lean and agile supply chain strategies: an exploratory investigation. *The International Journal of Logistics Management, 32*(4), 1150-1189. https://doi.org/10.1108/IJLM-04-2020-0157

Raut, R. D., Mangla, S. K., Narwane, V. S., Dora, M., & Liu, M. (2021). Big Data Analytics as a mediator in Lean, Agile, Resilient, and Green (LARG) practices effects on sustainable supply chains. *Transportation Research Part E: Logistics and Transportation Review, 145*, 102170. https://doi.org/10.1016/j.tre.2020.102170

Sahu, A. K., Sharma, M., Raut, R. D., Sahu, A. K., Sahu, N. K., Antony, J., & Tortorella, G. L. (2023). Decision-making framework for supplier selection using an integrated MCDM approach in a lean-agile-resilient-green environment: evidence from Indian automotive sector. *The TQM Journal, 35*(4), 964-1006. https://doi.org/10.1108/TQM-12-2021-0372

Shahzad, F., Du, J., Khan, I., Shahbaz, M., Murad, M., & Khan, M. A. S. (2020). Untangling the influence of organizational compatibility on green supply chain management efforts to boost organizational performance through information technology capabilities. *Journal of Cleaner Production*, *266*, 122029. https://doi.org/10.1016/j.jclepro.2020.122029

Shastri, Y., Hoda, R., & Amor, R. (2021). Spearheading agile: the role of the scrum master in agile projects. *Empirical Software Engineering*, *26*(1), 3. https://doi.org/10.1007/s10664-020-09899-4

Shin, N., Park, S. H., & Park, S. (2019). Partnership-Based Supply Chain Collaboration: Impact on Commitment, Innovation, and Firm Performance. *Sustainability*, *11*(2), 449. https://doi.org/10.3390/su11020449

Srinivasan, M., Srivastava, P., & Iyer, K. N. S. (2020). Response strategy to environment context factors using a lean and agile approach: Implications for firm performance. *European Management Journal*, *38*(6), 900-913. https://doi.org/10.1016/j.emj.2020.04.003

Wang, C., Zhang, Q., & Zhang, W. (2020). Corporate social responsibility, Green supply chain management and firm performance: The moderating role of big-data analytics capability. *Research in Transportation Business & Management*, *37*, 100557. https://doi.org/10.1016/j.rtbm.2020.100557

Waqas, M., Honggang, X., Ahmad, N., Khan, S. A. R., Ullah, Z., & Iqbal, M. (2022). Triggering sustainable firm performance, supply chain competitive advantage, and green innovation through lean, green, and agile supply chain practices. *Environmental Science and Pollution Research*, *29*(12), 17832-17853. https://doi.org/10.1007/s11356-021-16707-z

Yadav, A. K., & Kumar, D. (2023). A fuzzy decision framework of lean-agile-green (LAG) practices for sustainable vaccine supply chain. *International Journal of Productivity and Performance Management*, *72*(7), 1987-2021. https://doi.org/10.1108/IJPPM-10-2021-0590

Younis, H., & Sundarakani, B. (2020). The impact of firm size, firm age and environmental management certification on the relationship between green supply chain practices and corporate performance. *Benchmarking: An International Journal*, *27*(1), 319-346. https://doi.org/10.1108/BIJ-11-2018-0363

Yu, Y., Huo, B., & Zhang, Z. (2021). Impact of information technology on supply chain integration and company performance: evidence from cross-border e-commerce companies in China. *Journal of Enterprise Information Management*, *34*(1), 460-489. https://doi.org/10.1108/JEIM-03-2020-0101

Zamim, S. K. (2021). Identification of crucial performance measurement factors affecting construction projects in Iraq during the implementation phase. *Cogent Engineering*, *8*(1), 1882098. https://doi.org/10.1080/23311916.2021.1882098

Zaridis, A., Vlachos, I., & Bourlakis, M. (2021). SMEs strategy and scale constraints impact on agri-food supply chain collaboration and firm performance. *Production Planning & Control*, *32*(14), 1165-1178. https://doi.org/10.1080/09537287.2020.1796136

Zheng, X., Deng, J., Song, X., Ye, M., & Luo, L. (2022). Examining the nonlinear relationships of corporate social responsibility, innovation and construction firm performance: the moderating role of construction firms' competitive position. *Engineering, Construction and Architectural Management*. https://doi.org/10.1108/ECAM-03-2022-0286

Zimmermann, R., Ferreira, L. M. D. F., & Moreira, A. C. (2020). How supply chain strategies moderate the relationship between innovation capabilities and business performance. *Journal of Purchasing and Supply Management*, *26*(5), 100658. https://doi.org/10.1016/j.pursup.2020.100658