CLIENT SATISFACTION MODEL FOR LEAN IMPLEMENTED CONSTRUCTION SMES: A REVIEW

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ABSTRACT

Client satisfaction is a critical determinant of success in the construction industry, particularly for small and medium-sized enterprises (SMEs) that have implemented lean principles. Despite the recognised benefits of lean construction, many SMEs continue to struggle with achieving high levels of client satisfaction. While existing studies primarily explore the advantages and challenges of Lean implementation, there is a lack of research that specifically investigates the underlying causes of less client satisfaction in Lean implemented construction SMEs. Therefore, this study aims to bridge this gap by developing a conceptual framework for a client satisfaction model tailored to lean implemented construction SMEs. A literature review was conducted to examine the key factors affecting client satisfaction in lean implemented construction SMEs. The review analysed existing studies on lean construction, client satisfaction, and SME-specific challenges to identify critical themes. The data was synthesised to develop a framework that integrates lean principles, benefits, barriers, factors influencing client satisfaction, and reasons for failing to meet client expectations. The findings highlight that perceived quality, customer satisfaction, and customer loyalty are interrelated, with higher satisfaction leading to increased client retention and improved financial performance. Additionally, the study identifies key barriers that hinder client satisfaction in lean implemented SMEs, including ineffective communication, resistance to change, and inadequate understanding of lean principles. This study contributes to both theory and practice by offering a structured framework to enhance client satisfaction in lean implemented SMEs. It provides SMEs with strategic insights to improve lean adoption while recommending future research directions to empirically validate the proposed framework through case studies and stakeholder engagement.

Keywords: *Client Satisfaction; Construction; Lean; SMEs.*

1. INTRODUCTION

Construction SMEs play a vital role in the economy by creating jobs, contributing to economic growth and stability, and remaining one step below large construction companies (Ranadewa et al., 2018; Palacios-Manzano et al., 2024). Globally, SMEs are contributing significantly to innovation, economic growth, poverty reduction and supporting job opportunities and large-scale enterprises (Ismail et al., 2023). Often

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construction SMEs are responsible for residential, commercial and infrastructure developments due to the rising demand (Motsetse, 2015). As demand for affordable housing increases, while raw materials become scarcer, medium construction firms need to adopt creative circular economy practices (Zuofa et al., 2023). These practices will help them build sustainably and grow their businesses, providing a strong reason to embrace circular economy principles in their construction processes (John et al., 2023).

Even though SMEs were able to gain more benefits than micro-sized firms due to the availability of required basic capacities, most SMEs are still unfamiliar with the lean concept (Ranadewa et al., 2015). According to Balkhy et al. (2021), the performance and productivity of a company can be achieved through a lean implementation to SMEs in the construction sector. Lean offers several intrinsic direct advantages that improve an organization's capacity to compete successfully by increasing operational effectiveness and efficiency. Worldwide construction industries have adopted lean construction and have reaped its benefits (Dehdasht et al., 2020).

According to Demirkesen and Bayhan, (2022), the most important benefit from LC (lean construction) will be client satisfaction when implementing lean construction under customer focus. Lean principles in the construction industry can minimize and eliminate non-value adding activities, increasing value for the client (Maradzano et al., 2019). Even though many construction companies across the globe have embraced lean principles, the achievement of client satisfaction for many of the construction firms is still a dream (Bayhan et al., 2019). Therefore, construction industry needs to understand the essential factors for enhancing lean implementation that would eventually improve client satisfaction. However, due to the fact that lean principles have not been implemented to the fullest, some of the SMEs have failed to achieve their objectives (Yusup et al., 2015) and could not achieve the expected client satisfaction level.

Most studies have been done to address the barriers to lean implementation and have developed models for those causes. Durdyev et al. (2018) have developed a client satisfaction model: a PLS-SEM approach to investigate the service quality on construction client satisfaction. In the local context, De Silva et al. (2023) have done a fuzzy TOPSIS analysis for implementing Lean Six Sigma in SMEs in the construction industry.

Despite that, there is lack of studies that specifically address the causes for lack of client satisfaction in lean implemented construction SMEs, as the problem remains the same. Therefore, this research aims to develop a framework for a client satisfaction model in lean implemented construction SMEs. The structure of the paper is as follows: It begins with an outline of the methodological approach. This is followed by the presentation of research findings, derived from an extensive literature review. Finally, the paper concludes with a summary and suggestions for future research.

2.   METHODOLOGY

The method adopted is a literature review of the LC at SMEs in the construction industry. The literature review is a comprehensive and reproducible method for identifying, evaluating, and synthesising the existing body of recorded knowledge produced by researchers, scholars, and practitioners (Chen, 2017; Pollock & Berge, 2018). Literature reviews are essential in generating evidence from existing studies and for their ability to

create new knowledge by compiling the existing works, which is essential for directing new research (Cobo et al., 2011).

The review covers the literature published in the last 15 years between 2010 and 2025 (March), a period in which both the lean and SMEs research domains have visibly matured and attracted significant attention from researchers and practitioners. Figure 1 describes the research process of this study.
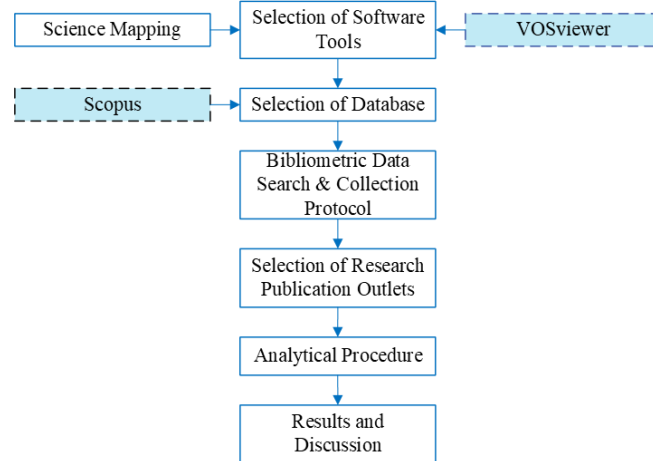

Figure 1: Research Methodology

In the first step of the literature review, the following main keywords were searched in the titles, abstracts and (or) keywords of publications in three search rounds: {("Lean" OR "Lean construction" OR "Lean principles" OR "Lean management" OR "Lean implementation" OR "Lean tools") AND ("small and medium-sized enterprises" OR "SMEs" OR "Construction SMEs") AND ("construction industry" OR "construction sector" OR "building industry" OR "construction projects" OR "construction" OR "building sector")}. Articles were identified after the exclusion of non-peer reviewed publications, articles out of the construction research domain, and articles that do not actually discuss or do not mainly focus on Lean and construction at SMEs in the construction industry even though they contain those keywords in their titles, abstracts, and (or) keywords.

3. FINDINGS

3.1 LEAN IMPLEMENTED CONSTRUCTION SMES

Lean construction is an approach to managing the performance of construction activities where maximum value is achieved with reduced wastage and lean construction draws principles of Lean manufacturing, which originated from the Toyota Production System (Salem et al., 2006). Lean practices are used as an approach to develop and continuously improve production efficiency and to enhance the effectiveness of a business by reducing wasteful practices and improving efficiency (Majava & Ojanperä, 2017). Furthermore, lean practices enable firms to satisfy customer expectations while reducing cost and wastage at the same time (Bhamu & Sangwan, 2014). Lean Construction (LC) has been widely used in several industries, including building, road infrastructure, sanitation, mining, industrial facilities, and energy and oil projects (Erazo-Rondinel & Huaman-Orosco, 2021).

In many countries, the construction industry will be categorized into a few numbers of large companies and a very large number of SMEs (Tezel et al., 2020). Globally, SMEs represent 90% of businesses and contribute to economic growth, job creation and support for larger companies in the construction industry (Ranadewa et al., 2015; Tezel et al., 2020). The definition of SMEs varies across countries due to factors like the economic conditions of the country, population, and government policies. According to Tezel et al. (2020), an organization which has fewer than 50 employees is a small company, and one that has between 50 and 249 employees it is considered a medium-sized company. SMEs are considered the backbone of many economies, as they are instrumental in promoting economic growth, reducing poverty, and fostering sustainable development (Erhan & Gaugas, 2022). SMEs in the construction industry face a variety of challenges, including limited access to financial resources, technological barriers, and the ability to adapt to rapidly changing market conditions. Implementing lean construction principles has emerged as a potential solution to mitigate these issues by minimizing various forms of waste (Islam et al., 2019).

LC at SMEs has also attracted little attention from researchers, evidenced by the limited number of publications that directly reference the use of LC within SMEs (Tezel at al., 2020). The application of lean principles in construction SMEs involves tailoring lean tools to the specific characteristics of these enterprises, considering factors such as size, financial capabilities, organizational culture, and human resource capacity (Ayarkwa & Agyekum, 2017).

3.2 BENEFITS OF LEAN IMPLEMENTED CONSTRUCTION SMEs

Lean Construction methods can improve performance in the construction sector by addressing project-related issues and focusing on stakeholders and management to add value (Nwaki & Eze, 2020). Many countries see Lean Construction as an appropriate method that can save resources, decrease costs, speed up activities, and improve control (Ivina & Olsson, 2020). Lean construction methods, techniques, tools, and concepts could face value challenges in construction and offer a solution for the efficiency-based problem in the construction industry (Shaqour, 2022). Many project-related items could be enhanced after implementing Lean Construction tools, such as time saving, material waste reduction, labor waste reduction, and space-cost saving (Reinbold et al., 2018). Many studies have discussed the benefits of lean construction, and Table 1 will summarize them.

Table 1: Benefits of Lean Construction in SMEs

Benefits Group	Benefit	Reference
Environmental benefits	Safety control improvements	[1]
	Time, cost, and material waste reduction	[2], [3]
	Material waste reduction	[3], [4]
	Improve the quality of the environment	[5]
	Preventing pollution and emissions	[6]
	Material storage control (access and inventor)	[1]
	Reduction of energy consumption	[5]
	Water conservation	[4]
	Enhancing work environment	[7]

Benefits Group	Benefit	Reference
Economic benefits	Time reduction	[1], [8]
	Cost reduction	[1], [3], [8]
	Improve quality	[4], [8]
	Increase productivity	[1]
	Rework minimization	[7]
	Improve prediction of risks	[7], [9]
	Improving safety	[7]
	Improved planning	[9]
	Improve process control	[9]
	Labor cost reduction	[9]
	Value achievement	[9]
	improving life-cycle cost	[9]
	Reduction of rework	[9]
Social benefits	Customer satisfaction	[1]
	Employee satisfaction	[1]
	Minimization of conflicts	[1], [3]
	Improve communication between project stakeholders	[3]
	Enhancing transparency	[4]
	Improving decision making	[3]
	Continues improvements	[3]
	Enhancing teamwork	[3]
	Valuing relationships	[9]

[1] - (Sarhan et al., 2017), [2] - (Ghosh & Bhattacharjee, 2014), [3] - (Silvius et al., 2017), [4] - (Ogunbiyi et al., 2014), [5] - (Saieg et al., 2018), [6] - (Salem et al., 2014), [7] - (Maradzano et al., 2019), [8] - (Ansah & Sorooshian, 2017), [9] - (Ivina & Olsson, 2020)

Table 1 highlights the key benefits of Lean implementation in construction, categorized into environmental, economic, and social benefits. Environmentally, Lean techniques contribute to waste reduction, pollution prevention, energy conservation, and improved safety and material management. Economically, they enhance efficiency by reducing time, costs, rework, and labour expenses while improving productivity, quality, and risk management. Socially, Lean fosters better communication, transparency, teamwork, and overall stakeholder satisfaction, minimizing conflicts and enhancing decision-making. Collectively, these benefits emphasize Lean's role in promoting sustainability, efficiency, and collaboration within the construction industry.

3.3 CHALLENGES OF LEAN IMPLEMENTED CONSTRUCTION SMES

The adoption of Lean principles within SMEs in the construction sector is fraught with numerous challenges, many of which stem from resource constraints, organisational limitations, and a lack of strategic integration. One significant challenge is the lack of time to implement Lean in ongoing projects, as SMEs often operate under tight schedules and financial constraints that prioritise immediate project deliverables over process improvements (Salvatierra et al., 2015). Further, client satisfaction in construction SMEs is a crucial issue in lean implemented construction SMEs. The real need of the clients is not being fulfilled as the lean implementation is not customized to the specific needs of the clients (Sergeeva, 2022). Another critical challenge is the inability to measure

performance and team progress, which hampers the ability of SMEs to assess the effectiveness of Lean implementation (Koohestani et al., 2020). Performance metrics are essential for continuous improvement, yet many SMEs lack the necessary tools and frameworks to systematically evaluate their Lean initiatives (Aslam et al., 2020). The absence of clear performance indicators not only diminishes accountability but also makes it difficult to justify further investments in Lean practices. This issue is closely linked to the low ability of personnel to recognise waste, as employees may lack the training to identify inefficiencies within workflows (Cerveró-Romero et al., 2013; Bashir et al., 2015). Without this fundamental awareness, Lean strategies risk becoming ineffective, as inefficiencies remain embedded within existing processes. Furthermore, low levels of Lean knowledge among university graduates present a systemic challenge. Many construction professionals enter the workforce with limited exposure to Lean principles, resulting in a workforce that is ill-equipped to drive Lean implementation (Murguia, 2019; Thomas et al., 2015). This knowledge gap necessitates extensive in-house training, which SMEs may struggle to provide due to resource constraints.

Compounding these difficulties is the tendency of some SMEs to replicate another organisation's Lean strategy without tailoring it to their specific needs. While benchmarking against successful Lean adopters can provide insights, blindly imitating methodologies without considering organisational context can lead to inefficiencies and misalignment with business objectives (Almanei et al., 2017; Kawish, 2017). Similarly, the lack of leadership and empowerment of personnel presents a substantial barrier, as effective Lean implementation requires strong managerial support and a participatory work culture (Huaman-Orosco & Erazo-Rondinel, 2021). In SMEs, where leadership structures are often less formalised, decision-making tends to be concentrated at the top, limiting employees' ability to contribute to Lean initiatives. This hierarchical approach can stifle innovation and reduce engagement with Lean principles at the operational level.

Moreover, Lean adoption in SMEs is often hindered by local rather than global flow optimisation, where firms focus on improving isolated processes rather than considering the broader supply chain and project-wide coordination (Bashir et al., 2015; Wandahl, 2014). This narrow focus prevents Lean from delivering its full benefits, as bottlenecks persist in areas that are not addressed holistically. Additionally, the lack of collaboration among project stakeholders exacerbates inefficiencies, as fragmented communication and misaligned objectives hinder the seamless integration of Lean processes (Gomez et al., 2018). Without early-stage collaboration involving all stakeholders including suppliers, subcontractors, and designers' lean efforts may be undermined by conflicting priorities and inadequate information sharing.

3.4 FACTORS AFFECTING CLIENT SATISFACTION IN LEAN IMPLEMENTED CONSTRUCTION SMEs

Even though there are so many studies that have proved the benefits of lean implementation to the construction SMEs due to poor service design and an over focus on efficiency, lean implementation can fail (Radnor & Osborne, 2013). The adoption of lean manufacturing techniques has garnered substantial interest in recent years, especially within the construction sector, as a strategy to improve efficiency and minimize waste (Demirkesen & Bayhan, 2022). Nevertheless, the success rate of lean implementation has been quite unsatisfactory, with studies indicating that up to 90% of lean initiatives fail to be sustained beyond the first three years of their introduction (Xing et al., 2021).

One of the primary problems that has not been addressed is client satisfaction in construction SMEs. The real needs of the clients are not being fulfilled, as the lean implementation is not customized to the specific needs of the clients (Sergeeva, 2022). The construction industry is inherently complex and dynamic, with projects often facing a myriad of uncertainties, complex supply chains, and varying site conditions (Bayhan et al., 2019). This complexity and varying conditions can pose significant challenges to the effective implementation of lean principles, which are often more easily applied in a manufacturing setting. Furthermore, the lack of knowledge and expertise in lean methodologies among construction professionals exacerbates the challenge, further impeding successful implementation (Bayhan et al., 2019).

To overcome these obstacles, construction companies need to take a more comprehensive approach to lean implementation, focusing not just on process-level adjustments but also on cultivating a culture that encourages continuous improvement and the elimination of waste.

3.5 CLIENT SATISFACTION MODELS

The client is the owner of a construction project or the buyer/seller of goods or services (Challender & Whitaker, 2019). Client satisfaction refers to meeting or exceeding their expectations with services or products (Riak & Bill, 2022). Accordingly, client satisfaction is based on recognizing and addressing their requirements (Durdyev et al., 2018; Rahman & Alzubi, 2015). Customer satisfaction is often associated with performance in the construction sector and companies with high client satisfaction ratings get a competitive advantage (Alshihre et al., 2020). Moreover, failure to communicate effectively and meet deadlines may result in dissatisfaction on both sides of a construction contract (Obonadhuze et al., 2021). Client satisfaction is an emotional response when realizations exceed expectations (Sulistyawati & Listiyanti, 2024). Client satisfaction models have evolved significantly over the years, reflecting a diverse range of approaches and methodologies tailored to various sectors and contexts. These models are crucial for understanding the factors that contribute to client satisfaction and for improving service delivery across industries.

One foundational model is the Kano model, introduced by Noriaki Kano, further enriches the discourse on client satisfaction by categorizing customer needs into five distinct types: basic, performance, excitement, indifferent, and reverse qualities. This classification helps organizations prioritize features and services that enhance customer satisfaction (Wang et al., 2019; Rahaju & Dewi, 2014). The applicability of the Kano model extends beyond product development to service industries, where understanding the nuances of customer expectations can lead to improved satisfaction outcomes.

Moreover, the SERVQUAL framework, which assesses service quality through dimensions such as reliability, assurance, tangibles, empathy, and responsiveness, has been widely utilized to evaluate client satisfaction in various sectors, including healthcare and retail (Luruli et al., 2016) This framework allows organizations to identify gaps between customer expectations and actual service delivery, thereby facilitating targeted improvements.

American Customer Satisfaction Index (ACSI) serves as a benchmark for measuring customer satisfaction across various sectors. It emphasizes the relationship between perceived quality, customer satisfaction, and customer loyalty, suggesting that higher

satisfaction leads to increased loyalty and, consequently, better financial performance for firms (Liu et al., 2020; Wang et al., 2021). The ACSI methodology captures the nuances of customer expectations, perceived quality, and perceived value, all of which contribute to the overall satisfaction score. The resulting data enables businesses to identify areas for improvement, refine their strategies, and benchmark their performance against competitors, enhancing their competitiveness and fostering sustainable growth (Wang et al., 2021; Sha et al., 2022). This insight is invaluable for prioritizing investments in product development, service enhancements, and customer relationship management (Liu et al., 2020). Figure 2 illustrates the ACSI model.
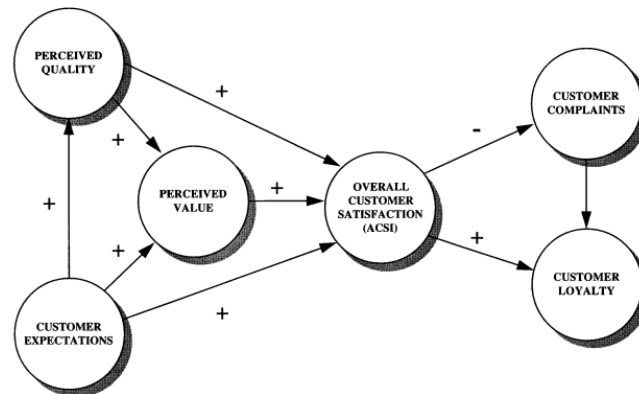

Figure 2: ACSI model (Source: Fornell et al., 1996)

Furthermore, the ACSI model's proven track record in various sectors underscores its robustness and reliability as a tool for measuring customer satisfaction (Sha et al., 2022). Therefore, by integrating the ACSI framework in lean implemented construction SMEs can gain actionable insights into client satisfaction, enabling them to refine their processes, enhance service quality, and achieve a competitive edge in the market.

3.6 CONCEPTUAL FRAMEWORK

The literature review revealed a clear need to establish a client satisfaction model specifically for construction SMEs that have adopted lean principles. Accordingly, the conceptual framework presented in Figure 3 was developed based on the insights gained from the literature review.

This framework offers a structured approach to identifying and understanding the factors that influence client satisfaction in construction SMEs that have implemented lean principles. It outlines key elements, including lean principles, the benefits of lean implementation in SMEs, barriers to adoption, factors affecting client satisfaction, and reasons for failing to achieve client satisfaction. Furthermore, the framework proposes a model for identifying these influencing factors and enhancing client satisfaction in construction projects.

Figure 3: Framework for client satisfaction model in lean implemented construction SMEs

ACSI model is selected over other client satisfaction models due to its comprehensive, adaptable, and empirically validated structure, which makes it particularly suitable for application in lean implemented construction SMEs. Unlike generic satisfaction models, the ACSI model provides a robust, cause and effect framework that links client expectations, perceived quality, and value to satisfaction, and subsequently to client loyalty and complaint behaviour. This alignment is especially beneficial for construction SMEs adopting lean principles, as it enables the evaluation of how lean strategies directly influence client satisfaction outcomes. The model's flexibility allows for the integration of lean-specific factors such as process efficiency, waste minimisation, and continuous improvement. Through this framework, construction SMEs can not only assess the current level of client satisfaction but also identify specific lean-related practices that

enhance value delivery, thereby fostering long-term relationships and competitive advantage in the industry.

4.   CONCLUSIONS

Despite the increasing adoption of lean principles in construction SMEs, there remains a significant gap in research addressing the causes of low client satisfaction in these organisations. This study aimed to bridge this gap by developing a framework for a client satisfaction model tailored to lean implemented construction SMEs. Through a literature review, key factors influencing client satisfaction were identified, along with the benefits, barriers, and challenges associated with lean implementation in SMEs. The study proposes the adoption of the ACSI as the basis for the client satisfaction model, emphasising the relationship between perceived quality, customer satisfaction, and customer loyalty. The model suggests that higher client satisfaction leads to increased loyalty, which in turn enhances financial performance, making it a valuable approach for improving business sustainability in lean implemented construction SMEs.

This study contributes to both academic knowledge and industry practice by offering a conceptual framework that can serve as a foundation for improving client satisfaction in lean implemented construction SMEs. From a theoretical perspective, it enriches the existing literature by identifying critical factors affecting client satisfaction within the lean construction context. In practice, the proposed framework, grounded in the ACSI model, provides SMEs with strategic insights to enhance their lean implementation processes and client engagement strategies. Future research should focus on empirically validating the framework through case studies and stakeholder interviews to refine its applicability and effectiveness in real-world construction projects.

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